



INVISIBLE ARCHITECTURE

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la collection

ATTILA BATAR

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**Diplomats' residence,
Budapest, Castle District,
built 1971-1981**

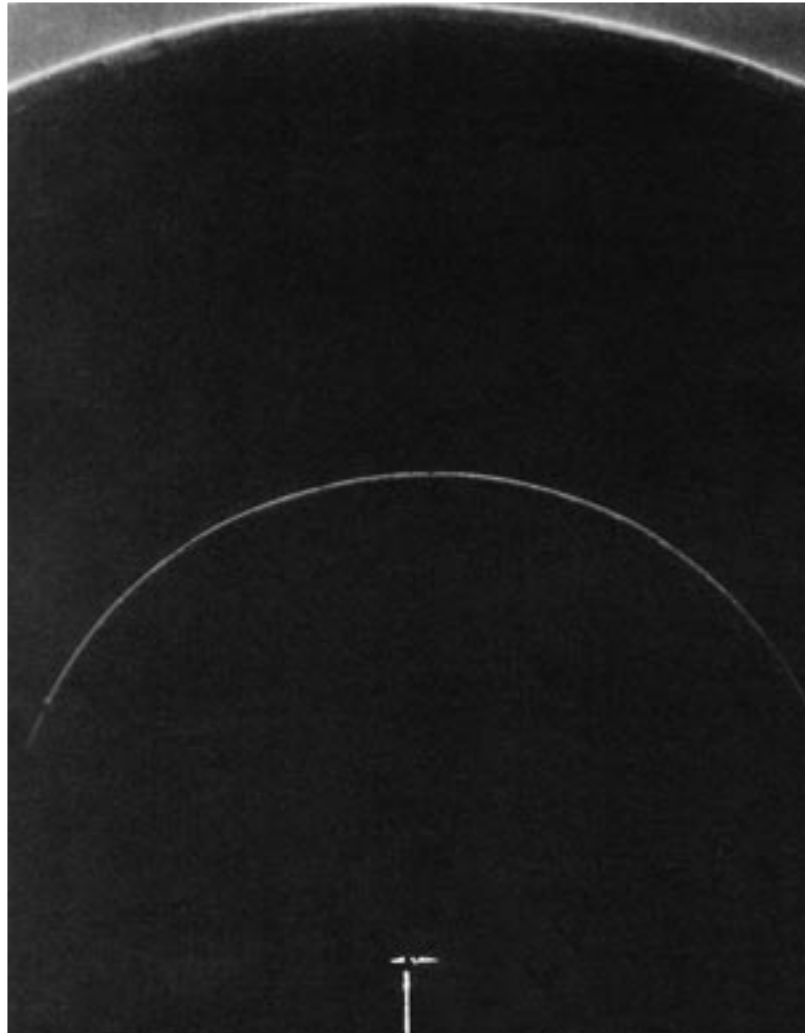
The photograph below recalls architect György Jánossy's short-lived building, which was recently destroyed in the Buda Castle District. It was not a victim of war. The building was demolished despite the protest of architects, because it did not meet the old-fashioned views of the authorities in power. Its demolition is unforgivable. Even in its death the building shows how it adjusted the future to the past, and how simultaneously it represented its own era and the Castle's tradition of a thousand years. This structure joins the destroyed architectural edifices which continue to live in works of graphic art or photographs. Having been made invisible, they still belong to the historical image of the Castle.

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FOREWORD



Escorial – descending to the crypt, Madrid, Spain

Each space – the physical environment surrounding us – has its own aura. Whether it is an urban street or a room in a building, a space combines architectural and natural features that radiate a particular atmosphere or mood. We, too, are influenced by this atmosphere, even though we are often unaware of the factors giving rise to it. Architectural space imposes its character and ambience upon us in a variety of ways. Moreover, the atmosphere of each space is unique in its own manner. Some spaces stimulate us, while others depress us. Still others apparently have no effect upon us at all. In many cases we are unable to put our reaction into words; and yet the effect is definitely there.

We tend to think of the visual effect as the most important impression telling us about our environment and the buildings around us. But an analysis of our observations reveals that this is not exactly the case. Instead, it is a combination of stimuli that forms the overall impression. One or more of these stimuli may be stronger than the others: for instance, our awareness of a sound or an image may be greater than our awareness of impressions caused by other stimuli, such as smell. Still, it will always be true that each of our senses plays a part in the process of perception. Looking back on past experiences, I realize that my visual impressions have not always been the decisive ones; indeed, sometimes a visual effect has been absent or quickly forgotten. This does not mean that the visual element played no part in creating the impression, but it does show that the notion was not important enough to survive as a memory. In my view, wind, smells, vapor, sounds and so on shape our experiences to a substantial degree. And they do so, even in the absence of visual recollections.

Owing to its distinctive features, sometimes the architectural space we inhabit shapes our impressions without us being aware of it. The smell of a building, the circulation of air, the smoothness of the floor, the unevenness of a street, the acoustics of a room – each one influences us to a greater or lesser degree. Each aspect contributes to our overall perception of a building or space. Sometimes such factors complement each other. When looking at a fountain, for example, we perceive not only the visual spectacle, but also the gushing water, the associated movement of the air, and the sound of splashing and gurgling water. On the other hand, sometimes our impressions are contradictory, as in the case of the *trompe l'oeil* – when we touch a window painted onto a wall and realize that it does not really exist, that there is no window.

So our reactions are not simply or exclusively based on our visual perceptions. The sound of our footsteps or the smell of cool, damp or stale air will influence us just as much as the size of the room or the color or ornamentation of its walls. Moreover, quite naturally, our particular resonance will depend not just upon our surroundings, but also upon the personality, culture and mood of whoever plays host to us. But what constitutes the surroundings? To what extent are they architectural and to what extent are they unrelated? To what degree can a distinction be made between the factors comprising architecture in the strict sense and other conditions that are not apparently linked with architecture? When selecting a restaurant, we often decide by simply taking a look through the windows rather than by actually entering the establishment. Our decision will depend on whether we consider the restaurant spacious or cramped, whether the surfaces are hard or soft, whether the floors are excessively plain or highly decorative, whether sounds reverberate or are swallowed up, whether the room is well ventilated, whether we can smell fresh flowers or fatty foods, whether the place is bright or dull, and whether the tables are covered with white tablecloths or have been left bare. Each detail will contribute to our decision.

But we must decide which of these characteristic features falls within the scope of architecture. The “spacious or cramped” category is certainly one, since it is dependent on the size of the space relative to the crowd. The type of floor is similarly a decision taken by the architect. The strength, direction, pitch, clarity, and tone of the sounds depend not just on their source, but also on the architectural design. Acoustics is clearly a part of architecture, because the spatial proportions, the rigidity of structures, the use of materials, the nature of the surfaces and decorations will determine how sounds are transmitted within a given space. But does a building have its own sound? Wooden flooring can creak even when no one is walking on it, because wood is alive even when it is dead. Wind whistles up the flue, because a difference in air temperature will always result in a draft, thereby creating a noise. The breadth and length of the ventilation duct was designed by the architect, and the flue forms a part of the building. Architecture is accompanied by sounds, and our sensors will inform us about a given building.

Thus the impact – which may seem unrelated to architecture or only indirectly linked with it – applies not just to sounds but also to other phenomena, to other senses, and to other human resonances. By means of a complex network involving the sense organs and nervous system, all of them influence our perception of architecture.

Thus there are influences stemming directly from architecture, such as – in addition to the visual spectacle – the sound of a building, which is created by the building itself. There are also indirect influences: accessory factors associated in some manner with a building that are not actually caused by architecture, but which would never arise if the building was not there – such as smells that have been absorbed into the walls of a building. Finally, there are also effects that are not caused by or indirectly linked with architecture, such as fog, but which nevertheless contribute to the overall architectural impression.

The stimuli we perceive by means of the various sense organs – touch, kinetic, smell, and taste (which are related) – enrich our knowledge of architecture. Our perceptions of architectural spaces always arise as complex impressions formed by the senses. The various influences differ only in terms of their relative importance. Some factors may have merely a temporary effect, which then passes away. Freshly cut flowers wilt and their scent disappears, although walls and surfaces will retain the fragrance for a while. Other factors have lasting effects, such as the smell of materials used in construction pending ventilation, or floor materials affecting the way we walk.

The aim of this book is to examine in depth architectural themes that have been ignored and neglected in the past. It addresses our non-visual perceptions of the man-made environment. I have tried to describe my experiences in this field as an architect and also as a user of buildings. At the start of each chapter I formulate my past impressions and old memories. Such recollections are, of course, highly subjective, but I feel that presenting them alongside other experiences may benefit colleagues as well as professional people – all of us who live and work in buildings and spaces. By broadening perceptions in this way and by making use of the different senses, one can achieve architectural synergy.

The examples listed in the book are intended not merely to convince readers of the significance of synergy for architecture, but also to demonstrate that visual perceptions should never be the sole criteria for evaluating architecture. Sounds, smells, and various other non-visual effects can and do provide esthetic impulses to those looking at or using a building. Architects that bear in mind such factors when drawing up designs are far more likely to satisfy the esthetic requirements of the people who will use their buildings.



LIGHT, SHADOW AND DARKNESS

Helmut Jahn: New Sony Center Forum,
Potsdamer Platz, Berlin, Germany

LIGHT THROUGH THE FOG

Each morning cloud and fog linger in San Francisco, which lies at the tip of a peninsula between the Pacific Ocean and San Francisco Bay. Yet by noon the sun is invariably shining. Initially, the early morning ocean breezes envelope the city in a cloud. But later, the same winds break the gray cover into pieces. As the clouds disperse, the sun appears intermittently, illuminating the city's buildings one after another. The clouds move on, joining together or breaking apart. Parts of the city are bathed in sunshine, while others remain shrouded in the morning twilight. The strength of light varies, so that some buildings seem very close, while others appear distant. Indeed, the sunlit buildings on a nearby hill jump out at us, but others on the same hill – those still in relative darkness – look as though they have been built on the next hill.

Whether we can see the buildings clearly or dimly depends on distance, light conditions, and air density. In the fog of San Francisco, sometimes the whole city disappears. Shrouded in mist, the city is transformed into a rather murky spectacle. Meanwhile, from our hilltop location, we can actually perceive areas beyond the city limits more easily and with greater clarity. What is visible can no longer be our sole means of judgment. Something similar happens at the theater when the curtain is raised and light falls upon the dim stage, illuminating the dramatic act or emphasizing the entry onto the stage of an actor. The phenomenon also reminds me of the headlights of evening pleasure boats on the Seine, whose beams of light sweep across the river, illuminating riverside buildings. In the evening darkness, the only buildings and structures visible to the eye are those reached by such light rays. Buildings lit up in this way receive particular emphasis, drawing our attention as they emerge from the surrounding darkness. To exert an effect, light needs darkness.

DESIGNING WITH SHADOWS

In architecture, things concealed in darkness are just as significant as visible objects. What is invisible may have just as much meaning as what we can actually see. Our attentiveness can be drawn by taking something away. To attract attention to a particular detail, we have to neglect another part. We are unable to pay attention to everything at the same time – even less, to be able to look with the same intensity. Color, shape or decoration obviously give emphasis to certain architectural elements, while other objects appear more obscure since they are covered by shadow. If our eyes rest upon certain elements, our opinion of the whole will alter. A particular element may receive greater emphasis than other parts of the whole or of the whole itself. The constituent parts, given or denied emphasis, develop the various proportions of the parts of the whole – and thus our view of the entire entity.



Inner space of the Pantheon, Rome, Italy

The impression we receive of the object in front of us varies, since the position of the sun, the role of light, the projected shadow and the shade, in addition to the quality of the air, together contribute to our multifarious perceptions of the building. Moreover, our own perspective changes constantly, as we move from place to place or focus our attention on different aspects and details.

Shadows are a recurring element in the architectural photography of Lucien Hervé.¹ He treats shadow as a color or uses it as a black spot for the purpose of concealing objects or creating new forms. Hervé paints with shadows. Half of his photograph of El Escorial near Madrid is covered by shade. We see the contours of El Escorial separating it from the sky, but only a part of the building is visible below. It is concealed by the shadow of another wing of the building behind the photographer. We see both what is in front of us and what is behind. The contours of the shadow endow the image with new lines, spots and shapes. Hervé recomposes the spectacle by using shadow. In doing so, he helps us to see the building's façade in a different manner and by different means.



The shadow of the main entrance
of the Queen's Palace, Madrid, Spain

He also succeeds in getting us to see just half of what is in front of us. Hervé thus takes us into the world of imagination, showing us the many ways in which we might envisage the building. His other message is that what is not present is just as important as what is visible to us at any particular moment. That is to say, nothingness is always present, both in image and in reality. Things that cannot be seen are constituent elements of the visible, architectural image.

The exterior façade of Rome's Palazzo della Cancelleria (1489–1511), a building attributed to Bramante,² seems rather two-dimensional (flat and plain).^{3,4} This does not mean that there are no elements on the surface of the building, no window frames, cornices or columns dividing up the façade in various proportions. Since the differences are barely perceptible on the surface, all these elements seem to be just lines. However, when sidelight reaches the chancellery, the apparently flat façade becomes a three-dimensional object. The smallest indentation on the surface casts a shadow, and various details on the edges of the elements are emphasized by shade. The façade receives depth on account of the shadows. The differences in depth on the façade and the shadows caused by the sun produce, in conjunction, the overall image. As dark lines, the un-built parts of the building – the shadows – form a part of the picture.

DARKNESS

In illuminated spaces, shaded surfaces and shadows may easily mislead us, but in thick fog or darkness we become incapable of orientation, and notions such as north and south lose any meaning. When the familiar reference points are lost, there is nothing that might help us to determine our exact location. The senses of visually handicapped people are more developed than those of others. In the darkness, our own non-visual senses are incapable of directing us. In the twilight, our eyes seek to make out the outlines of objects, as they do in a dark room after the light has been switched off. Where darkness is incomplete, such endeavors are justified to an extent, because our eyes usually adapt to the circumstances. There is always some light.

The facade of the
Chancellery, Rome, Italy



In the film *Satantango* by Béla Tarr the first frames, following the introduction, begin in darkness. Minutes pass, without anything appearing on the dark screen – anything that we might see. Then, infinitely slowly, the outline of a window becomes visible. It is as if our eyes are getting used to the darkness, but indeed dawn comes. It takes an infinitely long time, but gradually daybreak arrives. It seems as though the beginning of the film is taking place in real time. But what would happen if we were to run the film backwards, and the screen would become dark once more? From the light of dawn, we would slowly be enveloped by darkness. Contrary to the previous ever-lighter images, our eyes would accommodate even less the increasing dimness of the images on the screen. Our vision is constantly influenced by what we have just seen.

In the course of the above descriptions, we first compared the objects adjacent in space and visible, i.e. illuminated elements, with what was still obscure, concealed or invisible. In the example of the film, we compared, from an unchanging position, the events occurring consecutively and finally the combination of the two, since the time factor divided the space into two – into the visible and the obscure. In both time and space, we function in a similar manner with changing perceptions. Thus, darkness – or what we cannot see – plays a role in how we perceive and appreciate architecture.

Both light and darkness can be used to manipulate our visual impressions and our perceptions of architectural space. Just as an interpolated space serves to “prepare” us for the spectacle of a subsequent space (for instance, a foyer placed between an inner room and the world outside), a similar effect can also be achieved by inserting various strengths of light into a passage. Light is needed so that we can see, but also – subsequently – so that we should perceive things differently, perhaps paying more attention to a particular object.

Lucien Hervé’s second picture of El Escorial portrays the gate leading down to the crypt.⁵ The picture is dark; nothing can be seen on it, apart from a curved shaft of light between a gate and a wall – a thin white pencil line on a dark piece of paper. Surrounded by darkness, the finely curved white line creates a feeling of anticipation. The dark image points the way to the crypt, warning of death. The thin crescent of light, on the other hand, offers hope.

The fear of darkness – and of death – and a feeling of hope are both expressed in the image. Darkness, just like brightness and twilight, has its place in a building. Emilio Ambasz has drawn similar curves and arcades using light and shadows onto the walls of the hall of the Banque Bruxelles Lambert.⁶ In addition to stone and plasterwork, spotlights add decoration to the chamber. He created between two curtains an amaterial form by light (Financial Guaranty Insurance Company, New York, 1983).

Darkness, just like light, creates an architectural milieu. Varying degrees of light – from darkness to full light – should be included in construction plans and in accordance with function. A dark inner chamber is just as much a part of the mysteriousness of a medieval Christian church as are the thin beams of light filtered through its windows. Before making love, a couple will often darken the room by drawing the curtains, thereby creating a more intimate atmosphere. During interrogations, those questioning a suspect use a beam of light to divide the room into two. The interrogators are invisible, sitting in the darkness behind the lamps. All attention is focused on the interrogated person, under a full beam of light. In such cases, light becomes a means of intimidation. On other occasions, the removal of light – solitary confinement in complete darkness – is used to intimidate a prisoner. Architectural training determines what remains in darkness and what is brought out into the light. Mystery, intimacy, intimidation and security are just some of the effects that an architect can achieve using light. Moreover, simply by increasing or decreasing the strength of light, one can change the light milieu.

Outdoors we always benefit from a small amount of light from the stars; there is never complete darkness. Only in the depths of the earth, in a cave system far from the entrance, can one experience complete darkness. In Jerusalem, the ancient City of David, there is a tunnel 521.5 meters in length (Hezekiah’s Tunnel) in the womb of the hill (dating from 700 BC). Through this man-made tunnel (which probably made use of a natural cavern) water was directed from the Gihon Spring to the Siloam Pool, in order to guarantee, even in times of war, the city’s water supply.⁷ I myself have passed along this ancient aquatic route. We were half-way along the tunnel and up to our knees in water when the torch of our young Arab guide went out. It took the guide some time to find the spare battery and remove it from his pocket.

As we stood there waiting for the light of the torch to return, I realized that, even after a few minutes, I still could not see anything. My eyes had not got used to the dark. Obscured by total darkness, my surroundings remained invisible. I was forced to rely on my sense of touch and on my hearing. I had to touch with my hands to discover the position and texture of the wall of the cave. Even so, I remained surrounded by an architectural environment.⁸

THE INVISIBLE CAVE DWELLINGS

The best-known type of invisible dwelling is the cave dwelling. Rather than given by nature, most cave dwellings are man-made, hollowed out of a hill. Volcanic rocks are the most suited to their formation – most of them having been carved out of tuff or some other kind of workable rock. Cave dwellings are found in Spain, Italy and Turkey, as well as in Hungary – although their number is diminishing. Many people are disdainful of cave dwellings, discounting them as a primitive form of housing for the poorest of the poor. The cave dwellers themselves usually have a quite different view of their homes.

In Egerszalók, a village in northern Hungary, I spoke to a man who had lived his whole life in a cave dwelling – that is, until his children forced him and his wife to move to a “proper” dwelling. The children claimed to be embarrassed in front of the villagers. People might think they had left their parents behind in misery, while they themselves moved to a large, modern house. Even so, the old fellow I spoke to did not share his son’s views. He took me up the hillside and proudly showed me his old, and now vacant home. Together we examined the tools he had used to excavate the tuff. He explained the purpose of the various tools, which included a pickaxe and a crowbar, as well as instruments that were used to smooth the surfaces of the dwelling. The cave-dwellings, including his own, lay on a hillside on the edge of the village. In front of the dwelling there was just a narrow track. He told me how, at the end of each working day, as the sun was about to set, he used to step out of his cave dwelling onto the track, from where he could look down at the village in the valley.

He recalled his joy and pride that he could see so far over the village. Then he would go back into his house, where he felt no fear, since he could not be seen in the darkness of his well-protected den, but he could see what was happening around him.⁹

Those who listened to his story were often incredulous, he said. Did he not fear, they asked, that the earth would fall upon him and bury him? To them it seemed he had been living in his own grave. One cannot deny that tuff rock is not as hard as granite and that it can, during construction, collapse if the stone structure is poorly supported and unable to take the weight of the rock roof above.



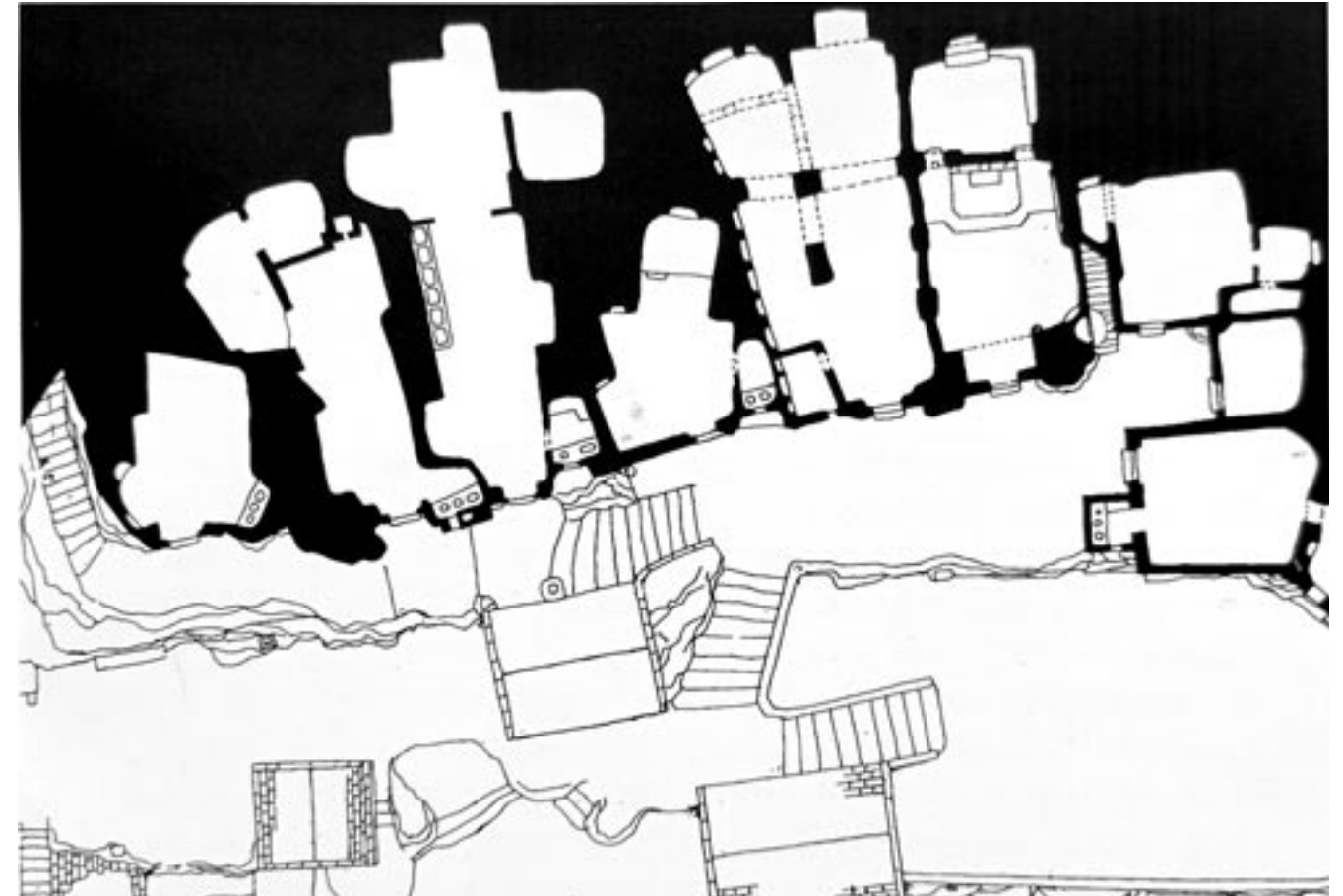
Cave dwelling, Egerszalók, Hungary, 1926

But it seems accidents are no more frequent here than they are in the traditional building process. In the 1950s, I was witness to an elderly woman's forced eviction – carried out by military personnel – from a cave dwelling in Dunaföldvár, which lies in the centre of Hungary. The woman's son had reported her to the authorities. He wanted her to move in with him in his house in the village, but the old lady did not want to leave her home, which had been carved into a hill named Golgotha. She was very much attached to her cave dwelling: "This is where I spent my whole life, and this is where I shall die" she cried on being removed from her home.



Cave City Matera, Italy

Surely, it could not have been such an uncomfortable place, if she so vehemently rejected moving to her son's comfortable house. Her protest reflected the arguments of the cave dwellers in Egerszalók. For the old lady too, the earth and stone surrounding her dwelling offered her unbeatable heat and sound insulation, as well as waterproofing. She felt protected against burglars, and the costs of maintenance were very low. Moreover, she was proud to live "under the Golgotha," protected by her God and with a panoramic view of the Danube.



Floor plan, Cave City Matera, Italy



Cave dwellings, Cappadocia, Turkey

Such kinds of home differ significantly from traditional forms of housing, since they are created not by adding something but by taking something away. The dwelling is preexistent; you just have to remove natural materials for it to come into being. Cave dwellings are special because they do not remove space from nature: the “roof” of a dwelling is made of earth, it can be cultivated, sown or used in the same manner as before. There is no need to bring in construction materials from elsewhere. What is more, the entrance and façade of a cave dwelling take up just a fraction of the space required by traditional homes. It is impossible to walk around a cave dwelling, and we certainly cannot speak of three-dimensional homes visible from the side. Instead, these “buildings” simply blend into nature.

Indeed, the buildings are part of nature. You can walk on top of them, and it is easy to overlook them, because they are not really visible. They hardly disturb nature; and the people living in them enjoy the resulting advantages: the earth’s protection and security. The big drawback of these almost invisible dwellings is the lack of light – the front door often being the only source. The air ducts and flues hardly let in light. The invisibility of the home is coupled with darkness.

One finds many of these completely invisible houses – often with as many as four or five rooms – in Andalusia and in Portugal. Often such dwellings have a narrow entrance, which then expands deeper into the cave. As far as I know the largest cave-dwelling settlement is in Italy.



Emilio Ambasz: Private Estate, Montana, USA

It is to be found in the town of Matera, close to the Gulf of Taranto. As recently as the first half of the 20th century, 10,000 people were living here.¹⁰ The newer core of the town lies on a plateau. For centuries, the hillside, with its unexpected paths running up and down, was home to a large number of people, who lived in cave dwellings and were accompanied by their animals. Throughout the valley and on the steep hillsides, it is possible to spot holes and dwelling entrances. Looking down, or looking up from the valley, we can see paths and, behind them, the façades of dwellings. Sometimes there are only entrance doors, as well as the occasional window. In other places, however, we find decorated portals, with Renaissance columns and tympanum. Here and there, porticos have been erected in front of the cave dwellings. This makes the building seem more significant. There are even those that appear to be palaces. At the top of the hill, there is a chapel.

Over the years most of the cave dwellers moved out, so that just a few hundred were left. But the trend reversed some time ago; newcomers filled the vacant space. Artists were the first to appreciate the value of the caves as studios or simply somewhere cheap to live. The artists have been followed by gallery owners, antique dealers, and craftspeople. Some of the caves now house modern offices with computerized staff. The usual process has been in action: first came the pioneers, and the “trendies” followed them. It became chic to live, work or set up shop in the caves. Street by street, the caves were rehabilitated. Marble flooring replaced old earthen floors, and the walls were plastered or tiled. Electric lighting meant that interiors shone shiny and bright. Once you get inside, you quickly forget you’re in a cave.

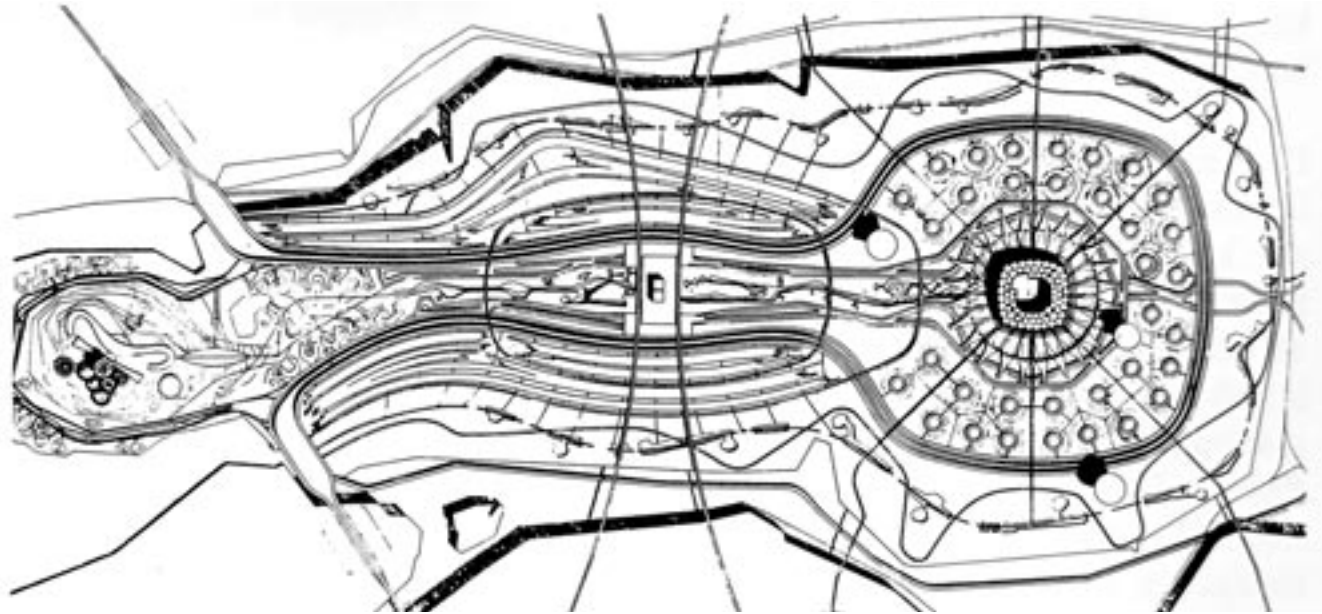
Arguably the most fascinating cave dwellings are to be found in Cappadocia, Turkey. The distinguishing features of the site stem from volcanic flows during the Miocene era, which were then molded by the floods of the Pleistocene era, the erosive power of the lakes and rivers. Out of the plateau arose several thousand cone-shaped mounds made from volcanic tufa.¹¹ The wind has eroded them further into thin little peaks. The region was discovered by nomadic tribes as early as pre-historic times. This natural wonder became a place of human settlement, and the earliest inhabitants hollowed out cavities where they could conceal their valuables. In the end, they made dwelling places in these artificial caves. Being high up, they were difficult to access and so offered protection from robbers and transient armies.

The plateau and the valley below were part of a trade route between Asia and Europe. Migrants came in waves, and among them refugees, in particular persecuted Christians, who established sizeable settlements.¹² The most famous subterranean habitations in Cappadocia were Derinkuyu and Kaymak, which at times offered sanctuary to several thousand inhabitants. Both were built by early Christian refugees in the second century. The cave-dwelling communities had secure stocks of corn and wine cellars. They stored enough to last for six months in case of siege. In these subterranean cities several richly decorated chapels were created. The cave dwellers had all they needed for life; and they even buried their dead here. The inhabitants of the subterranean settlements received fresh air through countless air ducts. Occasionally, such air ducts were blocked by the cave dwellers’ enemies – an act that was tantamount to mass murder.

Caves in the Loire valley have also been made habitable once more. Initially, they were used as cellars for the storage of wine and then some of the hollows became taverns. More recently, wealthy individuals have converted the caves, which remain cool even in the hottest weather, into summer homes. Such technical advantages are not the only reason for the caves’ transformation. Their present worth also stems from the perceived strength of the surrounding rock. A further attraction is their uniqueness and unusualness. A dwelling of which people were once ashamed has become, in many instances, a symbol of wealth. Owning a cave dwelling has become a status symbol.

Still, we are not just talking about the revival of old cave dwellings. There are new ones too. Indeed, some contemporary homes are built on open flat sites, only to be covered with earth and thus concealed, looking like a mound. Some others are placed below ground in cavities that have been hollowed out of the earth. Both types may be considered artificial cave dwellings, produced either by adding or by taking away. Emilio Ambasz, an Argentine architect who lives in New York, has designed several cave dwellings, including Private Estate in Montana (USA, 1991) and Casa de Retiro Espiritual not far from Seville (Spain, 1975).¹³ The roof is an extension of the site, and the additional earth is grassed over so that it resembles the surrounding area. From the outside, virtually nothing can be seen of the building. Indeed, the only visible aspect is the garden, which has been sunken into the ground in front of the dwelling.

But even this feature can only be seen by someone standing quite close and above the court. One certainly cannot see the people living in the house. Another Ambasz design is the Lucille Halsell Conservatory at the San Antonio Botanical Center (Texas, 1982). Its glass-roofed buildings have been sunken into the ground. The earth around the building is both the container and the protector of the plants, while the reduced total area of the glass roof facilitates the regulation of both temperature and light.¹⁴



Paolo Soleri: Arcosanti, Mesa City, Arizona, USA

Paolo Soleri at Scottsdale, near Phoenix, Arizona, has created cave-like buildings. Extra earth was brought to the chosen site, creating a spherical segment. Wire cables were then laid onto the convex-shaped mound. Concrete was poured over it, forming a thin, hard layer. Once the concrete had solidified, the earth, which had served as a mold, was scraped out from beneath the roof, at such a depth that the one could walk in and out. This was how the architect constructed his bell-founder studio. After constructing the studio called Cosanti (1955–), Soleri built Arcosanti (Mesa City, Arizona, 1970–).

It was designed as a town but only partly completed. The building, which is a semi-spherical hollow built into the side of the valley, comprises cave cells. Windows were only placed on the inward-facing side of the semi-sphere; all of them face the valley. From the outside, looking up from the flat site, the settlement is practically invisible. At most a part of the semi-spherical section is visible; the rest is concealed beneath ground.¹⁵

Cave dwellings represent one type of invisible architecture. Providing a sense of security, they are just as capable of fulfilling their purpose as traditional dwellings. If they are designed well, they can meet aesthetic requirements, too. Moreover, they are better able to reflect today's environmental standards than any other type of construction. It is a matter of taste whether visibility, tradition and easy ventilation are more important for you than invisibility, the environment, isolation, and security.

- 1 Attila Batár: Lucien Hervé. Héttorony Könyvkiadó, 1992, p. 96.
- 2 Arnaldo Bruschi: Bramante. Thames and Hudson, 1973
- 3 Paolo Portoghesi: Rome of the Renaissance. Phaidon, 1972
- 4 Peter Murray: Renaissance Architecture. Abrams, 1971
- 5 Attila Batár: Lucien Hervé. Héttorony Könyvkiadó, 1992, p. 102.
- 6 Emilio Ambasz: The Poetics of the Pragmatic. Rizzoli, 1988
- 7 Hershel Shanks: Jerusalem, an Archeological Biography. Random House, 1995
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HEAT, FOG AND MIST

HEAT

Mechanical engineering has long been an integral part of architectural design. In the western world, it is impossible to imagine a new building without heating and, increasingly, air-conditioning. Architects now incorporate heat-proof walls and ceilings in their designs. Stopping the flow of heat is just as important as enhancing its flow. Facilitating or preventing the spread of light, heat and sound – their selected diffusion – is an ever more complex task. Windows and doors, as well as sheets of glass, must fulfill a variety of sound insulation functions. Also needed is equipment capable of increasing or reducing air humidity in line with the requirements. Today, all architects take this into consideration. Rarely, however, do they incorporate thermal elements as objects in their buildings (e.g. thermal curtain); the use of thermal elements for aesthetic effects (artificial mist, “cloud sculpturing”) is even less common. Yet, heat, fog and mist occur naturally in our environment. And so what we really need to ask ourselves is how – alongside cooling and heating – we can include these phenomena in our architectural environment and use them to attain an esthetic effect.

ROME

In Rome, the hot August sun is unbearable. The sun radiates its energy, with its rays penetrating the stone walls, the ground, and the furniture placed outdoors. On café terraces, red-hot air fills every molecule of space – even beneath the protective sunshades. I visited Rome in the summer of 1980, where, sitting outside a café opposite the Farnese Palace [designed by Antonio da Sangallo the Younger (1483-1546)],¹ I felt the air to be impenetrably heavy. While I could almost take hold of the hot dense air, I dared not even touch the burning-hot metal furniture. The square in front of me was empty. In the silence.

I could almost hear the simmering of the air. The air particles wrangled with each other, and my glass of ice-cold water offered no relief. Everything was glowing and everyone was sweating in the heat.

The sun's energy was felt even where its rays could not shine. Indeed, the heat flowed into the adjacent narrow streets and through the windows of the stone houses; life almost came to a standstill. It must have been late afternoon: the sun shone ever lower in the sky, its rays just touching the surface of the square. The surfaces of the façade were lit by light, fleeting along the wall. Although the strength of the celestial heat source was decreasing, having relinquished none of its great warmth, the air was still red-hot. The stone walls of the palaces facing the square radiated



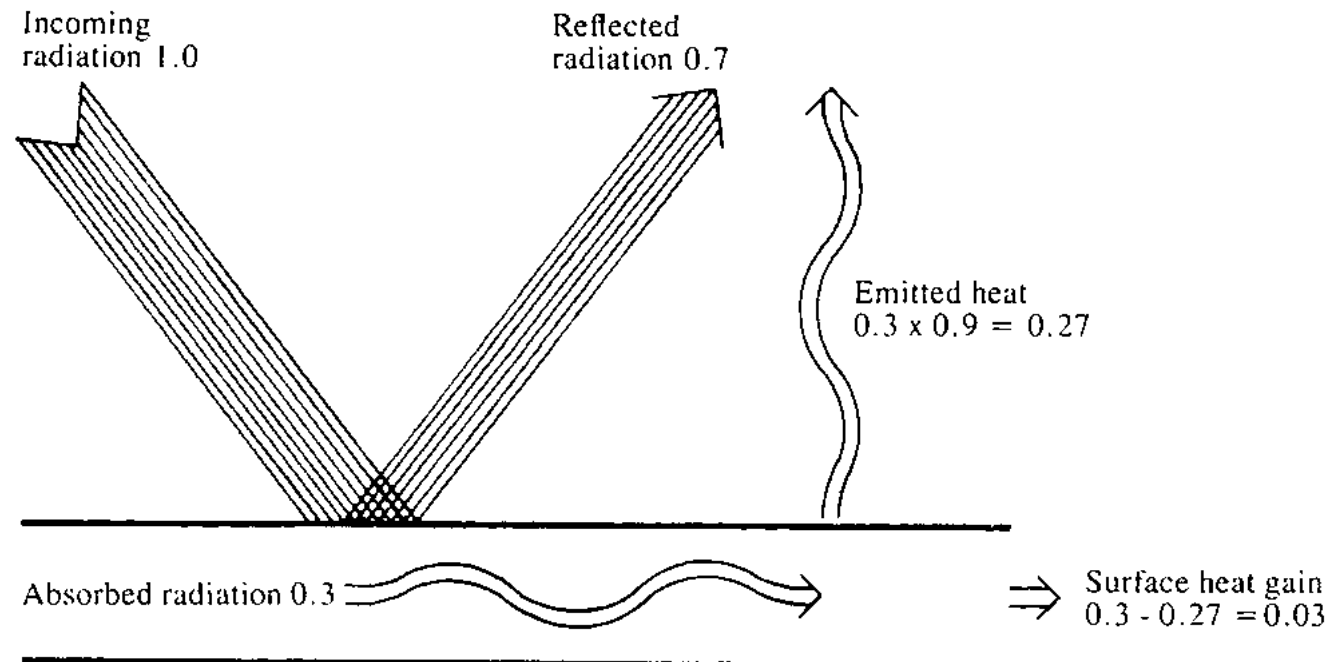
Corner of a Building on Piazza Farnese,
Rome, Italy

heat, shedding what had been retained during the day. Indeed, like a series of furnaces, the elevations of the buildings radiated heat energy. Streaming from the porous stone surfaces, the heat particles vibrated in unison before the stone walls, thereby creating a dense thermal curtain – a thermal wall in front of the stone wall.

I tried to touch the stones, but my fingers were pressed back before I reached the wall. After renewed attempts, I realized that a new wall – a thermal wall – had arisen in front of the stone-work. The vibrating air had caused the external wall to grow thicker and the house “fatter.” The building no longer ended as marked on the plan. Instead, it protruded as far as the thermal wall, forming a kind of new layer. For a short while, heat became just as much a tangible part of the building as was the stone. But the thermal wall could be perceived not just by touch but also when one breathed. The heat lingered in the lungs of those who came close. The people sitting by the wall actually became a part of the building as they sat within the thermal wall.

Indeed, we might even say that the thermal wall became visible. Under the rays of the burning sun, the heat particles flowing out of the wall crashed together, spreading out in chaotic movement. The sunlight flared on the particles in flight. Every hit and rotation brought a further explosion of color. Vibrating like little pearls, the particles no longer merely scorched, for now they sparkled in the air. And there was a bonus effect, too: as well as the heat drawn in during the day, the wall now exuded the smell of heated material. In contrast to vegetation, stone has a smell that we do not normally perceive. Even so, in great heat we can perceive its smell if we draw close to a stone-wall. This peculiar odor is particularly strong when the hot sun shines upon a wall. In the afternoons, the return-flow of heat brings with it the smell of heated porous stone. Falling upon each other, the heat particles bluster and rustle, as they swirl and zigzag. The movement of the air becomes audible. The vibrating thermal curtain can be smelt, heard, seen, and touched. Spewing forth its heat, the wall acts on several of our senses, shaping impressions through various channels.

The thermal wall is an addition to the existing wall. The designer did not include a thermal wall, just a stone wall. When selecting materials for a wall, architects actually determine its heat storage and radiation qualities. In this respect, a brick wall will differ from one made of wood or another made of steel and glass. Although an architect's prin-



Connection between the temperature increase of the structure and the radiant heat from the building's exterior

cial purpose will rarely be resolving problems related to heat radiation, nevertheless he should not neglect the issue. It clearly does matter whether he chooses heat-absorbing, heat-mediating or heat-conducting materials for the various parts of a building. Nowadays, people refer not just to thermal protection and thermal insulation – both of which are now general requirements – but also to materials that store or reflect heat.² One needs to consider what kind of surfaces we wish to lean against in the sauna or walk upon on the sunbathing terrace. Oversights do sometimes occur, such as at the Bibliothèque Nationale de France in Paris, where the architect (Dominique Perrault, 1995) initially enveloped the book storage towers in glass walls; only after criticism did he place an insulating wall between the glass and the books.

In most cases, thermal radiation and the temperature of surfaces are not the result of conscious planning, and yet the effects cannot be avoided – regardless of whether a wall is left naked, covered with ivy, or even possesses a thermal reflective or absorbent surface. Ivy or some other external protective element will reduce a wall's thermal co-efficient – whatever material it is made from. Steel takes up heat immediately, but also loses it quickly. Bricks absorb heat and then release it gradually. Reflective glass repels heat, while aluminum begins to move. Indeed, as it expands and contracts, one can hear creaking and grating sounds. Whichever material we select, there's no denying that all materials influence, in some manner, the temperature and other characteristics of the surrounding environment.

Under the effect of heat, the visible spectacle of a building will change (for instance, light sparks off the thermal curtain of hot air). Still, the above observations also indicate how heat compels passersby to treat elements of the environment transformed by thermal energy as objects. If architecture means the artificial molding of the space around us, then heat is just as vital as any other construction material and just as perceivable as any visual phenomenon.

The ventilation systems in subways show how thermal elements can become objects. Suffocating, unbreathable air flows like hot steam out of the subway system through grilles in the sidewalk.

Walking on such a grate is unpleasant at any time. However, when, on a hot summer's day, a thermal acerbic column of air rises from a grille, then pedestrians really have no choice but to give it a wide berth. Of course, not all passersby look where they are going, but the column of hot stuffy air soon warns them they have strayed onto unpleasant territory. The heat beneath the soles of their shoes forces them to change direction. Indeed, pedestrians avoid not only the grilles but also the hot suffocating fumes they exude. Similarly to stinking trash cans, the hot moist air expelled by the ventilation equipment offends the human nose, forcing people to step back or walk around. Such hot, moist air is an additional invisible element in our environment, and it too has become an obstacle to our movement.

In the form of steam, heat can also create a horizontal space. Protected by the steam that lurks over the thermal waters at Budapest's Széchenyi Baths, one can bathe, play chess, read a newspaper or pass the time of day even on the coldest of winter days. The steam over the hot water substitutes in part for an indoor architectural space. While it may not offer protection against the rain, it does so against the cold.



Gymnast unfazed by smells from the grate.

COLD FLOWS, THERMAL RADIATION, AND ARCHITECTURAL FORMS

Thus, under certain circumstances, the effects of hot steam are pleasant ones. In order to regulate the flow of cold air and heat, building designers must select the right architectural forms. Flues bring in fresh air and remove used air. Sometimes, they establish a draught of air, taking away smoke from a fireplace or cooking smells from a kitchen. Architects try to conceal the route taken by such flows or create an esthetic design utilizing the opportunities at hand. Fireplaces, for instance, can be decorative elements in modern interiors. While the Romans placed their heating systems under the floor or in the wall, the Indians and Egyptians even today bring up cool air from the cellar through a complicated and closed system of flues placed between the walls. This is how they cool the interior spaces of their homes. Whether concealed or visible, ventilation alters the shape of a building. On roofs, air ducts may provide an esthetic spectacle, becoming the visible aspect of the otherwise invisible.

In the hot climes of North Africa, local inhabitants manipulate heat differently. Buildings here characteristically have flat roofs. Equipped with parapets, such roofs often function as water containers. The roof collects and stores the rare and valuable rainwater. Moreover the stored water also functions as heat insulation. The evaporation of the water, by removing heat, cools the rooms below. This practical solution helped to create the typical North African architectural shapes; they are a product of rational thought rather than formal design. The treatment of heat takes on an architectural form.²

Likewise, houses with high roofs are not merely the accidental result of the human tendency to create ornamentation. As well as being used for the storage of corn, high roofs also perform a thermal insulation function. Owing to the insulation qualities of snow, the aim is to keep some snow on the roof – but not so much of it as to result in the roof's collapse. Steep roofs are, therefore, the result of utility rather than esthetics. The sliding friction of snow determines the incline of high roofs. If a roof is too steep, the snow slides off immediately.

If the incline were too gentle, the roof would require a stronger structural support to bear the greater quantity of snow. On the other hand, during a rapid thaw, when the principal consideration is to remove rainfall as quickly as possible rather than maintain a protective layer of snow, a lesser incline might hinder the snow's descent. Another requirement is ventilation of the space beneath the roof – not only to keep the stored corn dry, but also to prevent the remaining snow on the roof from freezing (which might cause the whole roof structure to fracture). The traditional forms of hill country architecture are adhered to even in those regions where there is no rational reason to do so.³

Elsewhere we see the reverse of the above example. Oddly, it was the Swiss architect Le Corbusier who introduced the flat roof of North Africa to regions north of the Mediterranean Sea where the conditions and requirements of the two climates meet. The roof certainly became an important part of his buildings. He gave new functions to it in the case of his villas (Villa Savoye, Poissy, 1929-31)⁴ and large tenement houses (Unité d'Habitation, Marseille, 1947-52, Nantes, 1952-53). Le Corbusier utilized flat roofs as sun decks or as playgrounds for children. But he even included his favorite roof forms where such had no practical purpose. Le Corbusier often considered his own esthetic tastes to be more important than practical considerations (Centre Zürich, 1964-65). Shape and form do not always indicate rational deliberation.

INVISIBLE THERMAL SPACES

Occasionally, an architect will incorporate thermal radiation elements without there being any visibly apparent architectural consequence. This is true in the case of the “thermal curtain”, which is often used instead of a door at the entrance to a large departmental store or shopping mall. Thermal curtains keep out the cold, but not the people. Conversely, in the summer, old air is blown down at the entrance – where otherwise there would be a door. Elsewhere, at the entrance to cold storage plants hot air separates interior and outside. In this way, cooled or refrigerated air is kept inside the building. In both instances, architectural objects are replaced by invisible elements.



D. G. Schindler: The House of J. J. Buck, 1934, Los Angeles, USA; Roofs in Granada, Spain; Thatched reed roof in Tard, Hungary; Corbusier: The Unité d'Habitation, 1947-52, Marseille, France

They fully satisfy the requirements: one can go in and out of the building without the air of different temperature on either side of the “door” being mixed up. An invisible dividing wall has been raised; it is open to objects and people but not to air. A further invisible architectural element utilized on café terraces is the electric or gas heater; it enables guests to chat over coffee or drink beer outdoors even in colder weather. A concealed radiator transforms the open-air terrace into an interior-like space. In this instance, therefore, thermal radiation performs an architectural function much like a wall or a roof – but it does so invisibly.



Benham-Blair:
Departement of Human Resources,
Sacramento, California, USA

Cooled spaces are established in a similar manner, by means of concealed or visible ventilators and air-conditioning equipment. A cooled space in the open air can be created using a fountain or a ventilator. Once again this shows how architectural expectations do not necessarily arise in visible form and as tangible objects.

If invisible thermal currents perform the function of some object – keeping out cold or hot air, then one might say that a part of the building is present invisibly. But when this happens, is the building's designer creating architectural space? If architectural space is created by transforming the environment and dividing and delimiting space, then an artificial temperature difference between two areas must qualify – since it creates two different spaces (thermal spaces).

Utilizing the hot rays of the sun, it is possible to create a sun-drenched corner within a house or just outside it for sunbathing. Similarly, one may also create a cool shady area protected from the sun. All this will depend on nature – the local climate, seasonal variations, the frequency of cloudy weather, and whether or not the location is protected from the wind. But nature is not the only factor: architects can also influence (mitigate or increase) the effects of climate by means of orientation, landscaping and manipulating mass.

One can use the summer sunshine to heat water even in cool weather. Similarly, solar power can be used to heat a home in the winter or, conversely, to cool it in the summer. The offices of the State of California Department of Human Resources (Benham-Blair, 1980) are equipped with a heating and cooling system that uses exclusively solar energy (actively and passively). It is possible with mirrors to direct solar energy into thermal collection pipes. But by planting trees and making use of draft increasers, ventilators and fountains, one can create shady corners of cool fresh air even in areas where there is little wind. A solarium need not be indoors; one can make a natural one outdoors. Each designer has to determine how to use natural temperatures to develop various thermal spaces inside and outside a building.



Davis-Brody-Bond:
Virgin Music Building, Union Square, N.Y., USA

THE SPECTACLE OF MIST

My observations in Rome show how heat may change even the visual image. Not just a vibrating heat particle can alter our impressions of a wall. Rainbows or mirages created in hot humid air are well-known natural phenomena after rain. In addition to clouds and light-shadow phenomena, mist is a formative element of the architectural concept. Everything depends on the thickness of the mist. This factor determines whether we can see the things around us clearly or dimly. What happens if the space around us is completely absorbed in mist? The things around us disappear; we cannot know whether the mist is concealing a building or not. Indeed, we too are lost in the mist. It plays a deceiving trick on us.

