

# PARALLAX

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Those architects who base their theory of architecture on Sigfried Giedion's analysis of its modern developments (and this, I suspect, is tantamount to saying all architects under forty) will doubtless be so used to the idea that Space-Time is an essential element of contemporary architecture that they may consider it an impertinence to enquire whether, outside the realm of astronomy and nuclear physics, the term means anything at all. Giedion himself is curiously vague about the precise way this new space concept operates. Part VI of *Space, Time and Architecture* is called "Space-Time in Art, Architecture and Construction," and its first chapter is called "The New Space Conception, Space-Time." Yet in this first chapter, the hyphenated word does not occur at all, whilst in the remaining eighty pages of Part VI, it occurs only four times, namely with reference to the three famous buildings and one famous project in which its characteristics are apparently to be discerned.

Paul Rudolph believes that the concept of Space-Time has been the motivating force behind much of the International Style, and that in the hands of a great man, this concept can be immensely successful.<sup>1</sup> On the other hand, John Burchard and Albert Bush-Brown contend that even the serious efforts of Giedion have been unable to build believable connections between Gropius's *Werkbund* building at Cologne and the recondite Space-Time of Einstein.<sup>2</sup> It seems worth enquiring, therefore, what Space-Time really does signify in terms of architecture, and whether, if it means anything, the meaning could be more accurately expressed in simpler terms. This enquiry aims neither at philological hair-splitting nor at substituting one catchword for another. Its purpose is to give a clearer idea of what the fundamental aesthetic nature of contemporary architecture is, whereby it can be more accurately studied and its future possibilities more effectively explored.

One difficulty of analysing the implications of Space-Time in architecture is that it seems to mean different things to those who use it. In some passages it evidently means "related to Einstein's theory of relativity," whilst in other it seems to mean only "related to *avant-garde* paintings of the 1910's and 1920's." Sometimes it is used as a synonym for

"four-dimensional," sometimes as the equivalent of "non-Euclidian geometry," and on at least one occasion it is used to explain the architectural significance of Zen Buddhism. I propose to look briefly into each of these various meanings in an attempt to isolate those ideas which have some application to architectural design.

Firstly, we can, as Burchard and Bush-Brown rightly observe, dismiss as an illusion any idea that using the words "Space-Time" establishes a firm analogy with Relativity. Indeed, Giedion in one instance seems to dismiss this relationship himself as a "temporal coincidence."<sup>3</sup> However inspiring the announcement of Einstein's initial theory must have been to painters and writers when it was published in 1905, and however exhilarating his startling experimental proof of the final theory (published a decade later) must have been in 1919, the fact is that neither had anything to do with the kind of space that painters, sculptors and architects are involved with, but were a development of the algebraic techniques of analytical geometry, extended to solve problems in dynamics. Moreover, although Einstein's general theory of relativity (which is concerned with accelerated motion) involves non-Euclidian geometry, his "special" theory of relativity (which is concerned with uniform velocity) does not.

It is clear therefore that when Giedion talks about non-Euclidian geometry as if Euclidian geometry were limited to three dimensions,<sup>4</sup> and claims that "like the scientist, the artist has come to recognize that classic conceptions of space and volume are limited and one-sided,"<sup>5</sup> or that "the essence of space as it is conceived today is its many-sidedness,"<sup>6</sup> he is not talking about anything which would have been intelligible to Einstein; for Einstein never claimed that space was many-sided, or that "in order to grasp the true nature of space the observer must project himself through it." On the contrary, it was precisely because of the impossibility of measuring our absolute velocity through space that he engaged upon his famous research. His great feat was to demonstrate why it was that the true nature of space was not apparent to observers moving through it, and the truths he enunciated were more to the effect that problems of measurement involving mass and light are not so much a matter of geometry as a matter of history. "The past," wrote R. G. Collingwood



in his *Philosophy of History*, "consisting of particular events in space and time which are no longer happening, cannot be apprehended by mathematical thinking because mathematical thinking apprehends objects that have no special location in space and time, and it is just that lack of peculiar spatio-temporal location that makes them knowable."<sup>7</sup> Einstein's theory may, without unduly broadening the meaning of "history," be said to constitute the ultimate extension of historicism<sup>8</sup> to our interpretation of nature by relating it to astronomy and nuclear physics.