Even so, mist does not mean complete darkness. Although our glance can see only partially in cloud or mist, light still manages to shine through. Mist and cloud always allow a certain amount of light to pass, resulting in a rather odd sensation: “we could see but we do not see.” Even if it is still visible, a building always looks different in the mist.

Sometimes an architect will add smoke or mist forms to the façade of a building. On New York’s Union Square, the brick façade of the Virgin Music Building (Davis-Brody-Bond) sometimes lets off steam (Metronoma, K. Jones and A. Ginzel, 1999), concealing one part of the façade while leaving the other part visible. Released at regular intervals, the steam repaints and reshapes the façade. Accordingly, our impressions of the building change. There is no such a thing as perception of space separated from air.

Some architects have made conscious use of the mystique of fog, including it in their creations. Bernard Tschumi, who designed the Parc de la Villette (1992), incorporated mist machines in the park.⁵ He created a world of mist and “built” amorphous forms using the fog. He lay pipes onto beams placed on the ground – we can stroll happily along these beams until the fog machines start up. When this happens, visitors to the park soon find themselves surrounded by artificial fog. The beams are narrow and edged by raised concrete strips; one can easily miss one’s step in the fog and slip off the beam into the depths.

As the fog grows thicker, so the Parc de la Villette disappears before our very eyes. And then we ourselves disappear. Once again, the mist plays a trick on us. Albeit in a negative sense, fog reminds us that the characteristics of air and the relationship between the building and its viewer determine how we see or do not see what surrounds us. In the case of La Villette, we are observant of the spectacle, but as soon as the fog appears, everything simply disappears. At such time, we see merely amorphous misty forms and then nothing at all. We experience two things: the first is caused by the easily discernible form of the fog, while the second is the increasingly dim and finally disappearing image, whose mere memory we keep. Semi-visibility and dimness can also provide us with an esthetic experience.

An even more spectacular example is the Showa Memorial Park in Tachikawa City, Tokyo.⁶ In the park, the artist Fujiko Nakaya collaborated with the landscape architect Atsushi Kitagawara to create a mist-shrouded world, an artificial “fog forest.” The mist machinery comprises two parts: a stump pyramid placed head down into the ground and a perforated aluminum tube. Every half hour, both pieces of equipment disseminate artificial mist. Since the mist is heavier than air, it stays close to the ground. From the sunken base of the upside down pyramid and from its upper edge, mist appears in an irregular rhythm. With greater and lesser pressure, sometimes from above and sometimes from below, the mist appears at varying speeds, continuously acquiring a changing shape. Obviously, the breeze and the movement of the hot air contribute to a constant renewal of the shapes formed by the mist. As we look at the amorphous forms of mist, we may think of sculptures. The pyramid of mist plays off two contradictory forms – the hard geometric concrete form and the fluid mist: the immobile with the changing.

The other mist-making device, the tube, lies at the edge of the site. From the cylinder-sized, long and perforated pipe, which has been positioned at an angle, mist is emitted, spreading in all directions. The mist-producing pipe and the flow of mist have been so arranged that the cloud of mist covers the surrounding surface like a pillow. Once again, amorphous shapes are formed by the mist, and there is a contrast between the straight (the pipe) and the foamy. It looks like a spear piercing a cumulous cloud. From above, the mist resembles the changing cloud forms one might see from an aircraft, while the long and large tube, as it appears and disappears in the mist, evokes the silhouette of an airplane. Between the two mist machines, there is a series of low mounds –

similar to burial tumulus. Giggling children climb these tiny mounds; they think they will get a better view of the changing forms of mist. For a while, this is true. But the surprise continues when they too are enveloped in the mist. This is part of the fun: sometimes they cannot be seen by the others and sometimes they cannot see the others. All they can see is the mist around them. The mist not only creates visible forms but also acts to conceal previously visible forms, the landscape, and finally the whole park. The mist first attracts viewers and then eliminates them. But the viewers also contribute to the spectacle; in their colorful clothes, the visitors – most of whom are children – liven up the clouds of mist with spots of color. Then, as the spots of color disappear, the characterless nature of the mist is restored. Such objects and intangible elements together form the landscape. Under their influence, the visible, invisible, and transparent are in constant flux.

Thermal movement is visible under other circumstances too – having consequences that can be perceived by other sensory organs and also enjoyed visually. The volatile movement of smoke from a fireplace affects our eyes as well as our skin. In addition to what we actually see, the smoke of the fire may irritate our eyes or our nose. We are affected by a sequence of unpleasant and favorable experiences. As one sits watching a fire burning in a fireplace, the atmosphere is sometimes cheerful, sometimes melancholic. Man created neither sunshine nor the cold of winter. But humankind has learnt to live with nature, to make use of its advantages as well as overcome its difficulties. It is human ideas that determine how we heat, cool or ventilate our buildings. Human intervention can reverse the direction of the wind, thus swapping stuffy and drafty areas within a building. The atmosphere of a space can be transformed in many ways, without this altering our visually perceived objects of the space. Our environment comprises not only visible objects but also thermal radiation, cold drafts, air motion, and lack of motion.

DESIGNING A THERMAL SPACE

It is an ancient and perpetual human ambition to lessen our dependence on nature. This is why people seek to change the temperature around us. Sunlight, cold, heat, wind, and rain are the underlying causes of such endeavors. Whether we try to make use of the forces of nature or eliminate them, we have no choice but to change our environment.

As architectural structures and forms change, so new elements are incorporated (e.g. window shutters, heating appliances, and ventilators). As a result of such changes, our view of architectural objects unrelated to temperature is also altered (a steamed-up mirror, our view of objects behind the mist coming from a humidifier). The incorporation of thermal elements inevitably leads to side effects (refrigerators produce heat), but they can be the consequence of conscious planning (a light source warms up the air blown in by a ventilator placed close to it). In both cases, the phenomenon is invisible. Another possibility, however, is that conscious planning leads to visible forms of heat production (open fires and smoke). Indeed, under certain circumstances, heat can acquire an esthetic function: for instance, when a heating appliance becomes a decorative element in the home (such as the fireplace with mantelpiece), or as in the aforementioned examples of La Villette and the mist sculptures of the Showa Memorial Park. One summer afternoon, Picasso invited his friends over to view his art. After his guest had arrived, the artist lowered the roller blind, leaving small gaps so that the rays of the burning sun could shine through into the room. He then sat down in his armchair and lit a cigarette. Shining through the tiny gaps in the blind, the sunlight painted stripes onto the wisp of smoke curls. An hour later, Picasso sent his guests home. His artwork had been the rising cigarette smoke. The smell of smoke, the changing shape of the wisps of smoke, the color of the smoke painted by the shafts of sunshine, and the things covered by the smoke or dimly visible through the smoke – all had become part of his work of art. Was it a joke? Perhaps. But it also reminds us that we can create intangible forms.



Making of fog begins, Tachikawa, Japan

Heat – as the above examples illustrate (such as thermal curtain, thermal reflection, thermal radiation) – can take the place of an object and substitute for an object. This invisible architectural element can influence us without there being any visual cognition. Heat can be an architectural element, and it can shape our impressions of our human-altered environment. Thermal sensations can be pleasant; the sensory pleasure they cause may be just as great as the enjoyment we receive from music, pleasant smells and touch. Invisible phenomena may offer us an esthetic experience. The interpretation of esthetics is broader today than it ever was before. It now covers a far wider field. Almost any human activity and creative work has an esthetic aspect. The boundaries of art have become indistinct. The objects we caress, the make-up we put on our faces, the smells we breathe in, the plants that we see come into leaf, the foods we taste, the sounds that we hear reverberating in our ears – all are part of the system of relations we call art. Just like sound waves, heat can be perceived by our human senses, causing us pleasure or pain. As the field of esthetics broadens, so our sensory organs become sensitive to additional phenomena. Thermal motion is part of architecture, both informing us and influencing our notions of architecture.⁷



Park under fog, Tachikawa, Japan



Entrance to the frozen meat market, New York, N.Y., USA

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URBAN WATERS

PALEY PLAZA

In recent decades, a whole series of miniparks cooled by artificial waterfalls have been established in Manhattan's 53rd Street. They are refreshing oases, creating relatively clean air. At lunchtime, office-workers come here to eat their sandwiches, to relax and to read. In New York's Midtown such miniparks are becoming more numerous. The neighborhood has the highest traffic, noise and pollution levels in the city; in order to survive, people working in the area really need the fresh air and stillness of these miniparks.

The most famous and successful mini-park is Paley Plaza.¹ Albeit little more than a drop in the ocean, this tiny park constitutes a true oasis amid the otherwise unbearable noise of Midtown. Sandwiched between several high-rise buildings, the park could be described as a "vest pocket" park. Even so, Paley Plaza is a success – despite the limited amount of "nature." A feature of the mini-park is a series of well-ordered trees. The foliage filters the noise from the street, while at the same time allowing the sun's rays – the few rays that make it through at midday – to shine down on the paved area. The thin foliage enables the breeze to blow in the fresh air. The foliage not only filters the noise; its rustling sound is white noise, masking the noise of traffic coming from the street. The branches of the trees attract some of New York's rarest visitors – birds that have strayed into the city. Their chirping is more than mere "white noise;" it is music.

With regard to an oasis, the most important creative aspect is the waterfall; water pours forth from the wall facing the entrance. More effectively than any other sound, the music of this cascade neutralizes the noise of the street. The uniformly splashing sound of the frothy waterfall is just as calming as the sight of the water curtain. Those who take refuge in Paley Plaza can properly relax their ears, eyes, and nerves. The three forms of external sound actually do more than merely counterbalance the noise of the city; each provides a pleasant musical hum. Thus, as well as suppressing the underlying city noise, they also soothe and calm visitors. Moreover, the gentle breeze caused by the waterfall sets both the air and the foliage in motion. Thus, in addition to peacefulness, the park offers clean air.

The site has a cobblestone surface. But the cobblestones have been laid in waves rather than horizontally. The stones thus differ from the flat surface in two directions; raised and sunken in a square pattern, they constitute little mounds. Everywhere the ground falls away towards the trees, so that surface water is taken towards them. The water washes the stones clean and irrigates the roots of the trees. The use of cobblestones can be a very practical solution. After a downpour, contrasted with concrete, surface water is more quickly absorbed among cobblestones. Moreover, when an underground pipe breaks, it is easier to remove cobblestones than it is to break up a continuous surface. But this is not the main purpose of the cobblestones laid in waves.



The Paley Plaza on 53d Street, New York, USA

The only way to get to the park seats and to the little bench by the waterfall is to walk on the cobblestones. It is a delight to feel the bumpy surface under our feet. The stones also relate to the vertical surge of the waterfall. The wave-like surface forces us to move as well. It is a kinetic experience. Moreover, a cobblestone surface offers a richer visual experience, while the division of the surface into small parts makes it seem bigger. Everything works together here, activating our various sensory organs.

Water, fire, wind, sun, and earth – all are vital to our lives. Each one is provided by nature, but we are the ones who decide how to use them and whether to alter them. The value and usefulness of natural elements depends only in part on their manner of use; indeed, as the interpretation changes, so different values are attributed to each phenomenon.

On the French Mediterranean coast, an unexpected rain shower disturbed holidaymakers as they lay in the sun or bathed in the sea. Those in the sea were less troubled; they could simply stay in the water. The sunbathers, however, began picking up their things, and as the raindrops grew bigger, they took refuge in covered areas or under umbrellas. Within moments, the crowded beach was empty. But not completely: instead of heading for shelter, one of the bathers walked to an open-air shower on the beach. Wet from the rain but under the shower, he was no longer bothered by the downpour. As he looked out between the drops of water falling upon his body, he smiled to himself as he acknowledged the rather odd situation.

Under normal circumstances, if one is caught in the rain, one's clothes get soaked and the water flows down one's face. Most people quickly flee to somewhere dry, for it is unpleasant to feel the rain patting down upon us. On a hot summer's day, however, we rush with our sweaty bodies under the shower, and we certainly enjoy its cooling effect. Our evaluation of similar or identical water phenomena depends on circumstances and our subjective judgment. On seeing a waterfall, many will place themselves under the water, having previously taken off their clothes. Others run in front of the spray, while still others stand back to savor the mist caused by the refreshing water droplets. Most people are attracted to a waterfall, but some are put off by the din of the cascade. The visual spectacle, the sounds, pain, and pleasant or unpleasant feelings – all shape in some way the human resonance.

If you are naked, what is the difference between having a shower and getting soaked in the rain? Water is not merely a physical element, since our subjective judgment changes in accordance with circumstances, nature, and preferences. All of these factors determine whether or not we want to be under cover.

Water – whether it occurs in nature or in a man-made environment and whether it appears as a downpour, a lake, mist or ice – is an important part of our daily lives. But architects, landscape designers and town planners have been able to introduce it artificially in many ways. Fountains, basins, channels, flowing water, and water used by street-cleaning vehicles, influence our lives in many different ways. The presence of water increases humidity levels in our visible environment, making things a little more obscure. When it falls in a rain shower, water can actually make objects disappear. It may cause a bad sensation or pain when it is used to cool our environment, such as in storerooms for frozen goods. As a result of its temperature, movement and density, water evokes a variety of different feelings and sensations. It is in the light of such feelings that our impression of the world – and of architecture – changes.



P. Ligorio: The scheme of the Hundred Springs fountain, Villa d'Este, Tivoli, Italy



Lorenzo Bernini: Neptun fountain, Villa d'Este, Tivoli, Italy

THE COMPLEX EFFECTS OF WATER

When water drips from a poorly adjusted tap, people automatically tend to look at it. After several minutes, the fact that one must wait in anticipation before each drop falls begins to irritate those looking on. If, however, the frequency of the drips is increased or their rhythm, tone and strength altered, what would otherwise have been an annoying noise can turn into a calming musical motif. We can enjoy children playing in water, waves breaking on the shore, or the babble of a brook. But when the volume of sound increases and such things sound to our ears like explosions or a rumbling, this can give rise to anxiety. Sounds that had been calming suddenly become disturbing.

Because of their beneficial effect, certain sounds of water are incorporated in buildings. Sometimes they are left in their natural state, as when buildings are built close to lakes or rivers. In the past, architects have not always made use of such opportunities. Even today, wet areas are sometimes drained and ditches left empty. In most cases, however, natural and artificial forms of water are used in combination. A good example is the Tiergarten in Berlin, where artificial lakes and channels have added to the River Spree.



Cascade, New York, USA

Today, even natural waters are adjusted and altered before they are put on display. In Paris, the bed of the Seine has been changed several times, with islands being removed or merged. Architects and town planners have taken action to change the existing environment.

Often, water is present in artificial compositions, so that it becomes the feature of a city. When we see water flowing silently along canals, we become lost in reveries or lay down on the bank. Recently, each August, the banks of the River Seine in Paris are transformed into a beach. Other water caresses our souls, like the water that trickles over the edges of the basin surrounding the Louvre Pyramid. Or it causes us to fall silent, such as the water that runs down hundreds of small pipes from terrace to terrace at the Villa d'Este Gardens in Tivoli near Rome. Its sound makes us fall silent. Indeed, it is a pleasure to listen to the playful, bubbling sound. It is hard to imagine a park without a natural spring or some flowing water.

Fountains are often placed at the centre of a park, indicating its focus. The gurgling of the water serves as a reference point. The images and the sounds of rivers, brooks, and canals running through urban areas also serve as reference points among the mass of ordinary streets.

The water also has an effect on the air. The air above the River Danube in Budapest is more breezy than elsewhere in the city. Even at some distance, we can sense water evaporating from a pool. We notice when water is being sprayed, when sprinkling equipment is being used in the park, and when there is a fountain nearby. Architects have given new forms to such phenomena. The altered forms of water have become elements of “artificial nature.” The New York mini-park serves as an example of the complex effects of water. Water silently trickles from Rome’s Quattro Fontana (Francesco Borromini, 1634) placed in four corner buildings at a crossroads. The four fountains (Fidelity, Strength, the Nile, and the Tevere) have brought fame to this Rome intersection.² In many cities, a single fountain serves as the attraction, such as the small statue of the boy peeing in Brussels. Or at the villa of Cardinal Gambara in Bagnaia (near Viterbo, Italy), the Villa Lanté (designed by Vignola, 1578), where at the end of a system of fountains, the jet of water comes from the nipple of a female statue. In Budapest’s Erzsébet Square there is a fountain whose water flows down from one “saucer” to the next.



Frozen lake and snow-capped mountain, Jyväskylä, Finland



The sequence of fountains in the André Citroën Park, Paris, France

As it falls from various heights, the water changes its sound, from a cascade-like din to a gentle whoosh. The musical effect is combined in the same manner at the Medici Fountain in the Jardin du Luxembourg, Paris, where the sound of the water flowing from the pool has been composed in such a manner as to harmonize with the cascade of the fountain. In other places, water systems have been established; the effect is achieved through various combinations, as in the gardens of Versailles. This example, and that of Villa d'Este, are actually fountain systems.³ A particularly stunning example of such systems are the series of fountains in Paris's Citroën park (1992).⁴ The water is thrown from almost a hundred fountains, situated on a gentle slope. Since the ground rises at an angle, visitors can enjoy the reflection, on the wet stone surface, of the water dance created by the fountains above.

Released at different speeds from so many different fountains, it is as though the water is being pressed out from the various pipes of an organ, with the organist determining the rhythm. The water appears at one place and then another, in individual spurts or as group formations, reaching to the sky or falling to the ground, heading straight upwards or dispersed in a great arch. The pattern or rhythm changes constantly, from a wild dance to a quiet motionlessness in accordance with a computer program. We witness a choreographic, aquatic orgy of spurted water drops.

The spectacle is accompanied by noise, with the latter changing in accordance with the differences in pressure, the size and density of individual droplets, and the various dispersion patterns. Moreover, the changing speed and the distortion and collision of water droplets results in a humming of a thousand different sounds. Not only does the spectacle change, but so also do the sound's volume and character; both relate to the spatial aspect.



Fountain
New York,



Drinking fountain
New York, USA

In addition to these two impulses – the visual and aural, one also perceives a very fine mist, which cools the air during its tardy descent. The fountain’s water droplets fall back onto the platform and then bounce up, throwing additional water particles onto bystanders seeking to cool down. The suspended and jumping pearls of water set the air in motion, causing additional flows of air. The resulting breeze caresses the skin of those who have come to relax at the fountain. Added to the multiple effects of the fountain – the captivating visual spectacle, the soothing sounds, the refreshing mist particles, the unstained air, and the gentle breeze – is the fountain’s ability to encourage us to take deep breaths of pure, sweet-smelling air. The water sprayed from the fountains and evaporating from the pool produces a pleasant smell as it condenses on the surrounding vegetation. People sitting close to the water enjoy the luxuriant odor of wet plants and grass. While a ballet troupe dances to the music of the orchestra, in the case of a fountain the dancing water drops themselves provide the music. The droplets – like the sound of a hand bell, a growl, a sharp hiss, a crackle, or a sluggish hum – perform their dance individually or in unison.

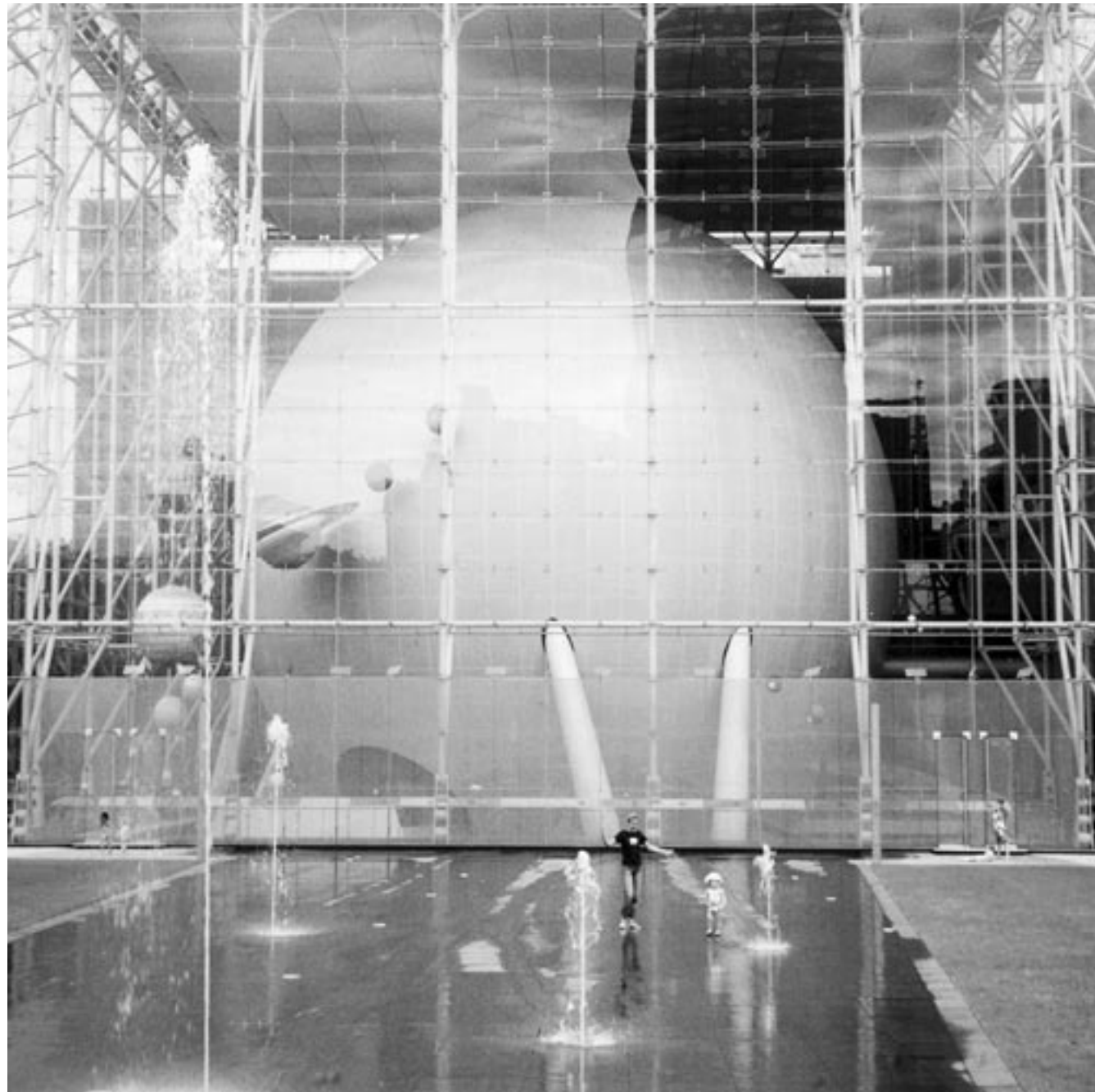
The music produced varies from the harmonic to the cacophonous. The variations are endless – consequences of the decisions, skills, imagination and taste of the composing, electronic sound-mixing “artist”.

Even so, we must ask once again: Is all this architecture? If we regard the supposedly beneficial water and pipes installed in a building as aspects of architecture, then how much more should we categorize water systems that alter the atmosphere of the space around us as such? Water can regulate heat; it can substitute for walls altering the flow of air; it can replace the background music, and enhance the breeze that brings the smells of flowers and plants.

Water is an active participant in the formation of a building’s character. Architects use water to shape environments, and they contribute to the development of new aquatic phenomena. The form, choreography and sound of water will always depend on the intervention of the architect.



The Louvre, Cour Carrée, Paris, France



Just as bamboo rushes could be used to make pipes, and just as stone can be used to make a sculpture and stone powder for painting, so architects form the space around them, and water becomes a means for achieving an architectural effect. Water creates atmosphere.

In the hand of an architect, natural water becomes an architectural element and an artistic work. If we regard, in addition to Bach, Vivaldi, and Liszt, the electronic music of Philip Glass or György Ligeti as art, then the original or altered sounds of waves utilized by the designer must also be artistic works. Water as a visual spectacle, as sound and as motion, is capable of giving rise to aesthetic pleasure.

But it is not only the sound of water that can become part of musical art. The architect, through his actions, can become a painter-artist. A flow of water will repaint a wall, the bricks appearing to be of a darker color. On the shores of San Francisco Bay, a sculpture composition placed in a pool constantly changes its color. Any part of the sculpture that gets wet is affected. Rainfall paints patterns on concrete or plastered façades, as it runs down the surface. Rain comes from nature, but architects are the ones who choose the form, the material. The two together give the color and tone. It influences how we walk too: on marble made slippery by rain we walk differently than we might do on a dry surface. As a result, our kinetic experience changes. In many ways, water alters our impression of a building.

Water surface by the Museum of Natural History's new wing, New York, USA

THE SPACE OF WATER

Water changes our visual impressions of a space, as well as its sound, smell, temperature, and air quality. In consequence, we perceive the space as being of different size, proportions, and character. Our value judgment of a space is influenced by all our sensory organs. In most instances, this is manifested in a complex manner; indeed, the effect itself is complex, since a dynamic and loud waterfall may be accompanied by motionless water with a peaceful aura. This is what happens at the Fontana di Trevi (Salvi and Bernini, 1735) in Rome, where the cascade flowing over the sculptures abates in the pool below.⁵ Occasionally, instead of a cascade, there is merely a tap, and the water is caught in a small basin. This is the other end of the spectrum. There are many possible versions. We can understand their significance by comparing and contrasting them with waterless spaces.

Imagine if the empty area of the Louvre's Cour Carrée (Le Vau, Claude Perrault, 1667-73) were planted with more pools, trees, and a lawn with flowers.⁶ It would become similar to the Jardin du Palais Royal with its fountains, lush vegetation and row of trees. The atmosphere of the courtyard would turn into its exact opposite. Today, everything in the Cour Carrée is made from stone, including the façade, the curbs, the benches and the courtyard cobblestones. Consequently, the visual impression is a hard one. This means, in turn, that the lines of the façade ornaments are even more powerful. There is a clear echo. Although the decorative walls break up sounds, there is no surface that might swallow the noise; it is reflected everywhere. One can clearly hear the clicks of shoes as people make their way across the cobblestones; just one pair of shoes is enough to create a general noise. Wind also easily passes over the courtyard. On the two opposing sides of the courtyard, there are openings, and there is nothing to prevent or divert the wind. Today, this breeze brings merely dust to the courtyard; it does not transmit the scent of flowers, and there are no leaves that would attract the dust and act like a filter. A single, shallow water pool cannot mitigate the heat of the courtyard. The pressure and the general feeling between the existing and the imaginary courts are completely different.

The courtyard has nothing to fix our eyes, an attraction that would give it some scale. And so we do not even look at the highly visible façade, because we just rush across. We think of each perspective as being of the same value. A visual spectacle cannot be properly conceived without objects marring the spectacle or elements giving a sense of proportion. There is an absence of anything that might influence our sensory organs and cause us to take better notice of the spectacle and breathe in the space. We may praise the formal richness of the buildings (works of the architects Le Vau and Pierre Pescot and the sculpture-artist Jean Goujon), the powerful formation of mass, the well-balanced proportions or the noble ornamentation, but something is missing, because the spectacle opens up before us in this sterile courtyard. Doubtless, our notions of the space would have not necessarily been better, just different, if there had been something to activate our sensory organs.⁷



Boat houses, Sausalito, California,, USA

Water manifests itself to us in a thousand ways, in various colors and motions. Sometimes it may appear as an object altered by man (ice), but it can also be an unfathomable “non-object,” such as a breeze that it has caused by a fountain. It can inform us about architecture, while transforming the environment and our own impressions. Another possibility is that we place our house on water, creating boathouses, as was, and still is, customary in Bangkok, Hong Kong or in Sausalito near San Francisco.⁸ The visual spectacle of the house is reflected in the water, while the sounds, having been taken by the waves, spread out a great distance on the surface of the water.

Water is always present as a natural phenomenon, and a builder can often transform it for his own benefit and at his own will. For instance, he can change the route taken by rain by erecting a roof so that everything underneath stays dry, or by constructing a channel on a site or alongside or beneath a road, so that the water flows into a ditch and pedestrians can walk on a dry path. A rain gutter may be added to the roof to prevent water from running down people’s necks. Instead of drainpipes, chains are sometimes attached to the ends of roof gutters; the water runs off the chains. Such chains can be seen in Turkey, for instance. Raindrops fall from chains quietly, and less water is sprayed about. By taking action, architects can create not just a drier but also a more favorable noise environment.

Rain received an important role in Kurosawa’s film *Rashomon* (1951). The significance of the opening and final scenes is symbolic.⁹ The enormous abandoned and semi-ruined gate is first shown in a rain shower, and then, at the end of the film, we see it again after the rain has stopped. The location is the same, but our impression of the building changes completely owing to the rain. Standing alone and on the verge of collapse, the ruin has a gateway that offers little protection from the rain. The scene indicates despair and man’s being at the mercy of nature or fate and subordinated to human interests and emotions. The first image, a rain shower, prepares the viewer for the drama of the film. In contrast, at the end of the film, silence surrounds the gateway. The rain has stopped, and so the narration of events from various perspectives comes to an end; it becomes a part of the past. With the conclusion of the film, we consider the contingency and unpredictability of events and the subjectivity of the evaluations. The pictures before and after the rain, the beginning and the end, demonstrate this change. Rain and its absence express the changes of mood, reflecting the life of those in the ruin. Altered nature is part of architecture.

We cannot create rain, and are hardly able to regulate it, but we are capable of changing its effect or of imitating it. For instance, we artificially irrigate our gardens. We can cover the vegetation with artificial mist. Pipes and sprinklers in the ground – hidden in the lawn or among the flowers – remain invisible, but their effect may be similar. In addition to sustaining the flowers and making the grass more opulent, the fresh air makes us feel good as we walk in the garden and it helps us to enjoy the architecture around us. Feelings of pleasure caused by water or another phenomenon become an architectural factor and as such they may influence how we perceive architecture. In the garden of the Villa Lante park, Vignola included a stone table.¹⁰ The cardinal entertained his guests at this table. A groove or channel was chiseled out of the stone table, along which ran water pumped up from the water system. The priests washed their hands in this little channel on the top of the table before every meal – or even before and after each bite of food. It was a highly practical solution. And water even ran below the table, so that on hot days the priests could soak and cool their feet in it. How much more comfortable they must have felt as they consumed their food and surveyed the façades of the two identical villas. Water changed the atmosphere of the place and the general wellbeing of the priests at the table.

- 1 A design by Robert Zion, 1968
- 2 Paolo Portoghesi: *Roma Barocca*. The MIT Press, 1970, p. 185.
- 3 David R. Coffin: *The Villa in the Life of Renaissance Rome*. Princeton University Press, 1979
- 4 Alan Tate: *Great City Parks*. Stone Press, 2001
- 5 Paolo Portoghesi: *Roma Barocca*. The MIT Press, 1970, p. 464, table on p. 443.
- 6 Jacques Hillairet: *Dictionnaire Historique des rues de Paris*. Les Éditions de Minuit, 1963
- 7 *Le Grand Louvre*. Le Moniteur, 1994
- 8 1979 Gaston Bachelard: *L’eau et les rêves*. Librairie José Corti, 1942
- 9 Akira Kurosawa: *Comme une autobiographie*. Seuil, 1985
- 10 David R. Coffin: *The Villa in the Life of Renaissance Rome*. Princeton University Press



WIND AND CALM

SEGESTA

In Goethe's words: "Without Sicily, Italy cannot be fully understood. It is here one finds the key to all things." I finally traveled to Sicily in the summer of 1981. My visit to the island convinced me that classical Greek architecture cannot be properly understood without knowledge of Sicily. From Palermo, my first trip took me to the ruined temple of Segesta, known in Ancient Greek as Egesta. At a rather lonely train station, I was told there was no bus, but that the ruins lay in the vicinity. A road sign helped, but it was the temple itself that directed me as I soon caught sight of it. It lay on one of the two hills above the valley. Both hills were framed by more distant mountains. The ancient village – long since abandoned – was located on the left side of the valley, with the temple positioned on the facing hill. At a greater distance, on the highest point of Monte Barbaro, a hill behind the valley, the ancient amphitheatre was visible.

The temple was erected in the middle of a clearing on a small hill; it seems to have been dedicated to Artemis, Aphrodite or Demeter. Behind the temple, a further valley rises gradually before merging into the remote mountains that embrace the plateau. Construction of the uniquely positioned Doric temple began in 425 BCE. The building's present condition is just as good as it was 2400 years ago when construction work was halted. Even now, archaeologists are puzzled why the builders stopped work within decades of the start of the construction project. But an even greater mystery is why the inhabitants of the local village started to construct such an enormous temple – which was out of proportion to the size of their settlement. The site was never hit by an earthquake or ravaged by Barbarians. The unfinished temple never served as a place of pagan worship, so it was left untouched by the Christians. Even today, the temple better represents its era than do many similar buildings erected concurrently that are now mere ruins.

One of Sicily's oldest settlements, Segesta was originally inhabited by the Elymians rather than the Greeks. It is unlikely that the inhabitants of the small town were capable of building the temple without outside help. Although the settlement was built on a hill, it had no Acropolis. Strangely, no traces of other buildings have been found near the temple. But why build a temple that obviously exceeded the material capabilities, size, and requirements of the town? To complete the project, the locals must have benefited from the assistance of other, richer settlements; the temple's architect was probably an Athenian. In the course of its history, Segesta repeatedly forged alliances with other states in order to counterbalance other hostile cities. The cities of Selinus, Siracusa, and Akragas may have offered their assistance. But why was the temple erected at an isolated spot, away from the settlement? What could have been the temple's role? Was it perhaps the symbol of an alliance between cities? Was it a place of relics? Was it a place where the allies could call upon all their gods to assist them in their battles? And did their alliance then come to an end? We can only guess.^{1,2}



Today, a car park stands at the entrance to the valley; alongside it, there are several drink stands. From here, there is a good view of the narrow, overgrown and winding path that leads up to the desolate temple. As one climbs the steep bush-lined path, only half of the temple is in view. But in the hot sunshine one's gaze is not really upon it. The sun and the incline soon make one sweat. The Elymians must have profoundly respected their gods, in order to build temples on such high hills, dragging the construction stones up the steep slope under a sun that must have been just as hot then as it is now.

After the arduous ascent, I arrived at the plateau with perspiration running down my neck. I got my breath back and began looking around in a sense of relief. The stones of the temple glistened in the sunshine before me. Perhaps I would have lain down, were it not for an unexpected breeze that brushed my front and blew right across the top of the hill. The breeze surrounded my body, removing the drops of perspiration from my face. I inhaled the fresh and revitalizing air. My eyes were no longer stinging from the sweat. I surveyed the scene before me; it was both compensation and reward. Is this how nature and the goddess Artemis herself sought to facilitate the work of the temple builders two and a half thousand years ago? Would this have given satisfaction to the inhabitants, as if they would approach their gods? Perhaps this breeze could make the pagan god-worshippers more receptive to prayer and more willing to serve their gods?

Antique temple,
Segesta, Sicily

The wind bends the wheat



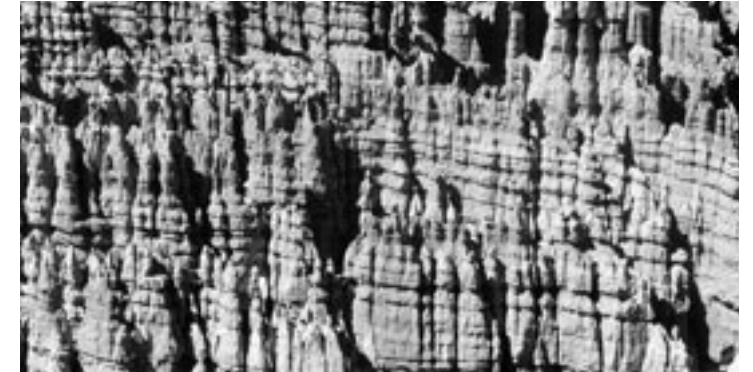
I walked around the ruins, admiring the temple's intactness, its sublime, noble proportions, and its unique and majestic position. And then I lay down nearby. The breeze, which blew across the hill parallel to the valley, henceforward softened the burning rays of the sun. The grass and wild oats surrounding the temple, as well as the meadow flowers, bent to one side, even when the wind apparently dropped. I realized that here on the plateau it was always windy. Is it possible that the compass-sensitive Greeks considered the role of wind alongside the importance of a dominant position when selecting the site? Was it a coincidence or a conscious decision? And when selecting the site, did the planners consider the strength and direction of the wind? Perhaps these reasons are not as important as the end result which affect our perception of the temple.

A breeze is a part of nature, but it is the architect who determines how such features are to be used and how to best position the building. A breeze may be included as one of the criteria. The builders of the temple could have chosen a wind-protected site or a location where a strong wind blew all the time. It was their decision. Nature, in this instance the wind, contributes to our impression of the temple. Invisible wind shapes our visually perceived architectural experience. Wind may wear away at a building and it may have a direct effect on the viewer's resonance – even if it does not actually change the architectural object. In our case, the change takes place primarily in the individual himself. Perception always depends upon the relationship between the object and the viewer (the person perceiving it). If change occurs in either of these, the perception will be altered. If there was not a refreshing breeze at the top of the hill, people arriving after a long climb would perceive the temple in a rather languid state, caused by the hot rays of the sun. The object is unchanged in a physical sense, but thanks to the breeze, its perception is different, because the viewer's sensation is altered. The spectator has been refreshed by the breeze and is no longer bothered by his dripping perspiration. And so the building appears even more sparkling and its contours even sharper. In such circumstances, wind can have a direct effect on us.

But can the breeze have an indirect effect? Does the breeze have an effect that one might classify as an architectural element? Indeed, can a breeze be an architectural phenomenon? Does the breeze shape our notions of the temple by architectural means or not? Can wind be a factor contributing to our architectural perception?

RAW WIND, PLEASANT WIND

Walking the streets of New York, one often feels the wind, because of the north-south wind tunnel, formed by the Hudson River and the East River. The wind is affected, in terms of both strength and direction, by man-made objects (the high-rise city blocks lying alongside the streets). Pedestrians are often caught out by the wind – particularly at intersections. At such times, it is difficult to focus our attention on the city's architecture. In contrast, in Chicago, wind flow tends to be rather eddying. The wind coming off the lake can turn into a whirlwind as it hits the high-rise blocks of the loop. In the cold, we fasten our coats and scrunch up our eyes, as the wind begins to pick up newspapers and dust. We see the town against the background of paper and filth flying in the air.



The wind-formed rocks of the Bryce Canyon

Architects can use wind to create both pleasant and unpleasant environments. By enhancing the airflow, they can cool rooms in a building. The air in a tunnel is cooler not just because of the effect of earth insulation, but also because of the wind blowing through it. In hot weather, we welcome cool air. But the pressure of cool air can indicate the arrival of the next train in the subway system. In this case it feels unpleasant.

The water from a fountain in a park sprays the adjacent area; its mist is refreshing. The movement of the water creates a breeze, and the draft caused by the two temperatures (the cold water and the heated air) cools the air. We enjoy it. This is why fountains are placed in the courtyards of atrium houses. The spraying of water creates the same effect as does a ventilator. A passageway through the house or courtyard arising within a building can serve to enhance the airflow, thereby cooling the various parts of the house. Wind movement can be used to create many different effects. There will be one effect if the wind is allowed to blow unhindered between high walls and another effect if objects are placed in its way, giving rise to turbulence. In contrast, airflow will be limited in a space surrounded on all four sides by walls; such courtyards may become stuffy and suffocating. Whether an architect creates cool, light, sunny or draft-free spaces will depend upon his imagination, and decision.

Wind has great power. In a hurricane, it can bring destruction to whole regions. Even a light wind has a gradual eroding effect. On the coast at San Francisco, the trees lean over, owing to the prevailing direction of the ocean breeze, eventually breaking. The beauty of Utah's Bryce Canon – its glistening red rock – derives from wind erosion (the red color is the consequence of iron deposited by the wind on the limestone). As a result, the canyon resembles an enormous Gothic cathedral with adorned columns, or a church choir awaiting the conductor's signal to break into a song praising nature.

Architects take into account the power of wind when rounding off, inclining and refining a building's shape. Just as automobile designers develop aerodynamic models, so both architects and structural engineers must take wind power into account. In Chicago, buildings are erected to withstand wind and storms. Solutions elaborated by structural engineers affect building design, with buildings being rounded off (Goldberg's Marina Apartments in downtown Chicago or György Szrogh's Budapest Hotel) or cross braces to be added to the façade (SOM: Hancock Tower, Chicago or Foster Associates: HSB in Hong Kong). Wind moves buildings; indeed, the upper floors of a high-rise may oscillate in the wind. When high-rises are built close together, a space measured in meters must be left between them – to prevent them bumping into each other.

“Just as automobile designers develop aerodynamic models, architects have to take into account the power of wind when rounding off, inclining and refining a building's shape.” A.B.



The Budapest Hotel on a stamp.
Budapest, Hungary,
architect: György Szrogh

Just like at Bryce Canyon, wind erodes and grazes buildings. For this reason, the windward side of a house is often protected by harder material: instead of plaster, a metal covering is used or, in the case of a wooden building, a type of hard wood. The wind “paints” the surface of a building – steel becomes rusty, bronze receives a patina, plasterwork is dull and gray. Sometimes, the wind will remove ornamental features or damage the entablature of a plastered elevation.

Architects do not just safeguard against the wind; in a variety of ways, they also make use of it. In the 19th century, windmills were a common sight. In rural areas today, one sees, with increasing frequency, wind turbines high above the ground. Wind power plants are particularly common in Minnesota and California in the United States, as well as in The Netherlands and Denmark in Europe. In the latter case, they provide 10 percent of the country's total energy needs. Such wind turbines do not just provide energy or indicate the strength and direction of the wind.

With their humming sound, they also become part of the noise environment. In addition, they alter airflow, so that the wind blows differently in their vicinity, and we feel different, too.

Calder's mobiles and other similar sculptures do not produce energy, but they are beautiful to the eye. The blades move when a slight puff of air hits them – the flow of air and the spectacle change continuously. Mobile elements are part of architecture whether the gadget is moved mechanically, such as in the case of a ventilator, or the movement is due to the wind (windmill). In many cases, one might ask what does the movement actually do and what is the reaction? I am reminded of the renaissance picture where people move the wheel inside a mill to create wind outside – like a kind of reverse windmill.



Windmill, Skanzen, Stockholm, Sweden



Wind power plant, Inota, Hungary



Flags in New York, USA

A flag flying in front of a building is a visible consequence of wind. Such windborne standard bearers do not just flutter in the wind; they also give off sounds: for instance, when the wind beats a flag against its post. The wind also makes ivy rustle against the wall and sun blinds twang against the window frames, beating the taut linen. It can roar up the chimney or through thin gaps between buildings. The wind informs us audibly of its power.

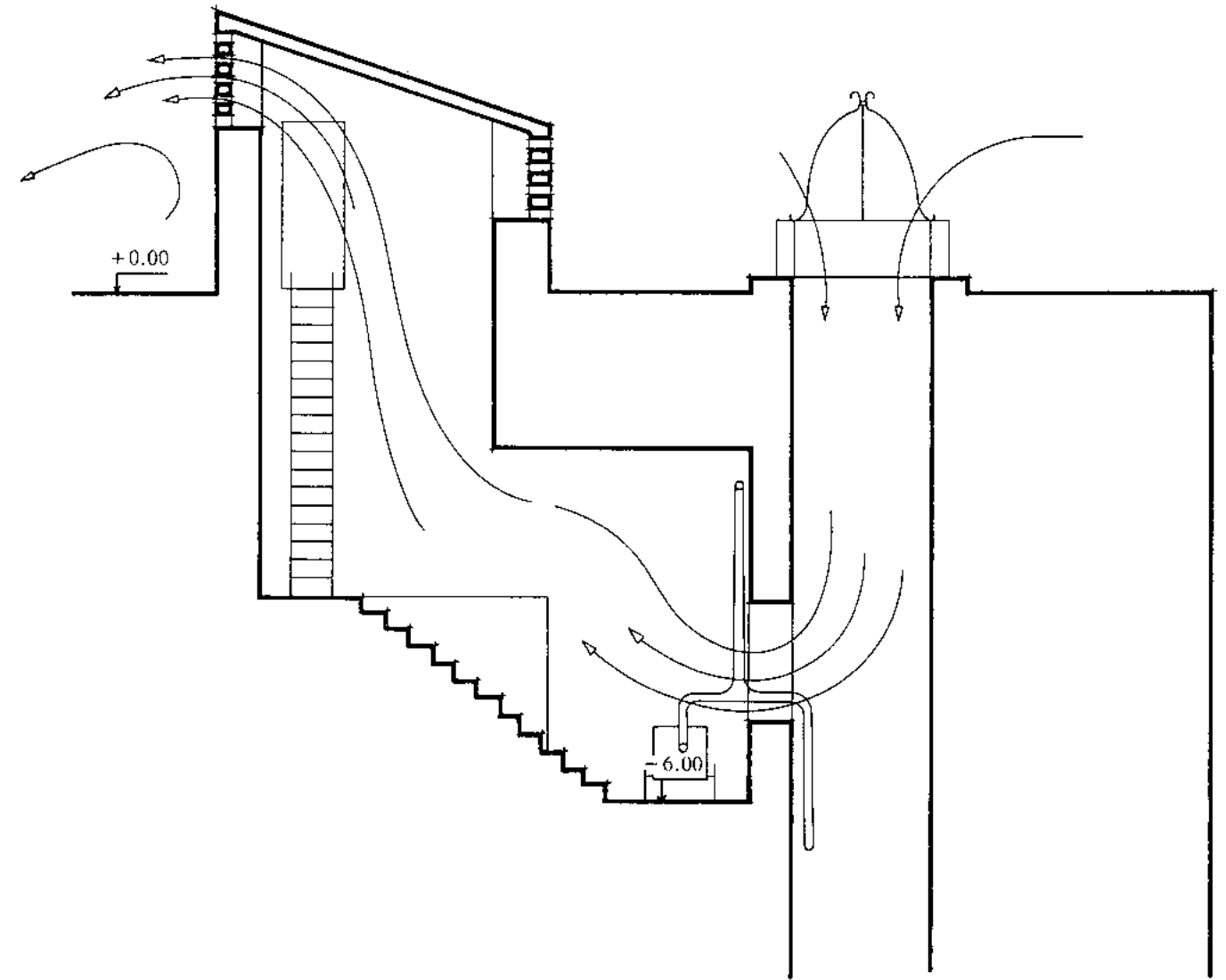
DESIGNING WITH WIND

Wind flows are just as much part of architecture as are other aspects of nature: the ground under a building, sunlight – without which no building would be visible – or the material taken from nature to construct the building. The Segesta temple was put in the way of the wind in the same way as it was installed at the top of the hill. What happens afterwards to the wind? Although a gift of nature, wind undergoes a transformation in the course of a construction. A building positioned in the face of the wind, will divert the wind. The wind will not blow where it used to blow. And where the wind does still blow, it will blow differently, because its forward direction will have been altered.

And the nature of the wind will have changed, too; it will have grown stronger in the new wind tunnel (between the walls and the columns); there will be turbulence where protrusions of the building have created disturbances; and it will have abated where walls have been raised around a space. Architects hold the wind in a yoke; they can shape the wind, and can even plan using the wind. By building walls, they establish spaces with different airflows, influencing the nature of the wind – from making it motionless to stirring it up.



The Gozdsu Courtyard, Budapest, Hungary



Cross section of the air flow in a typical Egyptian house

Stillness can be created within or outside a building. People desire windless corners where they can read and relax without disturbances. Buildings need protected areas just as much as they need drafty spots. And people need walled courtyards just as much as they require ways through buildings leading from one place to another. The passages of Paris are covered and the air does not move. The square is closed on all four sides; it is more like a closed courtyard than a recess cut into the block. At intersections in Manhattan, the corners appear bitten off the buildings or the front yards of buildings are pushed back from the street, which, wedged between the neighboring houses, protect pedestrians from the cross draft. A glass roof, taut canvas, a wall, a series of trees – all of these help to create spaces protected from the wind, enjoining to silence. Every nook and cranny has its own breeze, or its air is motionless but differently so. For this reason, care should be taken when cutting space into a block and deciding upon the height of the walls. Instead of a windless place, we might easily create turbulence, just by changing the proportions of the courtyard.

Apart from changing its size, there are other ways of altering the nature of an air-space. Just like walls, an architect can use windows, doorways, and open spaces to shape the blast-pressure. He or she can do this, for instance, by cutting across a building's siding at both ends of the closed courtyards and allowing the airflow to move freely. Depending on the opening made, we can determine the nature of the breeze or draft created. If we press air through a narrower and longer opening, we shall accelerate its motion. The quicker the flow of air, the cooler the space will feel. In the summer, as we enter the gateway of an apartment building, we are struck by the coolness of the air – in contrast, the air of the street and courtyard seems warmer. If we build a series of courtyards or passages (such as the Gozsdu Courtyard in Budapest), then we shall pass through a great variety of wind spaces and courtyards of different temperatures. The more an architect varies the size of the courtyards and the connecting passages, the more varied the airflow and temperatures will be. Passing through similar combinations of courtyards and passages (such as in London), one experiences a variety of calmness, drafts, and turbulences.

The movement of air also applies inside apartments, particularly where a through draft has been intentionally included. The "lofts" in England are good examples of natural ventilation, because windows can be opened at both ends of the apartments, which run from the street to the courtyard behind.

A draft arises between the two sets of windows, making it easy to ventilate (and cool) such apartments. The system has also been employed in larger buildings, such as in Philip Johnson's Crystal Cathedral (Garden Grove, California). Crystal Cathedral, whose complete façade comprises glass panels, is kept cool by an intentional cross ventilation.

Among others, Indians, Pakistanis and Egyptians were traditionally the best exponents of natural means of regulating temperature.³ They knew how to direct wind through a building and how to create a draft within a house, thereby cooling the interior. In their ancient houses, they used openings and flue systems, drawing up air from the cool cellar. They directed hot air coming from outside the building through a system of flues to the cool cellars, which were protected by the earth. Here the warm air was cooled down by being forced through stones and gravel. The cooled fresh air was then sent up other flues into the interior of the building. The flues were equipped with roofs that increased the draft, ensuring the maximum flow of air.

Such regulators, draft-enhancing panels, which were fixed at an angle to the roof, are now typical motifs of cities and villages. At the Repulse Bay residential complex in Hong Kong, an enormous opening, several floors high, has been made, so as to avoid disturbing the dragon's view, in accordance with the principles of feng shui. A practical side effect is that the wind can blow through, which diminishes the pressure on the building. A similar effect is sought when flags are pierced with holes in order to prevent them from being blown to pieces by the wind. On the entrance level of the ground floor, an open passageway enhances the airflow. The external areas heated by the sun and the passageway beneath the building, which is protected from the sun, create a natural temperature difference and thus increase the airflow (this happens in the entrance passages of the Royal Palace in Prague (Hradčany) and in Vienna (Hofburg)).

An original thought is realized in a family house designed by Tadao Ando in Osaka, Japan (Azuma house, 1975).⁵ Set amid a whole series of row houses, the building gets little air, since it is isolated from nature. Ando's idea was that, even in such an extreme case, it should still be possible to incorporate nature, in the form of wind and rain, into the house. He divided the two story high house, into two parts, separating the two spaces by a court.



Tadao Ando: Azoma Building, Sumiyoshi, Osaka, Japan

On the upper level, he connected the two areas with a bridge. The bridge is uncovered, so whether there is rain, wind, snow or hot sunshine, the residents have no choice but to pass across the bridge in order to reach the private spaces, which are for relaxation and sleep. Crossing the bridge, they may get soaked to the skin, frozen by the cold wind, or boiled by the sun, but in this way – and notwithstanding the absence of trees and grass – the inhabitants can feel they are part of nature. Pleasant and unpleasant impressions inform us about the external world and they shape our feelings as we attempt to conceive our environment. The wind's absence (stuffy air) or presence (draft) is a factor determining our impression of the outside world and architecture. In Ando's design, wind as part of nature becomes its symbol.

We can feel nature – including the effects of wind – on our skin, in our ears, and around our refreshed head. The wind can caress, unsettle and refresh. Its absence can make leave us feeling languid. But when the wind does blow, it may also be accompanied by a deafening howl or blinding dust; it can transport smells and sounds as well as cause pain. Its role in architecture is a varied one: it can change the visual spectacle, the medium by which the spectacle is perceived, and the mood of the viewer. Wind informs in a lively manner about a building. Just as light makes visible architectural elements that were previously hidden in darkness, so wind tells us about the shapes and position of the building. It may tell us something about sizes, proportions, masses, and cavities. It becomes a part of architecture, whether by influencing the design of certain aspects of a building, by continuously shaping an otherwise complete building, or by moving various parts of a building, thereby changing the visual impression. In addition, wind also influences how we perceive and sense a building. Wind is an architectural phenomenon with both beneficial and harmful effects.

- 1 Vincent Scully: *The Earth, the Temple, and the Gods*. Yale University Press, 1979, pp. 97-98.
- 2 Margaret Guido: *Guida archeologica della Sicilia*. Sellerio Editore Palermo, 1983, pp. 49-54.
- 3 Hassan Fathy: *Natural Energy and Vernacular Architecture*. The University of Chicago Press, 1986
- 4 Bernard Rudofsky: *Architecture without Architects*. Doubleday & Co., 1964
- 5 Francesco Dal Co: *Tadao Ando Complete Works*. Phaidon Press Ltd., 1996, pp. 59-61.



SOUND, NOISE AND SILENCE

SOUND

“Can architecture be heard? Most people would probably say that as architecture does not produce sound, it cannot be heard. But neither does it radiate light, and yet it can be seen. We see the light it reflects and thereby gain an impression of its form and material. In the same way we can hear the sounds it reflects and they, too, give us an impression of form and material. Differently shaped rooms and different materials reverberate differently.”¹

ESZTERGOM CATHEDRAL

In the early sixteenth century a Renaissance chapel was built in Esztergom, a Hungarian town 30 miles to the north of Budapest. From the eleventh to the fifteenth centuries, Esztergom served, with interruptions, as the seat of the Hungarian kings. Moreover, ever since the eleventh century, the town has been the seat of Catholic archbishops. It was here that in 1506-07, Tamás Bakócz, cardinal of Hungary, oversaw the construction of a sepulchral chapel, which was then named after him and which has always been regarded as an outstanding example of its building type.² The chapel was originally a separate building; just one side of it was attached to St. Adelbert’s Cathedral, a building that was later demolished. Between 1822 and 1856, the chapel was removed from its site in 1600 pieces and then reconstructed as part of the new, classicist cathedral. Subsequently, many of the functions of the chapel were transferred to the new and larger building, but this did not diminish the value of the interior of this unique artistic work.³

The Cathedral of Esztergom (designed by Pál Kühnel, János Pach and József Hild) was built on a central ground plan between 1822 and 1856.⁴ It remains to this day Hungary’s largest cathedral. The building is dominated by an enormous dome (interior height = 2815 feet) and by the grandiose and unusually bright central space beneath the dome. Within this large-scale interior, the space below the cupola, the cylinder and the spandrel, seem remarkably bleak.

Apart from a small amount of architectural decoration, the walls are bare. Columns, sculptures, chandeliers or other ornaments are surprisingly scarce; paintings are the main form of decoration. Visitors to the cathedral are immediately captivated by the immense dome; its great size causes them to fall silent.⁵

The Bakócz Chapel is accessible through a narrow passageway leading from the nave of the cathedral. The visitor has to scuttle into the chapel, for its entrance is pressed into the wall. In terms of scale, colors, plastic form, and spirit, the chapel is the complete opposite of the main cathedral. The restful and somewhat elongated composition of space, the classical proportions of detail, the dignified handling of surface, and the depth of the red marble surfaces together create a milieu that is both commanding and intimate. Notwithstanding its human scale and noble proportions, the chapel is not dwarfed by the classicist cathedral. Even today, it is to see the chapel that those who value architecture come to the Cathedral of Esztergom. The main part of the church always seems unusually vacant and hollow, even when the faithful attend mass and, sitting or standing in rows, they swarm across the stone floor. In contrast, the Bakócz Chapel is intimate, even when viewed by the lone visitor. He or she will never feel alone; thanks to the architectural forms, their physical body fills the space.

Several decades ago, on a visit to the chapel I became aware of a peculiar murmur. Reverberated sounds from the cathedral streamed into the chapel. My curiosity led me back to the cathedral nave. In one of the cathedral protrusions, sitting in the carved wooden pews reserved for the clergy, twenty-four canons were singing psalms, responding to the chants of the elderly prelate facing them. The prelate began the singing, and from his threadbare frame, a high-pitched and faint sound ascended to the cupola. From time to time the prelate's voice faltered, the broken pieces of his song falling back down to the floor. But once he had taken another breath, they rose once again to the heights, to the highest windows: may they continue to sound and flow, up there, by their own volition and freely.

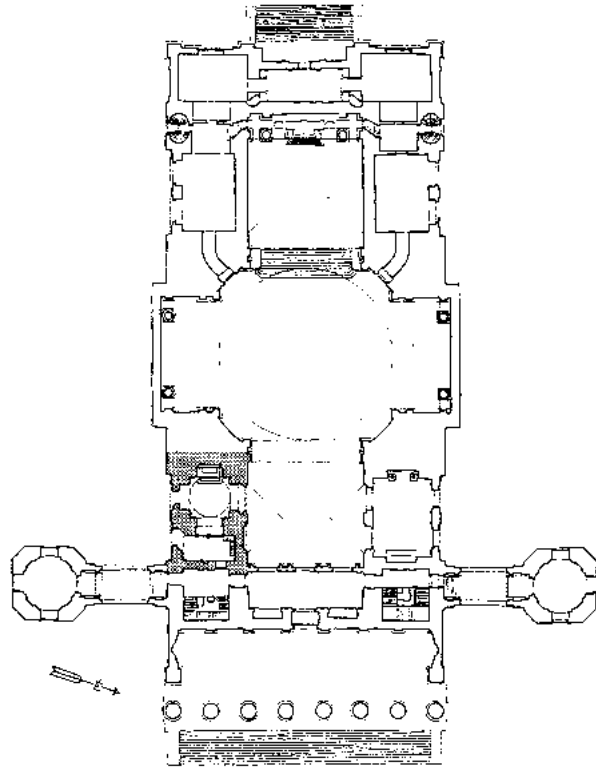
Twenty-four throats responded to the chant. Following the snatches of sound high above, the chorus began two octaves lower, respectfully and with a sense of detachment. It was as if they wished to underline, in the lower regions, the wavering and sometimes faltering call above;

as if the response might have come from the depths of the Earth. Their chant seemed rather monotonous, more of a rumbling noise than a song. And yet the sound was not dull, but resembled river water, whose waves pound upon the riverbank in a rhythmic manner, pushing any pebbles back and forth. By virtue of these sliced and distorted sounds, the noise of the waves became a murmur and then a roar. The accidental delaying and other momentary distortions added richness and depth to the monotone parts.



View from the Bakócz chapel
of the Basilica of Esztergom, Hungary

Gradually the growling voices of the choir reached up to the heights, thereupon scattering in all directions. The canons' chorus rumbled on, and the walls resonated. High above, and again far below, alone and together, the dialogue continued without interruption, the trembling, enticing sound being replaced by a robust murmur. The sounds at higher pitch more easily infiltrated the space between the pillars of the cylinder-shaped barrel, thereafter flying across to the opposite wall of the spandrel beneath the cupola. The echo broke many chords, some falling in a clatter to the stone floor of the church, others clinging to the heads of the pillars high up. Still others – with their strength renewed after resting – cling to the trunks of the pillars, slipping gradually downwards in final descent. Just a few danced across from the heads of the pillars to the entablature, whence they tempted their fellows below.



Ground-plan of the Basilica of Esztergom with the Bakócz chapel (hatched area)

The heavy sounds in the depths leisurely acted out the cumbrous dance of the frieze-clothed friars and of those pounding hard on the stone floor. From time to time, they caught the sounds as they fell and threw them back up into the heights. Their task fulfilled, they rested in anticipation, rising immediately in response to the first call and then reaching every nook and cranny of the church, so as to occupy all vacant space between floor and ceiling. The church became full of the singing of psalms: with full sounds, dance, vibrato, and a hanging veil. It seemed to me that the space in the church had become full. The church was no longer a large empty hall, where one might feel insignificant, small, and unprotected. The sounds ran right up my back. It was a quivering feeling. The humming of the music went right through me, the sounds filling my body. I became tense, and it seemed like I filled now the empty space between floor and dome. This was just an illusion; even so, I no longer felt alone.



The part under the dome of the Basilica of Esztergom

The priests closed their books of prayer and concluded their singing of psalms. They arose and left in procession, taking their voices with them. The walls continued to reflect the last snatches of sound, the echoes settling down on the stone floor or squeezing themselves into the crevices and between the pleats. The space became emptied. Indeed, within moments the space was as vacant as it had been before the psalm singing began. The pressure within me decreased as well. For a while I retained several sounds in my ears. But then there was stillness, and I was left by myself.

What happened in the Cathedral of Esztergom? The singing of psalms filled a space that had been empty; and the atmosphere of the church became dense with sounds. It was as though the enormous space had been filled in; sounds took over the role of people, buildings, and furniture. Sound became an object. Under the influence of song, our notion of space changed. This phenomenon, perceived in an auditory manner, has the same effect as visual perception. But has our vision of the space really changed? It seems that auditory perceptions can, under certain circumstances, contribute to the development of visual notions, producing synesthesia.

The objective space has not changed, of course. But our impression of the space has altered. The observer has become full of sounds. The murmuring sound, like some kind of “musical cloud” has passed through the person. Now a denser space has influenced the observer, and his impressions have been transposed onto what he observes. The visitor to the cathedral, surrounded by these sounds and saturated with them, no longer feels lost in a large space or stunned by the enormous dimensions. The Bakócz chapel is diminutive in comparison with the size of the main part of the cathedral. The diameter of the chapel is 20.5 ft., whereas the cathedral is 416.68 ft. long and 157.5 ft. wide. Even so, it seems that this difference in size diminishes under the influence of sound. On entering the church, the “changed person” has a different impression of the otherwise “unchanged space”. The contrast between the two spaces – cathedral and chapel – become the sole difference. The information we receive by means of various channels serves to transform any unified notions of the environment. It is not the case that auditory perceptions act on their own to change our visual images of the space. Instead the two means of perception act together to shape our sensation.

SOUND CAUSES THE SPACE TO BECOME DENSER

In the cathedral, apart from the pews, there are no other things dividing up the space. Without objects it is difficult to acquire a sense of scale. Our judgment of scale is affected by the distribution, position and number of furnishings. But the effect is not always clear. Several of them permit us to make a relative comparison – as the eye wanders from object to object. Our sensation of the dimensions of a space will not just be based on its size, but will also depend on the obstacles holding our attention. As the number of objects increases, so our perception of space grows – at least to a certain point. When, however, there are too many obstructions, we become overwhelmed by them and our judgment of space deteriorates. Building elements block our vision, and we can no longer see the wall in the distance. The spatial dimensions begin to decline. Clutter causes a reversal in the growth of our visual impression. Our notion of size thus depends on the number of objects present in the space.

The louder space seems denser in a visual sense, too. The judgment of distance is distorted in a similar manner when clouds, fog, rain, smoke or heavy, oily smells come between object and observer. In a similar manner to the above visual examples, sounds and smells can both thicken or thin the air under certain circumstances. By doing so, they change our judgment of space and distance. The information we receive by way of the various senses acting as parallel channels, gives rise to a unitary sensation which includes the visual.

Continuing the above analogy, we can say that the psalm singing in the cathedral has shaped our impression in two ways, both as song and as a fog of varying sounds. The introductory chant of the elderly prelate rose toward the dome as if it were the lonely ditty of a songbird. His plain chant did not change our impression of the space above us in the church. Instead, it was more like a decoration on the wall, an addition to the plastic ornaments that were already there.

But as the single voices began to multiply and the choir started singing in various tones and at various pitches and volumes, this sound-mass disintegrated the interior of the cathedral and spread throughout it. It was as if a full orchestra or organ had been playing. The music stereotypically occupied the church, infiltrating every part of it. As if a three-dimensional music score had been placed in the space, a mobile music score or musical choreography, in accordance with which the sounds constantly changed positions. Alongside the individual “sound objects” came the “sound fog” and the space became more congested. So long as a single sound can rise up freely in a given space, we feel that space to be large, and open. So long as sounds serve to give us a sense of scale and act as musical pointers for the purpose of measuring space, then the space will widen out before us. But if the sounds continue to multiply and strengthen, as happened in our case when the roar of the canons replaced the chant of the soloist, then the trend will turn around. Were the choir to exercise its powerful voice to the full or all the pipes of the organ to sound, we would most certainly feel that the space thickened with sounds was bearing down upon us. If we also take into account that echoes add to the confusion of sound and that the walls do not absorb most of it – but that sounds reaching the bare walls of the cathedral are first broken up and then thrown back – then the clash of voices may even split our eardrums. Under such extreme circumstances, the faithful waiting for devotions would flee the pressure of the chant. The volume of sound could reach the strength of an earthquake (see the section below on Kubrick’s *A Clockwork Orange*).

METAMORPHOSIS

The capacity of sounds to form notions of space is often used in architecture – sometimes unconsciously, sometimes intentionally. Music is often to be heard as one enters a restaurant, creating the impression of a less vacant space even when there are few other guests. Music serves as a substitute for absent guests. Music not only creates an atmosphere but also permeates the body of the listener. No space is completely silent: the rustles of nature, mechanical noises, human speech or music are always present in some form and to some degree. Even at recording studios, silence is not complete – although the acoustic surfaces in such places are supposed to absorb all sounds.



Young man submerged in his music,
Union Square, New York, USA

By its very nature, the milieu in which we live is full of sounds – sometimes excessively loud ones. On the streets we often encounter young people, or not so young people, wearing headphones. The walkman for them is a bit like the shell for a snail. They want to remain in their own musical world, where they feel comfortably at home. At the same time, they seek to shut out or neutralize the pressures of the external world, so that they may enjoy their preferred atmosphere and identify with their chosen music, living in their own individual “sound shells”.

Of course, an appliance with headphones is enough for this – but some want to achieve more. Young people without headphones but with portable stereos booming out their favorite music seek, above all, to give others a message. The hurricane of sound is less about establishing an imagined internal milieu. Instead the aim is to make a statement to those around them and the external world.

They want to establish circumstances in which other pedestrians and their friends will perceive them as wrapped in their music. Their aim is that others should form opinions about them by way of their music. Here, the function of loud music is not to create or sustain an atmosphere for somebody's private life, but to demonstrate that person's strength and significance. The real aim is to force their way of life – both its musical and its non-musical aspects – onto others, and to create a space by means of sound.

THE DISTRIBUTION AND REVERBERATION OF SOUND

As our surroundings have become increasingly noisy, architects have realized that they, too, must regulate the distribution of sound. Building regulations impose an increasing number of rules in this area. Meanwhile, new construction materials and methods are helping to ensure that unwelcome noise is eradicated from our everyday living environment. Sound insulation has become a special field of knowledge and activity. The inner rooms of a building are surrounded by insulating shells. Double-glazed windows and sound-insulating walls that reduce vibrations and prevent the spread of noise have been installed, while materials that transmit sound have been eliminated. Maximum insulation has had to be achieved in music recording studios, where sealed sound vacuums that are acoustically dead perfect the absorption of sound. In other places, such as conference halls and foyers, acoustically regulated spaces have had to be created on the basis of other criteria. Sound engineering has indeed become a very complex profession.

Architects have been struggling to regulate the distribution of sound for thousands of years – both indoors and outdoors. In earlier periods, a lack of mechanical equipment meant that considerable attention needed to be paid to space inside cathedrals and theaters, because architects and builders had only the simplest and most natural solutions at their disposal.



The Epidauros Theatre, Argolis peninsula, Greece

The best example of a classical Greek theater was constructed at Epidauros on the Argolis peninsula in around 350 before our era. Today it is considered to be one of the best preserved ancient Greek theaters (It is only recently that a few changes were made to the building). The acoustics of this open-air theater are so good that as many as 14,000 spectators could hear every word – and even whisper – spoken by the actors. Wherever one sits in the theater's auditorium, the view is splendid. Indeed, it is possible to see, above the theatre's proscenium and property room, the view stretching into the distant mountains. The greatest attraction is the line of valleys running between the facing hills, its axis coinciding with that of the theater.

Behind the last row of the amphitheatre the hills rise as though they were a natural continuation of the building with its steps. The horseshoe-shaped auditorium has been delicately placed in the line of the valley. Its position is a master stroke: the building melts into its delightful and gently sloping surroundings. The valley also determines the distribution of sound. Any sound coming from the stage passes without difficulty over the whole of the auditorium, reaching even the furthest row – row 55. The hill wraps itself around the horseshoe theatre like a slice of bread. The physical attributes of the site were used skillfully and to the full by the building's inventive creators. During my visit, students from the local high school were stage rehearsing a Greek drama that was unknown to me. The rehearsal was taking place on a floor that for the time being covered the proscenium and the orchestral ark. I realized with amazement that although I was sitting in the back row, I could still hear even the quietest conversations being held on stage. The acoustic feat of daring became fully apparent to me when, walking back towards the actors on stage,



Detail of the San Cristobal complex, Mexico City, Mexico

I realized that the actors were not speaking with raised voices. The natural spectacle, the theatre's insertion into the landscape, and the effortless distribution of sound, took me by surprise. The Greeks knew how to make good use of the physical environment. Their man-made work was built to accommodate the path of the natural distribution of sound.⁶

Builders have made use of the natural paths taken by sound waves for many centuries. We know of many flues in medieval mansions that were designed not just for ventilation purposes, but also to allow people to overhear conversations underway in other chambers. An example of such a flue is mentioned by Alexandre Dumas in his novel *Reine Margot*: in the Louvre, the queen, lovers and conspirators listened or spoke to each other by means of various secret shafts installed in the walls. Fellini alludes to a similar secret transmitter of sound in his film *Dolce Vita*: in the palace of a Roman aristocrat, Anouk Aimée and Marcello Mastroianni listen to the conversation of their friends by means of a cavity in the wall. Such auditory flues were incorporated in several Renaissance chateaux in the Loire Valley (e.g. Chambord).

Buildings act to regulate the distribution of sound, whether accidentally or intentionally and in accordance with the wishes of the architect. Any architectural feature will alter the path of sound, by stopping or diverting it, thereby forcing it to take new routes. A convincing example is the wall composition of the poetic Mexican surrealist architect Luis Barragan.⁷ In the gardens designed by him, the freely standing walls are considered to be statues. The spectacle is captivating in itself. The role of these lonesome walls is not to create rooms; nor even is it to separate indoor spaces from the outside world. Barragan composed his free-standing walls by making use of the natural characteristics of the site. Applying the simplest of materials he created outdoor spaces and special walls appearing as statues. In doing so, he formed peculiar sound spaces as well as space compositions of exceptional atmosphere and spectacle. Between the walls he places pools, on whose mirror-flat surfaces sound slips off far away. These outdoor walls sometimes interrupt and sometimes reverberate the encircling sound waves. In Barragan's atmospheric spaces, simple forms, smooth surfaces and colors are as captivating as the mood created by the sounds. In his creation, the masterfully divided space does not exclude nature. On the contrary, the freely standing walls allow the special elements of nature (water pool, cascade brought into the courtyards, wild plants, rocks, pieces of lava) to receive greater emphasis.

In this way we pay even more attention than before to such common natural phenomena as sunshine, evaporation, the gentle breeze, birdsong, and horses passing through the site. The ambience arising in the courtyards becomes the prisoner of the walls, which prevent it from melting away.

Narrow tunnels are particularly effective spaces for the transmission of sound. The longer and narrower a tunnel, the more true this will be. The long road tunnels running under the Alps intensify the noise of vehicle engines and tire friction, and they have their own sounds caused by the wind passing through them. It is the combination of the two that we hear as a sound experience based on the number of cars, their speed and engine types, as well as the nature of the walls of the tunnel. The path of sound in a tunnel is similar to a shepherd's reed. The wind plays on the instrument formed by the tunnel. The tunnel's ambience is dominated by the badly lit narrow corridor, like the sound waves rebounded by the walls, that are unable to escape. The closeness of the wall and the short-circuited echo provoke a similar reaction in us. They squeeze us. The architectural environment determines our perceptions by means of two sensors. (For more details on the effect of a tunnel, see the chapter Invisible and Virtual Architecture.)

Whether musical notes or plain noise, the sounds become points of orientation. The source of the sound – be it the bubbling of a fountain, the music of an orchestra, the humming sound of a lighthouse in fog, or the clamorous murmur of the dance halls – will always tell us something about where we are or where we are going. It is only in relation to the objects around us that we begin to understand our own position. The various noises help to orientate us.

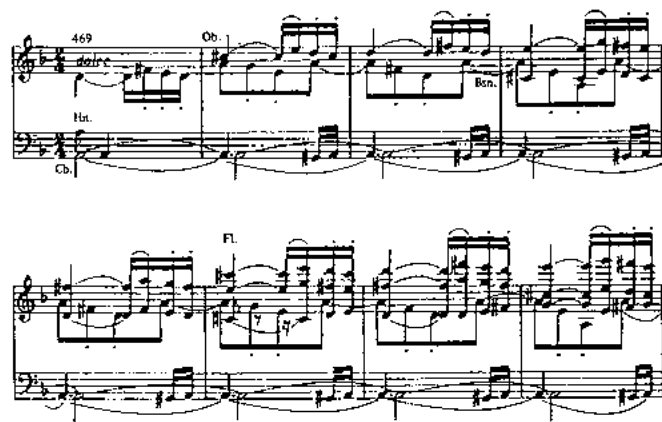
NEUTRALISING NOISE

The main auditory problem we face today is how to rid ourselves of unwanted sound and noise. Residents, government agencies, and architects have been exploring ways of reducing noise levels, doing so not just inside buildings but also in public spaces. Our cities are full of unpleasant sounds. The pleasant sounds of the countryside – such as birdsong, ears of corn bending in the wind, cowbells ringing, dogs barking – are now considered a rarity.

In their place, we have the din of the street, machine noise from construction sites, drills and earth diggers. Megaphones, electronic music, noisy advertising, screeching brakes, revving engines, hooting horns, sirens, airplanes, air-conditioning equipment, and industrial plants – all of them remind us that our world is run by machines, which means noise. Even the mechanical equipment used to tend to our parks, “pockets of nature in the urban sprawl”, contribute to the uproar. Today, foliage intended to neutralize noise is kept tidy by men with loud machines. Lawn mowers and trimming machinery recreate the din that the foliage was intended to neutralize. But even people without machines can cause a disturbance – the shouts of street vendors in open markets, the clash of pedestrians as they bump into each other on overcrowded sidewalks. In public places, people with cell phones pressed to their ear speak to invisible partners, their chatter adding to the noise of the machinery around us. In cafés, alongside never-ending conversation, one hears the clatter of glasses and plates associated with consumption. The noise level reaches new heights.

The solution takes many forms. In order to hear pleasant sounds and noises, we might stop the spread of the clatter or try to neutralize the source of the noise, perhaps even removing it. Walls designed to swallow up noise have been placed alongside highways, and they seem to be quite effective. They usually look rather ugly, but they do reduce noise. Another inspiring solution, and one that may prove more effective, is the reintroduction of flora. Trees and other foliage planted next to highways, or noise-reduction walls covered with bushes, can improve the environment.

Another method of reducing noise is the use of so-called “white noise”. “Counter noise” is no longer limited to indoor spaces, offices, hotels or cafés. It is now also used in outdoor spaces – sometimes, however, with disappointing results. In subway stations, “volunteer musicians” provide the background “noise” – which in some cases really is unfortunate. In bygone days, barrel-organ musicians came occasionally into the courtyards of apartment buildings, playing their music to the appreciative residents. But now the gates of such tenant buildings are locked, and the musicians are confined to the streets. As they compete with our roaring car engines, their “music making” seems merely to add to the sound chaos.



Example 11: movt. I, mm. 469–76.



Example 12: movt. III, mm. 25–33.

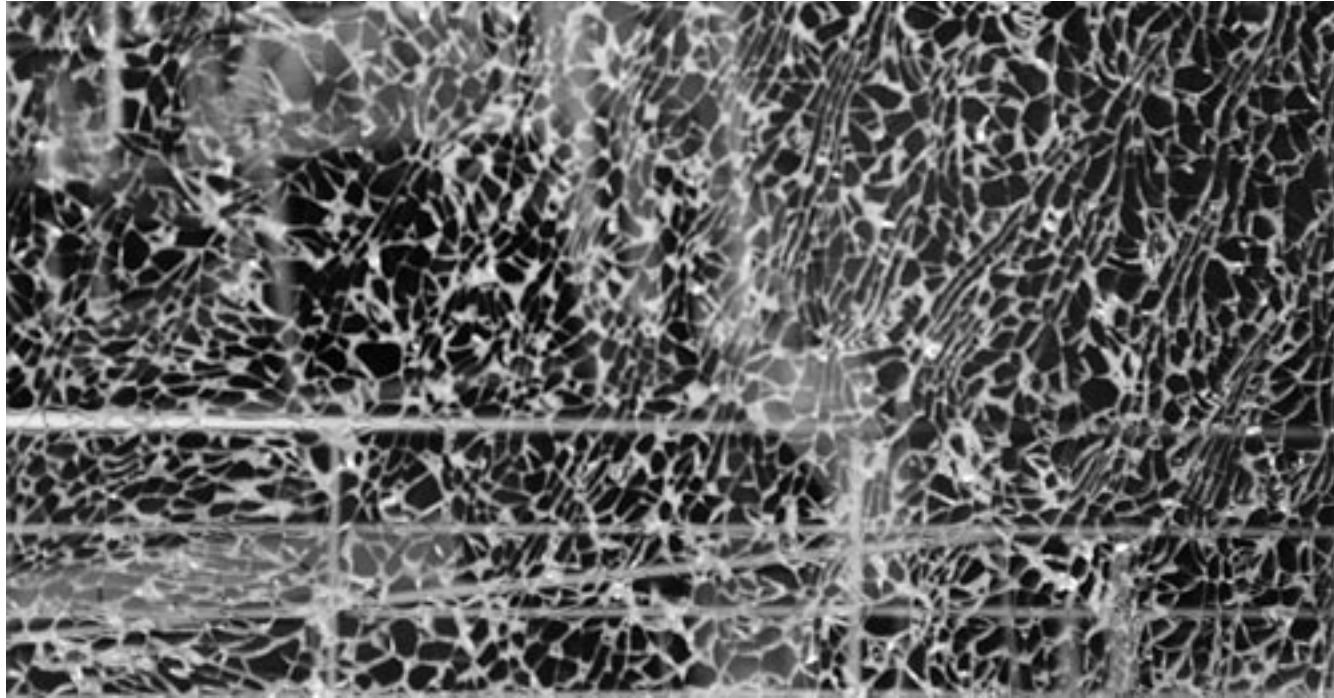
Beethoven: Symphony No. 9., detail of the sheet music

Waterfalls or fountains are particularly effective means of neutralizing unpleasant noises. In New York, they are no longer confined to public squares and have begun to appear inside buildings. When placed inside courtyards, fountains reduce noise infiltration – for instance, the sound of cars from the street.⁸ In Trump Tower on New York’s Fifth Avenue, water falls gradually in a closed interior space from the fifth floor (S. H. & C. 1983). Passing from stone to stone and from story to story, the water reduces the noise of people as they shop or dine. The WestEnd City shopping centre in Budapest (József Finta, 1999) has a waterfall at its entrance. The sound of the water counteracts the babble of the souk-like market in the adjacent subway tunnel. The water serves as a sound screen. Complete silence is impossible to obtain, but the reduced noise level is a source of delight.

Elsewhere, attempts are being made to reduce the number of factors giving rise to noise. In most European inner cities, there are restrictions on the use of private cars. Many cities look to alternative solutions based on public transport or electric cars. Some are extending their pedestrian-only areas and placing parts of the transport system in underground tunnels. In Paris, for instance, some metro trains run on pneumatic wheels. In many cities, speed stopper bumps and speed limit signs have been installed on roads, to slow down traffic, thereby reducing noise. Goods delivery is restricted to certain times of day, and other obstacles have been introduced to reduce through traffic. Many of Europe’s cities intend to build more bicycle paths, while reducing space for other traffic.

MURDER BY SOUND

People living in cities are confronted daily by unbearable noise. Many different sounds merge in urban areas – strangling the city and its residents. The noise level is so high that individual sounds are hardly distinguishable. Based on the level of noise and the specific features of sound, it is possible to differentiate between a city and a metropolis, a green suburb and a small town, an isolated farmstead and a village. In more urbanized areas, the level of general noise is so high that the differences between particular sounds disappear. Rather than the silence of nature, we hear a general roar. This “roar” has its own volume, tone, pitch, rhythm, and echo – and it is different in every city. It is abstract noise, which is the background to the specific sounds we hear close up. Harder sounds are produced in New York than in Los Angeles – where there are more trees, fewer mid- and high-rise buildings and row houses, and greater distances between buildings, so that sound can pass through the gaps. Front yards are common in Los Angeles, and so echoes are weaker because it takes longer for sounds to pass from one side of the street to the other. In Los Angeles, everything – even noise – spreads out. In contrast, the narrow streets of Rome capture every sound. Wherever one is in a suburb or a small town, individual sounds can still be distinguished from the general background noise. The high level of noise in our big cities largely contributes to the desertion from urban areas.



Broken window glass

The use of excessive sound and its murderous effects are brilliantly portrayed in Stanley Kubrick's film *A Clockwork Orange* (1971).⁹ In the film, Kubrick uses Beethoven's Ninth Symphony to illustrate the horrible effects of excessive sound. Alex, an uninhibited adolescent, and his mates break into the house of an elderly author called Alexander, whom they proceed to humiliate by raping his wife and then assaulting him. The youngster's violent deed lands him in prison and then in a prison hospital. Here, in the course of experimental therapy, Alex, who is a fan of Beethoven, is forced to listen to Beethoven's Ninth while viewing brutal films as a form of deterrence. The music terrifies Alex. After his release, Alex incidentally shows up at his victim's house. The writer decides to use music to take his revenge. He locks the boy into a room and plays Beethoven to him at an unbearably loud volume. The well-known piece *Ode to Joy* becomes his means of punishing Alex.

The brutally loud music bombards and torments Alex, driving him mad. Engulfing the whole room, the music presses down upon the adolescent like a heavy weight. The visually perceived space becomes blurred and gradually disappears. The only thing Alex can feel is the mass of "objectivized" sound. Finally, he attempts suicide by jumping out of the window.

The rumbling noise that destroys Alex in Kubrick's film is experienced, to a lesser extent, by anyone who lives in a city. For many people, the unpleasantness of noise outweighs the benefits of city life. And there are times when even die-hard urbanites would surely choose a quieter life away from the hustle and bustle.

Over and above the general level of noise, specific noises can also become important elements of the architectural milieu. Individual sounds – even those from a distant source – may occasionally rise above the general background noise. We may or may not welcome such sounds. The destructive force of shrill "antagonistic" sound is described by Günter Grass in *The Tin Drum*.¹⁰ In the novel, a scream of destructive force becomes the metaphor for a small invalid boy's hate, means of punishment, and rebellion against the Nazi regime. Günter Grass's story is about Oskar, a boy with peculiar abilities, whose piercing scream is so shrill that it can break anything made of glass in nearby houses. Oskar's strange manic interest is his drum. Constantly beating it, he drives those around him insane. Though of small stature, Oskar has seemingly supernatural abilities, inducing fear in others. On one occasion, Oskar climbs to the top of a 164 feet tower in Danzig (now Gdansk) called the *Stockturm*. Screaming and beating his drum, he manages, in less than fifteen minutes, to destroy all the windows of a theater and the glass of every shop window on the city's main square (*Kohlenmarkt*). His voice has become a weapon.



Frank Lloyd Wright: Waterfall House, Stewart Township, Fayette County, Pa., USA

SILENCE

In contrast to the above example, we are also aware of specific sounds that endear a building to us, such as the gurgling of a fountain in an Andalusian courtyard, the crunching of gravel on a path in a park, or the drip-drop of rain on a tin roof. Architecture makes its presence felt in a thousand different ways. Fountains and waterfalls not only neutralize other noises, but they also fill our ears with pleasant sounds. Similarly, the rustling of leaves of a tree also affects us, causing us to daydream. Meanwhile, the howling sounds of a hurricane evoke fear. Our mood is affected by the wind, influencing how we perceive and assess the world around us. Sound informs us; it wanders through and offers us descriptions of space (openings and recesses, ornaments on the walls, and whether the space is closed or open and includes objects or not). Space transforms sounds in the same way as sounds influence our spatial impressions.

Noise is caused by a combination of nature and human activity. Man-made architectural features just as much contribute to noise as do natural features. Buildings do not normally create noise, but without space noise cannot exist. The nature of sound depends on the architectural environment. In urban places, sound has a more definitive role. The width of a street, the size and structure of a building, the hardness and weight of a wall, the materials used and decoration applied – all influence the manner in which noise is absorbed. Trees in the street, foliage, objects, newsstands, electricity masts, lavatories, advertising boards, poles, subway entrances, and bus stations – all influence the manner in which sound is reflected, amplified or consumed.

A wonderful example of the magical potential of sound is a house designed by Frank Lloyd Wright for E. J. Kaufmann (Ohiopyle, Pennsylvania, 1934).¹¹ Wright sited the house above a natural waterfall, constructing it in such a manner that the sound of the water could be heard throughout the house, but could not be seen.


In order to discover the source of the sound, one must first take a long walk around the house or look behind the steps leading down from the living room. In his Falling Water House, the architect has separated the visual spectacle from the auditory experience. We see one thing, but hear a sound from somewhere else. Sound is “invisibly” present. We become inquisitive and seek to discover the secret – the source of the concealed sound. Wright’s work achieves more than the waterfalls in New York’s buildings. The sound of his waterfall is not intended to neutralize or counterbalance other noise. Instead, it seeks to attract our attention; the secret enralls us.

MUSICAL SPACE

Auditory perception, like visual perception, can elicit strong resonances. Bubbling sounds of water, if decomposed and rewritten as a music score, would tell of a complex rhythm, tone, and volume. When we hear broken down sounds in a space, we are in fact “seeing” them here and over there. The sounds describe a space. Architects rarely make use of the potential of sounds to form spatial notions. Even more rarely do they describe space with the help of sounds. But there are several examples that remind us of the opportunities, such as water music. Sounds and sights act together to shape our experience of space. As changes are made to the water pressure of a fountain, the direction of the spouts, or the shape of the holes, so the water drops will perform their dance. But as it rises or falls, in wider or narrower spouts in accordance with a certain choreography, the bubbling water does not just dance but offers a musical experience – according to a changing pitch, tone, and volume. Music is occasionally composed and played in harmony with the planned water “music” and complementing the spatial experience of the auditory spectacle. A highlight of the Festival of Versailles was a combined auditory and visual experience in this vein.

Listening to the first movement (Largo, Allegro) of Beethoven’s The Tempest (Opus 31/2), we can conceive spatially of the music of the storm. If we close our eyes, the sounds become part of space. Someone peeps in, comes on stage in a crawl, and then looks around with growing confidence.

But it may also be that tiny balls crack in the imaginary space, setting out in trepidation. Over time, the first hesitant jumps become more decisive movements, vibrating ever more quickly. Moving up and down, flying from one position to another, or gently running across the scene, in a playful bustle, hesitating in contemplation. Some of them change rhythm, rest, and then run around the space inquisitively. The events take on an increasingly loud tone. Two or perhaps more are already running on the spot, chatting, telling intimate stories to each other. Finally, they crash into each other and separate. Perhaps there is no stage, and the movement is shown in veils, mind-boggling smudges, and swishings. One can even imagine that small lamps are burning at various points in the space, dangling here and there, in the most diverse rhythm, in color, they lighten up for shorter or longer periods of time.



ERMITAGE

Wilhelm Backhaus

Franz Joseph Haydn (1732–1809)

Sonata in mi bemolle maggiore Hob. XVI n. 52

1 • Allegro

2 • Adagio

3 • Presto

4 • Andante con Variazioni in fa minore Hob. XVII n. 6

5 • Fantasia in do maggiore Hob. XVII n. 4

5'47"

4'44"

4'14"

9'16"

5'20"

Ludwig van Beethoven (1770–1827)

Sonata n. 17 in re minore op. 31 n. 2 "Der Sturm" ("La Tempesta")

6 • Largo, Allegro

7 • Adagio

8 • Allegretto

8'19"

6'27"

6'31"

Frederic Chopin (1810–1849)

Sette studi

9 • op. 25 n. 1 in fa bemolle maggiore

10 • op. 25 n. 2 in fa minore

11 • op. 25 n. 3 in fa maggiore

12 • op. 25 n. 6 in sol diesis minore

13 • op. 25 n. 8 in re diesis maggiore

14 • op. 25 n. 9 in sol bemolle maggiore

15 • op. 10 n. 5 in sol bemolle maggiore

16 • Notturmo in re bemolle maggiore op. 27 n. 2

17 • Valzer in mi bemolle maggiore op. 18

2'09"

1'27"

1'56"

2'04"

1'08"

1'07"

1'40"

5'55"

4'22"

Total time

72'52"

DIGITALLY REMASTERED

ERMITAGE 1990

Recording 1953, 1960

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Registrazione effettuata durante "I Concerti di Lugano" il 18.5.60 (Haydn, Beethoven) e l'11.6.1953 (Chopin) dalla Radiotelevisione della Svizzera Italiana/Rete 2. Regia Musicale: Bruno Amaducci (1953); Ermanno Brincer (1960)

112

113

Or from time to time a wind blowing across the space lifts the net curtains, the girls' skirts or hair, and upturns objects. Or the wind stops, having been frightened by the loud implosion and its own audaciousness. Only once its fear has been dispelled does the breeze start to move the balls and shoes more boldly or set the light dance of the electric bulbs in motion. But its courage turns into the musing glance of a daydreamer, and for some moments the space becomes quiet, until after a while the various aspects of movement, multiplying, once again together emit hammering sounds. Self-confidence and playfulness interchange. The repeat is similar to what has been repeated already. The previous movements, with the soft rhythm, no longer on the ground but high above, happen ever more quickly and float. Then, to the same beat, they gently become quiet. Finally, looking back, some elements quietly disappear from the auditory range, while others, having received strength, throw themselves up high, and jump out of the imaginary space.

Listening to the music of the contemporary composer György Kurtág, we become aware of space – perhaps more so than when listening to traditional classical music. It seems like the sounds are voiced as elements of a spectacle, sometimes from up above, sometimes from behind us, each time at a different level, made up of various instruments and with changing volume. The sounds do not just penetrate us. Having identified with them, we also position ourselves, here or there in the space. Zigzagging, we feel the movement from one point to another. The sound and the effect of the imaginary spectacle are merged together in the mind of the listener.

Of course, everybody perceives what they hear as an image evoked by the person's imagination, culture, and memories. In everybody's mind the scene will be different. Many people associate music with buildings that apparently cite movement. The endlessly repetitive rhythm of the windows of an office block is the equivalent of a monotonous beat system. We hear a mono-rhythmic series of sounds. If the balance of a building's surface, its mass, proportions, rhythm, decoration, and architectonic elements are more variant, the effect will be the opposite. A risalit, a garret roof, or a tympanum – or perhaps even a syn-copated row of buttresses or a series of capitals, window rims, French windows, and balconies – will elicit a different, more complex reaction from us. A monotonous row of windows can be compared to a drip from a tap or some homogeneous rap music.

As the phenomena become more complicated, not only does the spectacle of the building and space become richer, but so also does their sound equivalent. As music uplifts or presses down, pounds the chest or lulls one's soul, so the emotions of the person looking at or listening to the building can similarly rise or fall.

Today, public spaces are increasingly used for performances. Film screens are put up, festivals held, and opera sets constructed in municipal squares, giving a new function to what were simple market squares. Italian television put on a production of Tosca at the sites of the real drama and at the times of day when it occurred. History, drama, song, and venue were combined. Music and song flowed from the sites that provided the original inspiration. Even without stereo equipment, the music was experienced in a spatial sense.

The combination of music and building has often arisen in people's mind. Most of us are acquainted with Goethe's aphorism that "architecture is frozen music." Music elicits a comparison because just like architecture it causes us to think spatially. But we cannot speak of frozenness because a building is never static and, above all, never seems to be static. People looking at a building constantly change their position and always see it from a different perspective; its details, the connections and relative space between such details, are distorted according to where we are standing. And even if someone is standing still, their focus can change in a split second, piecing together a notion of space based on constantly changing perceptions. The musical score determines the final order of the sounds, and so the notes and the work are always played in the order determined by the composer. But this is not so in architecture, where the designer is not able to prescribe the order in which people perceive the various parts of his building. All he can do is draw attention to certain important elements and try to direct those looking at his building to follow a certain order. In most cases, however, even the architect is unsure of the proper order. But what cannot be denied is that each viewer of a building will choose a different way of approach. We could say that the viewer improvises, and by doing so, he too takes part in forming the final product's notions and ideas.

The Dancing House (1992), a building in Prague designed by Frank O. Gehry, is a paraphrase of the world-famous dancing pair Ginger Rogers and Fred Astaire. The building is one of the most tangible examples of the connection between form and movement.

In this pop-art building, everything “moves”, the windows appear to be shifted apart from each other, following wave lines on distorted surfaces, while the twisted masses, standing on various legs and comprising different protrusions, “move” the building still further. Steel, glass, concrete, plasterwork – the changing surfaces also refer to the different characters of the dancers. Gehry’s work leaves no room for indifference. The building lives in the space, and elicits dynamic spatial resonances. It is not just the presence of the building that gives rise to the feeling of movement, but the spectacle itself compels the viewer to alter his position, so that his perspective of the dancing pair is forever changing. Our glance slides along the glass surface, and our view fixes on the window rims of the solid part of the building. The support columns allude, on the one side, to a clumsy figure and, on the other, to stiff leg stumps. Perhaps the real inspiration for the building was not the American pair but a later parody of them, *Ginger and Fred*, a film by Fellini (1986), in which a rather ancient Italian dancing pair (Giulietta Masina and Marcello Mastroianni) try to imitate Rogers and Astaire, but stumble and totter. The comic elements are obvious. Looking at the building, our glance goes from bottom to top, acting out the dance and playfully accepting what we see.¹² But this is not the first time that a building has produced a feeling of movement in the people who look at it. Our favorite baroque churches and palaces also allude to this. For example, two churches in Rome – Pietro da Cortina’s Santa Maria della Pace¹³ and Francesco C. Borromini’s San Ivo della Sapienza¹⁴ – cause our eyes, instinctively, to follow the bending lines. Meanwhile, the process of movement begins in the viewer.

ARTIFICIAL SOUNDS IN SPACES

The exclusion of droning sounds from our everyday lives is not necessarily our exclusive goal. To eliminate them completely would be dangerous, for we do not wish to live in a vacuum as though we were deaf. Sounds do inform us: the peeling of bells tells us how far we are from the main square of the next town or village. The noise of a major thoroughfare betrays the location of main street. An echo will also inform us how narrow or wide the space is around us, how high or low the houses are to the left and to the right of us.



F. O. Gehry: The Dancing House (Ginger and Fred), Prague, Czech Republic

Quiet village street,
Moulin d'Andé, France



The quiet Servandoni Street,
Paris, France



Reverberated sound from a building or other man-made object tells us about the things that surround us. A strong echo indicates something different from soft sound in a small road where trees standing in front of the low houses swallow up sounds and conceal the character of our environment.

Complete silence, a deaf space, leaves us a bit like a blindfolded man. In a space without sound, where there is no echo and nothing to which we can relate our position, we become unsure of ourselves. Complete silence, if there is such a thing, causes fear. Although we desire freedom, we are not accustomed to experiencing space without limits. Indeed, the silence we desire can only be called relative silence; indeed, we can only conceive of silence in relation to noise. It is only when we hear a dog barking, a man passing by, bells ringing, or even the noise of a car engine revving that we understand something that would be inconceivable without sound – silence. Indeed, we can even say that noise helps us, in a natural way, to perceive silence. Cities have been established by pushing out nature and at nature’s expense. Many people believe, therefore, that the two cannot exist together in the same place. Yet aspects of nature that appear to have been lost can be recreated in urban areas; we are able to restore a part of nature artificially, and make up for its deficiencies. Harmful aspects of the current urban scene can be removed by means of clever solutions. Our current focus is the exclusion, reduction or neutralization of unwanted noise. But in fact we should also be thinking of ways to replace noise with more favorable sounds, to “plant” pleasant sounds just as we do vegetation.

Bernard Tschumi created a “vineyard” in the Parc de la Villette, by the Promenade Cinématique in Paris (1983). Beneath the cables tied to the metal posts, the site slopes downwards gradually towards a “marsh.” From the sedge below, we hear sounds. Our path is accompanied by the artificial croaking of frogs. The planners of the Parc de la Villette have piled up several experiences: narrow trails cross the wide tree-lined promenade; aluminium bridges have been placed above the sunken marsh; artificial objects rise from the lower vegetation regions, the metal bars covered with steel mesh, perforated platforms, and benches are partially submerged in water. The design was based on deconstructionist principles by placing different layers on top of each other.¹⁵ What we absorb is a spectacle of natural and artificial sound, sight, and a series of playful elements consciously arranged in the park, such as an enormous



Dolmen, Bretagne, France

bicycle sunken into the ground, whose pedals and saddle are climbed over by seemingly miniscule children. The site is full of trees, bushes, objects, and buildings (follies), and we are led across it by the sound of the electronic croaking towards the marsh, or the Globe. The sound designed by the architect becomes part of the spatial experience, and contributes to the ambience of the site.

I experienced something similar on a visit to the André Citroën Park in Paris (1992).¹⁶ The path leading to the grassy glade is lined with bushes. Appliances making various different sounds have been placed in the heart of the bushes. They make a noise every time someone passes by. The sounds accompany the visitor all the way to the glade. As one walks by the bushes, one approaches a series of spectacles by following the sounds. Movement activates the sounds, while the sounds indicate the path one should take. The visitor elicits a sound resonance. The examples are yet rare phenomena, but their appearance alludes to unknown paths. The means of using the new possibilities is a humorous one. Irony can serve architecture. The ironic treatment of methods and means of expression can have a liberating effect on architecture as a whole. Architecture, once deeply emotional and deadly serious, can now cause us to smile or even to roar with laughter.

AN EXHIBITION OF SOUND SCULPTURES

In 1993, the Paris electricity supplier, EDF, requested proposals for artistic works based on non-traditional technologies that could be erected or displayed in public spaces. A group of artists were asked to think of ideas based on “sound art” and “light effects” that could revitalize Paris in a novel way. The aim was to establish, by artificial means, a pleasant and exciting light and sound environment – in contrast to the existing noise pollution and functional lighting of the city. The task was to give every public square an aspect of the “unfathomable” by employing “incorporeal” means. The material submitted by participants in the competition was subsequently shown in the Espace Electra exhibition halls of the EDF.¹⁷

The idea of transforming what is heard into something visible by altering the urban environment was a legitimate demand. The exhibition treated sound artworks of public space in the same way as it did conventional artworks. Some of the exhibited works proposed the erection of “sound sculptures” as the “decoration” of public squares, showing how sound perception and the artistic development of the sound environment can be a part of the urban spatial experience.

Nicolas Frize’s proposal Transparences for the Pont des Arts (a bridge above the Seine) connected various sound elements together. In his plan, Frize suggested that the sound of the River Seine should be exploited as natural “white noise.” The sound of the river would be connected to the bridge in such a way that loud speakers placed under the bridge’s iron trusses would start working whenever a barge passed by. The bridge’s “own” sound would be concealed under the planks covering the trusses so that those walking on it would hear musical motifs. As well as the sound of shoes walking on the wooden planks, the sound hidden under the planks would be activated in such a way that the person stepping on the planks would hear it. The pedestrian would take part in making the sound. Resembling the foot pedals of an organ, the planks would function like an instrument. The series of sounds, the source of sound under 12 planks, would establish a musical series. The score consisting of changing pieces would never be repetitive, because the people walking on the planks would assemble the musical elements in an accidental manner and always in a different combination. Chance would be the composer, producing innumerable variations, and the work would always remain open. The full musical image is the combination of four parts: the sounds activated by the tow boats, the music of the planks, and the concrete sound of shoes tapping while the Seine serves as the background. The proposal amounted to an interaction between instrument and environment. People would take part in developing the sound ambience surrounding them, or would stop to listen to the “musical composition” created by others. The bridge would make sound. Over time the musical experience associated with the spectacle of the bridge would become a characteristic of the bridge. It would become a part of our memories – just like the delicate and playful image of the iron arches of the Pont des Arts.