In such circumstances one would not expect to find any detailed explanation of the Space-Time qualities of modern architecture in Einstein's own writings, but he makes one remark in his introduction to Max Jammer's *Concepts of Space* which provides a useful clue as to his own ideas concerning the relationship between architecture and space. "Now as to the concept of space," he wrote, "it seems that this was preceded by the psychologically simpler concept of place. Place is first of all a small portion of the earth's surface identifiable by a name...a sort of order of material objects and nothing else."<sup>9</sup> Now this is precisely the kind of space involved in architectural design, as one might contend that a "place" (plaza, piazza) is the largest space that an architect is able to deal with as a unified work of art.

Closely related to the analogy with Einstein's theory of relativity is the notion that modern architecture is characterized by its use of a fourth dimension. "The fourth dimension," wrote Le Corbusier in *New World of Space*, "is the moment of limitless escape evoked by an exceptionally just consonance of the plastic means employed,"<sup>10</sup> and whatever this may mean exactly, it is obviously related to Giedion's notion that the "fourth dimension" enables us not merely, like the Cubists, to depict the world in a new way, but to *see* it in a new way. The four-century old habit of seeing the outer world in terms of three dimensions, Giedion tells us, rooted itself so deeply in the human mind that until quite recently no other form of perception could be imagined. "No wonder," he concludes, "that the modern way of seeing the world in terms of four dimensions should be so difficult to comprehend."<sup>11</sup>

Now "fourth-dimensional" in architecture presumably means time considered as a measure of displacement, and since buildings do not move (although Moholy-Nagy defined Space-Time architecture in terms of automobiles, trains and trailers),<sup>12</sup> the "fourth-dimensional" component must necessarily be contributed by the observer. Yet Giedion states not only that to appreciate a Space-Time structure in its entirety one must move through it and around it; he also states that one can appreciate both the inside and outside simultaneously by staying in the same place—a seemingly contradictory distinction which depends in fact on the extent to which the structure is sheathed in plates of glass.

According to Giedion, it is impossible to comprehend Le Corbusier's *Maison Savoye* by a view from a single point, since "quite literally," he says, "it is a construction in Space-Time. The body of the house has been hollowed out in every direction—from above and below, within and without—so that a cross-section at any point shows inner and outer space penetrating each other inextricably, in a way which Borromini had been on the verge of achieving in some of his late Baroque churches."<sup>13</sup> Le Corbusier gives much the same interpretation of it, although he does not use the expression Space-Time, and considers that his building exemplifies the exact opposite of Baroque principles (which, according to him, produced an architecture conceived on paper around a

fixed theoretical point). Moreover, far from considering his own principles exclusively modern, he derives them from Arab architecture. "Arab architecture gives us an invaluable lesson. It is appreciated *whilst walking*, and it is only thus, while moving around, that the observer sees the architectural dispositions develop."<sup>14</sup>

Giedion's other great Space-Time paradigm, the *Bauhaus*, is also, according to him, too complex to be summed up at one view, so that it is necessary here again to go around it on all sides, to see it from above as well as below. This means, he says, new dimensions for the artistic imagination; "an unprecedented many-sidedness." But for him, the specific Space-Time quality of the building is attributable to the fact that the extensive transparency permits interior and exterior to be seen simultaneously *en face* and *en profile* "like Picasso's *L'Arlésienne* of 1911-12."<sup>15</sup>

Perhaps, then, Giedion's views might be summarized by saying: modern architecture is characterized by the fact that the inside of a modern building can often be appreciated from single external viewpoints, and the external totality of a modern building can only be appreciated as a sequence of visual impressions. If this is so, it is the converse of what occurs when one looks at traditional buildings of similar purpose; for in a typical Renaissance villa comparable to the *Maison Savoye*, the totality of the outside of the building is intelligible from a single viewpoint (because of the axial symmetry), whereas the interior can only be appreciated as a sequence of visual impressions obtained by moving from room to room. But "fourth-dimensional" does not, for Giedion, simply refer to the movement of an observer. In an introductory passage, he makes clear that he regards it as evidence of the evolution of art. The Renaissance manner of seeing the world three-dimensionally, he tells us, was an important step forward, because the art of previous centuries had been two-dimensional. Thus our contemporary four-dimensional vision is in one sense revolutionary, but in another sense it is simply an inevitable advance in the evolutionary progress of civilization.<sup>16</sup>

Disregarding the question whether all the art of pre-Renaissance cultures really was in fact two-dimensional, whether even painting was then two-dimensional, and whether, for example, a mediaeval Italian painting depicting the same person participating in several sequential events on the same panel is to be called two dimensional, three dimensional or four-dimensional;<sup>17</sup> disregarding also the logical extension of Giedion's theory which would seem to imply that the next development of art is to become five-dimensional, then six-dimensional (as in the dynamic theory of gases) until eventually it becomes *n*-dimensional; it is surely enough to say that this evolutionary theory is only possible if one considers the *creation* of space to be indistinguishable from the *depiction* of space. That painters have found new ways of "conquering" space, first by mastering perspective and then by discovering techniques for producing the illusion of infinity, is a matter of common knowledge. But to suggest that architects before 1400 actually *created* only two-dimensional architecture, in the way that between 1500 and 1750 they were creating three-dimensional architecture, and that the Baroque heralded the creation of four-dimensional architecture, is to divest the words of any real tectonic meaning, and nobody except Moholy-Nagy has ever been rash enough to try to demonstrate the theory by reference to historical examples. He illustrates the theory by asking us to believe that Egyptian architecture was "one-dimensional" because their temples could be comprehended by walking



through the sphinx alley leading towards its façade; that Greek architecture was "two-dimensional" because the architects of the Acropolis designed a two-dimensional approach to "the temple;" and that the spectator inside a Gothic cathedral became the centre of co-ordinated space cells of all directions, whilst the Renaissance and the Baroque brought man into closer contact with the inside and the outside of its buildings. "In our age of airplanes," he concludes, "architecture is viewed not only frontally and from the sides, but also from above—vision in motion;"<sup>18</sup> i.e. Space-Time.

The interpretation of architecture in terms of space was initially a contribution of German philosophers, and it goes back at least to the beginning of the nineteenth century.<sup>19</sup> But the influential disseminators of this idea were the late nineteenth-century German art-historians, and it is significant that when Wölfflin (from whom Giedion derived his basic ideas about the primacy of space in art-historical analysis) discusses architectural space most eloquently, it is with reference to the *painting* of an architectural interior, rather than to an architectural interior itself. Altdorfer's early sixteenth-century painting of the birth of the Virgin, he tells us, characterizes well the fundamental difference between the German and Italian conceptions of space, since here "space is undefined and in motion," whereas with Brunelleschi all forms are defined and distinct. In Altdorfer's interior, he continues, the nave and aisles flow into one another, "and what is more, a rotating, whirling movement throws the entire space into a turmoil." The church's ground plan remains intentionally unclear, and the painting, he therefore concludes, compensates for the completeness of the diverse views offered to the spectator wandering on the spot "by transforming finite into infinite form."<sup>20</sup>

When Wölfflin discusses Baroque interiors, his descriptions are almost indistinguishable from Giedion's description of the Space-Time experience of the Maison Savoye. "We move round them," he writes, "because in the intersections new pictures constantly arise. The goal cannot lie in a final revelation of the intersected form—that is not even desired—but in the perception, from as many sides as possible, of the potentially existing views."<sup>21</sup>

Nevertheless, Giedion's interpretation of Baroque clearly differs from Wölfflin's in that Giedion sees Baroque only as the anticipation of Space-Time, and I suspect that the immediate source of Giedion's theory is to be found not in Wölfflin's lectures or Einstein's theory, but in an extremely influential and popular German book which appeared in 1918, when Giedion was a student in Munich, namely Spengler's *Decline of the West*. If specific evidence were required to demonstrate Spengler's influence on Giedion, it could be adduced by the term "Faustian," that most Spenglerian of expressions, which occurs in *Space, Time and Architecture* on page 525, with reference to the League of Nations competition. But for readers of Giedion, nothing could be more conclusive than the following quotation from *Decline of the West*:

*The temple of Poseidon at Paestum and the Minster at Ulm... differ precisely as the Euclidian geometry of bodily bounding-surfaces differs from the analytical geometry of the position of points in space referred to spatial axes. All Classical building begins from the outside, all Western from the inside... There is one and only one soul, the Faustian, that craves for a style which drives through walls into the limitless universe of space, and makes both the exterior and the interior of the building complementary images of one and the same world-feeling... The Faustian building has a visage, and not merely a façade.*<sup>22</sup>

"Faustian" might be an appropriate substitute for the increasingly unpopular word "International" as a stylistic iden-

tification of twentieth-century architecture, but regardless of "style," I would suggest that in fact the visual effects usually referred to as Space-Time, Fourth-Dimensional, and so on, are nothing more or less than modern developments of the exploitation of effects of parallax. The phenomenon of parallax (whereby an apparent displacement of objects occurs when the point of observation changes) is also, like Space-Time, a device for astronomical measurement, but unlike Space-Time it has always been an important element of architectural composition, and has been manifest in architecture ever since the first hypostyle hall was constructed. It occurs in every large space containing rows of free-standing columns, and must have produced particularly striking effects in the great mediaeval churches and halls when these were also subdivided by low screens, or spanned by deep hammer-beam roofs.