Even more comprehensive and multifaceted was Bill Fontana’s proposal for the Arc de Triomphe entitled *Ile de son* (Island of Sound), which was erected for three months in the summer of 1995.¹⁸ While Christo has packaged buildings in canvas or decks the field with flags, Fontana surrounded the monument with a sound shell. As a first step, he neutralized the traffic flowing round the Arc de Triomphe. Loud speakers attached to the surface of the memorial sounded – as “white noise” – waves breaking on the beaches of Brittany and Normandy, and the shrieks of seagulls. In this way, the noise of traffic in the vicinity was removed. Fontana called his work a sound sculpture, because, by means of the breaking of the waves, he created a sound arena in Paris, away from the original site. In this way, a “sound island of peace” could be established under the Arc de Triomphe.

As a further step, Fontana connected recorded sounds to the existing spectacle. Visitors to the upper terrace of the Arc de Triomphe can see a panorama view of Paris. Fontana composed a sound accompaniment to this sight (*Vues Acoustiques de Paris*). On the edge of the terrace, next to telescopes pointing at attractions in the city, he placed loud speakers playing the sounds of events associated with or taking place at the distant locations: for the Eiffel Tower, it was the noise of the elevators; for the Seine, it was the splashing of the river; for the Champ-Élysées, it was the sound of pedestrians walking along the street or raindrops falling; and for Notre-Dame, it was the cathedral bells. Next to the telescope pointing at the Montorgueil, a market district in the city, one could hear the loud shouts of the street vendors. Thus, people standing on top of the Arc de Triomphe were surrounded by sounds. The visual and auditory elements complemented each other. Sound and view referred to the same object, and the link between the two was immediate. Fontana’s solution enabled the visitor to hear as well as see what was in the distance. The artist overcame distance with the help of simultaneity. The simultaneity was obtained by means of a specific sound from the distant spectacle, enriching our impressions and thereby also strengthening our visual image. At the level of the street, beneath the Arc de Triomphe, visitors experienced the exact opposite of what had been created above. One was left with just the spectacle. The sound of the traffic was silenced, whereas at the top of the monument, a faraway sound/noise was made audible. Fontana gave, but he also took away. In a creative manner, he used the strength of sound to shape our experience.¹⁹ The aim was to replace unpleasant noise with artificially created sound.

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- 5 Pál Cséfalvay: *Az esztergomi bazilika [Esztergom Cathedral]*, Helikon, 1992
- 6 Vincent Scully: *The Earth, the Temple and the Gods*, Yale University Press, 1979
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- 8 Cf. chapter *Urban Waters*
- 9 Thomas Allan Nelson: *Kubrick*, Indiana University Press, 2000
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**SPACES HAVE
THEIR OWN SMELL**

BAJZA UTCA

I spent the first eight years of my childhood in the Sixth District of Budapest, in Bajza utca. At the time the street ran from Podmaniczky utca to Városligeti fasor, which was known in my youth as Vilma királyné (Queen Vilma) út. The first section of the street is lined by middle-class apartment buildings, but at the other end it passes through Budapest's most affluent leafy residential quarter. I lived with my parents in an apartment building at the corner of Bajza and Podmaniczky utca. The sizeable building had been built for Hungarian State Railways (MÁV) before World War I. My elementary school was situated at the other end of the street, near the Reformed Calvinist church to which it belonged. On schooldays I walked there and back twice; I can still clearly recollect the street's various features. Indeed, I have more than mere visual recollections; I also remember the smells of the street. Each of my visual memories is associated with a particular smell: the cool scent pouring from the archway of the decorative entrance to the squat Calvinist church (designed by Aladár Árkay), the smell of flowers coming from the gardens of houses at the posher end of Bajza utca, the acerbic odor of the rusty iron fence enclosing the garden of the classicist Széchenyi mansion (formerly the Wanderbilt Villa), and finally the fresh oxygenated air of the Epreskert (Strawberry Garden). All of these buildings stood on open plots. Further along the street, the buildings were pressed close together as row houses; cooking smells emanated from the excessively decorative eclectic houses. Bajza utca runs all the way to the railway lines that lie parallel to Podmaniczky utca. The smoke of trains entering or leaving Nyugati Pályaudvar (Western Railway Station) even reached our street. The slightly raised railway tracks served as a kind of barricade; a tunnel ran beneath them to what is now the Thirteenth District. This end of Bajza Street was marked by desolate buildings and truck garages, along with the somewhat unpleasant smells of poverty and deprivation.

The olfactory and the visual memories induce each other. In today's Bajza utca, visual aspects rather than smells invoke the past, since most of the latter have disappeared over the past 70 years. Still, my strongest visual memories are of houses that were associated, in my youth, with particular smells – rather than with the general smell of the street. Indeed, in my memory, Bajza utca lives on as a series of unique, individual smells.



The entrance of the House of the Hungarian Railways (MÁV) in Bajza Street, Budapest, Hungary

Each time I left our gray stucco building through the stone framed portal, I was struck by the change in smell. From behind the gate of our cave-like entrance – a gate that resembled the deep throat of a lion – the smell of the cool, stale and moist cellar accompanied me out onto the street. The difference in temperature added to the contrast between the two smells. The smell of the parched air of the street differed sharply from the cool but rather thick air of the house entrance and courtyard.



Calvinist Church in the Városligeti fasor, Budapest, Hungary

The Podmaniczky Street entrance of the tunnel, Budapest, Hungary





The blocked entrance
of the Lőrinc Bakery,
Budapest, Hungary



Window of the former
carpentry workshop,
Budapest, Hungary



Iron fence in Bajza Street,
Budapest, Hungary

On summer evenings, the warmth of the street was accentuated by heat coming from the exterior walls of the house, which had been drenched by the sun during the day. In the winter, the cold of the street meant that the difference was considerably less.

Our apartment building also included a shop. From the small front yard – which had an iron fence, steps led down to a grocer's store in the basement. In front of the entrance, there were sacks of paprika, onion, and potatoes, and one could sense the smell of soil on the vegetables. Inside the shop, however, in contrast to the fusty odor outside, various spices, each with its own smell, lent a kind of eastern magic to the scene. Whenever I stumble across a grocer's shop at the basement of an apartment building, I still think of this little shop of my youth and its gray-aproned owner. A metal fence, steps made of stone, a little front yard, bags, and spices evoke such memories.

On my way home from school, not far from our house, two very pregnant smells would cause me to stop almost every day. One of them was the smell of the bakery owned by Lőrincz; the other was a cabinetmaker's workshop. The irresistible odor of the bakery allured many passersby. Entering the store, customers found themselves surrounded by a U-shaped counter, with the smell of freshly baked rolls, croissants, and bread. Although I sometimes did buy a pastry, more often than not I would enter the shop merely to experience the smell of a bakery. During the war, the bakery was closed. What else could the baker – who was a master of special cakes and excellent breads – have done in that world of rationing? Since then, the entranceway has been bricked up and replaced with the window of what is now a residential flat. Despite the removal of the entrance, the steps that led up to the shop, are still there – the only physical memory of the shop. When I saw these anachronistic steps, which now lead nowhere, I thought of the old smells. Smell and visual recollection are indivisible in my memories.

At the corner, the next smell I used to encounter came from the cabinetmaker's workshop. Through the basement shop's window, which was placed just above the sidewalk, I could smell the sawdust. Although I was still an infant, I had to squat down on all fours to look through the window. The workshop was dark, and the one light bulb hardly provided enough light.

It was a while before I could make out the various objects – the workbench, the lathe and – finally – the bent figure of the carpenter at work. But before I could see all of this, I felt the smell of woodchips and sawdust.

At the time, as well as chairs and table legs, the cabinetmaker was making yoyos, which had just come into fashion. As time passed, however, I was attracted to the window less by the spectacle of the cabinetmaker making his yoyos than by the smell of sawdust. The smell fascinated me, drawing me to the window each time I made my way home. Today, there is no cabinetmaker's workshop; behind the broken window lies a vacant cellar. Even so, the sight of the window still awakens in me the old, forgotten smells. Not all scent associations are so unique. The smell of sawdust and pastries is exceptional, since similar smells, wherever they are experienced, evoke these same childhood images. In contrast, when I experience the scent of trees in a park, I do not think of the Epreskert in Bajza utca. It is only when I stand in front of the shops themselves that the old memories return. Similarly, the metal fence of the Széchenyi mansion does not immediately give rise to a mental connection; when I perceive iron rust and its smell elsewhere, I do not immediately think of this mansion. But when I spot the mansion, the associated smell memories immediately resurface. It was an instinctual movement by which I caught hold of the iron rods as I passed in front of the pikes. I remember the smell of the rusting metal fence, an acerbic and putrid smell, and one which my palm preserved until I next washed my hands. Indeed, I recall how, in my childhood, I struck the metal spikes of the fence with fallen tree branches and how I ran my fingers along the lute, created from the iron spears, causing the fence to “sing”. The visual image, the smell, the sound, and the movement – all of them come to mind, even though in this form they are hardly interconnected. The thought association begins. Smell, sound, touch – each sense conjures up long-lost memories.

As I walk past the entrance to the church, designed by Árkay, I feel a draft of cool air. This experience reminds me of the cool air current that used to hit me each time I entered our apartment building at the other end of the street. The only difference is the absence of the damp, penetrating smell. In place of that musty odor, I recognize the smell of burning candles.

The grocer's store is now gone, the door to the bakery has been bricked over, the cabinetmaker's workshop has been abandoned, there are no roses in the gardens, and the metal fence has been painted over and no longer has the same smell, nevertheless the mere visual spectacle conjures up what no longer exists, including the smells.

In the present, the visual spectacle and the smells no longer co-exist. At the same time, the still existing, or in other cases now absent smells, become, as one recalls them, some of the features that evoke the buildings. Occasionally, the recollection of a smell is associated with an evoked visual spectacle; at other times, the reverse is true, and the image is associated with a smell.



Hearthfire

Occasionally, a smell will evoke a general image seen elsewhere, while at other times, the image will be a very particular one. A whole series of associations are possible. There must be a special individual connection if a recollection stored by one of our sensory organs is to evoke a perception by another. Buildings are recognizable from their smell. Odors can be used to reconstruct the old and otherwise lost streetscape. The connections and associations are multiple. Smells inform about architecture. Synesthesia begins to function.¹

The question is: Do all buildings have a characteristic smell? Can one perceive a smell characteristic of a single building? Over time, humankind has lost its fine sense of smell; our ancestors could distinguish a far greater number of smells. Our noses – like our eyes – are less capable of differentiating than we think. Even the Eskimos’ different shades of white are rich only in comparison with those of more southern peoples. We are able to recognize just a small fraction of the many different odors, and certainly fewer than can a good cook. Sniffing the air, we can usually distinguish between a rural cottage and a mansion or between a mud-brick hut and a brick-built house. But can we distinguish the apartment on the right of ours from the one on the left? If we close our eyes, can we use the information coming from our nose to recognize a building we know?

But there may be circumstances in which, for some particular reason, we associate a place with a special smell – or combination of smells. Regulars at the Lukács baths can distinguish, with their eyes closed, between the smell of water at the pool and the smell of water at the Széchenyi baths, another popular pool. Indeed, the smell is still there when the water has been drained away. We can orient ourselves by way of smells that have seeped into the building. We do not mix up the garlic smell of an Italian restaurant with the smell of curry at an Indian restaurant. But can we distinguish, on the basis of smell, the various Indian restaurants that line New York’s Sixth Street? Perhaps, an Indian chef could do so.

A musty smell combined with stale air will remind us that we are in a cellar or an underground passageway. But can this smell relate to a single cellar? Most buildings have a unique appearance; we can easily distinguish them visually. But can we say the same about their smell? All fireplaces radiate a typical smoky smell, even when the fire has already gone out.

Each fireplace has its own features and is made from different materials. Fireplaces are used to heat a variety of rooms and spaces, and use different types of wood as fuel. Even so, are we able to distinguish one fireplace from another? Can smells become exclusive features of different objects?

There is never just one smell, but a complex of odors. In every building there are several smell factors, which depend on the architectonic components of the building, its use, collateral factors and the environmental conditions. Obviously, such factors cause differences in smell between rooms and spaces. The sensitivity of our nose will determine to what extent we are able to distinguish these differences and then associate certain smells with individual buildings. It is the combination of various elements of smell that gives each building its own peculiar smell.

SMELL ASSOCIATIONS

The objective of this chapter is not to dwell upon the unpleasant smells one encounters in city squares, parks and streets. (Many books and articles have been written on such smells.) Rather, the aim is to show methods of eliminating, counterbalancing or transforming smells – or replacing them with new more pleasant smells. The question is: How do we make smells into characteristic features of buildings?

Who cannot recall the penetrating smell of their high school gymnasium’s changing room? After sports or physical training, the changing room became full of the heavy odor of sweating students, the air almost too thick to breathe. The stinking air suffocated and demoralized the students. I recall this smell each time I encounter sweaty people in the subway, at the beach or at a sports center. Without consciously thinking about it, I begin to step back from my fellow travelers on the subway or other sunbathers on the beach, in an attempt to avoid the smell. The memories come quicker than does the odor itself.

The air has become objectivized, similarly to the voices. It feels like weights are bearing down upon me, and the old memories simply intensify the experience. Everyone is preconditioned, and each impression is added to the sensitivity of a person with their own memories.

But we do not think only of unpleasant smell recollections. Decades ago, when I was searching for the city archives building in Los Angeles, I suddenly recognized a familiar smell.² Where had I experienced the same smell? I realized that it was in the archives of Budapest city hall.³ The acerbic, musty and dusty air I encountered in Los Angeles was known to me from the archives in Budapest. The dust of dried out papers, the gluey odor of the files, and the acerbic smell of the blueprints could be felt wherever one went in the archive. And when the archivist dropped some fragile drawings, a familiar-smelling dust was released. In this case, the extra odors that had become a feature of the building seemed to create thought associations. Is it possible that every archive has the same smell? It is possible, but not necessarily. The reason for the similarity of smell does not depend merely on the stored materials, but also on the structure of the building.



City Hall, Budapest, Hungary

The city hall of Los Angeles is the result of traditional mason's work, as is the city hall of Pest. Externally, the two buildings could not be more different. Whereas the white art deco 1920s building in Los Angeles stands alone and has a wacky tower, Budapest's city hall dates from the 19th century – a neoclassicist building, painted yellow and situated on a crowded urban site. I could make a long list of differences between the two buildings, but the thick walls made of similar materials have preserved the same document odors. Although the two buildings were not built at the same time, the same smells have been produced in them over the past 80 years or 200 years. And although the walls in the two buildings have been repainted many times, the musty odors could never be eradicated. The smells have become permanent accompaniments. Indeed, the odor is now just as much characteristic of the building as are its size, shape, appearance, and color. Despite their different appearance, the similarly smelling and functioning buildings evoke a memory. In this case, the similarity between the conserved scent and stored materials produced the same smell experience. Despite the dust, the odor was not unpleasant. Its familiarity brought joy, the joy of recognition and of recollection.



City Hall, Los Angeles, USA

SECONDARY SMELLS

Typically, secondary smells are features of buildings, which were not born with the erection of the buildings: cut flowers in a private apartment or plants placed in the foyers of an office building. Some people fill their living rooms and bathrooms with the petals of dried flowers. The tree placed in homes at Christmas, the orange or apple skins placed on heating appliances, the pine branches thrown onto the open fire, joss sticks, or the smell of incense in churches, the scent of candles in restaurants, aromatized water in the bathtub – all of these add to the original smell of the building. In Chinese homes, a similar effect comes from the scented fruits placed in the corners of rooms or on window ledges in honor of the ancestors. Most of these odors have no lasting traces; there is no time for them to be absorbed by the furnishings. Even so, the smells do become – if only temporarily – symbols of the premises. Odors reveal much about the lifestyle of those living in a building. The homes of people that smoke cigarettes, keep cats, or cook with garlic will smell differently to the homes of people who smoke dope or enjoy the smell of incense. Odors can mediate culture.

Occupations and trades have their own smells too, leaving lasting traces. The locksmith, decorator, and perfume seller will give off different smells. The florist on the rue Tournon in Paris scatters petals onto the sidewalk in front of his shop. As one approaches, the smell of flower petals precedes the actual visual spectacle of the shop. The rue Charonne was once the patch of master craftsmen; today most of the craftsmen have moved to the suburbs. But off the rue Charonne, several passages and courtyards are still full of craftsmen, who, in fine weather, perform their crafts in front of their workshops. From the welding pistol of the locksmith a sulfurous smell is emitted; further along at the antique furniture maker's the dominant smell is turpentine; and then there is the smell of tanning. Sawdust is the odor coming from the carpenter's workshop, while at the bookbinder's it is glue. The smell of sulfur wafts from the soldering workshops of the copper craftsmen, while the cleaner's workshop can be recognized by its acrid smell. The smell of wood, resin, dye, and much else comes from the musical instrument maker's workshop.

One odor follows the other as the visitor passes by the various workshops. The same happens on the street. By the drugstore, one perceives various chemical smells, by the tailor's the smell of steam coming from the iron, by the barber's shop the scent of patchouli. From the patisserie comes the sweet smell of fresh pastries, and from the espresso bar the bitter odor of freshly ground coffee. Smells can reveal one's occupation.

But they can inform about more than this. What does the entranceway to an apartment building tell us? Encountering an elegant, marble entranceway with the scent of flowers coming from the courtyard, we automatically make assumptions about the residents inside. And our assumptions will be rather different when we are faced with a damp, dirty and musty-smelling gateway, with the smell of greasy food coming from inside the building. A crumbling façade is a visual impression, while a stagnant smell informs our nose. A musty smell may tell us that the stairwell leads down to the cellar, while the smell of petrol will suggest the presence of a garage for vehicles nearby. We can even determine whether the trash is kept in the trashcans or whether the house has its own incinerator.



Incense salesman in New York, USA

All such information will add to our general impression. In the hallway, we encounter further smells; the scent of plants and flowers tells us that the residents are keen gardeners. We perceive, based on smell, their hard work and attention. The air may be sweet or sour, full of oxygen or stale, sterile or penetrating, muggy or fresh, heavy and oily or refreshingly light. Indeed, smells can inform us about the social wellbeing of the residents.

Accumulated smells tell us of past residents and life in past centuries. We can infer the activities carried out in rooms and spaces in times past. Indeed, we can even guess how long the craftsmen carried out their occupations in the workshops. Did a father pass on the craft to his son or do the smells tell of a change of occupation caused by fashion or whim? We might even find out who lived in the apartments, recognizing the smells of a particular lifestyle. Smells that cannot be eradicated may be identified. The odor of workshops full of smoke, sulfur or acid lingers on, gradually being imbibed by the walls. In the street, we are often guided by smells. Odors associated with building use enable us to identify hospitals, railway stations, garages, and market halls. Certain buildings we identify with particular odors. Directed by smells, we move around town like slalom skiers between staked pikes. There are people who can find their way around the bazaars of Istanbul or Bombay based on their sense of smell; they can tell you where to look for silk, metal tools, wooden furniture, and woven baskets. Many Parisians too, as they walk along the rue Mouffetard, use their noses to get to the butcher's, the greengrocer's, the fishmonger's or their favorite bakery where they have bought their daily bread for years or even decades.

Secondary smells are the temporary bedfellows of buildings and may become architectural features in their own right. Smells are more readily retained by buildings that have thick walls, preserving the odors and resisting the movement of air. Such walls ensure the continuity of strong smells. Similarly to their thermal capacity, some materials more easily preserve scent. Bricks, wood, clay, reed, and organic materials generally tend to retain smells alongside their own smell. Steel and glass do not. If a previous resident stank, it is very difficult to get rid of the odor even if you repeatedly repaint the apartment. This is especially true where the original construction material has absorbed the odors.

Synthetic materials tend to be neutral. Their smell is negligible and rarely do they have the capacity to preserve odors. The structure of a building is also crucial: a framed wall preserves smells differently from a dense wall.

The flow of smell resembles the flow of heat. A dense wall does not permit the free flow of air, heat or odor. The result is musty air. This applies in particular to the old-style adobe or clay walls. Small windows have a dual effect. They serve to store heat, but prevent the free flow of air. There was a case in Canada where the thermal insulation against the cold was so effective that small holes had to be drilled into the wall to prevent the residents from suffocating inside. Meanwhile in southern climates, walls are sometimes built with gaps to ensure a building's proper ventilation.⁴

BUILDINGS HAVE THEIR OWN SMELL

The materials used in the construction of a building may take on and conserve smells, but they also have their own smell – which will be present even before the building comes into use. A building begins its life with its own characteristic odor. Stone, brick, adobe, wood, cast iron, steel, concrete – all have a defining smell. There are no odorless materials, just some that preserve their smell much less – such as plastic. Another factor will be the relative quantity of a specific construction material in a building.

Some decades ago, I designed a country cottage in the San Gabriel hills near Los Angeles. My client's wish was that the construction materials should come from the site; he wanted the two-story building to fit in with the natural environment. The construction site was located on a slope in thick woods. Rocks littering the site were used to construct the ground floor, half of which was sunken into the incline. The upper floor was made from timber. These local materials largely determined the odor characteristics of the building. The foundation and the basement walls were laid by an experienced stonemason of Italian descent, who was fairly advanced in years. Each time the mason selected a stone, his glance swept over the site around him with the dispersed rocks.



He took one look at the wall under construction and another look at the rocks; almost immediately he selected the next piece in the wall, and in a decisive movement he lifted it into place. It was as though each new piece had always been there, so perfectly did the rocks accommodate each other. The rustic surface of the natural stone wall and the gaps between the stones fulfilled their purpose, providing a secure foundation to the building. But thanks to the stone wall, the basement rooms acquired a peculiar smell; half-buried in the ground, the stone took on the moistness of the earth. Soaked by rain and snow, the earth pushed its dampness through the stone wall despite the presence of waterproofing. Indeed, the stone wall breathed inwards. The stone, which became a little moist to touch, emitted an acidic mineral-like odor that was a little musty. As one descended into the basement, one encountered smells that offered tangible proof of being in a stone-walled room half-sunken into the ground.

The upper story had walls made out of logs or a wood frame with planks on the inside and wood shingle on the outside. The floor and the ceiling were also made from raw wood. The young carpenter, having been blessed with a refined esthetical sense, selected the right pieces – from wood that had been timbered some years before. Wherever he considered it appropriate, he left the knots in the wood, so that, in his own words, the interior surface should be more decorative and attractive. The columns were also made from logs, as were the banister, the beams, the rafters, as well as the “slats” – logs cut in two and covering the gaps. Inside and outside, everything was of wood: the larch and oak emitted their own peculiar, resinous, sweet-smelling and thick pulverous air. Whenever the wood lying on the site was collected together to be used in the wood-fuel fireplace, the smell of wood became particularly strong in the upper rooms. In view of the construction mode and the materials used, the smell, above all the scent of pine, became an integral feature of the house. Two different odors predominated in the two levels of the house. The different odors were just as much characteristic of the house as were the different views.

The effect of the husked or roughly sanded, unvarnished wood on our eyes was the same as when we breathed in the smell or felt the surface. In the above case, all our senses served to produce an image which made us think of the first story as a warm, homely and intimate place, in contrast to the cold and bare basement. The sight of the rough and untreated stone wall corresponded to other associations with stone.



Sour cabbage vendor in Market Hall (Vásárcsarnok), Budapest, Hungary



Spice vendor on the Campo dei Fiori, Rome, Italy



Arch support master, Budapest, Hungary

The rooms proved to be cold and unfriendly. The rough and cool feel of the stone and the smell of dampness in the air corresponded to the spectacle of the room. The smell and the appearance were in harmony in a different manner at both levels. Two rooms of differing milieu and mood were created. It is through this combination that the cottage in the woods demonstrates the significance and effect of the smells emitted by materials. It turned out that certain smells could and did become constant features of the building.

One can determine the odors emitted by a building through the selection of construction materials and the method of their treatment. A wall made from wood will have a particularly strong smell if it is left uncovered. The same is also true of an unplastered stone wall. In general porous material lets through more smell than do denser substances.

Nowadays, building users strive to create a neutral environment. By means of air-conditioning and draft enhancers, they seek to drive out “unpleasant” smells. People increasingly forget that not all smells are unpleasant. Congenial odors are also being eradicated or their presence negated. Rooms and spaces in relatively new buildings have far fewer odors than do the old types of construction. The materials used in recent decades do not favor smells; a building is far less likely than before to have its own distinctive odor. Buildings with glass exteriors and iron girders give rise to an extremely sterile impression.

THE LAYOUT OF A BUILDING

Through his choice of a particular material, structure or formal solution, an architect can determine the smells present in a building. This is true whether he designs broad or narrow spaces, closes off the path to smells, or includes zigzags to break up the way of odors. It matters whether a building has windows on both sides, thereby allowing the wind to pass through. The architect is the one who determines the orientation of the building, influencing its interior climate. For instance: Are the windows facing the predominant wind direction? Of decisive importance is the amount of sunlight entering a building and the angle at which the sun's rays shine in. Are the interior spaces of the building likely to dry out or will they be left damp? The surrounding earth and ground water will also affect the smells. In other instances, the wind may be shut out entirely, in order to prevent the entry of unpleasant smells. Pine or apple are not the only possible smells coming in from outside; there may be a smell of fertilizer or sewage. A constant exchange of air – ventilation – will also influence smell and its effect upon us.

Interior courtyards, windless corners or open spaces causing turbulence, indeed anything that hinders or reverses the wind, will influence the air quality within the building. Other factors are the location of the kitchen (with all its intensive smells), the bathrooms, the irrigation fountain, the water basin, the sun terrace, the brise-soleil, reflective surfaces, wall climbers, plants and winter-gardens, sliding doors and lookouts. Each individual decision will fundamentally influence the path taken by smells through the building and the circulation of odors within the building.

Odor orientation played an important role in Le Corbusier's Cabanon in Cape-Martin on the Côte d'Azur.⁵ That summer residence had just one room (including even the WC) and was built by Le Corbusier using logs for his personal use. Here every window had a special view. The view from the window also meant an odor orientation. A window facing the Mediterranean Sea allows the wind to enter along with its refreshing smell, while the window looking out on to the rocks of Roquebrune brings with it the smell of flowers and plants which have just been rained upon.

Two impressions and two types of water smell. The other windows do not merely let in light, serving to illuminate the interior. Le Corbusier influenced the path of the wind and the sun. He planned the windows of different sizes and shapes with the aim of using them to manipulate the various parts of the day, having regard for the seasons. Le Corbusier could determine how much nature he wanted to let in or keep out. The mountain air, the smell of the sea, the odor of fish (the house stood next to an old pub for sailors), the scent of the forest, the quantity of dampness and coldness – all could be transformed in accordance with his wishes. The various smells were connected to the visual image in that, on the inner side, the windows were fitted out with reflective surfaces. These various reflective elements could be opened at different angles in order to allow into the open-plan apartment more or less light, beside air quantity. In this way, different smells were associated with every single change of sight. Light even came into the room when the sun shone from above the windowless wall attached to the bistro.



Onion vendor
at Crawford Market, Mumbai

Sunshine, shadow, wind, smell, the view, indeed, to a degree, almost every element relating to the house was compelled to obey him. The Cabanon house was a trial run for Le Corbusier's large-scale Chandigar complex in India.

As a small-scale house, Cabanon is an extreme case, but the same factors apply to the construction of large building complexes and courtyard systems. A case in point, easy to analyze, is the series of courtyards that begin at Blutgasse No. 12 in Vienna. The block, which can be accessed from three different streets, contains five interconnecting courtyards. The Blutgasse courtyards have been connected together in the course of the past 200 years. They now comprise a labyrinth. The first courtyard to be encountered as one enters from Blutgasse is full of the scent of flowers. The second one is narrow; with no light or flowers, it feels rather stuffy. The third courtyard has a sharp incline and includes trees, bushes and lush grass. The ivy on the wall creates a refreshing atmosphere. The air in this green oasis between high walls is rich in oxygen, but it is always damp since there is no through-draft. It is a highly picturesque courtyard; the lush green incline and the single bench at the center create an odd sense of scale. The fourth courtyard has been pushed to one side, although at one end there is an exit to the street. The feeling is of being squashed between high walls, and there is little vegetation. Spring never comes to this courtyard. Its sole redeeming feature is a glimpse, through the gateway, of the adjacent street and the architecture of old Vienna. In the fifth courtyard, a single sculpture-like tree dominates the scene; the rest is bare pavement. The gigantic tree with its many branches and leaves provides a supply of fresh air and a sense of grandeur to this last space. All five courtyards differ in terms of size, volume, proportions, and aspect. The reflective or absorbing capacity of the walls varies, and the vegetation is different in each courtyard, while the path of the wind and the angle of the sun also vary. Consequently, each courtyard has a different smell.

Based on the above, one may conclude that smells arising from architecture are determined by two factors: first, permanent features such as the division of space and construction materials, the building's own smell; second, temporary and transient activity in the building. Additional smells are associated with the functions of a building, the various activities in progress; these smells become over time a feature of the building which cannot be eradicated. Buildings conserve smells. Any building will be defined – among other things – by its odor.



Wooden house on stone foundation in a skansen, Stockholm, Sweden



Mesa Verde National Park, city under the rock, Colorado, USA



Kiva, Mesa Verde National Park, Colorado, USA

CAN SMELLS BE INCLUDED IN BUILDINGS INTENTIONALLY?

Nowadays an important part of an architect's work involves the struggle against air pollution, the eradication or neutralization of unpleasant smells. The people who live or work in a building often introduce flowers, incense or candles to create temporary pleasant smells – in much the same way as a woman or man may use perfume to scent the body. Recently and with increasing frequency, some architects have shown a desire to include smells in their buildings. The time may come when architects and designers plan for permanent and temporary smell solutions, integrating odors into the solid parts of their buildings.

There are, of course, historical precedents for this: just think of the Alhambra in Granada, where scents were indeed an integral part of the design for the gardens in the various courtyards. Even today, many visitors to the Alhambra wish above all to experience its famous rose gardens. Similar ideas were realized at the Oakland Museum in California (1965-70), where the building was opened to smells.⁶ Between the square sunken buildings of the museum, the architects (Kevin Roche and John Dinkeloo) placed courtyards in a chessboard pattern and with green vegetation. Grass was planted on the roofs of the buildings. The wind blows smells from the courtyards to the roofs and back into the courtyards and the exhibition halls. Nature is present between and above the buildings. The buildings are surrounded by a scented environment. In other cases, aquatic plants such as water lilies determine the smells of the architectural environment in accordance with the seasons.

Over time, such temporary smells infiltrate the fabric of the buildings, becoming a permanent feature. Native Americans held smoke in particularly high regard. In what is now the southwestern United States, the Pueblo Indians, who have since died out or who have moved to other regions for unknown reasons, were constructing buildings for their kiva ceremonies around 1000 years ago.

The kivas can still be viewed today, but the tribes who lived alongside them disappeared in the 13th century. The structures, which are usually circular, less than 8 meters in diameter and half-sunken into the ground, were covered by a tent roof. It appears that such community spaces were used for various religious ceremonies and for community decision-making. A bench ran around the inside of the stone structure; generally it was used by the tribal elders. In the center, a pit was dug for a fire. Occasionally, kivas were interconnected by a subterranean tunnel. The ceremony took place around the smoke coming from the fire at the centre of the kiva. The smoke left the structure through a hole in the roof. The expulsion of smoke was speeded up by draft enhancers built into the pilaster of the circular wall. The smoke symbolized the spirit of the Earth, transmitting its message. Decisions had to be deduced from the peculiar features of the smoke. The aboriginal Indian people constructed buildings or submerged them in the ground in honor of smoke and the spirit of the Earth.

The smoke was mystical, swirling, uncertain and transparent. It formed an amorphous column, whose smell was felt by those sitting nearby. The smoke dazed them, causing them to muse and to explore their fantasies. Perhaps this explains why it had a magical effect. The release of the spirit of the Earth was, though, to result in benefits, fine judgment, and rewarding advice. The aim was to release the Earth's supernatural powers. The smoke enveloped those sitting around the fire, saturating their skin. The smoke even penetrated the substance of the kiva. Soon the temporary smell became an inseparable part of the kiva, even when there were no ceremonies. The path taken by smoke is always rather uncertain. A light breeze can divert it from the original destination. Nature decides upon its path, but man can force it to change course. A decisive factor in the case of the kiva is the man-made opening at the top and the draft enhancer in the walls around the fire. This forms the link between the smoke, the path of the smell and man-made architecture. Smoke, similarly to objects, creates architecture, as it emits its veiled form and its peculiar blemish, thereby adding individual contours to the room or the sky. Just as architecture shapes the path of smoke, so too smoke influences people: it warms the surrounding space, stings the eyes, and fills the room with a peculiar smell. Smoke becomes an architectural factor; as such, it also has an effect on humankind.

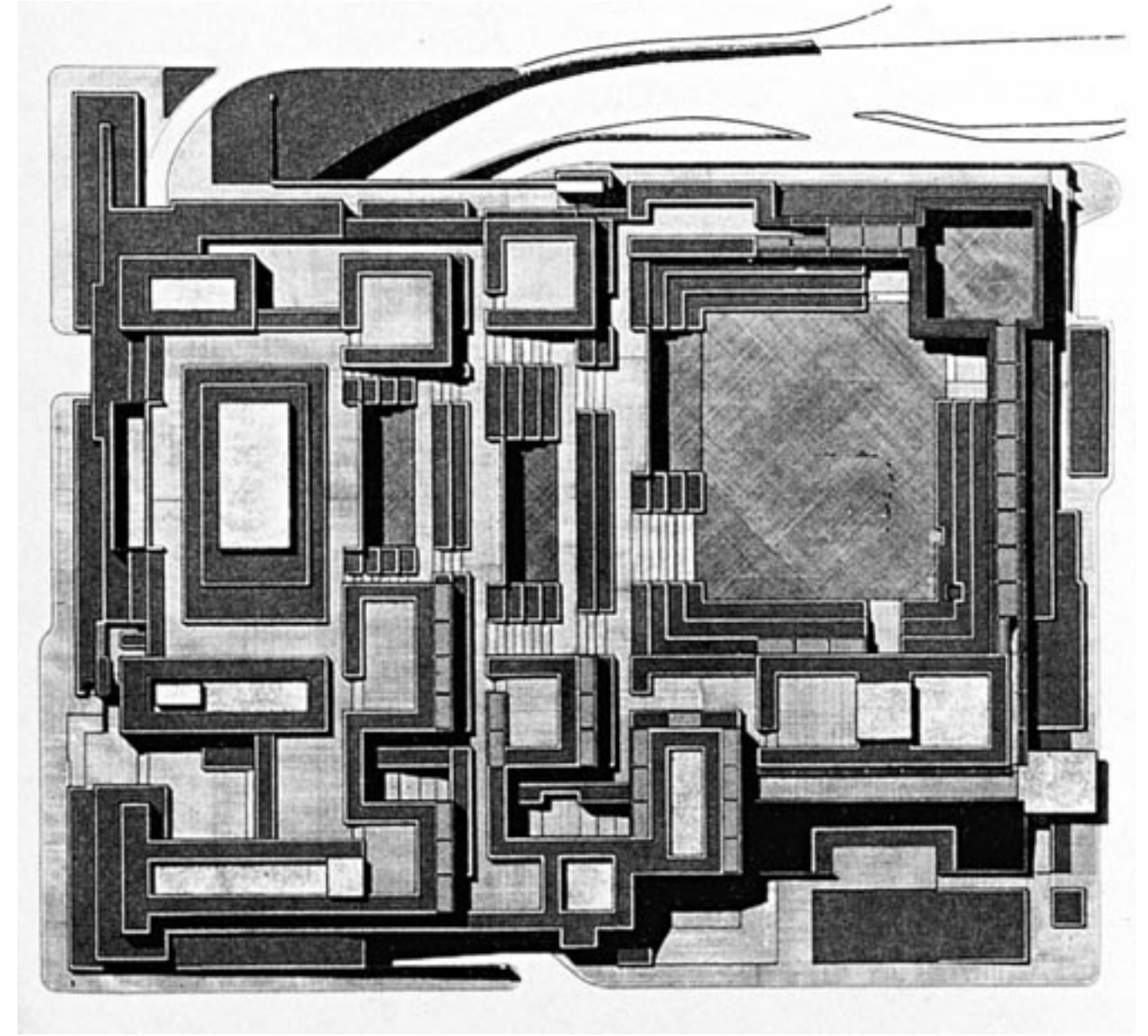
Smoke also contributed to the development of the term kiva. Although the smell of smoke was simply a side product rather than the objective of the architectural form, nevertheless it is an inseparable part of the term kiva. But there are examples where the creation of odor is an express aim of construction. Years ago, a client of mine asked me to renovate his house. After completion of the work, he invited me to visit him. The smell of freshly painted walls and windows was still present throughout the house. But my main impression was the suffocating smoke wafting through the room. The irritating odor was caused by the smoke coming from the fireplace. Moving closer I saw that a significant part of the flue had been blocked off and an additional metal plate had been forced into the flue's opening/closing device. I dutifully reminded my client of the danger of fire and asked him why he had blocked off the chimney. His response surprised me. He had done it intentionally to divert some of the smoke into the room – only temporarily though. But why? It was not only dangerous but also unpleasant, I said. Because, he retorted, the room should take on the smell of smoke as quickly as possible, so that it does not feel and smell too new. When I pointed to the sooty wall, he said he did not mind that at all, because it made the place feel even more lived in. The wall would have patina and the house a past, he continued. My reply was that it would soon have no more than a past!

Attention had also been given to other smells. When drawing up the plans, I had been instructed to make sure the house could be easily ventilated. The windows had to be placed facing the predominant wind. Flowerbeds were placed in front of the bedroom windows, and a perforated plate was placed in the wall so that the smell of the plants could waft in while one slept. When it rained, water coming from the roof was directed onto the plants to enhance their scent. The flow of air from the flower bed thus cooled the bedroom and scented it. In front of the study, I was instructed to plant a eucalyptus tree; the idea was that each room should have its own distinctive odor. My client wished above all to prevent the rooms from being sterile. The question was: How should we make the various odors a permanent feature of the house? Just as the Romans built heating systems into the walls and floors of their villas, and the Indians equipped their houses with ventilation systems running from the cellar to the roof, so it is quite possible that in the future, systems for creating pleasant smells will be integrated into buildings as permanent features.

Alongside heat and ventilation, scents could also be introduced into the farthest corners of a building by way of pipes. Some smells, such as those of plant origin, could be integrated into the fabric of the building, the walls and ceilings. Almost everything has a smell, but most materials lose the intensity of their smell over time, and so it has to be reintroduced. The smell of paint and varnish returns each time the walls of a house are repainted or the woodwork is restained. Smells coming from wallpaper or from textiles also return during redecoration or when new furniture is purchased. The smell of a newly polished wooden floor can be felt even after a week. Such odors, even if they are transient, constitute part of the milieu of an interior space.

Any floor or wall material – indeed, any architectural element – is temporary. Its renovation becomes inevitable sooner or later. But these elements are considered to be parts of the building itself. Why should this not apply to smells? The Greeks believed that their buildings would last for eternity – until they were destroyed by earthquakes, fire, and rampaging foreign armies. Smells are temporary, too. If we wish to enjoy them in the long term, they must also be renewed.

But another possibility is to integrate materials that conserve smells for a longer time into the materials used in the construction of walls, ceilings, and other interior surfaces. Homeowners would order not just plaster from the building contractor, but also smells – which would be mixed into the mortar or rubbed into the outer surface. One might ask for a room smelling of cedar, olive or chrysanthemum – and one would get just that, without having to introduce a tree or plant into the room. Just as people have their own natural smell or wear perfume to disguise or enhance it, so the natural smell of a room could be enhanced or changed by including an additional scent or odor. We shall be able to plan for the smells of various rooms, just as we now plan for their visual appearance. Smells will become accepted features of architectural spaces. Finally, smells also tell us about time; we can learn how long people of a particular lifestyle inhabited a home as well as the age of a building, the period in which it was constructed. The smell memories of a building are superimposed one on the top of the other, gradually. But the most recent smell will always predominate.



Kevin Roche and John Dinkeloo: Oakland Museum, Oakland, CA, USA

The integration of smells into buildings, the conservation of smell memories, the ability to re-construct the history of a building based on smell – at first sight these may seem like strange concepts. But we have to consider them, as the technical possibilities become ever more numerous and people become increasingly aware of our ability to enhance our surroundings and our lives through smell.

THE SMELL OF NATURE

There are, of course, smell factors associated with the exterior environment of a building. Clearly, it matters whether a site is surrounded by a forest or a marsh, by an industrial plant or a park. Further significant factors are the presence of trees in the street and the volume of traffic passing along it. All buildings are constructed in some kind of prior-existing smell environment.

According to Giono, Rome was already Rome even before the appearance of the Romans. The red breasts, the red oak trees, and the hard skyline were already there. The newcomers knew that one could not build just anything at the place, and that one should listen, see and feel before setting to work with the plummet.⁷ The bright Italians have always understood this “from the very first”.⁸ Architecture has to be in harmony with its own environment and with the sky above. With reference to the architects, Giono states that they could not have lived with the rainbow if it had failed to establish a unity with the nearby sea (and not with another), with the sky, with the local steep inclines, with the winds of Piedmont, and with the sparkle of distant Lombardy. What would have become of Bologna if the architects had ignored the shining poplars of Emilia? And what would have become of Ravenna, if they had failed to consider the adjacent sand dunes, or of Venice if they had discounted the flapping of the lagunas and the storms coming up from Serbia?⁹ Architects must above all consult the landscape, the seasons, the sky and the windrose.¹⁰ Each palace, mansion and villa symbolizes a victory over man’s circumstances. From Genoa to Naples, from Turin to Venice, from Bologna to Rome, and from Ravenna to Grosetto, the passions are crystallized: on a roadside, on a hill-top, in the lowland woods, on a riverbank, and at other times alone and in the desert.¹¹

Giono’s exhorting words are still topical and relevant. Not long ago, many people were claiming that man could divorce himself from nature. But as time has passed, it has become increasingly clear that such an idea merely nurtures illusions – with disastrous results. Giono reminds us to take note of our surroundings – which have been there since man’s first appearance. Almost all such elements are longer lasting than the buildings we create. The wind brings with it the smell of the desert, the forest, the hills, the meadows, and the sea. Our task is to make use of the opportunities offered by nature.

1 Attila Batár: A Bajza utca szinesztéziája [The Synesthesia of Bajza Street] in Holmi, 12 July 1995.
2 Reyner Banham: Los Angeles. The Architecture of Four Ecologies. Pelican Books, 1973
3 Arnold Shoen: A budapesti központi városháza [The Central City Hall in Budapest]. Budapest Székesfőváros közönsége, 1930
4 Hassan Fathy: Natural Energy and Vernacular Architecture. The University of Chicago Press, 1986
5 Bruno Chiambretto: Le Corbusier à Cap-Martin. Éditions Paranthèse. 1987
6 Francesco Dal Co: Kevin Roche. Phaidon Press Ltd., 1986
7 Jean Giono: La chasse au bonheur. Gallimard, 1988, p. 59-60. (“Rome était Rome avant les Romains avec des maremmes rousses, ses chênes vermeils, ses horizons secs, mais la vertu de ses ouvriers fut de savoir q’on ne pouvait pas bâtir n’importe quoi dans cette arène, at qu’avant de se servir de fil à plomb, il fallait écouter, voir et sentir.”)
8 Ibid. p. 60. (“avant toute chose”)
9 Ibid. p. 59. (“...avec cette mer /et non pas une autre/, ce ciel, ces escarpements, ces vents du Piémont et les lointaines lueurs lombardes. Que serait Bologne si ses architectes n’avaient pas tenue compte du scintillement des peupliers émiliens? Et Ravenne, s’ils ne s’étaient pas soumis au sable des dunes? Et Venise, s’ils n’avaient pas été attentifs au clapotement des lagunes et aux orages serbes?”)
10 Ibid. p. 63. (... “demandé conseil au pays, aux saisons, aux ciels, à la rose des vents,”)
11 Ibid. p. 66. (“Autant de palais, de châteaux, de villas, autant de victoires dérobées sur l’humaine condition. De Gênes à Naple; de Turin à Venise; de Bologne à Rome, de Ravenne à Grosetto, les passions se sont, de cette façon, cristallisées: là au bord d’un chemin, ici sur le sommet d’une colline, ailleurs dans les bosquets des plaines, quelquefois au bord des eaux courantes, d’autres fois dans les solitudes et les déserts.”)



TOUCH

CRITICAL REGIONALISM

“....Critical Regionalism seeks to complement our normative visual experience by re-addressing the tactile range of human perceptions. In so doing, it endeavors to balance the priority accorded to the image and to counter the Western tendency to interpret the environment in exclusively perspectival terms. According to its etymology, perspective means rationalized sight or clear seeing, and as such it presupposes a conscious suppression of the senses of smell, hearing and taste, and a consequent distancing from a more direct experience of the environment. This self-imposed limitation relates to that which Heidegger has called a ‘loss of nearness’. In attempting to counter this loss, the tactile opposes itself to the scenographic and the drawing of veils over the surface of reality. Its capacity to arouse the impulse to touch returns the architect to the poetics of construction and to the erection of works in which the tectonic value of each component depends upon the density of the objecthood. The tactile and the tectonic jointly have the capacity to transcend the mere appearance of the technical in much the same way as the place-form has the potential to withstand the relentless onslaught of global modernization.”¹

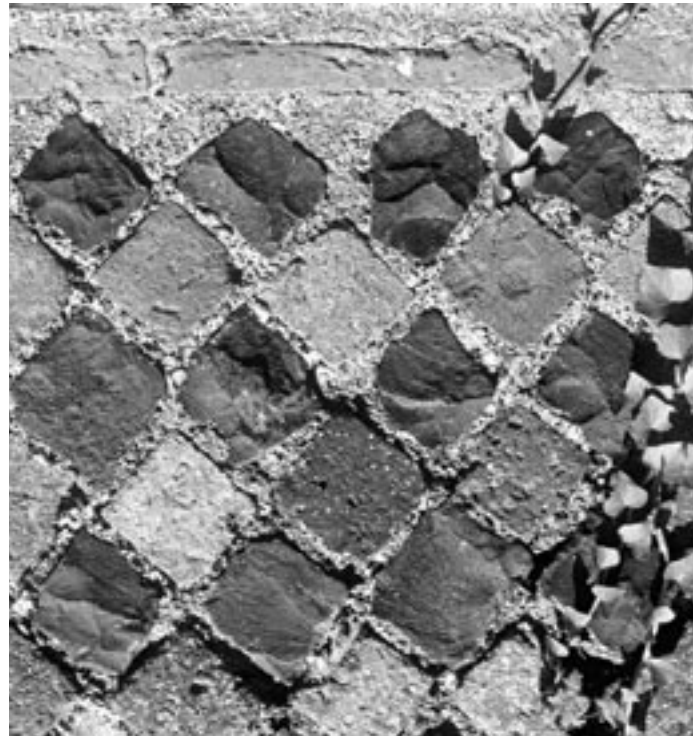
We can perceive space also by touch. We take objects into our hands and feel surfaces with our fingers, orienting ourselves by way of contacting. We take measure of a limited space with our hands and with the soles of our feet. Touch helps us to understand space differently and variously. Our hands, fingers, feet, and the surface of the skin, afford us knowledge of our surroundings and the events happening around us. Feeling the surface is one way of connecting with the outside world. Just as we may slide our hand over a smooth or rough surface, or a silky or coarse fabric, so we touch the surfaces of a building to find out whether they are hard or soft, flat or uneven, cold or hot, dry or damp. Touch does not just tell us about the composition of a material or the character of the surfaces in a building; it also informs about other features and functions of the building, about the building’s appearance, dimensions and decorative elements. Direct contact, by touching, establishes an intimate relationship between us and the objects.

THE FUNCTION OF MATERIALS

Renaissance buildings are characterized not just by their horizontal bulkiness, their massive walls capable of bearing a great load, and their proportions expressing strength. The divisions in the stone wall, the enormous ashlar of the foundations, the wide gaps left between them, the roughly finished surfaces, all serve as an expression of Renaissance thought.²



Detail of a stone wall, Milan, Italy



Wall detail, Tivoli, Italy

When one touches the rough stones, one feels an inner resonance. By touching, one becomes sensitive to the Renaissance concept. With its simple and firm forms, Renaissance construction aimed to express – in place of the playful, decorative and transcendent Gothic, which had preceded it – rational ideals and anthropocentric views, a firm belief in the potential of humankind, and a close connection with the things of everyday life. The Renaissance builder was able to interpret such notions not only by visual effect, but also by experiencing its façades by contact of the hand. The two perceptions complement and reinforce each other.

This happens in several ways: for instance, our visual impression of a massive building is made complete when we touch the roughly finished stone surfaces. The elegance we experience when our hand passes along the polished marble surfaces of the interior, closely resembles the visual impression of these mirror-like surfaces. It is similar if we run our fingers along a concrete surface “ruffled” by the blows of a hammer, and our hand is injured by the rough surface. We may well consider the façade of a building to be strong and energetic, based on these two forms of perception. Touching the smoothen and burnished concrete informs us in much the same way as does the visual image of the polished marble. But various subjective and objective circumstances will determine whether we consider the surface to be coarse or striking and whether we like or dislike it.

TOUCHING THE SURFACE

In order to make connections between the visual and tactile perceptions of construction surfaces and to better understand such connections, one should study Lucien Hervé’s photographs.³ Hervé – who as Le Corbusier’s photographer transformed architectural photography into art – devoted considerable attention to the material nature of buildings and to the finished look of façade surfaces. Often, his photographs contain nothing else but the material of a building. His main subject areas were various forms of concrete (above all the concrete to be found in Le Corbusier’s buildings) and attempts to show the roughness of stone (for instance, in his photographs of buildings constructed in the classical and medieval periods).

It was very appropriate that one of his photographs (of stone) appeared on the front jacket and one (a detail of a concrete wall) on the back cover of the catalogue for the Hervé exhibition (held in Székesfehérvár, Hungary, in 2001). In both cases, material fills the complete photograph.⁴ In his pictures, Hervé focuses on the texture of building surfaces. The surfaces he presents appear to be alive. Viewing Hervé's photographs, one experiences a growing desire to touch the material and to fully perceive the surface. The visual spectacle of the building introduced by Hervé also involves a tactile experience for the viewer.



Pedestal of a stone column, El Escorial, Spain

Rubbing concrete,
Le Corbusier l'Unité d'Habitation (detail),
Marseille, France



The material surfaces shown in the pictures of Hervé are varied. There are carvings and engravings, as well as knocked about, vibrating, shining, soft or plastic elements. The photographer gives expression to something that may not necessarily be what the architect imagined or the viewers see. This odd form of portrayal offers us an increasing number of features, thereby broadening our perspective. In the photographs, the texture of the concrete sometimes becomes coarse; in other places it reminds one of a creamy pastry – or possibly as something ground to dust. Alternatively, we may even perceive it as pliable, easy to shape, a little like butter. The artist thereby indicates the process of production, for concrete comes into existence in a mold, sticking together – just like its predecessor the clay wall, or the puzolan from the Roman era. The photograph indicates the origins of the material, its manner of use and application, and even its history.

Hervé places the lens very close to the surface. He is interested not so much in the lines of the smooth and reflective surfaces, but in the hollows of the porous materials, the gaps in the broken surfaces, through which he can get to the raw material under the surface. The marks are in consequence of the structure of the stone; the roughness of the concrete surface indicates the grainy nature of sand. By breaking up the surface, Hervé leads us right along the inner path of the materials. The enlarged images of the surface and the exposed fabric structures bring us to the micro-world of material. He exposes not just the texture but also the mass. The bispopic surface is replaced by a three-dimensional mass. Hervé's presentation of the building surfaces encourages us to become at one with the architecture as represented by the substance.

In his book (published in 1929), László Moholy-Nagy indicates how photographs can develop our tactile sensory abilities. *“Paradoxically, experience has shown that, alongside direct tactile events, the spread of photography – an optical procedure – encourages and stimulates tactile culture. Authentic photographs of the various material (tactile) values, enlarged, and the manifestations of form that were hardly acknowledged before, encourage not just the craftsman but practically everyone to test out tactile perception.”*⁵

THE HAND

At exhibitions one often sees the following sign: “Do not touch the sculptures.” This is how museums respond to our desire to run our hands over exhibited objects. The visual spectacle of sculpture provokes in us a desire to touch. Visitors to exhibitions feel that touching gives certainty. The material nature of an object and its shape arouse in us a desire to find out more by means of touch. Viewers of objects would like to “see” more by activating their tactile senses. Using their hands, they want to verify what they have seen with their eyes. Tactile stimulus increases our sensibility towards material and substance. We want to know what will happen if we touch a surface. Marble encourages us to caress a surface, whereas raw brickwork is something that we tend to grab hold of.



Wood sided building, N. J., USA



Brick patterned sheet siding, N. J., USA



Mies van der Rohe: Seagram (steel, glass) N, Y., USA,



Tadao Ando: C. C. Building, Tokyo, Japan

Rough concrete injures our hand, causing pain. Our reaction to the various materials varies. The question is: What effect does the architect seek to achieve? Attraction and rejection require different decisions, different materials. If the objective is to win over visitors to the building, then a noble material should be used. Stone, if polished, gives a distinguished impression. Marble – coolly elegant and shiny – may arouse feelings of deference and respect. Depending on how a surface has been finished, the same material can have a thousand different effects. When selecting a material, we must also determine how the surface is to be treated. Bricks can be painted or sand blown – or they can be made invisible by covering them with plaster. In each case, the effect will differ. If a building interior is to be made more homey, familiar and intimate, then we may wish to choose a soft surface – perhaps fabric or wood. Both these materials are more welcoming than stone, with its rough surface. If security concerns are paramount, then the right effect can be obtained not just by erecting robust walls, but also by creating rough surfaces that injure the hand. For instance, to keep out the burglars, one might place pieces of broken glass along the top of a concrete wall. Similarly, those fearing for their status and power, may have pieces of iron rods fixed onto the balustrade, so that passersby do not sit on them. Other people fix nails to their window ledges to stop pigeons from settling on them. Rough surfaces are introduced to put off graffiti artists and scribblers. To prevent graffiti, it is not enough to put up a sign prohibiting it; protective paints have to be used on the façade, producing a surface that can easily be washed down. Where the intent is to draw attention to the inaccessibility of a building, heavy materials are used to produce rough, inhospitable surfaces.

Methods of using materials and finishing a surface do not always have an immediate effect. Barbed wire may have a dual purpose – to keep out those on the outside and to confine those on the inside. Depending on the manner of use, wood can give rise to various impressions. Logs will make a house seem immense, but the effect will be more subtle if shingle is added. If, using a saw, grooves are added to thin plywood, thereby imitating the gaps between planks, a patchwork impression will be created. A brick imitation surface – just an inch or so thick and made from boards resembling bricks – will serve only as a visual replacement of a brick wall. If we knock our finger on it, we soon realize that it is not real. The same is true of other imitation procedures, such as stucco and paint. It is impossible to fool our fingers or our eyes for long. It is therefore more effective to use materials as they are and for what they are: plastic as plastic, concrete as concrete. There is not much point in painting steel guttering – we cannot transform it into bronze or copper.

Over time, a smooth, flat panel will bend, including the indentation, and this will be particularly obvious whenever the sun shines onto the surface. Cement panels soon break up, even if we nail them down carefully. One cannot deny the nature of a material.

Caressing the surface of a building with our hand, our senses provide us with much information, on the basis of which we can then form an opinion about the esthetics of the building. When formulating our reactions we tend to use categories such as robust, pleasant, overpowering, repulsive or spacious, fine, noble and elegant – similar to the feelings we experience on viewing the building. The foundation of a building tends to be a hard substance, thereby expressing the static power on which the whole structure is founded.



Lucien Kroll: Student dormitory of the Catholic University, Louvain, Belgium



F. L. Wright: Millard House/La Miniatura,
Pasadena, Ca, USA

For instance, the foundations of a Renaissance building stand on larger units, their surface is rough, so that you receive the same impression whether you touch it or look at it. Early Renaissance palaces and mansions, such as the Palazzo Pitti or the Palazzo Medici Riccardi in Florence, are fine examples of this.⁶

Lucien Kroll developed this notion further when designing the students' hall of residence of a Catholic university near Brussels.⁷ The foundation and ground floor of the building were built using heavy materials. As one ascends from story to story, the elements used become lighter and lighter. The building reminds one of an enormous tree, with its roots in the ground, a trunk and then the various branches – all the elements are constructed from different materials. The stone façade of the ground floor is linked with the rock covering the site. Higher up, it merges into the wall of the building. On the second level, the stone is replaced by brick and cement panels, with more and more glass at the higher levels.



F. L. Wright: Millard House, Textile Block,
Pasadena, Ca, USA

We can fathom this idea, by way of touch. Touch, feeling the surface, contact between the hand and the surface, is not a unilateral phenomenon. Not only do we obtain information about the material we are touching, but our hand remembers features of the surface. Furthermore, the surface also preserves the mark of our hand. Palm prints can be seen on clay walls. In Venice the façades were formed by the hands of craftsmen who pressed out the water of the concrete/plastered façades, doing so to such an extent that the material turned into marble and the material, which had been worthless, became ennobled. The substance has preserved the memories of the procedure and the palm prints of the master craftsman. Visual and tactile elements do not always produce similar and reinforcing resonances. The two forms of perception can work against one other; that is to say, the impression gained using one sensory organ weakens or demolishes that which has been established by other senses. Where such a contradiction arises, the perceptive person will tend to trust his fingers rather than his eyes. Our eyes can feed illusions – which then mislead us. If we have to distinguish artificial marble from the real thing, we are most likely to trust our fingers. Shadows can be misleading, but if we touch the borderline, it will become quite obvious whether or not we have been taken for a ride. Most of us experience disappointment when we realize that the beam is not made from wood but is fiberglass polyester, or when we see that a missing portion of a cast iron girder has been replaced by plastic during renovation work. Cast iron structures, resembling the pillars of Classical times, are often hidden behind rough, gritty paint. The intention is to give the column a more rustic look, and that the “imitation” should be closer to the original. The attempts have been in vain: nobody thinks that cast iron is stone. Despite this, it seems stronger than when it is without paint. A merciful deception. Touch will, at all times, correct the image seen by the eye alone.

Unwarranted assumptions and prejudices may contribute to our deception. Concrete, which is regarded as strong and tough, tends to be classed as a hard material. And yet when you touch it, you realized that its surface is flat, shiny and actually more refined than carved stone – because it has been poured into simple iron molds, the water has been pressed out of it, or the surface has been sand blasted. Tadao Ando is the master of concrete. Indeed, without exception all of his buildings have been made from concrete. But his carefully sand blasted surfaces seem to resemble a noble material.⁸ Ando has argued

that “people are attracted by concrete; they want to experience its weight, its steely firmness; they are quite willing to climb the stairs on firm concrete.”⁹ No roughness, however. In the final years of his life, Le Corbusier – who tended to think like a sculptor and who valued concrete for its plastic versatility – used this “hard” material to create distorted surfaces, as in the case of the chapel at Ronchamp.¹⁰ Contradicting the quality of the material, the baroque, finely curved forms created from stone express softness in a likewise manner.

After World War I, Frank Lloyd Wright standardized his construction materials, designing concrete blocks of various patterns from broken or engraved lines. He used this method to make concrete elements (and whole houses) lighter – without weakening their structural strength. These were the textile blocks, which have since become very well-known and which were used to transform building façades into patchwork surfaces.

The most famous example stems from 1923 – the Millard House (La Miniatura) in Pasadena, California. Running their hands over the walls of this house, the visually handicapped can also form an impression of it.¹¹



Stone covering, St. Stephen's Basilica,
Budapest, Hungary

THE FOOT

So far we have only covered information received by way of our hands, but our feet – or the soles of our feet – also inform by means of touch. Walking on stone is different from walking on concrete. To the foot, walking along a dirt country lane will not be the same as walking across a fallow field. Our step will be less certain on cobblestones than on asphalt – which is why so many prefer the latter. Meanwhile, joggers know that running on asphalt will damage their knees, so they usually seek out soft-surface paths.



Stone pavé, Main Square, Lisbon, Portugal

A dirt track may indeed be the favorite of runners and equestrians. Opinions are divided on cobblestones. Those with an unsure step, tend to curse them, since the bumpy surface just adds to their woes. Other people, however, praise them, because the rough surface provides extra hold. Those who enjoy the reflection of a street after rain and who like to listen to the tapping sound of a woman's heels, will choose a stone surface like the gently sloping cobblestone streets of central Prague. All of us are affected by such sounds and by our visual and tactile impressions. If arranged in a colorful pattern – as in Lisbon where pedestrians can enjoy a stunning arrangement of gray and blue – cobblestones may be very popular.

When the streets of Paris were being resurfaced, cobblestones were used to replace the old asphalt at several intersections. A change in the surface underfoot serves to inform. Cobblestones, for instance, can be used to divide off a pedestrian zone from the car traffic. The visual and tactile impression instructs both pedestrians and vehicle users about the limits of their respective zones. Both groups understand that what is forbidden for one is permitted for the other. The pedestrian zone in the French capital's Quartier Latin has a cobblestone surface throughout. Cobblestones have also been used in the shopping district of Montorgueil, from which most private vehicles have been excluded – to the joy of Parisian shoppers.

Ever since the advent of shoes and the consequent separation of ground from feet, our sensory feeling has been a less direct one. Nowadays few people are able to walk barefoot – whether in a fallow field, along a dirt track or on a hot asphaltic surface. Tactility, the experience of walking, has become an indirect one. Most people prefer to walk on smooth surfaces; they do not really wish to feel the earth beneath them. Many favor footwear with cushioned soles, so that they feel nothing at all. But this also induces the amount of information available to them. In some cultures, people take off their shoes when entering the home. In others, they do so at the beach – sand feels good underfoot so they discard their sandals. Tennis players, meanwhile, select their footwear according to whether they are playing on grass, asphalt, clay or a synthetic surface. Each of them has a preference. Rarely, nowadays, do people seek out direct foot contact with the ground. But small children still like to run around on leaves and dry grass and to kick the stones on gravel walkways. Interior flooring should reflect the chosen objective; clearly, a marble floor and a springy carpet feel very different underfoot.



Via Appia, Rome, Italy

Moreover, the latter slows us down, as we leisurely enjoy its luxuriousness. Vittorio De Sica, when filming *I Sequestrati di Altona* [*The Condemned of Altona*] (1962), demanded that the interior floor of the palace mansion be wooden parquet. He argued that the actors would be unable to take up the right posture, unless they felt a wooden floor beneath their feet. Our feet inform us about our spatial environment, about the world beneath us. Human limbs are rather like “feelers,” protruding from the body and gathering information about our surroundings (by means of nerves and muscles). Anything we touch will have an effect on us.¹² When the information we receive about our environment is limited in some manner – for instance, in a darkened room – and the nerve endings of our muscles and the soles of our feet begin to work together, (that is, the tactile and kinetic perceptions function simultaneously), then one may speak of the haptic perception of touch and kinetics.¹³ We must take a step, and stretch out our arms. Our muscles are forced into action and come into contact with objects. Using the nerve endings in our skin we then determine the nature and quality of the surfaces.

THE SURFACE OF THE SKIN

Touching is not limited to one's hands or even one's legs. Even our skin can be harnessed by our nerve endings to gather information – through touch and the pressure exerted about our surroundings. It tells us not only about the texture of a surface, but also whether it is painful to touch, hot or cold, wet or dry. Covering the whole body, our skin not only delimits, separating us from the external world; it also establishes contact.



The nerves of the back
also sense sound frequency

Our external surface – our skin – is receptive to all external and spatial phenomena. It wards off the effects of the outside world. Unlike our feet and our hands, which actively perceive our environment, our skin tends to do so passively: a light, soothing breeze, a cool, refreshing wind, and the fiery rays of a sweltering sun. Through our skin we perceive pain – an electric shock, a blow to the neck, the pressure of a storm, the falling rain in a shower, and friction between touching surfaces. By means of spatial design and the choice of coverings, the architect can also contribute to all this. People like to lean against a wall that appears to be soft; they prefer something more tender to touch like wood, wallpaper or a wall carpet – rather than brick or stone.

Another important factor is how the surface has been finished: polished marble, varnished wood, shiny tiles or terracotta will tend to attract us, while clay brick, wire netting or raw board cause us instinctively to draw away.

Our tactile senses do not function in isolation. On the contrary, the various sensory organs work together, often adopting each others' roles – synesthesia. Using their tactile senses, the deaf can hear and the blind can see. The hard of hearing can perceive sounds through the skin of their backs. Utilizing vibrations, human speech and other sounds can be transformed. Then, with the help of electrodes touching the skin, the deaf can understand words and enjoy musical motifs.¹⁵ Just as sounds are perceived in our ears, so the skin can feel mechanical vibrations, which are then conceptualized in the mind as sounds. This phenomenon is indicative of the common origin of the two processes.¹⁶ All of this relates not only to hearing but also to visual experiences. The picture on your television screen can be transmitted to your skin in the form of vibrations, with “images” actually being perceived through the skin. For people with visual disabilities who use Braille, tactile perception actually replaces the visual.¹⁷ Touch can also transmit an odor. The gluey smell of new wooden furniture may stick to our palms. And if we lean up against a stucco wall, the damp, putrid smell of plaster and sand will quickly adhere to the body. Clearly, there are many components; touch is just one of them. It is the combined strength of the components that determines lasting impressions of a building or of its composite materials.

When materials and surfaces touch our skin, they also inform us about temperature. Whether the impression we form is favorable or not, may depend on the temperature of a surface. Hot surfaces warmed by the sun or cold surfaces close to freezing point will cause us to draw away from a building – even before we actually touch it. At swimming pools, sunbathers recoil from metal seats that have been placed in full sunlight. Air humidity also influences the body's tactile senses. We do not like damp, slippery surfaces. And when the humidity is high, we perspire easily and quickly become tired. Dry air, on the other hand, may make us cough. Temperature and humidity together influence our tactile senses, and accordingly have an effect on our architectural perception.

Graveled street



Raked gravel



Wood shavings instead of grass



Snowy street, New York, USA

TOUCH VERSUS SIGHT

Just as a physician may recognize a disease by placing his hands on the body of a patient – he “sees” with his hands – so we too can often perceive the nature and appearance of a building simply by touching its surface. Mies van der Rohe’s pavilion in Barcelona, which was reconstructed between 1983 and 1986, is a dignified building in terms of both shape and layout, as well as materials and finishings.¹⁸ The original building was the German National Pavilion for the 1929 Barcelona International Exhibition; it was subsequently demolished. Despite its small size, the building is incredibly grandiose. Marble, a polished metal frame, glass, sculpture work, a pool, furniture, a soft carpet – all of these create a harmonious impression whether experienced by touch or by sight. The cool marble surfaces of the building and the soft breeze that runs through it, serve as realizations of the designer’s creative intent. Each partial solution submits to the common objective; each expresses the same gesture and formulates the same thought. The pavilion radiates a cool, noble elegance. A similarly unified impression is formed by the fortress churches of the Catholic missions in California, which otherwise bear no resemblance to the pavilion of Mies.

The character of these churches is indicated not just by their striking, stumpy forms and their straddling walls inclined towards the interior, but also by their massiveness of the adobe building, the dense thickness of the walls, and the uneven surface of the clay – all aspects that one can perceive by touching.

One should never state categorically that a material or construction technique is good or bad. Any solution may prove satisfactory, if the choice of material and finishing accords with the wider objective. The task of selecting materials is a responsible one. The effect, however, will always be rather ambiguous. The uncertainty of information conveyed by our senses means that the same building may inspire some, but bore others.



The depth of our impression will always influence our assessment, and this will depend less on the construction itself than on its architectonic values. In his book on the future of architecture, Le Corbusier wrote that his fellow architects “should use stones, wood and concrete, and make houses and palaces out of these materials; this is what I call construction. Resourcefulness creates. But you suddenly touched my heart, you were good to me, I am happy, and I say: This is beautiful. This is architecture. Art has come forth.”¹⁹ When we touch material, the effect may be the same as when we view certain forms. Materials that are soft to touch may affect us in a similar manner as certain shapes and forms, perhaps those with rounded contours. The reverse will also be true: rough surfaces may correspond with sharp, hard corners. Utilizing various solutions for establishing or adapting a surface, we can ensure that an equivalent effect is achieved by means of color. Seeking to create an intimate atmosphere, we obviously use pale or pastel tones rather than bright, shrill colors – and we also apply soft materials with a velvety feel.

Building a sidewalk, Berlin, Germany



Romantic couples frequently seek out darkened entranceways and hidden corners for love-making. Such niches provide an intimate atmosphere in which young couples feel at ease. But does this happen where there is a glass door at the entranceway? No, because neither the door's transparency nor the coldness and the brittleness of the glass encourage intimacy. Judgment of architectural phenomena and construction surfaces will always be personal and subjective. Even so, our opinions are greatly influenced by the dominant culture, traditions, and value judgments of past eras. People have different views on what is beneficial and valuable. Expectations concerning materials and surfaces also vary. Uniformity of the surfaces was the principal requirement in Peru, in the Incan city of Machu Picchu. Stone blocks were placed one on top of the other, without gaps or mortar. In Greece we perceive a difference between quarry stone walls and smoothly shaped, stone walls. The former have far greater potency.

No sitting on these!



Despite its softness, stone that can be carved will be preferred in the construction of a wall, if the principal requirement is decoration. While for the Romans stone was of insufficient value and durability, and therefore stone walls had to be plastered, the current trend in Europe is to remove plasterwork and expose the hidden stone, because stone and the patterns of stone constructions are now highly esteemed. At the same time, stone laid bare in this manner will be subject to the ravages of time. Criteria vary with the passage of time. Initially, concrete was hidden because it was rough to touch. Now, however, bare concrete is the preferred form, because its immense and even surface gives the impression of firmness and stability. The aim is to use such procedures to render the surface of the concrete as varied as possible. And all this is done for the “benefit” of our sight and touch, satisfying both sensory “needs”. Touch can also provoke something similar to what we call visual pleasure. Our tactile senses can enhance a soft visual impression and verify the visual esthetic effect. If listening to music, smelling a sweet perfume, tasting food, or feeling parchment can give rise to an esthetic experience, then why should we not classify as an artistic experience the impression formed by the material and surface of a particular architectural element. A tactile relief can indeed offer an esthetic experience; touching a polished surface or a shiny marble surface or metal plate can further enhance our esthetic pleasure. A rough, hard or sharp surface will have the very opposite effect: it may unsettle our nerves, just like the strident motifs of symphony music or the spicy taste of chili sauce. Abrasive stone is painful to touch, but it may also enhance our deference and respect. A work may cause esthetic resonance either through pleasure or through discomfort. Creative works affect us in complex and contradictory ways; our reaction may be extreme – from rapture to fury. Indifference, however, is an unlikely result.

The Italian futurists endeavored to create a new artistic genre based on touch. In 1921, Marinetti, leader of the Italian futurists, published his “manifesto on tactilism”.²⁰ Educational material at the Bauhaus also underlined the importance of developing tactile senses: “In the course of their introductory practical lessons, students studied material principally by using their tactile senses.”²¹ In his book, László Moholy-Nagy emphasized the importance of touch in the conception of space. “Individuals become conscious of space – the relationship between objects – principally by means of the visual organ and then of the visible situational relationship by means of movement: by altering their own position – and this can be verified concurrently with the help of our tactile senses.”²²

Moholy-Nagy subsequently invited blind people to the Bauhaus in Chicago, where they “read his tactile objects with pleasure, as if they had been pictures.”²³ With these pictures – that can be “read” from surfaces – Moholy-Nagy did not just create an opportunity for a new experience and introduce a new genre to the Bauhaus study program, he also raised the possibility of substituting visual impressions. He was one of the first to understand that we could use other sensory organs to perceive artistic works that had previously been interpreted exclusively by visual means. Our tactile senses enable us to verify other impressions and broaden our information base, thereby enhancing our understanding of architecture. Moreover, enhanced perception allows us to take into possession the spatial environment and architecture surrounding us.²⁴

- 1 Kenneth Frampton: *Toward a Critical Regionalism*. In: Hal Foster: *The Anti-Aesthetic*. Seattle Bay Press, 1983, p. 29.
- 2 Peter Murray: *Renaissance Architecture*. Schocken Books Inc., 1978
- 3 Attila Batár: Lucien Hervé. Héttorony Könyvkiadó, Budapest, 1992
- 4 Lucien Hervé. *A Study by Attila Batár*. King Stephen Museum Papers, Székesfehérvár, 2001
- 5 László Moholy-Nagy: *Az anyagtól az építészetig [From Material to Architecture]*. Corvina, 1972, p. 24.
- 6 Leonardo Benevolo: *The Architecture of the Renaissance*. Vols. I-II, Westview Press, 1978
- 7 Lucien Kroll: *On the Architecture of Complexity*. The MIT Press, 1987
- 8 Tadao Ando: *Album de l'exposition*. Éditions du Centre Pompidou, 1993
- 9 Tadao Ando: *The Yale Studio & Current Works*. Rizzoli, 1989
- 10 Le Corbusier: *La Chapelle Notre-Dame-du-Haut-Ronchamps*. In: GA 7, 1971
- 11 Frank Lloyd Wright Architect. *MOMA exhibition catalog*. The Museum of Modern Art, 1994
- 12 Kenneth Frampton: *Toward a Critical Regionalism*. In: Hal Foster: *The Anti-Aesthetic*. Seattle Bay Press, 1983, p. 28.
- 13 Coren, Ward & Enns: *Sensation and Perception*. Harcourt College Publishers, 1999, p. 237-239.
- 14 Ibid. p. 227.
- 15 Ibid. p. 238.
- 16 Ibid. p. 236.
- 17 Ibid. p. 237.
- 18 A. James Speyer: *Mies van der Rohe*. The Art Institute of Chicago, 1968
- 19 Le Corbusier: *Vers une architecure*. Flammarion, 1923, 1955, p. 165.
- 20 Marinetti: *Le Tactilisme*. Corso Venezia, 1921
- 21 László Moholy-Nagy: *Az anyagtól az építészetig [From Material to Architecture]*. Corvina, 1972, p. 21.
- 22 Ibid. p. 195.
- 23 Ibid. p. 243
- 24 Ibid. p. 186.



KINETIC EXPERIENCES

MOVEMENT AND ARCHITECTURE

“There are people who think that architecture, as [a branch of] fine art, relates exclusively to the eye. Instead, its primary effect is on the mechanical movement of the human body – an aspect to which scant attention has been paid. When we dance, moving in accordance with certain defined rules, a pleasant feeling runs through us. A similar sensation is felt by someone who, with his eyes bound, is led through a well-built house. This includes the hardly measurable and complex system of proportions, which determines the whole building and the character of its various parts.”¹

Hidden scenes

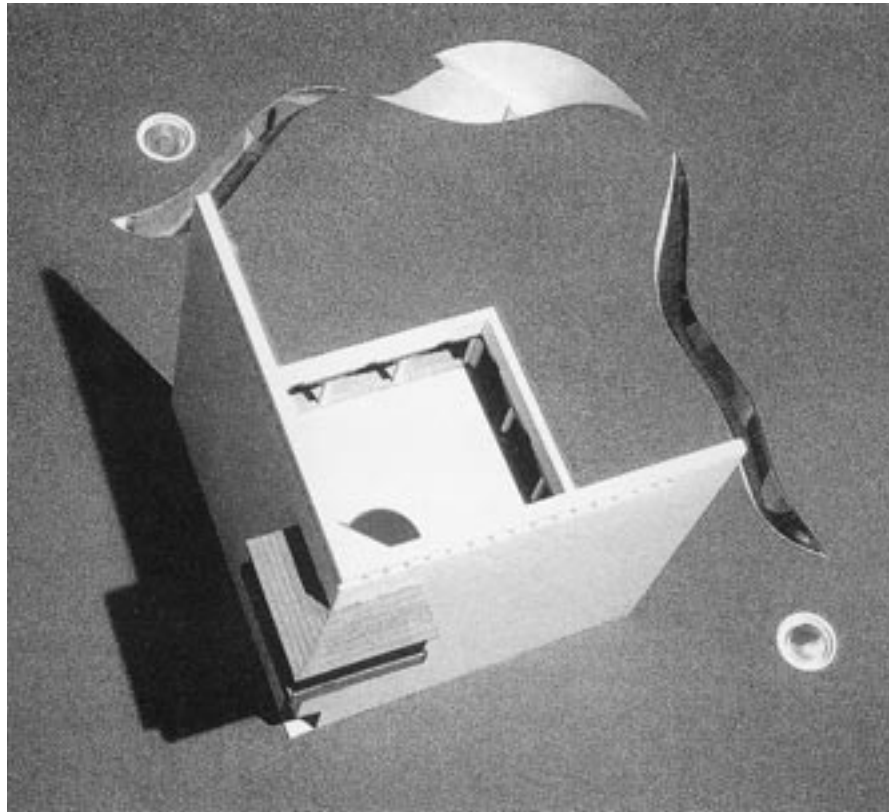


SECRET AND EFFORTS

When we use our muscles to bring our bodies into motion or to stop ourselves from falling over, a kinetic experience arises. The sensation of our nerves at such times of mobilization or immobilization is called kinesthesia. Each time we take a step, our muscles move, and we can feel whether the surface under our feet is rough or smooth, flat or inclined, moist or dry. Our feet are forced to accommodate the ground beneath us. We take a step upwards, and we lift our feet even higher, we pull our muscles together, we press ourselves up, and we feel with our entire body that we are going up a flight of steps. Another effort on our part, and we go up another step, we grip the banister that leads and directs us, and then we must turn. We walk step by step through the space. I have already referred to the connections between kinetics and touch (haptic perception). The perception of certain architectural circumstances encourages us to concentrate on the motional experiences that we feel through our feet.



An anecdote or a genuine story linked to the name of the 16th-century Japanese garden designer and Zen tea master Sen no Rikkyu, refers to the kinetic experience.² As soon as the last of his teahouses was ready, he invited his friends to show them his work, which, with a refined sensibility, he had placed at a softlined, atmospheric location. The guests could not wait to see the teahouse, but they were disappointed. Their hopes were not realized because, having walked along a lengthy garden path, they did not see the promised hill range or the lake surrounded by hills. Those invited to the opening were right to think that behind the garden there would be a wonderful panorama. But there was no such spec-



Emilio Ambasz: The Casa de Retiro Espiritual's sunken yard with balkony, Córdoba, Spain

tacle, because a hedge at the end of the garden completely obscured the view. Then the guests went back to the teahouse. Before they could enter it, however, they had to cross several steps to get to the pool where they could wash their hands and rinse their mouths. As they bent down, they saw, through an unexpected tiny gap in the hedge, the complete panorama – which had been hidden from them until then. The surprise was realized after all.

The effect must have been many times greater than it would have been if the guests had seen the landscape immediately, without hindrance, disappointment or effort. By holding back, the effect is intensified; disappointment leads to wonder. An effort was required to make sure the spectacle would have such an effect. The excitement did not come on its own, but only after a long walk, after alternating events: expectation, disappointment, effort, surprise, and satisfaction. Everything, from the secret to the movement, contributed to the significance of the visual experience.

A similar concept is realized in Emilio Ambasz's design of a cave dwelling (Casa De Retiro Espiritual, near Seville 1978), where in front of a family house sunken into the ground, two perpendicular, free-standing walls – each of them several meters tall – shut off the view.³ If one looks from the house, the walls appear to be completely bare – except that there are two staircases running up each side of the wall. At the top of the staircases, a door leads to a balcony, on the other side of the wall. From this balcony on the far side of the wall, one can see the previously hidden panorama. In this case, the effort required is even greater: one has to ascend the steps in order to see the view. Once again, movement precedes the spectacle. Human effort contributes to an intensified visual experience.

Overcoming differences between the levels of different sites is tiring but rewarding. At the top of the staircase, one's delight in having reached the top is accompanied by the spectacle itself. Things look different when seen from a higher position. We enjoy the benefit of potential energy. Having overcome the difficulties, one can enjoy the architectural value, the result of kinetic energy.

The joy of discovery is not always dependent on effort. Indeed, very often, the goal – being able to see the landscape – is realized as soon as we enter a house. The list of family houses and apartments with a view is impressively long. In San Francisco or in Hong Kong, whenever you enter an apartment with a view over the bay, you often see the spectacle right away. On entering such an apartment, the visitor may feel like he is immediately leaving the flat because the landscape can be seen from the entrance door. Everything is subordinated to the view. The house is just an elevated platform, revealing the wonderful landscape. The English loft is similar – an apartment with openings at both ends. One can look right through the loft. Such solutions require no effort from the curious; there is no secret, no surprise, just a brief encounter. We do not experience feelings of excitement, but “merely” an awareness of the spectacle. Comparing the two different solutions and the experiences to which they give rise, one becomes aware of the difference: the value of concealing something and then the “usefulness” of the kinetic effort – when we have to search and wander in order to see something.

OBSTRUCTION

Without movement, space cannot be fathomed; one has to move in order to perceive it. We pass through space using both our eyes and our legs. Space, however, is not free; even the most open spaces restrict us. There is no vacuum space, and architectural space does not exist in a vacuum. If nothing else, there is always some kind of terrain beneath our feet, and the gravitational force, although not completely constant, exerts itself everywhere, thereby limiting us. Through its objects, architecture always places a physical obstruction before us. It not only limits but also compels us to move in a certain manner. Spaces are full of obstructions; and objects divert people. Usually, we do not even notice this, as we generally move instinctively. But whatever the manner of the restrictions placed upon us, we do experience them. This may be because we have to overcome differences in height or because we have to avoid an object and are forced to change our course.

Still, all spaces – even the most confined – provide opportunities to make choices. Architecture directs and guides us not only by erecting obstacles in front of us, but also by tempting us. Frequently, it achieves its effect through a combination of the two. Often the impulse for the process of discovering architectural space is the spectacle – or, as the above examples show, the expectation or possibility of a spectacle. The process itself, however, is accompanied by movement, by a kinetic experience. Compulsion is coupled with attraction. Both factors incline us to explore the space. Discovery is the consequence of visual and kinetic perception.



Villa Giulia, Rome, Italy. Designed by J. B. da Vignola

The aforementioned examples indirectly refer to the architectural role of kinesthesia, because the path we have taken, our movement, prepares for and facilitates the architectural experience. But the kinetic experience may be indirectly linked with other experiences. Usually, there is a concurrence – especially with the visual spectacle.

The Villa Giulia in Rome (designed by J. B. da Vignola in 1551) well demonstrates this duality of attraction and compulsion.⁴ As one reaches the entrance to this 16th-century baroque villa, having passed through the first courtyard, one can look down onto the internal sunken court. A pool has been placed in the middle of the lowest yard, which is backed by an elegant three-story building with loggias. Looking down from the balustrade of the second open space, the visitor is entranced by the spectacle, and begins to ascend the steps. In order to walk from the upper level to the courtyard, one has to pass by two bended walls. A balustrade closes off the inner curve of the two flights of steps connected to the wall. The loggia and the spectacle of the pool attract the attention of visitors. The steps allow one to descend, while the curved shape of the wall helps to direct one's progress. The composition places opportunities for walking within certain limits. On the curve, as we pass down the steps and move along in the three dimensions, our perspective changes continuously. As our view-point alters with every step, and as the distances become shorter, our impression of the architectural image changes continuously. Indeed, the image is re-set constantly; as we descend the steps, the picture begins to move. The constantly changing series of pictures inspires us, stimulating us to continue along our path. As far as the Villa Giulia is concerned, it is what we actually see that attracts us rather than anything we might assume. With every moment comes a new surprise. As we descend the steps at the Villa Giulia we begin to understand that it is not simply the visual image we enjoy when discovering buildings. It is the viewer himself, altered by the kinetic experience – the impulse, the rhythm of the steps, and the dignified descent – who forms the visual image of the space. The movement dictated by the building compels us to see and feel it as more attractive and nobler. We direct the feelings that we experience (because of motion) onto what we see. Visitors to the Villa Giulia have to keep to a certain path within the space. Without movement, the picture would be a fixed one; it is only by walking around the building that the image of it becomes a living impression in our minds. The more we are compelled by elements in architectural space such as walls and staircases, the closer our path gets to the architectural space itself. The path runs along a generous route fixed by architecture.

THE LABYRINTH

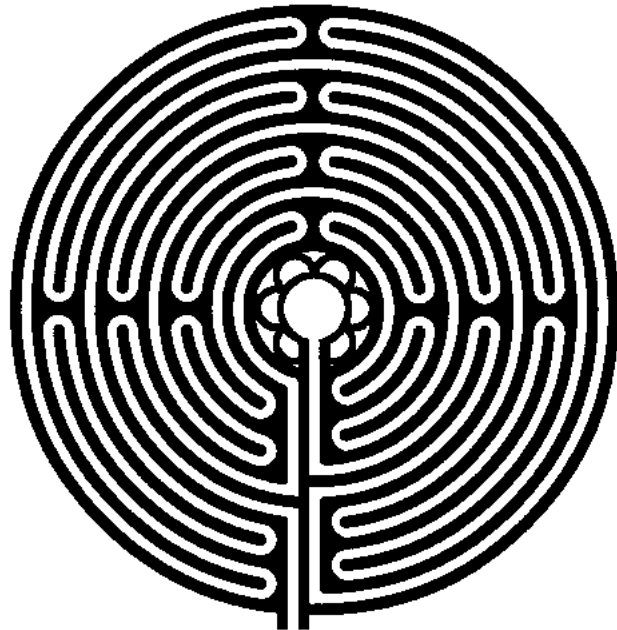
In an architectural space, each movement is based partly on external factors and partly on free choice. The barricades that close off spaces prevent our free movement, while an open space offers an indefinite number of opportunities. Physical obstacles can force the pedestrian to make a choice. How should we avoid such objects? We may be forced to make a choice not merely because of the openness of the space, but also because of the attraction of the spectacle.



King Minos' palace, Knossos, Crete, Greece

Movement is at its most decisive and most confined in the labyrinth.⁵ The fixed track of the labyrinth is an extreme solution; the narrow corridors placed close to each other clearly determine the way ahead – at least for a time, until the ways part. The choice is ambivalent, it signifies a maze. One can choose only blindly, because the goal is kept hidden. Both possibilities are like jumping into the dark. Freedom now means being without a way out. We experience the full uncertainty of an excessively defined position. According to Nietzsche, it is certainly true that if our thoughts take on an urban character, then we will necessarily feel that we are in a labyrinth. The labyrinth reflects our way of thinking.

In a labyrinth, one has no possibility of surveying the space, and the visual sight is reduced to a minimum. We can only recall the process of walking through the labyrinth, and for this reason the kinetic experience becomes dominant. Faced with the dilemma of each path having an equal chance of leading us to the exit, we can do no more than imagine the way out.



Labyrinth on the floor of the Chartres Cathedral

The target remains invisible, and so our ability to discover it is linked with our desire to get out rather than with any visibility. Hope is our motivation. The endpoint – the exit – is something that we suppose but cannot substantiate. We have to make a decision without knowing the consequences. Space becomes unfathomable and orientation impossible.

The word labyrinth originally meant a double axe, the sign of which was found carved into the wall of the palace of King Minos of Crete. According to the myth, King Minos confined the monster Minotaur to an unending system of narrow tunnels.⁶ It was between these walls that the Minotaur went along his hopeless path. Others think that it was a place for holding a bull fight. After Theseus killed the bull, it was only with the help of Ariadne's thread that he was able to exit the labyrinth. According to another legend, King Minos wanted to confine the designer of his palace, the famed architect Dedalos, to the labyrinth, so that nobody would ever discover the secrets of the building. Other chroniclers claimed that the royal palace counted as an unusually complex building at the time, with many small rooms and long wind-



Labyrinth of plants by the Cathedral

ing corridors where one could easily get lost.⁷ The basis of all these myths was the power struggle between Athens and Knossos, the rivalry between the two royal families.

Labyrinth does not just mean a maze; it also signifies inevitable choices. The space in a labyrinth is both confined and free, since the exit is unknown but choices have to be made at regular intervals. By means of its objects, architectural space prevents our movement, but also forces us to choose. The first labyrinths were mazes. Over time, however, a new meaning was given to the word. In the middle ages, for instance, the naves of cathedrals included “labyrinths”. Round in shape and made from stone, they forced people to move in a complex manner.⁸ The path was clear – unlike in the case of the mazes. Such labyrinths usually comprised 11 parallel circles. They could be as long as 965 feet – as in the case of Chartres. These circles ran in circular forms to the centre. One could exit the labyrinth by following the circular pattern. If one followed the path, it was possible to reach the center and then exit it again. The goal was not to discover the way out. They took the idea of the fight against the devil from the ancient myth of Ariadne’s thread, supplementing it with Christian notions and symbols, such as pilgrimage, salvation, and the divine encounter.



Labyrinth of reeds on the road toward Kaunas, Turkey

One day in every year, the Ascension of Mary on 25th August, the medallion placed in the center of the circle was lit by the sun, through a hole in the roof – the rays of redemption.

But not all labyrinths are made from stone; some comprise cut hedges or shrubs. One such labyrinth is to be found right next to Chartres Cathedral and others are located at the Parisian Bagatelle, and in the vicinity of the Trianon Palace, in Versailles. Nature, too, has established labyrinths in many different places. Indeed, garden-like labyrinths are just as old as those made of stone. The first labyrinths were constructed in the Neolithic era; what we see today are, in a sense, imitations of these ancient constructions.

Decades ago, I was in a group that got lost in a labyrinth consisting of reeds on the southwestern shores of Anatolia. We approached the seaside town of Kaunos from the bay. As the water became shallower, we had to swap our boat for a dinghy. The boatman – who knew the area – drove our little motorized craft across the reeds towards the ruins of an ancient settlement. From the boat, we could see nothing but the reeds, which were taller than a man. Our boatman, relying on his experience and instincts, drove the boat confidently. The journey lasted more than an hour, and yet it should have lasted no more than 10 minutes in bee-line. Without realizing it, we had gone from side to side, and backwards and forwards. Orientation was possible by means of the position of the sun and a rocky cliff that we could see above the reeds. The rock tombs of Nekropolis were located there far above sea level; there were no steps leading up to them, which indicated that at some time in the past the sea level had been far higher. Nowadays, one can stare at the ancient wonder from a level that is 50 feet lower. In the evening, the captain of our boat reminded us that it was time to return whence we had come, before dusk descended.

Most of the return journey was made in the dark. There was complete silence, apart from the steady monotonous sound of the motor boat. There was a new moon, and so we were surrounded by complete darkness. The cliff was soon invisible, and the sky above us gave nothing away. We became more and more anxious as our boat zigzagged its way across the water. Each time the boat turned, the reeds would open in front of us but only at the very last moment. Our boatman continued to gaze ahead into the darkness, without even turning his head.

If we add together, in our heads, the distances we have walked on different paths, we still do not obtain the real length. For this reason, a labyrinth based on a network of a limited number of paths (or its length) can seem unending.

Unlike the labyrinth, the order in which we perceive things in the “open air” is completely undefined. The order in which one perceives something does not clearly determine our concept of perceived space; our memories of space can be cited in an order that differs from how we perceive something. The order in which we become acquainted with something depends, firstly, on the architectural design and, secondly, on the desires of the person who is moving in the space. The two factors together define the path already taken. It is in this order of perception that we store in our memories – the architectural space. Although an architect can influence and even direct processes by including attractive motifs and forms as well as barricades, the route he suggests is merely one of many. The notion that arises after a series of perceptions, may be an abstract impression of a picture or a collage-like painting whose details change over time. But another possibility is that we remember processes, perhaps in staccato or perhaps overturning the original order of perception. The pictorial imitation of space that forms in our minds during movement does not correspond fully with reality. The record of our memory differs from the order in which we perceive things. Contrary to the labyrinth, in open spaces it is the depth of our impressions that alter the memory processes which follow the order in which we perceive things. If the more important memories come to the fore, they naturally suppress less meaningful recollections.

An open space labyrinth is best described in a short story by Borges titled *The Two Kings and the Two Labyrinths*.¹⁰ The king of Babylon arranges for the construction of a complicated and ingenious labyrinth, which nobody dares to enter. On one occasion the king of Babylon is visited by an Arabian king, whom he entices into his labyrinth. The Arabian king wanders in the labyrinth for a whole day, hungry and humiliated, until he turns to God, who then leads him out of the labyrinth. On returning home, the Arabian king takes revenge on the king of Babylon; he defeats his army, destroys his fortresses and banishes the king, whom he has taken prisoner. He has him bound to the back of camel and lets him be dragged through the desert for a period of three days.



Tadao Ando: Garden of Fine Arts, Kyoto, Japan

There, in the desert, he announces that it is his labyrinth, where there are no steps, no doors, no wearisome passages or walls. Then he removes the bonds from the king of Babylon and leaves him there in the desert. The king of Babylon perishes, hungry and thirsty in the desert. Perhaps open spaces devoid of vegetation are the greatest labyrinths of all. Labyrinths are extreme forms of the determined nature of space; a building constructed according to the design of an architect limits our room to maneuver, as well as our notion of space. The major kinetic perceptions are not limited to so-called labyrinths. We can see many similar aspects in the street networks of cities. Just think of the medieval towns, which seem to resemble the classical labyrinths.

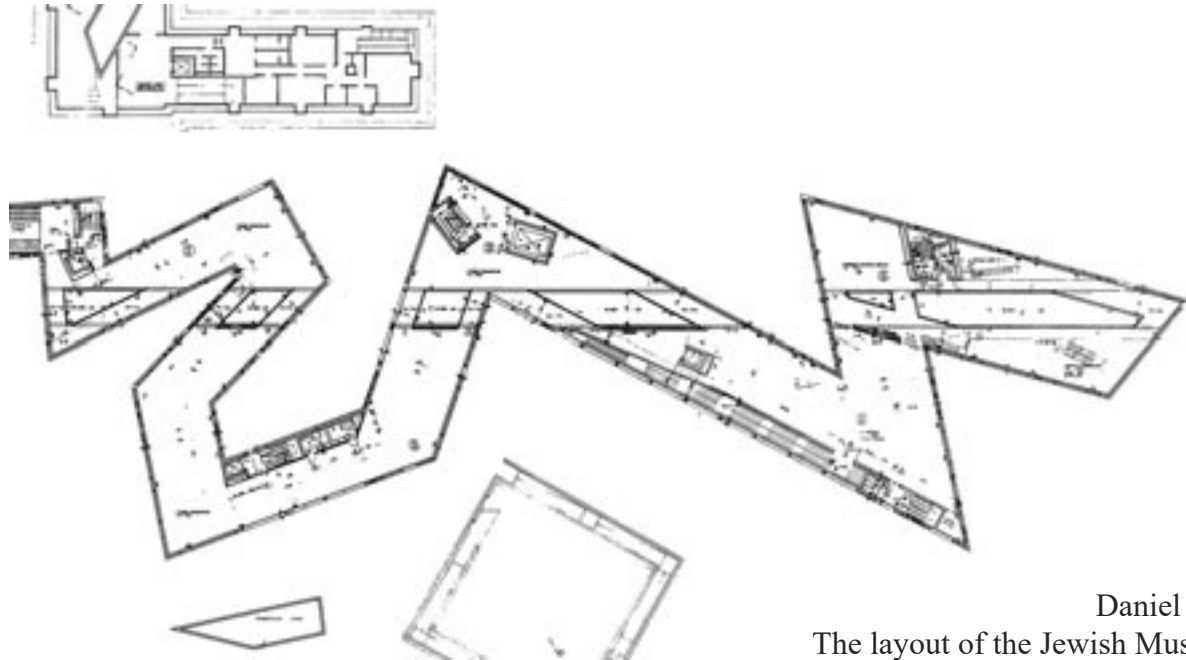
The old part of Barcelona (known as the Barrio Gotico) or the part of Rome confined by the corsos, are hardly less complex than Crete's ancient labyrinth. The slopes and street fragments differ from the Cartesian system of coordinates. Pedestrians and visitors lose track of where they are; especially in the evening hours they cannot look to the sun for assistance in orienting themselves. But this gives rise to excitement, when not just the spectacle but the experience of movement becomes one of the informative elements. Like the reed maze, here too a role is given to instinctual motifs based on memories, and we tend to feel rather than know when we divert from the sign-posted direction. The combination of various impressions – including the feeling that comes from movement – reminds us that we should listen to what our feet tell us about the ground beneath us.

Labyrinths have not yet gone out of fashion, neither physically nor metaphorically. In towns and in buildings, the certainty of finding one's way and the excitement of losing it together establish the joy of discovery. This is why people are still planning "labyrinths". Tadao Ando designed complex corridor systems for his buildings. In many cases, it is impossible to see the whole of a building; all we see is just a part of it. We can link the various parts together, if we go from one to another. It is only in our memories that we can put together the details that we perceive visually but individually. Tadao Ando's building in Tokyo – Collezione (1989) – which accommodates boutiques, is an excellent example of a complex based on the labyrinth concept.^{11,12} The building, which comprises several parts, is interconnected by means of a courtyard, a circular gallery, and various flights of steps. It is a modern labyrinth. All the shops can be accessed by a variety of means. Walking through the complex, one soon becomes uncertain of one's path. It is very easy to turn back on oneself or to find oneself where one set off. The complex is designed to confuse the visitor. It is not just that we lose our orientation, but also that the narrow and seemingly unending corridors confine us. Ando's labyrinth is even more complex than were those of the classical period, because it is a three-dimensional maze with several different interconnected levels. This also means that we see the building, which is relatively small in size, as larger than it really is. An even more exciting kinetic experience is to be had in Tadao Ando's Garden of Fine Arts in Kyoto.¹³ The museum, with its ramps, bridges, pools, and visible overhead beams, is similarly a three-dimensional labyrinth. The system of paths through the museum is fixed – even though the paths lead forwards and backwards.

There is no doubt about where we should go. The designer prescribes the path. But unlike the standard labyrinth, the whole building can be seen from certain aspects. This means it is quite clear in which direction we should go, but we still do not know where we are exactly or which part of the building we shall reach next. Ando cleverly resolved the various contradictions, giving visitors a clear and fixed path with the minimum amount of transparency, but still managing to leave them in a degree of uncertainty concerning the labyrinth. The exhibits are arranged in a fascinating way, so that visitors to the museum never lose interest. He placed a copy of Leonardo da Vinci's *The Last Supper* onto a durable concrete wall, while, a copy of Monet's *Water Lilies* was placed on the base of the pool in front of the feet of visitors to the museum, thereby attracting their attention.

For Daniel Libeskind, kinetic perception is a very important design criterion.¹⁴ Often, when planning a building, he starts with kinetics. He has emphasized that the important thing is not the external spectacle; instead what is important is the thoughts one experiences based on the kinetic experience. Elsewhere he writes of the linkage between the visual and the kinetic experiences; it is only by walking through a building that one can understand it. Libeskind does not design labyrinths, but he does influence motion by means of a great number of architectural instruments – including both obstacles and attractions. His most significant building to date is the Jewish Museum in Berlin, which is a first-rate example of the use of kinetic perception. Inside the museum, visitors pass along a fixed path, with long straight flights of steps, fragmented corridors full of zigzags, and bridges at intervals. The size of the network of corridors transforms continuously, not only because of the changing widths and heights, but also through lighting effects and the creation of illusory spaces. The strips of light coming through the gaps in the façade attract visitors to the museum. Compulsion and attraction together exert their influence.

With such physical and imaginary changes of size, Libeskind does not just guide visitors to the museum. Even more important are the impacts we experience as we pass through the museum. Perhaps he does not quite succeed in ensuring that visitors put together the pieces of the Star of David as they pass through the museum. Still, it is quite evident that the zigzagging of the corridors refers to Jewish history, to the periods affected by prosperity and decay. One is reminded of the humiliation, the persecution, the ghettos, the pogroms, and the Holocaust.



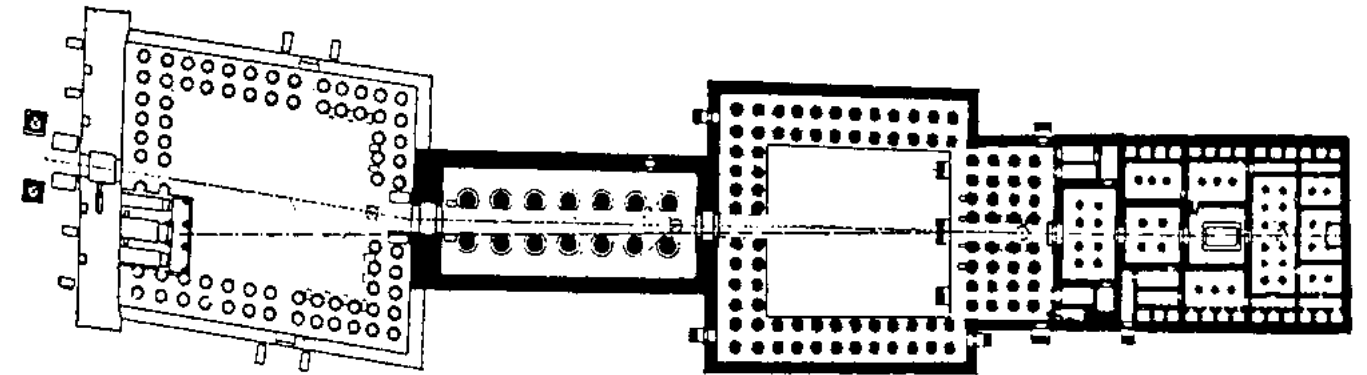
Daniel Libeskind:
The layout of the Jewish Museum (2001)
Berlin, Germany

The series of sharp changes in direction, the closed and confined space, the dark voids, the bridges hanging in the air, and the various staircases connecting the four floors – all are bound to make visitors meditate. A tiresome path full of obstructions leads us to the rooms displaying the past. Counterbalance is achieved through light, the bridge and the exit. Both the spectacular (strips of light in the dark) and the non-visible (dark shafts), as well as the difficulties experienced as one walks through the museum, are references to the history of the Jews.¹⁵

The Jewish Museum in Berlin is just one example of how Libeskind makes use of kinetic energy. The Nussbaum House (Osnabrück, 1998) is a closed system of returning corridors, with which Libeskind refers to the sufferings of this tragic painter.¹⁶ Nussbaum fled Germany in vain; he was taken back there and murdered in his native land. The fixed path indicates the lack of a way out and the painter's desperate fate. Visitors must proceed along the corridors in a certain direction. Without the kinetic experience, it is impossible to understand the concept behind the building.

Characteristically, Libeskind called the building the Museum ohne Ausgang (Museum without Exit). The entrance to the museum can hardly be seen, and its new wing is connected to the old merely by way of a suspension bridge, which refers to the contradictions of the past (the old building was once the Nazis' headquarters).

The architect prescribes the path to be taken by visitors to the museum, while also drawing attention to our own movement. The way forward, the speed, the direction, and the changes in direction are dependent to a large extent upon the solutions of the architect. If he makes progress easier, in order, subsequently, to place obstacles in front of visitors, then he does so. The kinetic effect is coupled inevitably with various associations, which the architectural environment forces upon us.



The layout of the Luxor Temple, Egypt

ARCHITECTURAL SPACE IS NOT A VACUUM

As time passes, the built environment becomes ever larger; natural space becomes architectural space. In this new man-made space, the existing buildings govern and limit motion. The choreography of motion is achieved through a combination of restrictions and human desire.

The temples of ancient Egypt vary in size. The sequence of courts was built on an axis. Perhaps the best example is located in Luxor. Most of the temple was built in the 14th and 13th centuries BC, during the reigns of Pharaoh U Amen-hotep.¹⁷ The original composition was never changed, although there were subsequent additions. The spaces, which decrease in size, are symbolic of the process of life. Some of the spaces confine visitors, while others give them a free reign. Visitors come from the open space of the desert to the two larger courtyards. From there, by way of a corridor, they approach the closed spaces. Here they may still move relatively freely. Everyone can select the most appealing path, although under the burning sun many visitors choose the shade of the columns and beams that surround the courtyard. Human desire can be freely exercised, but the hot air clearly exerts its own influence. The other factor limiting movement is the human mind; the visitors have come to be closer and closer to the divine. So most visitors, in spite of the burning sun, head for the internal spaces along the axis of the temple. Between the columns, motion is limited, because one has to watch one's path. The walls prevent any further free movement. The columns hinder but do not determine movement. This space is still a transitional one, between the confined and free space.

The inner sanctuary, "God's house", comes next, a space with several columned rooms. These interior spaces become smaller and smaller, increasingly restricting motion. The last space is the inner sanctuary, into which only the high priest could go – and only at certain times. In this sanctuary, movement is so restricted that one can feel the surrounding walls only. The high priest could circle the room in a few steps. Here there is no choice, and there is hardly any possibility of movement.

The confinement is complete. The layout of the temple from the desert to the sanctuary is such that the space gradually incapacitates those who enter, finally devolving them of their free choice.

For an architect there is no vacuum. A space always has "givens" – things that are pre-existing and which automatically limit the space or which place boundaries on the possibilities. Even before the advent of man, nature was determining the environment and limiting what was possible in a given space. Flat land versus undulating terrain, firm dry ground versus marshland, wind versus gravitation – no space is completely without shackles or fetters. If nothing else, we face the obstacle of the ground beneath our feet, which is unchanging. Although the ground allows us to move from one place to the next, it nevertheless hinders and limits our free movement. We only really notice it when it causes problems.

Corridors establish connections between rooms, enabling us to move from one to the other. These connective spaces are usually placed in the interior of buildings, invisible to people outside. The visual effects arise from the inner spectacle. However, there are connecting solutions which are very visible from the outside, like the external escalators of the famous museum in Paris named after Georges Pompidou, or elevators placed on the exterior of buildings. The designers of some buildings have placed corridors in tubes, thereby turning them into separate architectural elements. This is the type of building for which the British architects, Archigram, drafted a design (Plug in City). The designers grouped together objects with various functions, placing them on the ground or in the air. Most of them resembled ancient dinosaurs, with enormous tubes rather than legs. These tubes were not simply parts of the building structure; they were also designed to facilitate movement. The idea was to connect the various parts of a building with enormous tubes. It was intended that the tubes should form connections and become the most characteristic aspects of the building. Ideally, this is what was supposed to happen. Parts of a building providing movement and kinetic energy were to receive particular emphasis.

The group's designs were never more than bits of paper, and yet there was popular support for the group. A theater based on the principles espoused by Plug in City was finally built in Oklahoma City (John M. Johansen: Mummers, Oklahoma Theater Center, 1965-1970).



The Roissy Airport, Paris, France

Its designers incorporated a system of corridors made up of tubes, connecting the various functions and parts of the building. Even when seen from a distance, it is obvious how the spectators' view is separated from the stage and the spaces used by those taking part; that is, from the changing room, the scene dock, and other auxiliary rooms. The individual architectural masses swim in the air, like heavy clouds which are held together by a system of pipes so that they should not escape and fly away.¹⁸

Terminal One of Charles de Gaulle Airport in Roissy near Paris, was built in a similar vein, according to a design by Paul Andreu. The only difference is that here the tubes were placed inside, in a round-shaped courtyard within the cylinder-shaped building. In a ring surrounding the courtyard, onlookers can gaze at the spectacle from behind glass. The tubes, which are covered in glass and incorporate a moving walkway, pass each other in all manner of combinations inside the cylinder-shaped space. The multitude of glass tubes turns the large court-

yard into an exciting visual spectacle. The tubes take passengers to their planes, but at the same time they create the illusion that they are actually taking them into the air. The attraction is not just the mish-mash of tube corridors, but the manner in which passengers are moved around and the spectacle of watching them immobile on the moving walkways, as they are taken from the twentieth to the twenty-first century. It is a utopian solution. The passengers move back and forth in front of our eyes, and one can see how those running behind time apply their own motory faculties and walk briskly along the moving walkways.

TERRAIN

We register the nature and quality of the terrain beneath us through the soles of our feet. Terrain can affect our mood in a variety of ways. Through touching it with the soles of our feet, or by pressing against it, we are able to obtain a great deal of information about our environment. Our movements will vary, depending on whether we are walking on sticky, slippery or firm terrain. There is no such thing as neutral terrain. By means of the terrain, we undergo a kinetic experience. Nevertheless, most designers and architects seek to conceal the terrain. Many of them see it as an obstacle; they usually pay attention only to the technical aspects of terrain when drawing up their designs. They may sometimes consider it as a spectacle. There will always be terrain, and so it is worth turning our experience of it into something we register and contemplate.

Our whole bodies take part in conquering the space. Our kinetic discovery of the spatial is primarily the result of muscle work and walking. It is not just the skier on snow or the skater on ice who enjoy sliding around. The joy of rock-climbing is not just the privilege of some enthusiastic alpinists. It is not merely to "reach the top" that the mountaineer struggles ever higher towards the summit. It is the challenge of climbing that he enjoys. The hope of reaching the target, of the satisfaction that will be felt, runs right through the body of an alpine climber. Physical effort is always part of the joy felt by walkers, joggers and hill climbers.

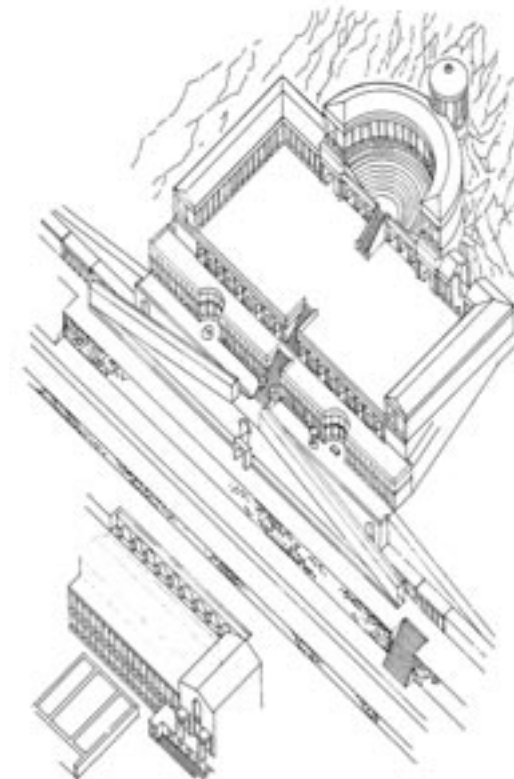
It is the combination of the two complementary aspects that give rise to the spatial experience. We traverse the terrain with our eyes and with our legs. Some of the spatial features become an architectural experience through our feet. We are no longer mere spectators; we have become active participants in the spatial dimension.

Road surfaces have changed over time. The dirt track was replaced by macadam, the stone pathway by concrete or tarmac. Each terrain invites a different movement, providing us with a different experience. In days of old, some roads were made out of wood – ideal for hansom horse carriages. And there were also paths strewn with sand – for equestrians. The relatively soft wooden surface swallowed up the noise of the wheels of the coach, while sand neutralized the knocking of the horseshoes. The movements of children pushing each other around on gravel differ completely from those of adults shuffling along on a hard surface on their Sunday afternoon stroll. To slide around on pine needles, to cross fields of wheat, to skate on ice – each is a different experience. To walk barefoot in shallow water by a sandy beach is still one of life's great enjoyments. Fine sand beneath your feet and cool water between your toes – what a pleasant and refreshing experience! As the terrain changes, so the kinetic experience alters.

Roads and paths do not merely allow us to move from one place to another. Sometimes they can cause us to stop and observe. In Japanese gardens, for instance, an unexpected bend, a minute bridge, a collection of stones leading across a brook – each may cause us to stop and observe the spectacle. Paths can force us to rest and observe. In this way, a connection is formed between spectacle and movement, between the visual and the kinetic experience. A rest is a natural part of a walk. We value the path leading to our destination, and do so particularly when it is broken up by rests at intervals. In many cases, we would simply pass by things, unless we stopped and observed. In a park, we slow down our pace, and as we sit on the park bench engrossed in a book, we may occasionally raise our heads and observe what is going on around us. Our evaluation of a path will not depend on its length but on the impressions formed as we move along it.

INCLINES AND RAMPS

The secret of the Avenue des Champs-Élysées is its incline. The Arc de Triomphe at the western end of the Élysées is particularly impressive for pedestrians that walk up the incline. Even the incline is not simply a straight one. The first section of the avenue from Place de la Concorde to Rond-Point is horizontal; there follows the second section, a moderate incline, all the way to the Arc de Triomphe. But the incline is not uniform for, as far as the Étoile, the street is concave rather than straight. This concave street has significant advantages; it enhances the view of the buildings lining the street and it makes the Arc at the end of the avenue look even larger and grander from below.



Steps and ramp composition
Palestrina, Italy

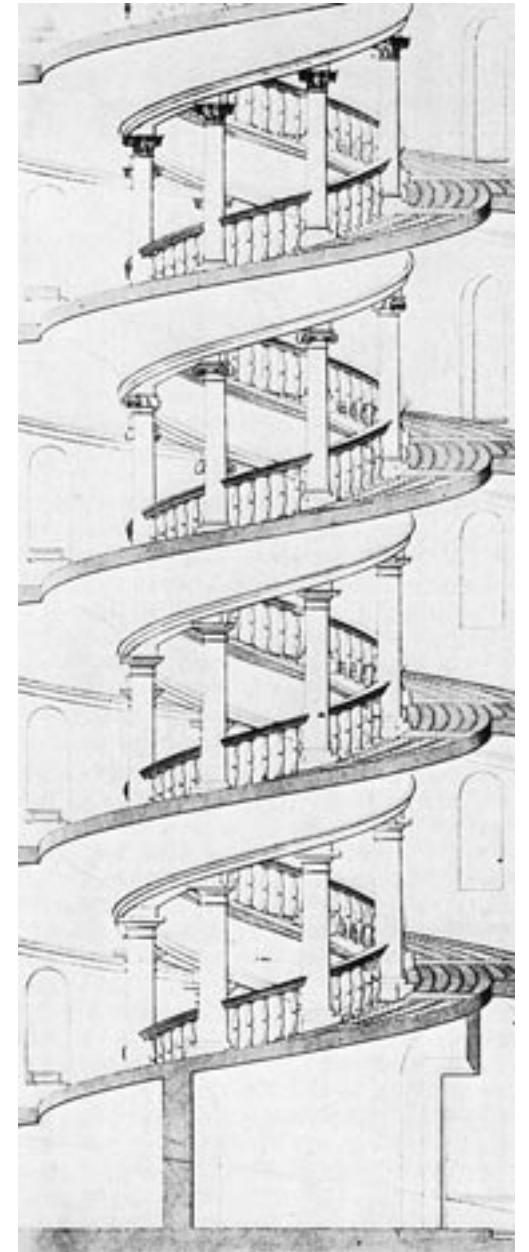
The street exploits all the advantages of its shape and subordinates everything to the impressive view of the Arc de Triomphe. But what one experiences is not just the advantages of a good view. The slight incline of the street brings the body into motion and prepares it for the approaching spectacle, as we walk irreversibly towards it. The spectacle and the body in motion are coordinated. Reinforcing each other, they enhance the effect.

The incline and the ascent, as well as the variability of the street network, excite us. At each intersection, we draw to a halt, resting and observing. And the various squares along the avenue provide an even more interesting spectacle. Often one finds oneself in a trance, searching for the nearest bench or café. One's pulse quickens, but there is time to observe and rest. Yet again, a connection is established between the visual and kinetic perceptions.

There are places where the terrain is inclined to such a degree that it becomes difficult to stay in one place. The impressive main square in Siena (Il Campo) is such a place. It inclines steeply towards its lowest point, the town hall (the 14th-century Palazzo Pubblico). Wherever one is on the square, one feels a “push” from behind. As one tries not to move, not to submit to the momentum of the incline, one can observe the town hall at the lowest point. The overall effect is the result of two factors. In Siena, the value of the unfolding spectacle is enhanced by the power of the incline. When one moves mechanically, one is usually completely oblivious to the energy one's body is expending. It is only when we grow tired and have muscular pain that we understand how the enjoyment stemming from our observations is not automatic. When overcoming a difference in height, we quickly become aware of our achievement. The kinetic experience is more evident for rock climbers than for walkers on a flat surface. Climbing the stairs requires a more conscious effort than simply ascending a ramp. The choice, in line with the preferences of pedestrians, will sometimes be a staircase and sometimes a ramp. Both options have different advantages and disadvantages. A serpentine road with a gradual incline is easier to walk along than a shorter road with a steep slope. All this applies both to the ascent and to the descent. Holding back one's body requires just as much strength and effort as the ascent. Whatever direction we are going in, on a steep gradient we observe more frequently the environment around us because we have to stop for a break more often than we might do otherwise.

The grandiose, covered ramp of Palestrina (known, in ancient times, as Praeneste) must have been a spectacle in the First Century BC. Behind it there stood the temple of Fortuna, one of the ancient world's largest and most impressive building complexes.¹⁹ An enormous ramp rose from the terraces that had been cut into the hillside and pressed against the stone walls. It was a spectacle that reached up to the sky, broken by the terraces of the hillside and the rhythm of a series of columns. The two seemingly endless ramps (about 300 feet long), leading one to the other, meet on a platform at the upper end, from where three open staircases rise to the semicircular rotunda at a height of 498 feet (today known as the Palazzo Colonna-Barberini). The ramp, which has no interruptions, imposes a monotone rhythm, as one walks along it. The only variation allows one to choose between an ascent on the left or an ascent on the right. Interestingly, on the terrace, turning 90 degrees to the hillside, one finds that the steps continue unexpectedly in the open. The sky and terrain have been revealed. The panorama is enhanced by one's efforts to reach the top.

The uneven incline of the ramp can be altered in many different ways: for instance, if pedestrians on the ramp change direction or if steps are added to the ramp. In such cases, the rhythm of the pedestrian changes. This is what the spiral ramp at each intersection in the Vatican is like – designed by Bramante (1512).²⁰ The perfect cylinder-shaped ramp is adjoined by a circle-shaped wall.



Donato Bramante:
Plan for ramp, Vatican, Rome, Italy



Le Corbusier: Ramp of the Villa Savoye, Poissy, France

It is so closed off that it is only possible to enter it through one door. Thus there are very few opportunities to view the ramp's cylinder. In the continuous spiral one should give all one's attention to the ramp, looking up from below or looking down from above; and one also has to concentrate on the spectacle itself. The smooth incline is broken up by landings. Such elements force one to change the rhythm. There are two factors disrupting the rhythm: the endless change in direction caused by the spiral and an irrepressible turning movement, and the inserted landings. The walls prevent one from seeing the view; just the inner view can be enjoyed – it is a spectacular one. The original ramp was copied and several even more perfect ramps were made, as for instance, 50 years later, the Vignola spiral staircase in Caprarola (Viterbo), in the five-winged Palazzo Farnese, in which a continuous line of steps takes us to the last floor beneath the cupola (1550—59).²¹ The solution serves the principle of continuity, and achieves it by way of a perspective sight and with the endlessness of a kinetic motion.

STEPS

On occasion, the two means of ascending may occur together. One instance of this is the aforementioned Palestrina (Praeneste), where steps, ramps and more steps are linked with each other in the open air. As one walks up to the shrine, one becomes enchanted by the extremely varied approach. Similar combinations of steps and ramps have been incorporated in modern constructions. Tadao Ando's buildings, analyzed above, are examples of this, as well as many of Le Corbusier's architectural works.²² We often encounter ramps for perambulators, placed between two sets of steps.



Le Corbusier The Spiral Staircase of the Villa Savoye, Poissy, France

In Le Corbusier's Villa Savoie, the combination of a ramp and steps is realized within the building.²³ The interior of the house is dominated by two movement experiences: one can move around using the ramp or the steps. Of these two methods, the ramp lies closer to the horizontal, while the spiral staircase requires one to climb up almost vertically. These two structures, and two means of moving around – the horizontal and the vertical, hold the building together. These two motifs, which, in relation to each other, lie close together, express not only the two different forms of moving about, but also the character of the whole building. The horizontal manifests the peace and balanced nature of the villa

with its classical proportions, while the vertical expresses the detachment from the earth of this raised-up building and its ambition to be in the air. The two opposite forms of movement, the two axes lying side by side, and the tension between the two, are what define the building.

The ramp begins inside the building in a closed space; it takes one upwards smoothly and gradually. The process is broken only as one reaches the various floors and landings of the building. It restarts, after a turn of 180 degrees, and one finds oneself going in the opposite direction.



Flight of steps with landings,
Lisbon, Portugal



The continuous stair
San Francisco, CA, USA



The 1500 meter long escalator, Honkong

We might think of this broken process as a banal solution, if Le Corbusier had not enriched this means of ascent. The ramp is initially inside the building, but then, after a turn, it comes out of the walls of the house and continues in the open air as far as the roof terrace. The character of the ramp changes in the meantime. The form and structure are the same, but the surrounding changes – an interior ramp becomes an exterior one. As the space around the ramp widens out, a view becomes visible, rain may fall on one's head, the wind may blow, the sun may shine, and one can inhale the smells of the outdoors. The movement experience is the same, but all other circumstances change.

The other means of moving about in the Villa Savoie is the spiral staircase. The stairs are curved, and one ascends by turning one's body in line with the vertical axis. The constant changing of direction as one turns, is an experience quite different from the previous one. The ascent is steeper and requires greater effort, but one goes up more quickly. Now the turn is continuous, and the step is what changes. Uniformity and periodicity, full of fractures and interruptions – they occur in both cases, but somewhere else and differently. These two methods of taking possession of the house require us to make different efforts, and so how one experiences space differs completely. Relatedly, the spectacle of space also differs. On a spiral staircase, we must watch out for our feet; ignoring our surroundings, we feel merely the ascent. Kinetic movement is the dominating aspect. In contrast, as we move slowly along the gently inclined ramp, we do not need to look where we are going. And when we reach the open air, we can look around and the landscape opens up in front of us.

Steps offer the greatest kinetic experience. Often we can see young people running down steps; they enjoy the momentum [impetus] of descent. They gallop down, almost flying due to their own weight. Going down steps gives us an impulse; we are almost thrown down. Small children love to hear the patter, as they go down steps, the rhythm beat with their feet. When going up or down steps, one becomes more aware than at any other time of how we move around in order to dominate the terrain. But if a system of steps becomes complicated, the relationship between the steps and man changes, and the steps take on their own power. Steps can force their own order on to those who use them. The means and speed of movement must be adjusted to the length, height and number of steps.

The scheme of steps, the number of steps, the incline, the landings, the length of the flights, the changes in direction, the width of the stair wings, the rail, the confinement of space, the lighting, ventilation, and odor – all contribute to the development of movement as established by the stairs. Steps are violent. Steps have their own rhythm, and the pulsation is transferred to anyone who walks up them, and this will determine their pace. The stamping of feet is like the roll of drums. It penetrates our bodies by way of our feet and our ears. We perceive a musical effect, especially when steps force us to change rhythm.

While recurring steps establish a rhythm, landings break up the rhythm. If several landings are incorporated into a flight of steps, these intervals will themselves create a rhythm, and a secondary cadence will develop. When the two are combined, an even more complex rhythm system is created. We can enhance this system by changing the length of the landings, by including sharp turns and curved handrails, or by alternating between covered and open spaces. All of these together establish a peculiar rhythm fabric. The more complex a configuration of steps, the more insistently it will demand that those using it should adjust to it, thus making the kinetic experience derived from the steps even more lively. But there will be trouble if the series of steps is too long or if the landings are distributed unevenly. The rhythm dictated by the steps is difficult to follow in such instances, the irregular steps contradict the normal rhythm of the feet, and the two types of rhythm cause a disturbance.

San Francisco, Lisbon, Haifa, Hong Kong, Montmartre in Paris, Rome... the beauty and significance of many cities is derived from its steps. A special case is Hong Kong where, on part of the steep hillside, an escalator one and a half kilometers long, takes one up and up. The escalator is a construction suspended above the road; it resembles a bridge at intersections. At such times, the pedestrian must walk across the bridge in order to continue upwards. Many people stop for a rest, and stare at what is going on in the side street. One can, of course, view the scene while on the moving escalator, but since it never stops the spectacle draws further and further away into the distance. It is possible to look into offices, apartments, courtyards, but only for a moment, as the escalator takes the pedestrian higher and higher. To have a really good look one needs stability and time, both of which are absent when one is moving. The special thing about the Hong Kong escalator is that although the movement is continuous, it alternates between motor-driven movement and human movement.

San Francisco's steps enrich the pedestrian with a whole series of experiences. Streets in the city are typically straight, leading up and down over the steepest of hills. City planners, ignoring nature, threw a quadratic network onto the hills. The network became distorted as it ran over troughs and ridges. A highly rational network of straight roads created the most irrational (the steepest) streets. To accommodate the hills, construction workers had to alter the incline of the various street sections. For San Francisco's planners, a solution that seemed simple on paper was more important than reality. Thus, the size and steepness of the steps changes constantly. With their plans, they forced road builders to make impossible combinations and the most unlikely configurations. The absurdity of the situation is that something that was laughable at the time has become a much-loved feature of the city. The street pattern's pointlessness affords the city its charm and humor.



The Baker street stair, San Fransisco, USA

San Francisco's Baker stairs are a series of sidewalk steps running alongside several blocks and across intersections without a break. In this continuous series of steps and ignoring all the official regulations, there are several dozen steps between each landing. In total there are more than one hundred steps. Horizontal pavements are absent even in front of house or garage entrances. The steps and landings have become so distorted that both pedestrians and motorists face all kinds of difficulties. In such cases, for the reasons described above, the monotone rhythm that dominates elsewhere is broken up. The steep inclines dictate, but in doing so they leave room for humorous and clever solutions. At the entrances, both people passing along the steps and those trying to go inside the houses, often get their feet mixed up, before they can continue their path.²⁴

The street is a series of "step manipulations". The steps cross each other, biting into each other. Juggling tricks and the most cunning forms can be seen at the entrances. The contingency of those going in and those passing by – or the independent logic of the system of steps – changes, in an irregular beat, the steps on the street which follow a straight line, and thus the rhythm of those walking up the steps. This system of beats is full of syncopes. The angle of inclination of the steps and the distance between them determine the gait of a pedestrian and the beat of his step, regardless of whether someone likes to walk slowly or at a brisk pace. They also influence the way the walker's muscles work, his breathing and his mood. As one reaches driveways and the incline of the steps flattens out, the walker changes his speed. These inserted landings, deviating from the customary incline, these bumpy surfaces and uneven dimensions are confusing to both those going up and those going down, forcing them to abandon their usual walking routine. Such unevenness – even the smallest differences, like the kinetic syncopes – all contribute to the fascination of the steps.

Complex combinations of steps are created by the paths leading up to the Capitolium in Rome. Thirty-six ramps and staircases lead to the top of this relatively small hill – excluding the steps leading to the Victor Emmanuel memorial. These include moderate and steep inclines, some going straight up, some broken into different sections, some winding steeply upwards, others with steps and long flat pieces. Some of them are made from stone, while others were beaten from earth. Some of them cross each other, breaking their order.

It is a real orgy of steps, and each of the staircases has a different rhythm. Each of them differs in terms of the size of the steps, the repetitions, direction changes and distortions. It is as if each of them were playing on another instrument and to a different beat. Staircases that start out in certainty often change to another system of rhythm and length. It matters which steps we use to approach the Senate's palace in Campidoglio, Rome. Arriving there will be different at any rate. On the ramp with steps leading to the Piazza del Campidoglio and facing the senate's building, our perception will be different from what it would be if we arrived at the square from the side stealthily. An uplifted head enhances the effect, our eyes looking up, and the effort stemming from walking up the steps. All of this causes the effect to be even more impressive.²⁵

The steps placed at intervals on the ramp leading up to Campidoglio lead to a loss of rhythm; before we can even get used to the ramp, a further series of steps appears in front of us. At first, we may be a little distressed, but then we get used to them. Walking from the Campidoglio towards the Church of Santa Maria in Aracoeli, we encounter several types of steps. They change direction and cross each other, but we cannot know which of the many rhythms will be the dominant one, and on which path and in which rhythm we shall be able to continue. Where the steps meet, their proportions and incline change. We proceed from steps of one particular rhythm to those of another. There is a discord of steps.

Although the experiences stemming from rhythmic walking are present to a lesser degree when we are going upwards, nevertheless even without trotting, the soles of our feet can feel the various steps, and so a walking rhythm develops even when we are going up. We enjoy going up, and the motion-based experience is, once again, concomitant with the kinetic perception. Going up steps is more tiring, and the reduced speed compels and allows us to stop and look around. The great diversity of the steps results in diverse impressions. A long, straight and continuous flight of steps can be monotonous, while repetition can result in boredom; a short flight of steps with just a few steps encourages one to walk briskly, and brings on impudence; a steep path leading downwards encourages drive and impulse. We like paths with ramps and long breaks, because it invites us to walk calmly and with dignity. Curved stairs lead to a feeling of elegance in us; a winding flight of steps gets us accustomed to flexibility; and with its regular breaks it makes us rigid, the smooth rhythm causes quietness, while an alternating rhythm encourages playfulness.

An orgy of stairs,
Campidoglio, Rome, Italy



If we encounter something unexpected on our path, this may bring forth the chaos of frequent changes in rhythm; while those coming together are astonished; those crashing into each other produce turbulence. We retire to the protection of the covered steps, while in the open air we can breathe the smell of nature's flowers. These various means of overcoming the differences in level, together with other kinetic factors influence the sensory world of those using the steps. The features and effects listed here do not exist in themselves, and they frequently become mixed. The different types of step alternate, and in this way the feelings they raise inwardly proceed accordingly.

Other factors also contribute to the various effects of the steps and the ramps. The surroundings of steps are important. The best examples of this are staircases that have been broken in two: The two wings are identical and symmetrical, but they lead to two very different natural and social milieus. For instance, the Lyon steps in San Francisco.²⁶ The stone steps that extend across several residential blocks with their balustrades, divide into two when one reaches a small-sized platform. One flight of steps runs near the palace, while the other continues alongside the park. The two flights of steps are completely identical, but the surroundings are very different. From the steps near the palace, one can look into the interior rooms of the palace, and the mood of this distinguished building soon enchants the passerby.

The other steps on the opposite side place us in nature rather than in an urban milieu. The steps run alongside the forest next to the Presidio Park, and instead of the distinguished atmosphere, one can imbibe the scent of the forest. We walk, here, in the shade of the many tall trees, whereas on the other side, the sun shines endlessly. We hear the sound of human voices coming from the palace, whereas on the far side there is birdsong and the rustle of the leaves of ancient trees. People can make their own choice and then continue their on their way. The steps are the same, but the spectacle is different, the air is different, the smell is different, and the noise is different. Consequently, we go up or down, and accordingly we will experience different emotions.

The steps not only influence how we walk and create a visual experience, but also set our imagination in motion. The steps in the Viziváros (Watertown) district of Budapest recall bygone ages.

One thinks of the times when the soldiers of foreign armies laid siege to the castle, with their swords and rifles, and when water was taken up to the Castle in barrels, and when artisans went up the steps shouting to the local population about their particular goods. Life on the streets and on the steps must have been rather lively. The steps leading up to the castle recall the past.²⁷

Movement directly affects the mood of the pedestrian – and even his imagination. In San Francisco, going down the steps towards Union Street, I noticed a small boy on his way to school. The schoolboy was running along happily, jumping from one step to the next. In an unexpected moment, as he reached a large landing between two flights of stairs, he spread out his arms, pressed his head forwards, and formed an airplane out of his body, and coming into the bend with a wide movement he landed on the asphalt surface, which he had temporarily redesignated as an airfield. Going down, the small boy, struck by the rhythm of the steps and his own beat-like trot, stretched out his imaginary wings and took off from the steps into his world of fantasy. The schoolboy was dancing rather than walking. His movements were inspired by the steps. The uneven rhythm of the steps set his imagination in motion. This small boy made me understand the internal logic of sidewalk steps, as well as the beauty of the composition linking the steps with the landings in between. The choreography of the steps and landings became a stage. The schoolboy wrote his choreography into the sidewalk landing. Not all of us can or dare move in space in accordance with our imagination, or integrate our dreams into reality. The situational conditions inspired him, while his ego – less influenced by social conventions – realized his inspiration. The spontaneous movements of the young schoolboy express the possibilities implied in space. Space – in this case, the steps – is more than what we perceive it to be. Space (the steps) is also what we can imagine it to be. Movement compelled by the terrain can fly up into the world of imagination.

IS THE KINETIC AN ARCHITECTURAL EXPERIENCE?

Where our movement is shaped by the built environment, an architectural kinetic experience comes into being. It is a fact that one rarely encounters a movement that has not been influenced by the architectural environment. Factors determining the extent of such influence include: the spectacle in the distance, the material obstacles in front of us, and the ground beneath our feet. Other factors are the effort required by our muscles (which will depend on the terrain), the tiredness of our bodies, and pain – if we climb up a slope, then that too; if we bump into a balustrade, then that too; or if the ground beneath our feet is soggy, then that too. Just as the sight of a harmonic or eccentric, a monotonous or varied building, penetrates the viewer in a different way, so also our emotional state is shaped by whether we are walking on even or uneven steps, along a generously wide path or a narrow alleyway.

Any way of walking occurs according to some kind of choreography, even if the inspiring element is the ground or the configuration of the spatial system. One may ask whether it is possible to compare movement influenced by architecture with choreographed dance. To a certain degree, it is possible. This means that movement inspired by architecture affects the observer in the same manner as would any other art form, such as dance. What does the sight of architecture do? It provokes an effect in the viewer, who feels himself to be elated, disturbed, full of perhaps chaotic emotions, or balanced. What else does the kinetic experience do? The kinetic experience arising out of the architectural space itself provokes a wide range of human resonance, which, together with the visual and other perceptions, forms our impressions of the artificial environment around us. In such instances, it is as a participant rather than as an observer that one experiences the artistic aspects of architecture.

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SYNERGY

THE TUNNEL

In Budapest, under the railway tracks of Nyugati Station, there is a tunnel. It is an extension of Bajza Street, running between Podmaniczky Street and Szabolcs Street. The railway line above the tunnel separates two of the city's districts. The tunnel is a long and narrow vaulted underpass; compared to its cross-section (3 meters) it is disproportionately long (approximately 100 meters). It connects the northern, predominantly middle-class part of Terézváros District, with the deprived southern margins of Angyalföld District. There is not much room in the underpass, so it seems oppressive. The arch of the vault is low; indeed, a tall person can easily touch the highest point of the ceiling.

Walking through the tunnel is a rather unpleasant experience. One inevitably brushes against the walls, as the underpass is so narrow. The closeness of the walls means that one feels hemmed in on all sides. The walls seem to be closer than they are in reality, for one has to stick close to them in order to avoid people walking in the other direction. If several people walk side by side through the tunnel, they are almost bound to collide with someone coming from the opposite direction; their clothes will brush the walls. But one still feels the presence of the wall even though one may not actually have to touch it. The mere presence of the walls compels those of us who use the tunnel to move towards the middle of the underpass. Even invisibly the walls force us to keep our distance. By their very nature, tunnels – even when they are illuminated – are darker during the day than the world is outside.

Very little light enters the underpass from its two ends, which lie far apart. Before the war the tunnel was even darker than it is now. A few solitary light bulbs hung here and there – until someone removed them and took them home. In the dark underpass, one could see just the occasional blotch of light on the tunnel floor. Today, instead of the old light bulbs hanging on a cable attached to the vault, neon tubes illuminate the pavement and the way ahead. The underpass is lighter than it was, but even these tubes provide only poor light.

The tunnel is also lighter today because its walls have been plastered smooth and painted in a light color. Head-on collisions have become rarer, since it is easier to avoid bumping into people, and one's shoulders are less likely to brush against the walls. A solitary pedestrian is unlikely now to bump into an embracing couple. Conditions in the underpass have become somewhat more civilized. But in the twilight, the presence of the walls is something that is felt rather than seen.

In the olden days, one could make out the raw brick and stonework behind the dilapidated plaster. And the surface was made even darker by random graffiti, acting like dirt on dirt. The colors were made even duller by the saltpeter acid exuding from the walls, by water seeping through as a result of poor waterproofing, and by the cool musty dampness of the surface. No thought had been given to proper waterproofing or even drainage. And behind the retaining wall of the underpass rain regularly soaked the rampart. Moreover, on hot days, buckets of cooling water were poured onto the railway tracks above in order to prevent fractures. The water seeped through, giving rise to a stale, malodorous and putrid smell throughout the tunnel. To touch the cool, damp, sticky and slippery surface of the wall was an unpleasant sensation. Moreover one could feel the taste of the moldy air on one's tongue. The proximity of the walls meant that these sensations were experienced all at once. The suffocating atmosphere of the narrow corridor kept pedestrians further from the walls than their simple presence might have implied. The walls have a presence, even invisibly.

The damp, cold and musty air of the underpass was not improved in the slightest by the breeze blowing through the tunnel/corridor. The underpass constitutes a wind tunnel. The air passing through the tunnel, which is cool even in summer, causes one to shiver. The draft is accompanied by cold air and a howl, seeking almost to launch the pedestrian into the air. The atmosphere in the tunnel is cold, bleak and unpleasant.

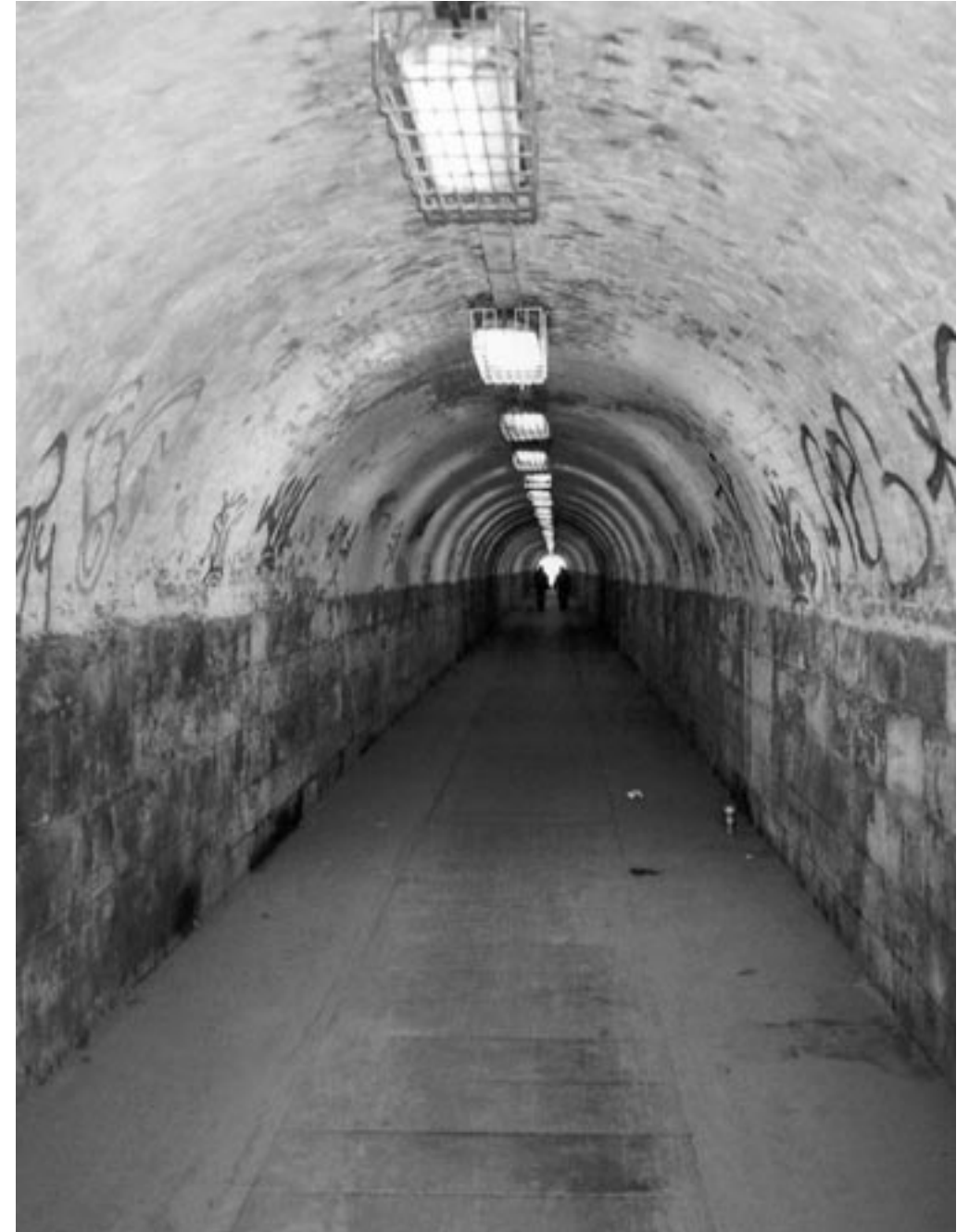
In the fall, the wind blowing through this underground corridor picks up leaves and old newspapers. It transmits voices along the corridor, too. The drops of air are objects, and they buzz even without human voices. The sound waves, coming from various sources and reinforcing each other, rush from one end of the underpass to the other, gaining strength from the echoes of the walls.

From time to time, one can also hear the rattle of the trains above, bearing down on the vault of the underpass. The beat-like rhythm disturbs the customary silence of the tunnel.

The tunnel also has its own noise. Under the iron-plate pavement, there is a space with a duct for underground cables. The iron plates covering this shaft are several meters long; they are not always perfectly fitted, and there are several gaps. Because they fit badly, the plates sometimes move as one walks along them. Each step is accompanied by a new tilt and a new hum. The iron plates creak beneath one's feet. The shaft beneath the iron plates functions as an amplifier box. Like the body of a violin, it amplifies the noises made by the plates. On this long drum, sounds flow from the entrance to the exit. Above the cavity, the tunnel functions as an amplifying tube, transporting sounds. The tunnel's barrel-like space becomes a part of the "instrument." Providing an echo it enhances the original hum.

Some people discover this tunnel-instrument and start "playing" on it. When children discover how the iron plates make sounds beneath their feet, they continue down the tunnel making further sounds as they go. They like this game, and they jump onto the iron plates using all their weight. Then they start to run, jumping in beat from one plate to the next, experimenting with their new-found instrument. Then children who already know the game arrive – those who used the iron plates to make a rhythm the last time they were here. The tunnel comes alive. The music beat resonates throughout the tunnel, and the children laugh. As we walk along the tunnel, our muscles move and we move our legs; we become part of the kinetic experience. The underpass, dead until now, breaks free, and even the shadows on the dark walls spin and twirl around. The bizarre situation is dissolved only by the light at the end of the tunnel: it offers help, shows the way, and cheers one on. But the shaft of light is far away, and the tunnel is long; countless rail tracks lie above it.

In our tunnel one finds all the architectural phenomena that can set our sensory organs in motion. All imaginable forms of perception work together to produce the overall effect. If we touch the dark musty walls, our palms become moist. If we brush the pitted wall, we feel pain. The wind blows right through; with the wind on our backs we get cold. The penetrating smell of the wall is irritating to the nose. We move our muscles, and walk along the boards while stamping our feet.





Plastic net for construction sites

The soles of our feet feel the surface beneath our step, and we undergo a kinetic experience. The noise is amplified by the sound-box shaft and the echo of the walls. It is as though we were walking inside a flute, listening to the tunnel-music. Ahead of us we see the light at the end of the tunnel, while on each side of us there are neon tubes attached to the wall. It is a combination of all imaginable effects; it is synergy.¹

The above words prove that stimuli coming from various sensory nerves act together to influence a person. It is not that something is altered: sound, smell, touch and so on do not change existing perceived notions; they do not deposit themselves on existing visual images. Rather, acting in concert, they determine our common sensation. Their effect is a complex one, even if one of our senses is more involved in the image formation than are the others. A separation of the various impressions makes it difficult for the strength and proportion of the various effects to develop continuously, thereby allowing our overall impression of our environment and architecture to change.

THE PRESENCE

Although the visual may be our strongest perception, nevertheless it alone cannot determine the unified image we receive. The sensory organs differ significantly in terms of their role, their involvement and effect. But sometimes we become aware of architectural phenomena without actually gaining a visual impression of them.

Consider, for instance, the various space separating elements. Wire meshing, an iron rod fence, or a thick brick wall – each is different in terms of their presence and their effect. Even so, what happens when the wind blows? The wind passes through the first with ease, whereas in the case of the second it faces an obstacle in the form of the iron rods.



Wrought iron fence

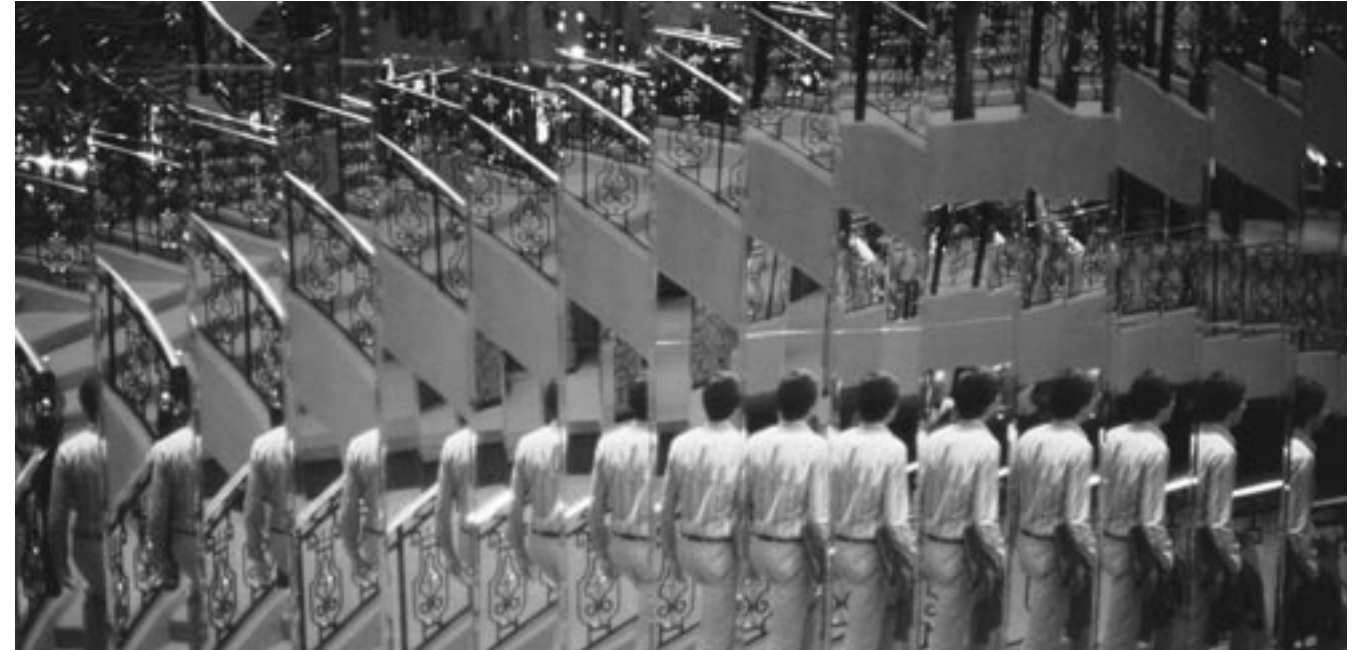


Compact brick wall

The third element – the thick brick wall – diverts the wind, stopping it from passing. Thus, the route taken by the wind will vary depending on the objects in its path. But the wind path is not the only thing that changes; so also does the area with sunshine or shade. In turn, the air temperature and the humidity differ, and there is a change in odor composition. Even if we stand with our backs to the fence or wall, which become invisible to us, the wind and the shade still inform us about these objects. All architectural acts influence people, and all objects indirectly and uniquely exert an effect on the passerby.

If we walk past the wings of a stage we see how the wind affects the canvas attached to the wood frame; if we press against it, the canvas gives way. Its surface caves in, feeling soft to the hand. Even though it may seem, from a distance, to be a real wall or “trompe l’oeil” painted onto a wall, it is unstable and there’s nothing behind it. When we look at wood frame buildings in the United States, we are immediately aware of the absence of firm, solid walls, even where stone or brick-panel walls have been added to the constructions. Such additions may initially give rise to doubt, but when we touch them we can ascertain that they are not made from firm materials. As we approach, even without touching them, we feel that they are makeshift solutions. There is no pressure, no presence; instead they give way to our touch. Reality belies the pretence. Ultimately we perceive their real nature.

And the reverse is also true. A glass panel is transparent, but it still acts to separate; we cannot pass through it. If we are not warned of its presence, we may even bump into it, hurting ourselves. Glass panels are present even if we cannot see them. Glass reflects sound and stops odor and dampness, rain and wind. But it lets through light and the sun’s warmth. That an element is categorized under architecture does not require that it be visible or transparent. The decisive factor is that an element should perform certain architectural functions, defining its role in determining space. If, in one of the large chambers of the Palace of Versailles, a glass cage – big enough to accommodate a man – had been placed there instead of a baldachin, we would still see behind it the 17th-century pieces, with their guild work, wall carpets, frescoes and furniture. Glass does not conceal the spectacle. But we cannot pass through it, and we cannot feel the furniture placed behind it; we cannot reach or touch the door handle of the room, and we cannot touch the upholstery and experience the smell of the wall carpet. Owing to their transparency, however, we do not feel ourselves to be safe and secure behind glass panels.



Mirrored stairs of the MGM Casino, Reno, Nevada, USA

In certain respects, therefore, a glass-panel wall fulfils the functions of the architectural element, but in other respects it fails to do so. At any rate, it does not depend on its visibility.

Something similar can be said of the water cascade, through which we can barely see, but which we can pass through at the cost of getting wet. The water cascade does not stop us from passing through, but it does hinder our vision. We can of course, see the cascade itself, but what lies behind it is obscured from us. Waterfalls lead to the spraying of water and the forming of air currents as a result. This, in turn, alters the degree of moisture, and certainly changes the smell of the place. The visibility of the waterfall, one’s ability to pass through it and other side effects, are accompanied by a peculiar presence. Water is and is not an architectural element.

A wall of mirrors makes a hall look larger, but it does not alter the surface area of the hall (MGM Casino, Reno, Nevada). Glass panels, mirrors, water cascades, firm walls – each of them has similar but different roles in architecture.



Alexander Platz, Berlin, Germany

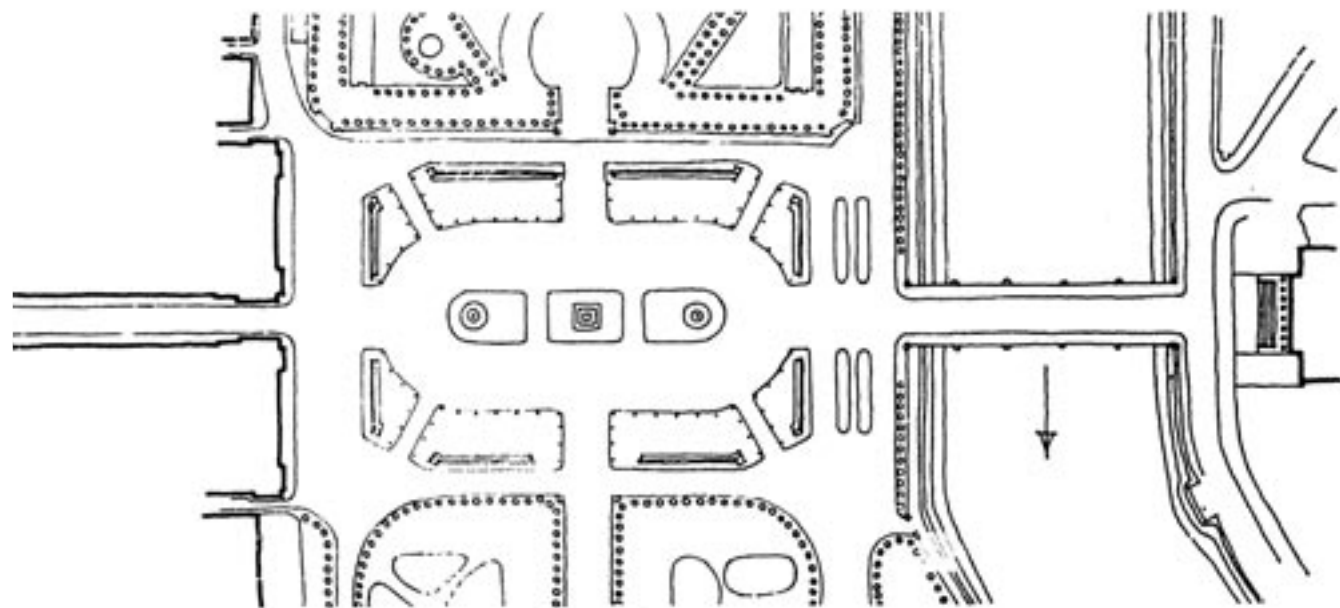
The common factor is that all of them divide and separate, thereby influencing the way we move; and so the kinetic experience will be similar. But they each look different. In the first case, we see behind the wall, but we do not actually see the separating surface; in the second instance, we even discover the space behind us; in the third instance, we catch an obscure glimpse of the space behind, and there is no physical obstacle to us passing through. Finally, in the last instance, we see no further than the wall, and the eye and the body provide for a perfect separation. All of the listed possibilities are true, but they look different and have different physical roles. The latter two can contradict each another. This is why their effect is complex.

Air and its features, temperatures of a different type, humidity and odors – all of them affect us differently. In previous chapters, I have mentioned the perception of the presence of invisible phenomena. In a room smelling of oil, we tend to perceive the walls as being closer together, because of the pressure of the heavy air.



Antonio Gaudí: Sagrada Família
Barcelona, Spain

The thick air presses the walls together, so to say. An unpleasant smell repels. The air in a room may also seem heavy if a bad smell is being brought in by the breeze. And the air may also be heavy even when, in contrast to the above, a pleasant smell reaches us. We still feel the pressure of the heavy air. We drew a similar conclusion in the chapter on sound, when analyzing the effects of noise. Sounds also thicken the air in a room, and exert pressure on us. We do not need to see the wall or the ceiling to feel that they are there somewhere, delineating the room. The same is true with respect to the presence of all elements of the invisible. The various invisible elements exert pressure on us.



Plot of the Place de la Concorde - Paris, France

ABSENCE

We perceive not only the state of being of the materials around us, but also the opposite – their non-existence, the absence of objects, the void. In cathedrals and concert halls, even if we walk in with our eyes closed, we can know simply by feeling the air on our faces whether there is a ceiling high above or whether the space above our heads is airless. We feel the void in a negative sense, as the absence of pressure. In Barcelona, Antoni Gaudí's Sagrada Família Cathedral is still unroofed; only the side walls have been erected.² On entering the space enclosed by walls, we can feel immediately and without looking up that there is no roof above us. The movement of the air, the temperature, the chance of rain, the absence of a sound echo – all of these factors lead us to perceive the spatial openness. The lack of a cover means that we catch a glimpse of indefinite space. The absence of the roof also proves something. The seemingly mythical belief that architectural objects exert pressure on us even when they are invisible, becomes something that we can perceive. Frequently, architects inform of the presence of objects invisibly, but not in an undetected manner. The opposite of a tunnel is an open-air space, such as a marketplace. The old main squares of prairie towns such as Orosháza, Mezőtúr and Túrkeve are good examples of this. The market squares in these towns were lined at the edge by small one- or two-story buildings. In view of the width of the squares and the low height of surrounding buildings, a great sense of disproportion could be felt. The houses seemed to be falling off the edge of the bare marketplace. They were no more than railings. The desolate area between them was plagued by the wind. The squares were bleak, deserted, and empty. The small houses on the edge were incapable of creating some kind of atmosphere, or of holding on to such an atmosphere if it arose somehow. The houses are too far apart, and cannot hold anything together. And anyway there is nothing to hold together. Today there are no livestock markets, general markets or extended fiestas. Rarely, the main square will be the venue for a sports event, a picnic or a public meeting. Without the colorful fairs of yesteryear, the market squares of Hungary's prairie towns have lost their old character. The recent construction of a few taller houses around such squares has not changed much.

These examples, of the absent or void, are a stern reminder of the consequences of ignoring the frame, and since there are no events, there is nothing to hold together.

True, it is no easy task to fill these squares with events and happenings. Even the world's most important squares, such as the Place de la Concorde³ in Paris or Berlin's Alexander Platz, suffer from emptiness. In Paris the two mansions designed by Jacques-Ange Gabriel on the Concorde, the state-owned navy ministry building and the multistory hotel complex, line just one side of the square. On the other three sides, there are trees, buttresses, balustrades, and the banks of the Seine – none of which close off the square. The spirit of the square fades. To increase the flow of traffic, all grade differences in the square – the curbs, the counterscarps, and the flower beds – have been removed, rendering the square even duller. Still, even the dismembered Concorde has retained the essence of its original concept. The square is not only the meeting place of various roads, but also the starting point of major routes and great events. It is the pump at the heart of Paris' circulatory system. Architects have faced similar difficulties when elaborating solutions for Berlin's Alexander Platz. No solution has yet been found, despite repeated attempts. At the edges of the square, which is distorted by the disproportionately broad Karl-Marx-Allee, one finds widely-spaced bordering buildings. The edifices on the square itself – the flag posts, electricity masts, and trees – are rendered insignificant by the grand dimensions of the open square. The square falls apart, there is nothing to see on it and no reason to visit it. The square has no boundaries and fails to provide a framework for events. It merely has a past, but still has no present. The absence of the space sensation, however, is not simply the result of visible proportions. Many other elements are contributory factors, such as sunshine and the related shade. The small buildings hardly give any shade, and the small dark patches on the rambling square do not create silhouette play. The sunshine, on the other hand, compels one to move. Given the absence of trees, pedestrians will rush across the square in hot sunshine. And the same thing happens when we find ourselves exposed to wind or heavy rain on an open square. At such times, we feel like we are in nature rather than in an architectural environment. In nature, however, we expect to be exposed to the elements, and there is no protection. It is man's defensive instinct that causes him to build. We adore nature for other reasons. We can feel the protection of architecture as we pass along narrow streets with walls on both sides.

The proximity of the walls holds us together. But if a street is too narrow, this also has its drawbacks. Thus, the size and proportions of buildings and the emptiness or void between them are what may determine our disposition. Architects create architectural milieus. Building masses and city blocks are factors determining the architectural character, and “between” these factors one finds absence or void. This latter “element” receives significance because of the very presence of materials.

In Ingmar Bergman's 1963 film *The Silence*, we arrive in a small town where there is not a soul in sight and complete silence reigns. It is as though the town has been hit by a nuclear attack. The streets are dead; it seems as though nobody has survived the war. The clocks do not tick, time has stopped. There is no one to ask, no information provided. We are in a vacuum, and we are lost. It is daytime, there is light, and we are alone. The town's buildings do not seem real. On its own, the plain spectacle provides too few points of support; we have nothing to grab hold of. For this we need movement and life. Life is not established by buildings, but by everything that they take in and make possible; by what they emanate and represent. The noise of the street, odors coming through open windows, sounds, oncoming pedestrians – which we feel with our very bodies if we bump into them. In the film, the sound void, the absence of a human presence, and the lack of movement are sufficient to persuade us that we are in a post-death state. All this underlines the extent to which non-visual perceptions contribute to bringing to life the architectural milieu. Absence also instructs.

Architecture's invisible phenomena do not deduct from the value of visible architectural elements. We experience architecture principally through our eyes. Nevertheless, architecture is still present even when it is invisible. As part of our spatial experience we perceive many different forms of architectural objects. Inside a tunnel or somewhere similar, simultaneous occurrences affect us by means of each of our sensory organs. The pressure of architectural objects, or indeed their absence, creates the final idea – together with the invisible architectural elements. Synergy is in operation.

1 Attila Batár: *A Bajza utca szinesztéziája* [The Synesthesia of Bajza Street], in Holmi, 1995, p. 12.

2 Joan Bergós: *Gaudí. Bulfinch*, 1999

3 Frigyes Pogány: *Párizs* [Paris], Corvina, 1965



ASSOCIATIONS,
MEMORY, KNOWLEDGE
AND IMAGINATION

AN IMAGE EVOKES AN IMAGE

An association of ideas may arise in a multitude of ways among architectural phenomena. It can be by means of visualization, if, when confronted with a building, we recognize things that we have seen or studied previously. The present image recalls the relics of the past. The present sight and the previously known image affect us simultaneously. In such instances, the association arises between architecture and memory; it is a direct association. Another possibility is that the object is absent when the building is evoked. When this happens, the image is recalled indirectly, from our memory. Finally, there are occasions when the notion of the architectural object is not evoked by architectural elements but by some other stimulus. This may mean that other sensory organs contribute to the development of the sight for instance, a visual architectural notion develops within us, based on sensations mediated by the nose, the ears or the palm of our hand. Alternatively, other features impact us such as the wind, smoke or humidity of the air.

The Parthenon in Athens has been in ruins ever since the seventeenth century, when a Venetian force bombarded the Acropolis, igniting the ammunition dump inside the temple. We see ruins, but we try to evoke the missing parts by imagining the original. We bring to mind what we once learned in school, recalling the reconstructed copies of the pictures in the temple. We know that the Greeks, aware of the distortions of our visual organs, bent the straight lines so that, standing in front of the temple, we should really see something straight. We look for the “trick” and inevitably notice something that is hardly perceptible on the dilapidated façade. It can easily happen that we imagine something that is not actually there. The distortion can mislead us twice, as the visible and the probable. Deformed images known from books or imagined, play on our impressions of the buildings in front of us. Our concept of the present develops in collation with what we already know.



Parthenon, Athens, Greece

If you have already been to Nashville TN and seen the replica of the Parthenon, you can, in Athens, imagine the copy you have already seen. This is true despite the fact that the replica, the life-size model, misleads in the same manner as any other copy does. The Parthenon reconstruction in Nashville cannot reproduce the original architectural phenomenon, because it was constructed from different materials, lacks patina, and above all, provokes a different reaction in us because of the different surroundings. We look with suspicion at this second Parthenon shining in its bright colors – in contrast to the original, which is known for being dilapidated and grayed by air pollution. (It does not help that we know that the Nashville copy has already undergone several restorations). We miss the Acropolis, the buildings surrounding the temple, the drop signaling the end of the plateau, the view over old Athens. The modern “old” does not represent the original, the Athenian Parthenon. At best, we can compare and contrast the two, establishing the differences.¹ Still, precisely for this reason, the differences can alter our impressions of the original.

A comparison can arise not only between recalled images, but also between two different buildings located in different places and conceived in different periods. Looking at the Parthenon, we may call to mind examples previously known or seen, such as the early temple dedicated to Hera on the island of Samos (800 BC), temple D in Selinus (535 BC), or the heavy, ponderous buildings of Hera I (Basilica, 530 BC) and Hera II (Poseidon, 450 BC) in Paestum. We can compare and contrast them with the very different monumental temple of Zeus in Agrigento (Akragas, 480 BC). But we may also think of the unique and pleasantly situated temple of Apollo in Bassae, which seems more like a jewellery box (450-425 BC), or of the image of the ruins of the elegant temple of Poseidon on the hill at Cape Sunion (444-440 BC). Even compared with all these, we still need superlatives to describe the Parthenon, the patron saint of the city, and the temple incorporating the statue of Athene (447- 438 BC). We look at it, and in doing so we realise how it is more elegant than the temple in Paestum, finer than the one in Bassae, nobler than the one in Aegina, simpler than the one in Eleusis, more measured than the one seen in Sunion. Classical proportions are a standard characteristic of the temples, but the Parthenon on the plateau, rising above the fortress, appears more harmonious than all the others. They share many similarities, but in the details and proportions the difference is such that we feel what is otherwise similar to be different.²

But we live in a different era, and we, the viewers, are different too. Visitors to the temple today are unlikely to be faithful believers in the goddess of wisdom Pallas Athena, and they do not represent the spirit of the era. Today’s tourists are not identical to the pilgrims who came to the shrine of their goddess almost two and a half thousand years ago. It is not just the clicking of people’s cameras or the babel-like mixture of sounds people shout at each other, since one cannot be sure that the procession of ancient times would have been any more reserved. Those taking part in the ancient processions probably talked about everyday topics rather than lofty ideas. But one can be sure that they fretted about other things, that their heads were full of other thoughts, that their joys were different, and that they behaved differently too. The basic difference is that over time every sight is reassessed without ceasing. The time when the building was completed cannot be brought back, just as the attitudes and viewpoints of visitors in days of old cannot be recreated.



Temple of Concordia, Agrigento, Sicily



Temple C, Selinus, Sicily



Temple of Aphaia, Aegina, Greece

For this reason, questions surround the “reconstruction” of King Minos’s royal palace at Knossos, which is how the archaeologist Arthur Evens called rather: the renovation. The palace, which was too speedily excavated and redesigned, is inevitably full of errors. The reconstruction only approaches the presumed original. In the absence of hard facts, construction decisions were based on many subjective hypotheses. The mode of construction was just one of many possible approaches. From what is visible to us we cannot draw conclusions about the original. In this case, we compare what we have seen with what is not visible, what is just supposed and assumed. It is with such doubts that we see the building in front of us.³



Temple of Hera I. and II., Paestum, Italy



The Watts Tower, Los Angeles, USA

We make associations between one sight and another sight even when a building evokes the image of the whole town. These buildings have become the symbols of their cities. We imagine Rome, when we see the Colosseum, London, when we see Trafalgar Square, Los Angeles, when we see the Watts tower, Budapest, when we see a row of houses on the Danube. The visible detail brings into our imaginations a new whole. For similar reasons, a small detail can evoke a complete era, the bare ancient columns can evoke Hellenistic Anatolia, the large quaderstones, the Italian renaissance, just as waves bring to mind the architecture of the baroque, and arches reaching to the skies make us think of the gothic. With a little exaggeration, we can say that somebody's scrunched up papers evoke the buildings of the final stage of Frank Gehry in architecture,⁴ while brick surface variations bring to mind the facades of Mario Botta.

There are buildings that we can imagine in front of us even with closed eyes. We do not need to see the original in order to evoke St. Peter's Basilica in Rome, since we have seen it so many times on postcards and in albums.⁵ These impressions remain within us, so that we can more precisely record the details that have gone from our memories. In most cases, we have only a sketchy idea of the buildings; we do not recall the style of the capital of columns in Saint Peter's, how the builders managed to create the laterna's windows, how many columns surround the cupola. Despite all this, the general impression is still evocable.

But not all buildings evoke such an unambiguous association. When we see a French Gothic cathedral, we naturally think of others similar to it. But to what extent do we recall the differences? We can distinguish the Notre Dame from the others, but it is easy to mix up most of them. Do we recall that above the main entrance an ogive arch runs into the rose window? The same difficulty would arise if we had to give the deviations between the towers. If we had to give further details, the difficulty would simply increase, and the chances of identification would be smaller. Experts aside, most of us have just a general picture in our minds, and we cannot take note of the individual features.⁶ In spite of this, there is still a comparison, an alteration to our notion as the result of refreshed memory. That which is not present and for the time being invisible, is present as the trace of memory.

The presumed function of a building, however, may be at odds with what actually goes on in the building. Rock concerts held in cathedrals for the first time startle those entering the gothic milieu as well as the faithful. In place of the usual liturgical music, one hears audible music of the present, ecclesiastical and secular, contradicting each other. The visible and the audible differ radically from each other and from what we are used to. But the reverse can also happen, when, for instance, a disused industrial plant is converted into a venue for a religious ceremony or a concert hall. Frank Gehry's Temporary Contemporary Museum was placed in an abandoned factory in Los Angeles. At the time, the combination, which was still highly unusual, had a shocking effect. Today, we are used to it. Even so, when one enters the building, one cannot but think of the old associations. A similar sensation was felt when one entered one of the first factory buildings to be converted into an entertainment place – the Ghirardelli Square in San Francisco (which had previously been a chocolate factory). In such cases, the abandoned elements of the past are still present in the layout, and they are mixed up with the new function of the building.⁷ The layers of different function, placed one on top of the other over time, may cause a shocking disharmony. The past still accompanies what is now visible – only it does so in a transformed mode - the building's memory. The old is still with us even if it is invisible.

NON-VISUAL PERCEPTIONS EVOKING ARCHITECTURE

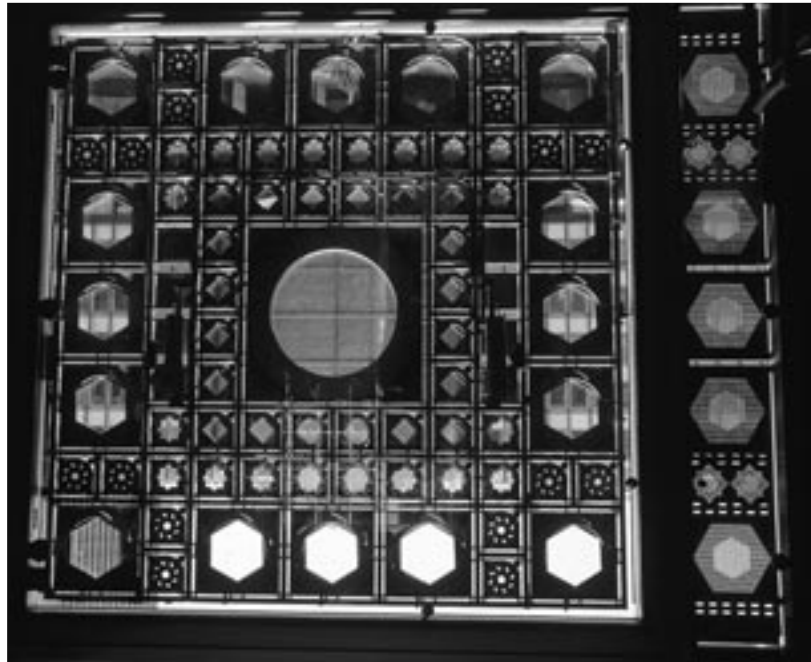
In most cases an architectural notion is evoked by a specific architectural phenomenon. But experience tells us that non-visual perceptions can also become souvenirs or mementos – stimuli that provoke an architectural notion. These stimuli can produce associations that either evoke a general architectural milieu or point to a concrete and specific architectural image. The association may seem to be evoked by a single phenomenon, but in reality the notion arises as the result of several stimuli working in tandem, with one particular stimulus becoming the decisive factor. Occasionally, nature is the decisive element among the causes provoking architectural phenomena. Generally speaking, the symbols evoking a town are buildings, but

on occasion natural non-visible phenomena may become elements evoking towns and buildings. Fog is indispensable to the image of San Francisco, just as wind is inherent to Chicago. The peal of bells is a feature of village life, Versailles can only be pictured with the waters of its splashing fountains. The subway system is recognizable in Paris by its smell, in New York by the hustle and bustle, and in Budapest by the overpressure preceding the arrival of a train. But what do these phenomena have to do with architecture? The fog of San Francisco arises as a result of the nearby sea, the wind coming off the ocean, and the hills that prevent the clouds from moving on. It is therefore a result of nature. But in addition to the hills, there are highrises in the downtown close to the bay. These buildings are just as tall as the hills, and they too hold up the clouds. The whirlwind so characteristic of Chicago, which is due to the proximity of the lake, is enhanced by the loop street system of the downtown, which increases the turbulence. The street system is the creation of the town planners. In villages, the church tower was erected at such a height so that the sound of the bells could be heard far and wide. Chimneys are also products of human invention, spreading smells and pollution across the neighborhood. The differences between the various subway systems arise out of the plans and the structure. Natural phenomena, in conjunction with the adjusting work of man, establish the symbols and characteristics of a particular place.

In addition, we can also list the instances where something manmade, some invisible phenomenon, evokes the architectural associations. There are smells that characterize building types. Where we see the smoke of incense flowing from a building, we rightly presume it to be a church. The heavy and damp air of the Budapest Palm House creates a milieu that is hard to bear for your lungs. On entry into one, we associate it with the rest. The tropical vegetation and the high air humidity (sometimes artificially maintained) are characteristic of all palm houses. So that sunlight passes through, all palm houses have a glass roof, which rules out the making of generalizations. During the thea ceremony a bunch of flowers in an unusual arrangement or a painting chosen for the occasion, are all part of the ritual – just as is the drinking of tea by those in attendance, or the buzz of the kimono being used by the lady leading the ceremony, or the discussion initiated by her. All of these phenomena achieve the transformation of a notion through visual and non-visual elements that are mutually strengthening. But they do not give rise to the illusion of the teahouse, as do neither a bunch of flowers nor a conversation.

It is only when these elements act together with the elements that they can be heard, and the question posed:8 But, in which teahouse? All of these constituents do not of themselves indicate a specific teahouse atmosphere.

The places described above tend to evoke abstract architectural environments and recall general architectural milieus. The question arises: Is it possible that a building or part of a building will have a non visual mark that only relates to a certain architectural work? Is it possible that a noise, odor or surface should lead directly to a particular architectural phenomenon? This may be because the image of the architectural element appears in front of us as a result of the stimulus – as a photograph evokes a photographed building – or because, as a result of a specific non-visual perception, we perceive the phenomenon giving rise to the information, just as when we touch a relief, we perceive the work itself, the architectural object, without actually seeing it.



Jean Nouvel: Institute of the Arabic World, Paris, France



Le Corbusier: The Unité d'Habitation, Marseille, France

Among churchgoers there are some who can recognize their own church based on non-visual features. Many visitors can say where they have come, based on the acoustics of the place, its air, the draft, the smell, the smoke of incense, the coolness, or the sound of the organ. Such associations arise out of architectural factors – the size of the spaces, the layout, the thickness of the walls, the peculiar features of the finishes, the decoration of surfaces, the size and position of the doors and windows, the furnishings, the multitude of sculptures. Many architectural factors establish a flow of air, a smell and a sound, which lead one to conclude that one is in a church. Associated with these impressions is the architectural notion of space. There are those who determine, thanks to the smells, that they are on the right place, because the windows fit badly and the unpleasant air of the outside world can enter unhindered – especially if the windows are thrown open because the chimney pours out smoke against them. All of this arises out of the combined effect of the structure, material and architectural milieu of a house.

In Paris, in Bercy, the twelfth arrondissement, barracks that had been used to store large amounts of wine for long decades, were recently demolished. Over the years the wooden buildings had sucked in spilled wine to such a degree that one could already perceive, at a considerable distance from the site, the acidic and penetrating smell. The barracks were identified with their smell. At the eastern end of New York's Fourteenth Avenue there developed a Meat Market district. If someone entered the deep-frozen warehouse, which still exists even today, the person would immediately experienced the ice-cold air (see Chapter 2). The large warehouse functions like an enormous icebox. On the inner side of the entrance, one fears freezing to death. The name of the district does not bring to mind an image of the warehouse but the freezing air inside. The ice-cold air has become a feature of an architectural phenomenon.

At night, in the dark, we know even without seeing that we are at home, because, by feeling our way along the wall, we reach the door, which is still where it was yesterday, and it creaks as it opens just as it always does. In the entrance hall we hear how, in the customary manner, the wind blows in through a gap under the door. And as we enter the bathroom, we automatically tread carefully, because on one occasion we slipped on the tiles. But in the meantime we do not have to imagine the wall or the door, and the tiles. We do not have to imagine the objects in a visual sense, for it is sufficient if their touch, their sound, their draft, and the mode of our step, form inside us. We perceive these familiar phenomena, and we know that we are at home. All these phenomena are a part of our dwelling derived from the errors of the architectural construction. There are sounds and gentle breezes elsewhere, but these particular ones occur only here in our apartment. In this case, the building enters our minds by pushing aside visual associations and on the basis of impressions caused by other stimuli. Rather than draw conclusions about the architectural image based on instinct, we look to the sensations brought to our knowledge by other sensory organs. The tips of our fingers, the soles of our feet, the skin of our muscles, and our ears preserve the auditive, kinetic and tactile experiences. Disregarding the image, the notion is taken note of within us. We know, even without becoming conscious of our perceptions, these signs, these material elements, are only to be found in this particular place.

In most cases, we experience several non-visual sensations simultaneously. But such stimuli do not always give rise to a pictorial perception. The experience does not necessarily subsist in pictures. A noise, a draft, the feel of a hand-rail are not automatically accompanied by an image, even though our ears, our skin, and the palms of our hands preserve the memory of the sound, the wind, and the touching of the object. None of these sensations, however, inevitably evoke the image of the building. Just as the image of our house is a mediatory means of developing the notion of "this is our house", so also do the home's noises, drafts, and the feel of its walls mediate. Separately or together, each of these elements contributes to the idea of "our home." In such instances, the home appears not as a concrete image but as an abstract, as a notion of a particular building. It is abstract, because the perception, oblivious to the visual image, is specific, for our impressions are based on concrete experiences (sound, touch, etc.). Even without an image, the notion forms within us.

TRANSPosed PLACES

Often, when we look around, we do not see the objects surrounding us. Indeed, the effect of non-visual factors makes us feel as though we are somewhere else. Our thoughts take us off to a distant part of this world, which does not remind us at all of things already seen. The things that can be seen and the things that are presumed, contradict each another. The "misleading" factors are usually caused by non-visual stimuli, under whose influence false and illusory notions of our whereabouts arise. The example below indicates that in many cases a combination of multiple factors gives rise to our misconception. Our notion is the result of synenergy.

On a visit to some friends in Los Angeles, I ended up spending the night at their place. I woke up early the next day, and despite the twilight, I managed to find my way around as if I had been at home. Employing the usual movements I went to the bathroom, turned on the tap, prepared my towel, and reached for the soap. Suddenly, however, I felt a kind of strangeness, as though I was no longer surrounded by the environment I knew.

Indeed, it was as if I were in another city rather than Los Angeles. But where? Through the open bathroom window, I could spy the well-known Los Angeles scene: the freeways, the small family houses squashed between them, the endless village panorama. Through the window, however, fresh air – a rarity in southern California – was flowing into the bathroom. The sharp dawn air brought in by the gentle breeze mixed with the steam of my hot shower.

All at once it dawned on me: Paris. Of course, I had felt Paris. But why? Surely one could not find two global cities with such different milieus. What could be the basis of the association? Outside, the well-known faded picture of Los Angeles was still there in front of me. I searched my memory banks, and suddenly I thought of a dawn awakening in Paris I had experienced years earlier. On that day too, a cool breeze could be felt flowing through the window into my room. It had been fall. And in Paris, mornings in the fall are usually a little damp. The similar rimy sharpness of the air attuned me to the past. On this particular morning I did not inhale the hot, suffocating, irritating and debilitating air that is so typical of Los Angeles, because a cool, slightly sharp and energetic breeze had arrived from the ocean, and it was this cooling breeze that I could feel on my skin. It was this breeze – along with the steam of the shower – that had misled me, teleporting me from dusty Los Angeles to Paris in the fall at dawn.

But it was not just the air. The breeze enhanced the association, bringing sounds more characteristic of Paris into the Los Angeles bathroom. Instead of the monotonous hum of early morning traffic on the freeways, I could hear individual, distinguishable sounds. Years before in Paris, I had awoken to the sound of the first entrance-door being opened. Then I had listened to the swishing of brooms on sidewalks or the banging noises made by the green-grocers on the street as they unloaded their produce. There was a market nearby. And then there had been the patter and voices of the first early morning shoppers, the bargain-seekers, the yammerers, and the chit-chatters, followed by workers rushing to their early morning jobs – more and more of them. One could gradually make out sounds coming from the nearby intersection, vehicles braking, creaking, hooting. The voices of the pedestrians, each of which had been audible, began to merge with the whirr of an ever greater number of vehicle engines. The city had woken, and general noise had filled the air.

The peculiar sounds of the early morning in Los Angeles resembled what I had heard in Paris years earlier. I looked out of the bathroom window, and I saw the break-line of the L-shaped street near the apartment. At the corner, the stop sign merged into the pylons and trees lining the street. The partly concealed sign became visible to motorists only at the last moment; this explained the screeching sounds of vehicles braking as well as the sounding of horns.

Beneath the bathroom window there were shops. A grocery store, a barber's shop, a laundry, a cobbler's, a boutique – together they formed a U-shape around a concrete-surface parking lot. It was onto this surface that the garbage men threw the emptied trash containers and that the delivery drivers unloaded their produce. The lot was concreted from wall to wall, and there was no greenery to lessen the noise. The brick-panel or concrete-block walls of the building served to harden rather than soften the noise. The respective wings of the U-shaped building threw the sounds back and forth, holding their echo captive. And all of this in a city where noise is generally swallowed up by vegetation between the houses, and where there are no pedestrians. Several shoppers turned up; evidently on their way to work, they handed in clothes to be cleaned at the laundry or shoes to be heeled by the cobbler. Then I heard a screaming couple – their domestic argument brought out onto the street. In this way, the various individual noises multiplied.

The early morning in Los Angeles saw the interplay of many different factors. Certain human noises can be the consequence of conditions determined by architecture, such as the specific noises that resound back and forth between hard-surface walls or the clatter of containers thrown onto concrete and the patter of shoppers. Other noises can arise from arbitrary phenomena caused by humans, such as the noisy argument of the departing couple or the unexpected braking of vehicles. The same general and specific phenomena were experienced in places separated from each other by both time and space.

The above story proves that two completely different architectural phenomena can give rise to a similar milieu, owing to the effect of an association of notions. But a difference between sights or images did not signify the perfect divergence of the architectural peculiarity of the two places. In both instances, a hard surface covered both the ground and the reverberating walls.

In both places, much of the coming-and-going was caused by the shops located in the building. In addition to the noise, the association I felt in Los Angeles was based on similarities in the quality of the air, the flow of the air, the humidity, and the hustle and bustle. The association arose despite my visual perceptions. The notion created was both true and misleading. True, in the sense that the airflow and the humidity were indeed characteristic of Paris in the fall, and such sounds can evoke the city. True, because, in an atypical corner of Los Angeles, this combination of effects happened to arise. But also false, because an illusory image of Los Angeles was formed, one that contradicts the typical image and mood of the city. Invisible architectural phenomena can be misleading; and in this instance the assumed image developed under their influence was a false one.

MEMORY

Irrespective of the type of architectural phenomena that confront us, we only ever perceive buildings in association with other phenomena and in the context of their surroundings. We form associations. Such comparative associations may be applied to both spatial and temporal contexts. Our perceptions include the past, things seen before that are similar. The formation of concept is also what we have studied in advance of it: acquired knowledge and the culture in which we grew up. Our opinions and our prejudices influence the current perception. When confronted with things seen, we are never completely uninformed. In every instance, we can perceive things in a comparison with some prior experience. Our most recent perception of a previous event is integrated into our notion of the present.

Between 1920 and 1933 the manufacture and sale of alcohol was prohibited in the United States. Wherever the authorities discovered the prohibited liquid, they mercilessly got rid of it. Of course, the public was less inclined to stop consuming alcohol. Thus secret bars opened which the public called “speak-easy’s” because their real function could not be stated.



Speak easy, Barrow Street,
New York, USA



Speak easy, Bedford Street,
New York, USA

Many illegal bars sprouted up in New York's Greenwich Village. One of them was Chumley's, located at the intersection of Bedford Street and Barrow Street. Chumley's opened in 1928 and is still in business today. At first, an organization of radicals, the International Workers of the Word, or IWW, held its meetings here, where illegal alcoholic drinks were also served. Over time the bar became increasingly popular with writers as well as the original radicals. It became a kind of literary club, where writers such as Theodor Dreiser, William Faulkner, Allen Ginsberg, Norman Mailer, Eugene O'Neill, John Steinbeck, and Thornton Wilder came together to debate issues and hold readings.

Because of the secret radical meetings and alcohol consumption, the police held raids. But the location of Chumley's offered various potential routes of escape. Although the bar could be accessed from both streets, it did not actually lie on the corner. The building in which Chumley's was located formed an L-shape around a building at the intersection of the two streets. People in the bar could escape from the raids by way of the roof or through one of the doors that led onto the two streets – assuming that the police had entered through only one door. The advantages of the bar included its accessibility from either of the two streets and its inconspicuous exterior. Those who were not in the know could never have guessed what lay behind the modest exterior door. There were no signs or billboards, no gaps in the wall for those wanting to take a peek. Even today, newcomers have to ask local pedestrians to direct them to the “speak easy.”

On the ground floor of the building, there were a couple of dilapidated doors – one on each of the two streets. Coming from Bedford Street, even the initiated press the door handle down timidly. Entering through the door, one stumbles upon a small foyer, with a wall just two feet in front. Then, having gone up several steps and down the same number, one arrives at the first chamber. The foyer is an obstacle, preventing somebody from seeing immediately what is going on inside, and the steps were designed to slow down the police. Inside everything is dark – even during the daytime because the interior lighting is so scanty. The foyer “podium” and the upward and downward staircase are less of a transitional space than a barricade between inside and out. After the first room, there are two more of the same. The middle room is the bartender's place; one can exit from there to the courtyard and then to the street.

The other way of entering Chumley's is via Barrow Street and across the yard. Here too, one finds a signless door, leading through under an archway to a narrow corridor and then to a small courtyard, which is overlooked by the windows of apartments in the surrounding buildings. Avoiding the curious stares of the local residents, one searches stealthily for the bar entrance. This mode of arrival differs in every respect from the previous one, because the transition from the airy street outside to the inner chambers of the bar is longer and more fragmented. The courtyard in itself causes a surprise, because from the outside the door appears to lead straight into a building. Instead, however, one finds oneself in a courtyard. The archway, the windows of apartments on the ground floor, a staircase leading down to a basement, the ground ivy, and a makeshift – all cause surprise. Entering the bar, one is a little astonished by the dark interior, brown finishings and wood furniture of the interior of the bar after experiencing the lighter courtyard. All of this means that one experiences different feelings if one enters the bar by this route. One feels the same “sense of guilt” for having entered a forbidden place, but the feeling does not overcome us all at once. Instead, we gradually become gripped by a desire to solve the puzzle. The two modes of entry are accompanied by two very different experiences.

In both instances, the experiences undergone on arrival affect our perception of the interior rooms – but they do so differently. In the first case, the immediate contrast causes surprise and astonishment; it feels like we have lost our way. In the second case, the mysteriousness of the approach makes us curious; it is alluring and attracts us inside. The mood of the interior space is identical in both cases, but our mental state, having been influenced by the two approaches, is very different. We experience it, in conjunction with our previous experiences, with what we have seen most recently.

All of this relates not just to the spectacle. In addition to the contrast between broad and narrow and light and dark, one also experiences the contrast between silence and noise. On the street, one hears the sounding of a horn and the flitting past of a vehicle; inside there is peace and relative quiet. A sound-breaking wall separates us from the hustle and bustle of the street. The difference between interior and exterior noise will be perceived differently if one enters directly from the street rather than indirectly over the courtyard.

But it is not just a difference of noise; even the smells will be different. On the street, the smell of exhaust fumes predominates, while in the courtyard one is struck by an airless, fusty smell that mingles with intermittent kitchen odors.

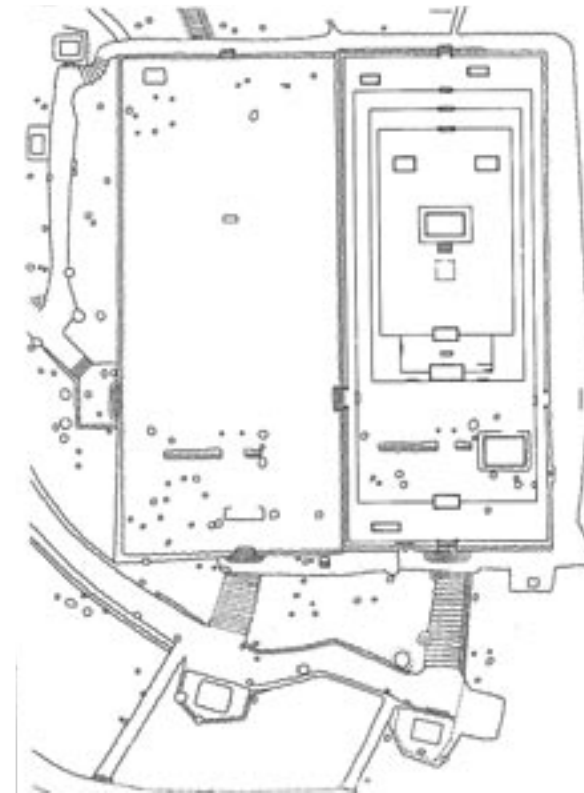
Chumley's consists of several rooms; one can walk through them and then exit by the other door. Of course, the route will not be the same if one proceeds in the opposite direction. We will see the various chambers from a different vantage point, our perspective will differ, and the impressions we gather by the time we leave through the second door will also be different. What we see will be different because the things that had been behind our backs are now in front of us. From a noisy place we enter a silent realm, or vice versa. The result is a series of experiences that differ from before. Perceived in reverse order, the composite spectacle is transformed. Along the route there or back, all factors – the spectacle, the light, the sensation of motions, the memory of rooms left behind, the number and strength of experiences, and the order in which we perceive them – will shape our notions in a different manner.

We see the present with the past. But the things seen in the past are not just separate memories provoking a comparison but intertwined elements developing the overall picture right now. The non-present as a memento “invisibly” influences what has just been exposed. This even holds when the “presence” of things past is continuously fading. Only the proportion may change. That which is inconceivable, as past events that are only present in our memories, shape our most recent perceptions of space in two different ways. Firstly, by means of the revived, or recalled memory preserved into the present day and secondly, as a preventive experience (in contrast to), in relation to which we take note of the newer perceptions.⁹

Just like our visual memories, the scents already inhaled and the sounds heard, there is also our notion of space. After the suffocating fog, the salpeter pot, and the smoke-bomb thrown onto the ground in front of us, even an otherwise stuffy, or even somewhat smelly, space can cause refreshment. Strolling through a market, we sense the smell of stagnant water absorbed by the fishmonger, and we feel it once again as we pass the florist's stand. This is not because the smell extends as far as the florist's but because we transport the odor with us in our noses.

It is no different when we hear the shouts of children in the playground; we still hear the din later on as we walk through the quieter bits of the park. Just as our bleeding and painful finger rubbed sore by the rustic stones reminds us later on, so we carry with us our previous impressions, even as these grow more distant in time and space.

CONTINUOUS CHANGE IS THE ONLY THING PERMANENT



Site plan of a Shinto sanctuary, Mie, Japan.
The area on the left is under construction

In ancient Japan a peculiar custom arose concerning the construction of Shinto shrines.¹⁰ Two, completely identical shrines were always built next to each other, one of which always stood at the service of the faithful, while the other was repeatedly demolished and rebuilt. The origins of this custom can be traced to the third to fifth centuries. Shinto shrines are not really temples; they are more like relic preserves, whereby even the buildings themselves are relics. Unlike in Buddhist temples, here neither visitors nor even the faithful can enter the shrine, and they cannot take part in the ceremonies underway inside the building. At most, believers coming to the temple may approach the building. The repetitive and ritual rebuilding continues until our day. One of the two shrines to Ise (in the Mie prefecture) is demolished and rebuilt every twenty years.

The reasons for rebuilding are not primarily practical ones, although the shrine is constructed from wood, a material that deteriorates over time. The other available material is stone, which although found in large quantities is not the most appropriate building material in an earthquake zone. A more significant factor in the development of the tradition is philosophy, which, in turn, has been influenced by the physical features of the island (wood is more resistant to the effects of an earthquake).

The shrine of Ise was devoted to the sun-god, which symbolizes the history of both country and imperial family. The imperial family's origins are traced back to the sun-king. For the Japanese, the pursuit of eternal life is a factor when constructing monumental buildings, but it is done so differently. They do not believe that material can exist for ever. If the idea of eternal life arises, it does so in continuity. The process is what lasts for ever. The reconstruction of the shrine symbolizes a return to the beginning, to the outset. The purpose is not to save the objects, but the spirits that have inhabited the various forms. Crushed gravel was spread at the site of the demolished building, and so the site, divorced of the building of the shrine, retained its sacral character even when it was empty. The demolished shrine exists even when it is invisible. It is only in unison that the temporarily removed shrine and the one in use can fulfill their roles, thereby symbolizing continuity. Such attitudes are self-evident in earthquake zones. It is only in combination with the presumed, with the momentarily non-existing, that the visible makes real sense. The subsequent reconstruction of the demolished shrine integrates the notion of a future. In this way, the process is complete. Whether we remember it or use our knowledge to conjure it up, we know that there was something there, and we imagine it together with our memories, whether pictured or learned. The past is present even as an absence. Meanwhile, the future exists as a supposition or hypothesis. The non-existent is also a part of perception.¹¹

In a traditional Japanese home, our surroundings may change even while we sit in one place. Through the movement of mobile partitions, the space around us can expand or detract. Our situation is unchanged, but the space around us varies, since the partitions can be pushed around from one place to another. Although the building is unchanged, the home undergoes constant readjustment as a result of these changes. It is not just a spatial transformation, however, since we find ourselves in completely different surroundings and a different atmosphere when space opens out or closes in around us, or if the things we see around us change, or if the draft of fresh air or

the smell of cut flowers or something being fried in the kitchen changes in direction. In a continuously reshaping environment, our experiences undergo constant readjustment. But what is the real experience? Do we have to choose? Or are all of them valid? Together, or just one of them? Or one after another, separately, cumulatively? Or many experiences together? Perhaps the last choice is closest to the truth. If we think back to the Japanese house described above, then the images of things seen at different times merge. We have already forgotten what we experienced at two different points in time, but the two sights remain – separately, both what we saw when the partition closed off the view, and what we saw when the partition was removed. But another possibility is that when evoking the image, the pictures are placed one on top of the other, or they appear lying side by side. A change in visual perception never occurs on its own. Whether we close off with the partition or remove it, we will be subject to other stimuli.

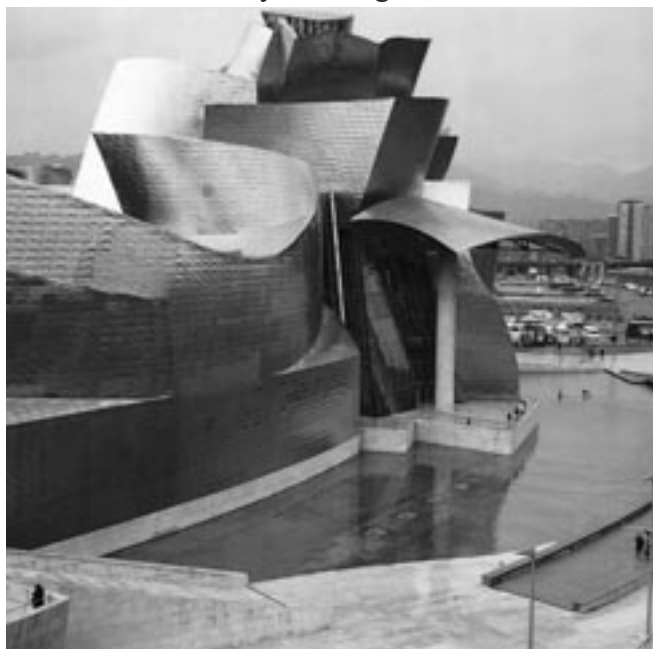
Our spatial impressions develop in the course of the unceasing transformation of our surroundings. The things we see change – as in the case of Alexander Calder's mobile sculptures. And they do so not only because the visible form of a sculpture changes as it turns on its axis, but also because the sculpture always covers or leaves free a different surface. We see both the sculpture and the background as continuously changing elements, as the landscape behind a windmill in motion or moving cloud. So what are the visible changes. What is the picture? Is it what is visible or is it what is covered but will appear the very next moment?

EVOKING THE PAST

When looking at objects, we are choosing selectively from our memories. What we register or what we ignore also depends on us. Evidently, we pay more attention to unique objects and strange forms, simply because of their unusualness. But in relation to when does something become unusual? Is it in relation to our general knowledge or our specific lexical knowledge? Or is it in comparison with what we have seen before? We are likely to recall Frank Gehry's museum in Bilbao, because its forms are novel.¹²



Four Frank O. Gehry building



But when we have seen the third or fourth undulating bubble building by Gehry (for instance, the Film Institute in Paris, originally the American Center, the Walt Disney Concert Hall in Los Angeles, or the Art and Teaching Museum in Minneapolis), some of the novelty wears off, leaving us with what has become known as the Gehry formula.¹³ At the beginning of the baroque period, did people think the same after the construction of Francesco Borromini's Church of Sant'Ivo della Sapienza in Rome when they saw another church in Rome, the Church of Santa Maria dei Sette Dolori, or when they compared it with other baroque churches such as Guarino Guarini's Church of San Lorenzo in Turin?¹⁴ We always take into account what we have already seen. When comparing these churches with the visible, the images of the objects of comparison automatically come to mind, despite the fact that they are not physically present and exist solely in our memories. The non-present past – memory – takes an active part in the development of our thoughts.¹⁵

When making comparisons, we pay attention both to similarities and to differences. Viewing a building, similar motifs present in our memory may emphasize the familiar aspects of what we see, just as the differences may assist us in concentrating on the peculiar. In a great number of places, we can find similar elements to those seen on the Church of Il Gesù in Rome, designed by Giacomo della Porta (based on a groundplan by Vignola). Such similar constructions are the Madonna dei Monti and the Santa Caterina dei Funari (Rome), both designed by Giacomo della Porta, or Carlo Maderno's S. Susanna (also in Rome) and the Santo Spirito in Sassia by Antonio de Sangallo, Jr.¹⁶ And we could also include in the comparison Lemerrier's Sorbonne chapel (1635) or François Mansart's Val-de-Grâce (1645) in Paris.¹⁷ Several of them are almost copies of something built elsewhere. All of them have the shared motif, the tympanum, surrounded on two sides by the voluta. Because of their shared features, we inevitably compare them with the best-known example, the Il Gesù in Rome. But we also take note of what is different. Is the voluta shorter or more of a spiral on the one rather than the other? We also note how many times the tympanum motif is repeated on the façade, and whether or not the line of the cornice breaks up the row of columns or runs right around the building. Based on our experiences and our knowledge, we place the buildings in a system canonized by others. What had been a revolutionary novelty is now “merely” a feature of the era, a basis for comparison and categorization.



Santa Susanna, Rome, Italy



San Lorenzo, Viterbo, Italy



Il Gesù, Rome, Italy



Val-de-Grâce, Paris, France

Although familiarity breeds contempt and that which is seen too often loses its significance, then an important point of reference will be one's prior knowledge and what one has already seen elsewhere, as well as one's preferences. We see the present in conjunction with our memories. Our knowledge makes our eyes sharper. Our fantasy can take us back to the past, to the era when the building was designed and constructed. We can experience, alongside the buildings, the atmosphere that prevailed centuries ago. In Paris's Quartier Latin, if we look away from the crowd seeing in the street and the shop windows, we can easily imagine ourselves as students in the long-gone past. The winding streets and narrow lanes, with their windows facing each other at arms length, take us from the present into the past, or into the past as imagined by the present.

There is no architectural milieu that kept its original position. Most buildings have been rebuilt over the ages; as a result of additions and demolitions it is not how it used to be. Looking at what is present today, we not only ignore the various added features, but we even imagine the missing element where it should be. The building selects – sometimes the new dominates, sometimes the old does. Whether we wish to reconstruct the old or imagine an altered version without the original, we always have to hide something, and imagine in its place something that is. The real and the imagined live together. Apart from what we have seen in the past, it is thanks to our imaginations that we can evoke something different that no longer exists, and place them among the things that are seen.

THE IMAGINED FUTURE

The non-present and the invisible can also appear as something planned, as something imagined, and as something realizable in the future. We can add to what lies in front of us something about which we have mere ideas, our fantasies and daydreams. Fantasy can function even in the dark: we can imagine phantoms, our own anxieties, and everything else that stems from the unknown. From the darkness of the ghost train, a monster jumps out. On a nighttime trek through the forest, we see ghosts and spirits. The unknown, about which we know nothing, cannot foresee – and that does unsettle us. We can even imagine dreams in the dark. Those who pray to God or who meditate often close their eyes when doing so, because it is easier to hold a private conversation in darkness. Those who wish to surrender themselves to music also close their eyes, so as to prevent what they can see from distracting their attention from what they can hear. In a dark room, after the lights have been turned out, it is easier to allow our fantasies a free run. Having rid ourselves of external influences, we become freer in our thoughts.

Almost everyone has “furnished” an empty apartment in their mind. The couch can go here, the standing lamp here, the plants here... We may hesitate and modify our plans, but at least we can begin to imagine our future apartment. We imagine things there, things that are still not there. We see both the visible and the imagined together. Standing in front of a half-completed house, we would so like to see the final product. We imagine how it will look when the house reaches its full height, with its finished façade, its layout, its ornaments and its colors. But we may also try to leave out of the present the houses that can still be seen, the background, which in the future the new building will hide. What is imagined can change the visible spectacle. Imagining something into the situation and leaving it out – both can happen. The architect plans in a similar manner, first of all in his head. Having seen the site and heard the wishes of the client, he imagines the solution on an empty site. A great number of variations occur to him, but he allows his fantasy to run with his thoughts.

Then, one after another, he begins to find fault with the ideas that have arisen. And he does this until he is left with what he considers to be the best ideas. The architect then faces the task of building this unrealized vision, of making something real out of something unreal. The lay person thinks in similar ways. The client takes the architect to the newly purchased site and lists his ideas. He says, for instance, that he imagines a house that merges into nature and matches the undulating lines. His idea is that he should see beyond the house to the landscape behind it, and that he should do so not just when he’s sitting inside the house but also when he approaches it and when it gets out of his automobile. He wants the delightful landscape to be as beautiful as ever. He imagines, therefore, a single-storey house, partially sunk into the ground with a gently inclined roof. The architect will be satisfied if, after the construction of the house, the landscape is still the dominant feature, in accordance with the client’s wishes. Such ideas may develop spontaneously, or they may be the result of a conscious evocation. In the end, what is important is that the image of the future should contain things that are not visible, things that do not exist but can or could be

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**THE SPACE CONCEPTION
OF THE BLIND AND
VISUALLY HANDICAPPED PEOPLE**



As part of the reconstruction of the Musée du Louvre, a permanent architectural exhibition was established for blind and visually handicapped people. Models were made of Egyptian pyramids, Greek temples, and Gothic cathedrals. Blind people could touch and feel the models, thereby gaining an idea of the nature of the various productions of architecture. The exhibition's curator, Mme Hoëlle Corvest, is herself blind. We met at the reception of her current workplace, the Parc de la Villette, Cité des Sciences et de l'Industrie. From there she led me to her office, explaining to me how she finds her way in the complicated system of corridors. She listed, one after another, the objects and surfaces we were passing by and the distance they were from us, or from other larger objects. The description she gave was a perfect one. I thought to myself, this was obviously because she had been working at the museum for years and had gone along this route on countless occasions.

I decided to ask her anyway, and to my surprise she answered by giving an example. A few years earlier, she had been requested to take part in a research project involving visually handicapped people. As part of the research, she was asked whether she could tell the size of a room she had never been in before. She accepted the challenge, and was taken to empty rooms of various dimensions. To everyone's astonishment, she managed to guess the size of the rooms to within a 10 percent error margin. How did she know? It was the echo that led her to the right answer. Up to 400 square feet she can quite accurately determine the size of a room.

The curator's refined sense of hearing and many years of experience helped her to find her way around. But this ability, one supposes, is possessed by everyone – although perhaps only latently and doubtless not always to the same degree. Often our hearing organs are underutilized. But this does not mean that our ears play no role, instinctively, in our orientation. Proof of this is our uncertainty of movement in soundless spaces or in vacuums. In a hermetically sealed chamber – which is acoustically dead – we lose our orientation skills, our topographic sense. Space becomes homogeneous, without scale, and imperceptible. The person in a vacuum does not know where he is. In order to find our way, we need objects preventing the dissipation of sound or surfaces reverberating echo.

For similar reasons, the soil is also important. Using his cane, Matthew Sapolin (the director of the Mayor's Office for People with Disabilities in New York) collects information not only about the location of objects, but also about the surface beneath him. By knocking against the surfaces with his cane, he is informed by the sounds. This allows him to determine – with considerable accuracy – the material of the facing, as well as the nature and quality of the surface.



Blind Accordion Player

Scent of coffee



As for the curator, other factors also enhanced her orientation: for example, a fountain by the wayside. But what helped her, as she approached the fountain, was not just the sound of cascading water, but also the altered air humidity. The draft of air was a further element. The airflow was accompanied by a change in temperature. The natural flow of air, as well as the flow created by the air-conditioning equipment directed her; indeed, she could ascertain exactly where she was. And this information was still valid even when the air-conditioning facility broke down.

Experience had taught her how much time she needed to reach the doorway. She also registered when it was absent, since she had grown used to reaching a point at which the flow of air was stronger and the air cooler after a certain amount of time. Smells also informed her, because even if the flowers had been changed, the vase for cut flowers was still there – and she knew where that was. The scent of flowers essentially showed her the way.

Apart from sound and smell, her sense of touch was the most important factor. She leaned on a cane, used as an extension of her arm. The cane helped her to determine the presence of objects such as columns, bends in the corridor, and the location of the first step on the stairs. But of equal significance was the manner in which she used the cane to feel the floor surface. The sole of her foot also assisted her. It did not matter that between her foot and the pavement below was the sole of her shoe, she could still find her way by feeling, as if she had been feeling the floor surface with a part of her body. The material she felt led her on her way. If she discovered a change in the surface, it was always a sign full of consequences. Everything informed her. Her hands and fingers were at her service, since she did not always utilize her cane, but instead felt things – such as clothes, books, her computer, and Braille characters – with her fingers. In many cases, the cane helped not her, but those who encountered her. The white cane informed them that she was a visually handicapped person.

Another important factor, as we saw above, is the passing of time – which also showed her the way. She knew when she would reach the opening to the air-conditioning flue, and she also knew the distance of every object in relation to time. For her, space and time merged into one. As common factors, both of them led her forwards. The knowledge and experience of time became a part of her memory and automatically informed her of her position relative to time. Over the years, all of this has become instinctual and routine. Space exists only in combination with time.

Sound is not always a help. There are times when noise prevents visually handicapped people from finding their way. Demonstrators marching along the boulevards in the city may be a usual occurrence in Paris, but for the blind person who was used to walking along the route everyday it was a disturbance. The racket caused by the marchers and the crackling of the howling microphones altered the sound environment. The usual balance was gone.



Cigarette smoke

When I offered to assist, she complained that although she knew the district, the noises coming from all directions meant that she could no longer find her way. In this sound environment – where familiar sounds were suppressed by unknown howls – her orientation skills were lost.

The head of the department for people with physical disabilities at New York's mayor's office, Matthew Sapolin, noted that when his ears get blocked up because of the flu, he stays away from work because he cannot interpret the sounds around him and cannot find his bearings. He loses what is the most important sensory organ for blind people. The size of a room also changes the significance and evaluation of sounds. Just as sound may be the primary indicator in a small room, so it becomes useless in unending spaces such as an open plain, the ocean, or wherever there is nothing to stop the movement of sound and the creation of an echo. Matthew Sapolin told me that he liked to be able to feel the limits.

He loves traveling; on a trip to India many years ago, he visited the Taj Mahal, but he could only feel the walls that were close to his body. All he could perceive of the enormous space was that it was empty. The reverberating surface of the dome was so far from him that its echo did not offer any real insights. In contrast, in smaller spaces, he knows where the sounds are coming from and the distance of the source. For this reason, when he goes angling, he prefers to head for a river or small lake, rather than the ocean. If there is no ear-splitting noise, he can perceive the smallest rustle and he knows when a fish has taken the hook. Likewise, Mme Corvest prefers rooms with low ceilings, for the echo is louder.

Pharmacy



Barber sign





Braille typewriter

Sounds inform us by means of their echoes.¹ If the object reflecting sound is at least two or three meters from the person listening, then that person will hear the noise from the original source and then the reverberated sound. The difference between the two is then used to determine the distance from the object reverberating sound. This explains why blind people often make a buzzing sound or click their tongue: they seek to hear the echo. They can establish distances based on such information. Such forms of orientation assist blind people to conceive of their surroundings. By measuring distances in this manner, they can determine the location of objects and the layout of a room. Blind people then arrange the various objects in their minds. The blind person's conception of space is based on the relations between objects and its enclosing surfaces. A similarly important method involves kinetics: as they walk through rooms, becoming acquainted with the dimensions, or if they examine thoroughly the details of the spaces, they can determine the relative position of objects.

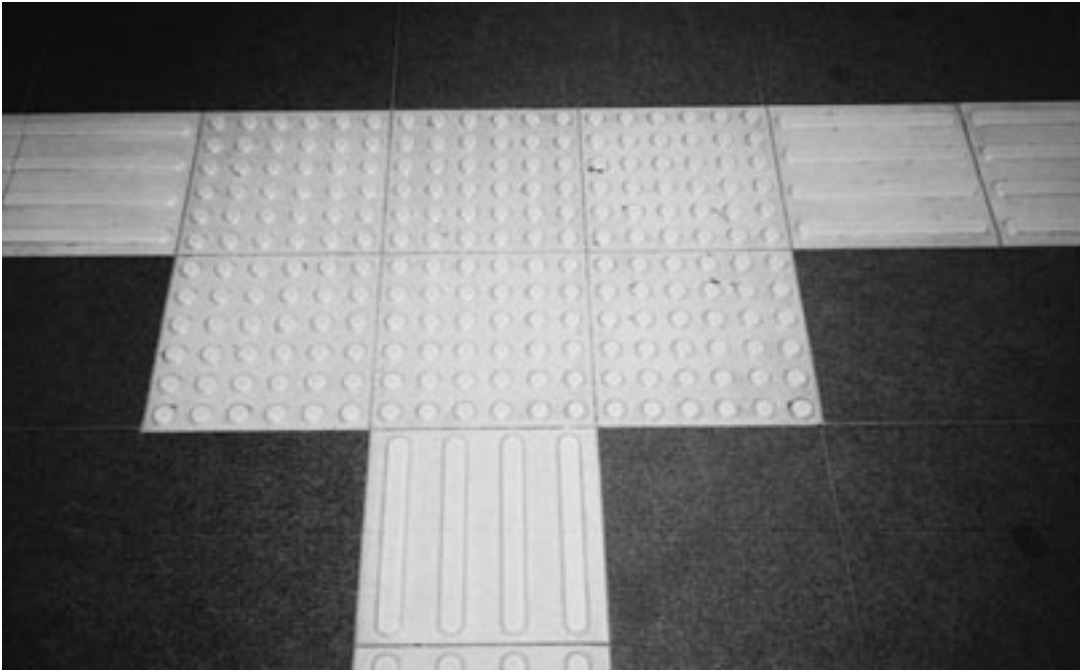
In this regard experiments have been carried out which show that most blind people can describe the rooms as well as the most important fixtures. In their minds they know where things are, but the idea of perspective causes them difficulties, or rather it becomes impossible. For instance, it is self-evident to a sighted person that, seen from a certain vantage point, things that are closer will look larger and things that are more distant will look smaller. The blind person could see an object from thousands and thousands of viewpoints. It serves no purpose to draw comparisons, because it is not the visual image that they supplement by means of their other sensory organs; instead they conceive an image by means of the many impressions.

Intersection of different walkway surfaces



Although blind people can determine where they are in relation to the other objects in a room, as well as the shape of the room, they do not perceive perspective vision. Blind people will not be victims of delusive perspective.

Mme Corvest told me how she had renovated her apartment a few years ago. She replaced the wall-to-wall carpet with stone tiles, on which she placed rugs of various shapes and sizes. The different surfaces – which varied in terms of both touch and echo – facilitated her movement within the apartment. Early visitors to her apartment were surprised by the changes; they found her home a lot more spacious than before. They said that the varied surfaces made it seem bigger. She was happy to hear them say this, because her own impressions – made by touch – were the same. Using their sense of sight the visitors concluded the same as she had done using her sense of sound and touch, and by means of kinetics.



Tactile road markings

The blind respondents in the survey stated they do visualize their surroundings. To my surprise, they used the word visualize. The furnished rooms do appear, in some form, as images in their imaginations. Of course, there are important differences between people who were born blind and those who lost their sight after the age of three. Visual memories contribute to the formation of images in the minds of people in the latter group, although as times passes their influence weakens.² Matthew Sapolin told me that although he has been blind for decades, he sees colors in his dreams. Still, his conception of his surroundings tends to be built on recent impressions. Familiarity with a given room – whether at home or at work – meant that he could move around it with greater confidence. Experience and cumulative knowledge gave him an awareness of the positions of the various objects in the room. New items placed in a room naturally disturbed him. For instance, if his children left the door of the washing machine open by mistake, he was almost bound to walk straight into it, since the echo was formed at a low level far below his head. This proves, however, that he did have some kind of conception of the apartment's accessories and furnishings, but without an open washing machine door. To what extent is it possible to refer to such ideas as notions of space? Objects recently conceived of do not appear in color. The shapes do not comply with the different forms observed by the eye.



Sighted people verify what they have seen by means of touch, whereas blind people use touch, the feel of the surface, the quality of the material, the finish of the surface to create something different. Since their sensory organs have developed to the maximum possible extent, they imagine a different world from that seen by a sighted person. On the street, smells and odors – coming from the tobacco shop, the cleaners, the barber's shop, the patisserie, and the chemist's – inform the blind person.

People who are born blind cannot conceive of colors, of black and white – or of gray. They also find it difficult to reconstruct the shapes of objects. For them, space is not created out of the visual image, but in response to something that can be touched, smelled or heard – or which causes movements of the air. After having felt an object or a face, these blind people do not remember shapes, certainly not in the same way as sighted people. The object already has disappeared, and their fingers carry with them the memories of touch. Everything depends on what has been conceived in the mind, based on touch or other senses. In this sense, space arises also from the data, but is mediated by the non-visual sensory organs. Even so, we can still speak of notion of space. Pressure and masses – whether less or more dense – are all space-generating elements for blind people. The sighted person observes objects, while the blind person concentrates on open spaces and vacuums in which he or she may freely move.

Blind people also sense space, even if the notions and effects reach them in a different manner. Just as the sighted person translates what he sees into an image, so blind people convert the sensations they feel into conceptions – but they do so in a different way and with different results. The images developing in their minds can differ from reality, but everything that follows from knowledge of space – the location of spatial elements in the mind, orientation, fixing our own position within our surroundings – constitutes fictive space in just the same way. Blind people establish a world in their minds – and the existing world of all the various aspects of the world. Just like everyone else, they only know the image of reality.

In his book, John Hull writes that before he touched the object with his cane, he felt that something was there. Where the non-blind see an open space, he feels, instead of emptiness, some kind of immobility. He perceives the presence or absence of something. As he approaches the wall, his face feels in advance the physical pressure of the wall.

According to Dr. Katalin Molnár-Erhardt, who was the general secretary of the Hungarian Association of the Blind and Visually Handicapped until her death, blind people's notion of space depends upon creative thinking. As I interviewed her, she stressed the importance of the mind, because the impulses arriving by means of the various sensory organs are put together in the mind of the blind person. Everything depends on consciousness; it is in the minds of blind people that the final conception of space arises, based on all the information received. The forms that have been felt live on as memories of touch; everything else depends on the impression formed by the impulse and the extent to which this impression has been transformed into an image in our mind. In the United States, an experiment was undertaken involving three groups: people born blind, blind people who had lost their sight as adults, and sighted people who had been temporarily blindfolded.³ They were taken one by one into a large room, where they were spun around or led across the room in a zigzag pattern. After a while, they were asked to point in the direction of the starting point. Most of the participants managed to correctly determine the point of departure (the least successful were those born blind). The procedure was repeated, but this time music was played in the background; some of the participants were still able to determine the precise point of departure. Finally, the experiment was repeated once again; this time, however, subjects were asked a series of questions during the experiment. Having been forced to think about other things, the respondents were now unable to indicate the direction. The experiment was repeated, but once again none of the subjects were able to give the right answer. Because they had been trying to answer the stream of questions, they were unable to evoke the path they had taken. Orientation and figuring out one's surroundings is primarily mind work – even though it may be based on data supplied by the sensory organs. It was with regard to this fact that Dr. Katalin Molnár-Erhardt said that everything depended on creative thinking.

In the course of his work, Matthew Sapolin has to fulfill architectural tasks. Ground plans are presented to him and he is told the size of a room, its furnishings, the position of the door, etc. Based on a two-dimensional ground plan, he has to imagine the three-dimensional space. It is a very difficult task, because it is not simply the objects that he has in his mind. Indeed, it is not the image or shape of the objects, but the felt surface of the object, the draft caused by the opening of a door, his kinetic experience of the room, and the memory of his muscular system as he walked along. He must put together a three-dimensional space, based on his own information and on what he has been told by others.

Books made for blind people also help them to understand architectural phenomena. Such books contain the ground plans, façades and details of famous buildings, with tactile forms similar to Braille. The lines of the buildings rose above the page's surface. Such drawings assist blind people in developing notions of buildings and their various elements, such as arches, domes, window frames, columns, and architraves. It is based on these images that Mme Corvest and I debated, among other buildings, Palladio's Venetian churches and their façade systems. The drawings provided an opportunity for the reinterpretation of the buildings and for evaluating the solutions, including Palladio's system.⁵ A great advantage of the book is that all the buildings are shown according to the same scale; thus, even though it could not evoke the real dimensions, it was capable of indicating the relative sizes of the buildings. Oddly, these semantic drawings do have their advantages, because the abstract pictures facilitate a better understanding of the building systems.⁶

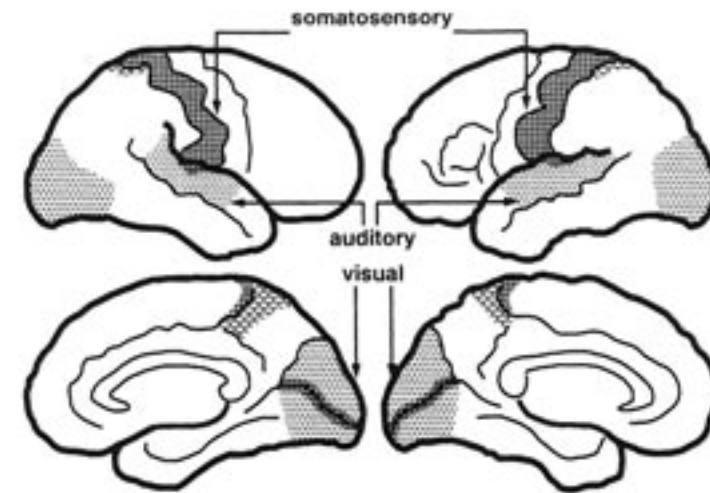
In summary, most blind people live full lives. I know of an almost completely blind Slovenian art historian, who not only teaches his subject, but whose photography has gained international recognition and has been exhibited.⁷ Most blind people go to the cinema and watch television. With a little help, they can follow the plot by listening to the sounds and noises. (See page of the chapter on Touch.) Many blind people run and cycle, and some of them even go skiing or play baseball (the ball is equipped with a system that emits sound). Katalin Molnár-Erhardt says that she feels space; even without a cane she knows when she is approaching an object. She can say how many cars are lined up alongside the sidewalk within one block. Mme Corvest speaks of the vibration felt in the atmosphere, the waves that arise in the space, which mediate to her the spatial events.

Hull writes of the physical pressure, while José Portala (a blind teacher at the Centre Forja in Paris), unlike others, prioritizes the outdoors, because there are no obstacles and he can move freely there. Matthew Sapolin distinguishes between spaces, depending on their effect upon him. He prefers intimate spaces because he feels secure there.

Opinions differ, but blind people resonate to the architectural environment just as other people do. To experience space, we do not need to see it.

I would like to thank all the people and organizations that have assisted me in writing this chapter, including: Hoëlle Corvest, curator of the Cité des sciences et de l'Industrie, Paris ; Daniel Cuff, librarian of the American Foundation for the Blind, New York; Dr. Katalin Molnár-Erhardt, former general secretary of the Hungarian Association of the Blind and Visually Handicapped, Budapest ; Sandra Green, A.F.B., New York ; Robert Piccolo, architect of the Mayor's Office of New York City ; José Portala, Centre Forja, Paris; Matthew Sapolin, head of the Department for People with Disabilities at the Mayor's Office of New York City.

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INVISIBLE AND VIRTUAL ARCHITECTURE

THE INVISIBLE HOUSE

Modernism freed buildings from the distraction of unnecessary adornment. But this simplification sometimes left houses looking rather bleak. The stripping trend was followed by efforts to dress buildings up. Indeed, each of the various schools of architecture tried to make up for the previous loss. Post-modernism placed old costumes onto bare skeletons. The ideology of deconstructivism was used to explain the disruption; systems were placed one on top of each other. Critical regionalism supported pluralism. Such parallel trends gave rise to a previously unimaginable growth. Systems were borne of the fractal, or baroque forms from distorted, rotational surfaces; some buildings were turned inside out, with structural elements and pipes placed on the outside. Then there were the glass-façade transparent masses, and finally the submerging of whole buildings into the ground and the founding of “virtual” architecture. Architecture grew close to absurd solutions. Diversity allowed for the rebirth of minimalism, including the new lyrical modernistic approach. As a consequence of abstraction, and as one got closer to the zero, there arose the “unbuilt” building, negative architecture, and virtual architecture. The absurd gave rise to the idea of the invisible building. These “dream projects” lacked everything that was usually present in conventional architecture. The design did not feature a house. To be more precise, there was no visible house.

The “house” was really fog-cumulus. If something was visible of the house, it was, in addition to the cumulus, a tube system nurturing the fog. The pipes were lying all over the site. The ground was covered by the thick mist, which had been let out of the tubes, a fog/cushion. One could walk, sit or lie on it. The walls were replaced by a thermal curtain whose temperature could be changed. This swirl was designed to protect the house from the vicissitudes of nature. By means of a hidden electrical system of wires hidden in the fog, residents of the house were to be protected from intrusions by animals and/or people. The electric voltage system was designed to give an initial minor electrical shock to intruders. Just as an electric fence discourages cows in a field from wandering off, so this system was designed to protect residents from animal or human intruders who ignored this initial warning, faced a stronger electric shock at the next hurdle – a shock that would have knocked them down.

Such systems have been tried and tested – in the reverse direction. The electric “fence” was designed with sections; by switching off the current in one of these areas, an opening was made for people to enter or exit. The surrounding thermal wall of the house could be painted. In this manner, one could change color and the shape of the walls. From the inside, the artistic experience would have been enhanced by means of the pictures projected onto the mist.

A similar solution would have replaced the roof. Overpressure would have kept away the rain and the wind. Meanwhile, to reach the residents of the house, the sun would have had to pass through, or filter through, a mist of changing density. Similar means could have been used to resolve issues of cooling and heating, as well as the humidity within the house. Everything would have come about through pressure, current or projection. In this way all the technical requirements would have been met, and the residents could have lived at their chosen place with a feeling of protection. Security – one of people’s major demands when building a house – would have been resolved.

Noise. White noise is only a partial solution; background music does not eradicate unpleasant sounds, but it does neutralize them. Countersounds of the same wavelength, amplitude, volume and frequency of the original sounds could have neutralized them. A relative stillness could have been established within the building (thanks to the countersound). By switching off the equipment, residents could have allowed the sounds of nature into their apartments. Even smells could be regulated by means of the rising fog. The air-regulation equipment could have been used by residents to let in natural or other pleasant smells into the house. Everything that affects the nose, ears, tongue, eye and skin of the building’s residents could be regulated by invisible objects.

From the outside, invisibility – if there was a need for it – could have been provided by means of back-lighting. This back-lighting could work twenty-four hours a day, similarly to the outdoor theatres where the audience are blinded by light coming from the stage during the intervals so that the scenery can be changed and the actors can move around on stage. The house could become invisible without having to resort to the swirl. Light shining into one’s eyes will even make the swirl invisible. When the light is switched off, only the swirl, the unfathomable reality remains. On the other hand, secrets and suggestiveness continue to exist.

But to bring all this into reality, one would need thousands of cables and pipes. Most of them would be laid at the “edge” of the house or in the earth. Some of them would have had to be raised into the air, so that they could perform the tasks of the roof. The building would have been a complex of pipes and wires. By turning off the machinery providing the energy, the swirl house would have disappeared. Just a few cables and pipes hanging in the air would have remained – like a scrap yard or a bunch of wires hanging in the air. But switching it back on, turning the mechanism on, the phenomenon, swirl, would have returned, in which the residents of the house would have stayed invisible.

The inconceivable would have replaced all the hard materials. The swirl produced by the pipes, the light, the electric current would have performed all possible roles of the house. What was lacking, however, was palpableness. The swirl of mist runs out of our hands. Whether it is a custom or a real need, there is, within us, a desire to feel with the tips of our hands, with our palms or the soles of our feet, the things that can be touched, the things that will remain. We feel a desire to run our hand across the silky curtain, to run our hand across the upholstery, to feel the power of sculptured stone by means of touch or the coldness of polished marble, so that we can seize the back of the arm-chair. We desire to touch, because it causes perceptual joy or so that the warmth of the material should pass through us. We certainly need to touch for a great variety of reasons. This basic human need cannot be satisfied by an invisible house.

We need to touch. We pinch ourselves to check whether we are awake or not. We caress our partner, and the contact establishes a feeling of togetherness. Catholics reach for their rosaries while Muslims turn their pearls in their hands; by touching their beads, they can enter an objectivized relationship with their gods. But anxious people also play with beads between their fingers to calm themselves. Artisans and musicians stroke their tools and instruments before use. Touching convinces us of the existence of objects.

This touching, this certainty, was missing from the invisible house. We need the house so that we can know where we belong. It is a symbol that shows us our place in the world, and relative to which we can fix our existence. After an injured homeless person was treated at hospital, he was asked where he wanted to go. Just take me back to my usual place under the

Árpád Bridge on the Buda side, was his reply. That is where he belonged. Another time, my friends working in Eastern Asia asked me to design a house for them in the hills near Los Angeles. I could not understand why they wanted to spend so much time, energy and money on this project, since I knew they would not be able to enjoy it. Their reply to my question surprised me: they said that since they were constantly traveling the world, they needed somewhere – just one place – which belonged to them and to which they could belong. In other words, they needed a symbolic fixed point, which would render them a place in the world.

When I heard them say this, I began to understand. Consequently, I changed the design of the imaginary house, adding a column to it. The design included a tall smooth concrete column, which rose above the swirl of fog, and could still be seen when the house was surrounded by fog. The column would have served no “architectural” function; it would not have supported anything or served as a flag pole or advertisement column. Instead it would have been a kind of reminder. Such signs are needed just as much as walls; they play the same role as the window revealing to us a spectacle. And they satisfy the same architectural requirements as ornaments placed on a building for aesthetic reasons.

The requirement to make houses disappear is not a new one. Interior spaces were the first to be emptied. Permanent walls were replaced by removable partitions that could be shuffled around, and then even they disappeared. This led to large open-plan family houses, or office buildings surrounded by glass curtain-walls. The next step was the eradication of supporting structural systems from interior spaces; columns were put around the perimeter of the building, while trusses and a framework replaced the traditional floor system of girders and beams.¹ Finally, everything was removed from the interior space, and the mechanical system and air conditioning systems were placed on the outside of the buildings, as were also the heating system, the ventilation, the plumbing, the electrical cables, the elevators, and the escalators. One of the best examples of an interior space cleared of all objects is the Centre Pompidou (1971-1977), designed by Renzo Piano and Richard Rogers.²

Another way of making a house disappear was to construct a glass-house. One of the first was a building by Pierre Chareau, a new construction hidden within a city block in Paris.³ Among the latter examples, perhaps the most famous transparent glass houses were Mies van der

Rohe’s Farnsworth House (Illinois, 1946-50) or Philip Johnson’s Glass House (New Cannan, Connecticut, 1949). In recent times, the glass walls of the exhibition pavilions for the Fondation Cartier (Paris, 1991-94), designed by Jean Nouvel, made full use of the opportunities.⁴ The Fondation Cartier’s building lies in a park; ancient trees are to be found both behind and in front of the exhibition building. The means of, and reasons for, making the houses disappear, making them invisible, could be many. Perhaps the designer was inspired by the idea of a union with nature. In the case of the glass houses, nature definitely has a presence. Looking across the glass wall, we can spot nature behind the house. The house becomes once again a part of nature. Similar criteria led Emilio Ambasz to create his masterful cave dwelling. On the other hand, the goal may have been to make the houses weightless, so that the house would float between earth and sky. Many have tried to achieve the elegance that comes with lightness.⁵ Others have desired sunshine and the visible proximity of nature. For them Richard Neutra designed interiors covered with light and with facades made of glass.⁶ Buildings can become invisible in many different ways.

DELUSIONS IN ARCHITECTURE

Architects create objects, but in many cases their minds contemplate merely the projected image of the object, without intermediate matter. The notion of the building is an illusion, which can arise in the form of a vision, a symbol or a mistaken belief – or even in a dream. The information received from phenomena can be false or misleading. It may also happen that the object is not what it seems to be, but indicates something else or serves as a substitute for, or symbol of, something else. At other times, the interpretation of the same object changes. Sometimes when one is asleep or half-asleep, it can arise as a picture in a dream. At other times, it appears as a memory of an object which is no longer there in a physical sense. Indeed, it is possible that something that used to exist, is now only felt in its effect; it “survives” in another object. But we also find examples where the image exists only in our imagination, where it manifests itself as a delusion or as a vision. An image can arise even in the absence of a real object.

In the aforementioned cases, the notion is only partly based on the object; it is to a greater degree a projection of the human mind. It is also possible that an imagined object gives rise to the same resonance as a real object, and that the notion arises without an object. Often it is impossible to identify the causes: for instance, is the trompe-d'oeuil based on real facts or on an illusion? A “window” painted onto a wall may deceive us, because the wall onto which the window was painted exists in reality. If we get close to the wall, it turns out that the sight causing the deception, the “window”, is in fact no more than a painting. But something painted is also real. It copies the real thing. Illusion and reality accompany each other. So what about the image projected onto the wall?

Or the electronic newspaper at Octogon Square in Budapest or the film advertisement or movie at Times Square in New York? All of them are concurrently real and illusory. There is a projection, and there is a surface on which the picture appears; it (a letter, an event) is real and visible, but you cannot touch and feel it. The image and the object can separate from each other. In a sense, illusory phenomena are real but mislead us because the projection, the means of manifestation, places in front of us an objectively non-existent world. An illusion is formed even if the same object is observed in changed circumstances. From a distance, a two-story house will look smaller if we see only one window – on the front of the house – that spans both floors. Today a fashionable solution is to place a picture on a metal curtain that is fixed to the façade of a building – especially in order to cover up the scaffolding during the construction of a building (often it is an advertisement or a copy of the building's future façade). We do not see the façade itself. Which is the real façade: the fake façade or the real one – or are both of them real?

The deception arises not only as a result of the camouflaging of the object; it also requires a delusion on the part of the sensory organs. They act together to create this illusion. What is the cause of the misinterpretation? In the above example, we judge based on the dimensions and proportions of the window – rather than the real height. The trompe-l'oeuil combines both the fake and the real. The causes of the effect – the real and hypothetical illusory elements – are not the same, but they give rise to the same effect in the mind of the apprehensive viewer – whether acting together or separately.

In any architectural phenomenon we find elements promoting both the illusory and the real. The surface develops on the basis of some kind of design. The façade itself is real. But we see on the surface shadow and shade, as well as areas bathed in the sun, transforming the picture of the object realized based on a plan. The picture changes based on the position and strength of the sun; and it is in relation to this that we see the building as different. Illusion is always an aspect of our image of the world. What then is the root of the misconception? The presumed data do not correspond to other information at our disposal – even within the spectacle, nor when the spectacle and our impressions mediated by other sensory organs are combined. Our minds reorganize each piece of information.

The building itself as an object does not always have the effect that we would expect based on its function. For instance, large-scale spaces originally served the coming together of large crowds, so that the people so assembled would feel a sense of solidarity from being together and could draw on the pleasure of being together. Instead, however, each large space – concert arena, church nave, meeting chamber, sports hall – provokes a different response from those who have assembled there – and the reaction differs from the anticipated response. A dome can be imposing, the interior of a cathedral can raise one's spirits, a skyscraper can intimidate, the Eiffel tower can make one feel like a dwarf. The various manifestations of architecture can provoke unexpected reactions. Similar things can be conceived in many different ways.

Any architectural object is meaningful to a degree, and it may mean something different from what allows us to see. Architecture often makes use of substitution and presents itself through signs. Great strength was attributed to the animals painted onto the walls of the caves at Lascaux. The cave-dwellers thought that they were animals with supernatural powers exceeding the powers of humans; and that they could summon their help by painting them onto the walls. Some experts claim, however, that the paintings were designed to conciliate these awesome powers. The cross is not just two straight lines crossing each another. It signified the nailing to the cross of slaves. But after the crucifixion of Jesus, it became the symbol of Christian religion. Nobody would associate the five-pointed star with the five continents, but a red star still symbolizes the Soviet Union while a white star signifies the U.S. army.

The tympanum was first associated with classical temples; it held the roof structure. Over time, it became a symbol. Indeed, as a symbol of power, it was placed on the façades of churches and then above bank entrances.

With the passing of time, people have started to use more and more signs in architecture. Letters are not just hieroglyphics; WC means something other than two letters. And rather than evoke ancient hunting, an arrow indicates the exit, a route of escape. The guard's house does not just tell us where the guard stands, but that it was placed there to protect some person of high rank, or a powerful institution. Belfry and bell towers signify churches while the ringing of bells tell us the time or calls us to mass – but not so that we can enjoy their sound. Modern western cities call to mind the streets of the Far East, with their billboards, neon lights, and signs. Each of them is telling us something. The signs on buildings have become the bearers of messages. Too great a burden has been placed on the façades. By means of adorned facades, a greater number of wreaths, and an abundance of ornaments, a building's owners want to show how rich they are. If the portal is more decorative, the entrance hall larger, and the whole building illustrious, then rental fees will be higher in consequence. Space composition, the use of materials, architectonics – all of these factors reveal the status of a building.

A grown up adult tries to substitute memories, of being born baby come into the world from the womb of its mother. In various ways, the adult tries to realize, by architectural means, the warmth, protection and security felt in the womb. As a small child it desires to be hugged and fall into the lap of the mother. At other times it will wrap itself up in a blanket or make a nook on its little cot. As an adult, if he lives in a mansion, then he will seek refuge in a baldachin bed, or, if he has less money than that, he might simply sit down in an enormous armchair. If he desires warmth, he will lean against the oven. He wants to satisfy – through architecture – the ancient demand, to find something that matches the old memory of being in the womb. He desires physical closeness, and molds his environment in accordance with his needs.

The fake picture and the erroneous belief may not merely relate to the visual impression, but could stem from any of sensory organs. Noises too may mislead us. The sound of a draught of air flowing through a building's long corridor may at first remind us of some noise we have heard in an outdoors fields.

The murmur of the ventilator may mislead us too. The buzzing and humming of a bluebottle fly is copied by the music of Mussorgsky. Neither the ventilator nor the music is a bumble-bee, but it may evoke the image of one. We hear the sound of switching on the central heating system as a loud hit of the hammer. At least for a certain length of time. The hum of the refrigerator, the buzz of the washing machine or dishwasher, may remind us of the sound of a drill, but we do not confuse the two sounds. In terms of their origins, various noises can be of similar effect.

The same causes can give rise to a different effect, and other notions can be linked with them. The noises coming from the flues resemble each other, but if people hear a whooshing noise coming from the fireplace, they often think of a ghost, perceiving this everyday sound as something mysterious. The flooring squeaks, a door slams shut, the window-glass cracks. What could be the cause? Apart from all the various things it could be, there will also be all the different things we imagine: a stranger in the house, burglars in the next room, a lover throwing stones against the window. An arbitrary association of ideas arises, allowing our imagination to run free. The fear within us, or in other cases the joy, alters the interpretations of the facts. All of this raises the possibility of deceptive conclusions. Misconceptions come from people's attempts to offer explanations and from their false interpretations. Misconceptions and delusions, such as the belief that a castle is haunted by ghosts – the whishing sound in the fireplace – has an effect on people in just the same way as do real physical phenomena such as being affronted by a monster. All of this is the result of our imaginations. Just as a small child imagines his larger box to be a house, or believes some bushes to be a forest, so we adults can easily fall wide of the mark. It is a known fact that if one returns to one's childhood playground after many years, it will seem smaller than how one remembers it. Indeed, revisiting such places can give rise to disappointment, because we are unable to recreate the atmosphere and the mood. The place will have changed, and we ourselves are no longer who we once were. Our memories mislead us.

Possibly, however, we may discover some new details in the revisited house, that “we never noticed” before. Having looked at the whole, we now pay attention to other aspects. As we look at Tokyo's buildings for a second time, they no longer seem as diverse as they did when we first saw them. The magic of novelty disappears. If, having looked at the first cumulus house by Gehry, we then seek out half a dozen others. We see increasingly more similarities rather than differences.

But there are an infinite number of types of delusion. In a storm, it may seem that the lightning has broken the façade of a building in two. We are the victims of illusion. In the fog, we may think our house has disappeared. In the dark, we do not know what is really there and what is merely the product of our imagination. We project our fears and anxieties onto our environment; the rustle becomes the shot of a canon, our own shadow transforms into a ghost. We suppose evil to be all around us. But when we are joyful, the opposite can happen; and the proud new homeowner perceives his house as a palace.

The sun radiates warmth, just as a building's heating system does. But we can be warmed by excitement, we may begin to perspire while watching a crime thriller; others may feel the cold running down their back. Experiencing such feelings, our judgment of the temperature outside will change. Faced with such tension in a film, some will shudder while others will be touched. And invoking memories can give rise to a similar effect. Memories may make some people's flesh creep, while others will experience feelings of relief. Excitement creates the same heat in us as do heating and refrigeration, architectural spatial shapes, surfaces, the quality of building materials, or the sun. Our ideas and notions change and react to architectural realities by becoming warped (for more on the role of memories, see the chapter on Associations).

There are some circumstances which promote the development of misconceptions and delusions. Natural factors such as a dense and dark forest, mist hanging over the water, fog descending onto a meadow, the rustling of leaves on a tree, a slow trickle of water, noises caused by the movement of a building, creaking, cracking, the sound or whistle of a draft, or even overpowering smells – all these elements help to give rise to delusions. On other occasions, however, our imaginations may simply be products of the mind. They may be caused by recreational drugs or may arise in a drunken stupor following the consumption of alcoholic drinks. But the reasons are not limited to the effects of stimulants. The figures we see in our dreams and nightmares are nurtured by our inner selves. There is no need for a building for someone to imagine himself in a palace or to have his head in the clouds. People always see different things and they see them differently from how they are in reality. The same room may be considered small and oppressive by some people but intimate by others.

When music is playing in a neighboring apartment and the windows are open and the walls badly insulated, those with sensitive ears will be disturbed while the hard of hearing will barely perceive the noise. Why should it not be possible for our minds to be thrown into excitement and to play with the creations of our imagination? What we perceive often has nothing to do with reality. It is not just writers and artists who live in the non-existent world. We can all live in the fantasies that we create. Does the sleepwalker know where he's going? Why does the pedestrian consumed in his own thoughts bump into other people on the street? The imagined "reality" has its own reality too. But it is a reality that differs from that of the daily real world. The things that we imagine, do exist – but in our minds.

In a similar manner to our memories, dreams also play a part in the development of our ideas and notions. The things that we dreamt last just as much a part of our perceptions as the things that we saw yesterday. How many times do we feel that the things that we have just seen, we have already seen at some time in the past. And we are uncertain whether we have really encountered these things or whether we have just imagined something similar – perhaps even in our dreams. Sitting at home, we think of a place where we have been in the past, and suddenly we find ourselves living in the past or in our perceptions of the past. But we do not see everything when reminiscing in this manner. We have selective memory. Occasionally we may even see something that was never there or that never happened. Memory, imagination, reality can become so mixed up in our minds that they are no longer distinguishable. To recollect one's dreams is to walk on familiar territory, but the various aspects of the dream will feature as they exist in our knowledge. The subconscious reorganizes memories in our dreams. We can remember all of these things in the same sharp manner that we recollect memories from the real world.

In every case, we tend to project our own inner feelings and imaginations onto objects. Since we are unable to distinguish reality, the effect evoked by the objects should be understood in terms of the imagined and the revived or even as a delusion. The mirror image, just like a reflection in water or a mirage, is not real, but just a kind of image of what is real. All of this has some kind of real core. We integrate our visions into the visible. Staring at the marble surface of a terrace, we begin to identify shapes and forms in it. If we keep staring hard, however, after a while these shapes will disappear. Then, however, we see new shapes and forms.

The mosaic and our imagination are playing games with us. On the other hand, hallucinations have no objective foundation. Hallucinations, visions, revelations, delusions can lead us to the same result as reality itself, or its imaginary replica. We perceive visions as reality. In regards to hallucinations, we think that we are hearing something and seeing some object, and yet there is nothing there to hear or see. Illusions arise when our senses are fooled. Even without the presence of external objects, pictures would still come into existence in our minds. Projecting the “spectacle” from inside, we imagine that these pictures do also exist in reality.

Italo Calvino’s *Invisible Cities* is a collection of dreams.⁷ Kublai Khan and Marco Polo are sitting in the same garden; they do not move as Marco Polo tells his stories of various cities. The story-teller speaks of imagined cities. After a while, however, Kublai realizes that all the stories are about the same city. The same person imagined them, and the same person projected his own ideas, thereby. According to the legend, Zobeide was built by the residents of various nationalities based on identical dreams. They imagined the same streets, in which, in their dreams, they pursue a naked woman without catching her. According to the legend, the residents of the city joined forces to build the city, but they stopped short at the place where the woman of their dreams disappeared. The center of the city remained unfinished. Their dream ward off reality. In the stories, Calvino replaced reality with imaginary cities.

VIRTUAL ARCHITECTURE

Virtual phenomena are not present in a tangible sense; they exist merely as images. The virtual world comes into being without real objects. A virtual phenomenon is not the likeness of an object, even when it refers to something real. One can create a virtual world that does not actually exist. It can be brought into an apparent existence by way of cybernetics, but not in contravention of the laws of physics and biology. A virtual phenomenon corresponds to its intended meaning only in its image. It is virtual because there is no physical object – just a picture. Film, television, computers – all of these create a virtual world. By looking at pictures of distant places and reading the news coming from such places, we can live in several worlds concurrently – both in the tangible world surrounding us and in a distant world (or worlds) that is/are present merely as a sight. Having dinner at home, we can watch people killing each other in Iraq, while listening to a concert of music by Bach broadcast from the Music Academy and following a discussion on the Internet about how people imagine life after death.

The genie jumps out of Aladdin’s wonderful lamp. A children’s fairytale. Today it is an everyday event. We can summon up, as if by magic, a world in which we would like to live. Everything depends on people’s insight. How many believers are there who imagine they have seen god and spoken to him or her? Believers in natural religions turn to spirits, drawing strength from them thanks to their faith. Fear and desire endow the imagined spirit with a magical power. For their part, the people receive a feeling of security and no longer fear life even on the open desert. Space and time is indivisible according to the ancient Japanese conception of MA.⁸ MA conceives of space as empty, and even a firm object embodies the void in which can enter the spirit (kami) of the ghost (ki). Space exists only in time, while time can only be comprehended together with the movement of space. People in Japan used to establish a holy place for the reception of kami. They bound together four poles stuck into the ground by rope, thereby marking out the square-shaped piece of land on Earth. In the middle they dug a column into the ground where the spirit could settle and reside. Mark-

ing out this piece of ground amounted to the initial phase of building a house. This holy place became the symbol of the spirit's place. Four poles, four ropes and a column proved sufficient for people to imagine the spirit in the square as well as the spirit's house. They did not see what was actually there, but what they imagined into the signs. From this symbol a house was born, and it was in line with this conception and this meaning that they later adjusted and perfected houses.⁹

Virtual reality wants to substitute for, or replace, palpable reality. Although in recent years great strides have been made in the field of virtual reality, we should not exaggerate its importance. We can create on our computers virtual houses; we can imagine the apartments of the future, or even plan the interior layout and decoration, but we cannot live in pictures. We can meet with our friends by way of the Internet, we can chat with them, and even visit them with a web cam. It is possible that in the future we will even be able to feel their smell by way of electronic mediation, or perhaps feel their bodies, but in order to make an electronic connection we need a roof over our heads, under which we can place our multifunctional television/computer devices. The virtual house can contribute to the existing house, but it cannot replace all the latter's various aspects. A variety of connections can be made virtually, but not all of them will be equivalent to the traditional ones. Virtual architecture can find its place among the old elements, but it cannot exist without them.

Although virtual reality can only come into being in some or other real space; the people of today can leave their usual surroundings and can become, with the help of cybernetics, residents of a world that happens to exist nowhere. The house of the guru of the American electronic network, Bill Gates, has internal partitions which are not walls in the traditional sense but enormous video screens which, when in their "neutral" state, simulate architectural surfaces, but when "activated" become electronic windows of the room. At the touch of a button, these window-walls can "look" anywhere; a projector can magically summon up something distant or non-existent onto the wall. It can convince its viewers of almost anything; indeed, the viewer may see anything and can be anywhere in his imagination. The screen wall offers the image of a non-existing reality or a digitally produced picture that does not exist anywhere. The simulated wall replaces reality, but it does so only until someone switches on the light or turns off the projector or removes the screen-partition.¹⁰

With the help of cybernetics we can partake in radically new experiences. Our horizons are extended, and with the help of transmission devices which eliminate material objects, we can enter virtual space. New dimensions open up before us. Having entered this virtual space, we can then move around it or even become participants in it. We can also activate the objects and creatures in this imaginary space, thereby mutually influencing one another. We can become participants rather than viewers. The virtual world resonates to our actions. Our lives may be expanded by the new imaginary and experienced space.

Some authors, however, refer to this as substitution rather than as supplementation. For Christine Boyer, cyberspace means the electronic space which, because it appears on the computer or television screen, enables one to replace urban space and the urban experience with an apparent space.¹¹ According to Boyer, when CyberCity appears on our screens, we are incapable of distinguishing between our experiences as manipulated by the media and our real experiences. Images replace direct experiences, because in a disintegrated city full of gaps and voids, we can no longer take reality as our point of departure. All of this may be true until we see it on screen. And then?

Some people claim that since most of our experiences in today's information society reach us via telecommunications, the information we receive directly from people in close proximity to us is called into question.¹² The apparent manipulation we see on our screens, the mixing together of real and virtual events, renders uncertain our judgment of reality. Virtual space only makes it possible for us to better understand natural laws. According to these critics, even our definition of reality is doubtful and disputable. The American architect and scholar Marcos Novak is not thinking simply of the manipulation of spaces when he writes of liquid architecture, his term for virtual space.¹³ For him, liquid architecture is the same as the dematerialized architecture full of thoughts and poetic motifs which is not satisfied with space, shapes, light, and all the other aspects of the real world. A characteristic feature of such architecture is the fluctuation between abstract elements. I suppose that this reductive world would not satisfy even itself. W. Mitchell writes in his book, of new conditions and circumstances that are contrary to the architecture we have known for thousands of years and which permit people to be present and active in distant or nowhere-existent places by means of electronically completed or remolded visual bodies.¹⁴

Architectural space and cyberspace are cumulative spaces; together they form an interwoven and complex hybrid. Mitchell emphasizes that cyberspace and digital information are promoting the disintegration of traditional types of building. The one known form disappears after the other. He writes not of a supplementation of the environment but of the dissolution of existing architectural norms and frameworks. But even if someone puts on a helmet with a headphone audio player, cellular telephone, and pager, and wraps himself in an electronic wireless body net so that he can only communicate with the outside world in a digital or electronic manner, he is still only partially and temporarily exiting the natural world and his own body. After a time the virtual trip comes to an end and we will eat, sleep, play, and make love.

Cybernetics may achieve the same effect as the real, palpable world. Its utility depends on its effectiveness. A monitor integrated into the technical panel of a vehicle can indicate the vehicle's position, as seen from above on an abstract map. If we state our destination – the city, street, and house number we wish to reach – then we are shown the direction to be followed on screen and are given aural instructions on when and where to turn off a road and the distance to be traveled along a particular stretch of road. Soon automobiles will be equipped with guiding devices that can tell us how many vehicles are ahead of us (and behind us), their distance from us – and all this information should help to eliminate accidents. As we proceed along the highway, such devices will see and register the physical world in place of us – and take the appropriate actions. It will feel instead of us our environment, where we are moving. The same technology could be used by blind pedestrians and people with physical disabilities in their wheelchairs. Indeed, thanks to such technology, even blind people will be able to drive safely around town. But who will press the button, who will decide upon the destination, and who will get in the car? It may seem as if people can be removed completely from life and that nature can be wound up. As recently as the post-war period, many people were still arguing that man would ultimately rule nature. Indeed, this misconception survived until the first earthquake and the first volcanic explosion. And one does not have to look far to see places where drought has decimated water resources and where the corn no longer grows.

All of these and other similar electronic devices play, in the final analysis, no more than an intervening role. With their help, reality and its altered likeness are mediated, by means of cybernetics and in a more complex manner, to our human senses. Having been broken into numbers, the tangible/palpable phenomena mediate to and exert an effect on people. Although it has been transposed, the sensation we feel can take its course in a manner similar to the original one. What is important is the extent to which cybernetic means can be used to evoke resonance in a person, and whether and how they, with the help of virtual means, can substitute for artificial impressions that are nevertheless based on (architectural) impressions. When we touch or embrace our lover, it is not only the physical interaction that increases our blood circulation; the spiritual experience we undergo is the additional factor. Touching achieves this result in many different ways. We are not only affected by the façade and interior of a house, but by the space surrounding us, the atmosphere, which – by means of shapes, materials, acoustics, touch, movement, and aromas – influences our mood and our thought resonances, doing so to the same extent as the presence of other people, their overpowering effect on us, and the radiating flow of from their bodies.

The virtual world can broaden our experiences and heighten our fantasies. Cybernetic means can help us to see in the dark and to imagine many things in our lives of which we previously had no knowledge. But we cannot and do not want to renounce the tangible pleasures of life. Such would be a vain undertaking, since we cannot exist without nature. Just as we can line up alongside the visible image the other effects felt by our senses, so by means of additional notions and impacts, the virtual world established by electronic devices can shape the place and role of people in the world. But it does so alongside these other impressions, supplementing rather than replacing them. In this regard, virtual aspects resemble those hitherto neglected non-visual impressions which offer completeness to the architecture world.

Créée en 1958, la revue du Carré Bleu questionne les rapports entre architecture et art contemporain. Depuis 2006, Le Carré Bleu est aussi une maison d’édition, proposant une collection d’ouvrages monographiques :

1.

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2.

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- 1 Kenneth Frampton: Studies in Tectonic Culture. The MIT Press, 1995
- 2 Jeremiah Bragstad: Pompidou Center, Renzo Piano & R. Rogers. Abbeville Press, 1983
- 3 Marc Vellay & Kenneth Frampton: Pierre Chareau. Rizzoli, 1984
- 4 Olivier Boissière: Jean Nouvel. Birkhauser, 1996
- 5 Hans Ibellings: Supermodernisme. Hazan, 2003
- 6 Enciclopedia of Modern Architecture. Abrams, 1964
- 7 Italo Calvino: Invisible Cities. Harcourt Brace Jovanovich, 1974, p.45.
- 8 MA, Space-Time in Japan. Cooper-Hewitt Museum, 1976
- 9 Günter Nitschke: ‘MA’ The Japanese Sense of ‘Place’. Architectural Design, 1966
- 10 Attila Batár: Városaink az ezredfordulón. [Our Cities at the Turn of the Century]. Európai füzetek, 2000
- 11 Christine Boyer: CyberCities. Princeton Architectural Press, 1996
- 12 Michael Benedikt: Cyberspace. The MIT Press, 1991
- 13 Marcos Novak: Transmitting Architecture. Ctheory, 1997

ATTILA BATÁR

Architect. He gained his degree at the Budapest University of Technology. He began his professional career in Budapest and continued work in France and the United States. From 1968 his designs were realized in these countries. His architectural activity ranges from designing single-storey family houses to high-rising buildings. He has been engaged in urban studies and is convinced that “all our sensory organs participate in how we perceive architecture”. This statement of his is supported by this book, which was first published in Hungarian in 2005.

“We tend to think of the visual effect as the most important impression telling us about our environment and the buildings around us. But an analysis of our observations reveals that this is not exactly the case. Instead, it is a combination of stimuli that forms the overall impression. One or more of these stimuli may be stronger than the others: for instance, our awareness of a sound or an image may be greater than our awareness of impressions caused by other stimuli, such as smell. Still, it will always be true that each of our senses plays a part in the process of perception. In my view, wind, smells, vapor, sounds and so on shape our experiences to a substantial degree. And they do so, even in the absence of visual recollections.”

A. B.



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