The aesthetic revolution which has occurred in architecture within the last century has consisted firstly in the reversal of the traditional method of exploiting parallax, and secondly in its extension by means of a greater use of cantilevers and glass. Reversal of the traditional method is best exemplified in Le Corbusier's work, and it is probably this which relates it so closely to Cubism; for, as Sir John Summerson has observed, "Just as Picasso's work is, as he has said, a sum of destructions, so, in a sense, is Le Corbusier's; for to him the obvious solution of a problem cannot possibly be the right solution...he sees the reverse logic of every situation."<sup>23</sup> Extension of the traditional method is best exemplified in the works of Gropius, and particularly of Mies van der Rohe, that greatest of all pioneers of modern parallax, whom Giedion, with regard to Space-Time, completely neglects. But all the leading architects of the century have exploited it to some extent, whether it be Frank Lloyd Wright's use of large balconies or free-standing mushroom columns, or even Perret's emphasis on isolating point supports. Its most striking development today is in the use of high towers which change their apparent relationship as one moves round the building, as introduced by Louis Kahn.

By the reversal of traditional methods of parallax, I mean the fact that until the present century, parallax effects were usually visible in large covered spaces because of the need for intermediate supports, whereas nowadays technology seems to have imposed a moral obligation to roof even the largest areas as uninterrupted volumes. Conversely, whereas formerly buildings containing a number of rooms produced no effects of parallax within their sequence of prismatic enclosures, all subdivided spaces now tend to be treated as if they were converted hypostyle halls. By the extension of parallax, I mean that modern structural systems have removed any compulsion to make structural space-articulators symmetrical, whilst recent developments in glass-making and in heating and ventilation have allowed the same tectonic elements to be visible in parallax both inside and out.

Giedion is clearly right in distinguishing between these new parallax phenomena and the *trompe-l'oeil* spatial effects of the Baroque, since it was precisely the lack of parallax displacement which hampered the illusion that Baroque pictorial effects were real. But he is wrong in implying that Baroque designers never did exploit parallax in a modern way, for it occurs in rococo interiors where large mirrors are placed symmetrically on opposite walls. According to Wölfflin, the beauty of a Rococo mirror hall differs from the beauty of a Renaissance interior (the ultimate effect of which lies, he says, in the geometric proportions) because one is intangible and the other tangible, and because one is imprecise



and the other clear.<sup>24</sup> But the main distinction is surely that in a rococo mirror hall, the architecture and the occupants are reflected to infinity by images which always remain in true perspective relative to each observer, no matter where they may move. Thus three-dimensional geometric proportions are extended further into space, whereas the aim of Baroque interior decorators was to destroy geometric proportions altogether by disrupting the volumes which unadorned architecture naturally creates.

It will be seen, then, that there was something very radical and important in the mid-eighteenth-century fondness for mirrored interiors, as there was also, by the same token, in their fondness for ruins (where interiors and exteriors also appear to be seen simultaneously). Both these features, often regarded as merely whimsical frivolities, were the aesthetic roots of modern architecture as it exists today. Indeed, some writers of the time seem even to have been dimly aware of the true significance of such effects, as when Robert Wood, describing the ruins of Palmyra in 1753, observed that "so great a number of Corinthian columns, mixed with so little wall or solid building, afforded a most romantic variety of prospect." The effect was undoubtedly exploited deliberately by Soufflot at Ste. Geneviève, for as Wolfgang Herrmann remarks, "While the visitor moves forward, the cluster of columns seems to move too, opening up constantly changing views"—an effect actually described by Soufflot's successor Brébion in a letter dated 1780.<sup>25</sup>

What is most strikingly novel about current attempts to exploit effects of parallax is that they are so often used without adequate regard for the needs of privacy, and that they are so often described in unnecessarily pompous terms. Phrases such as "continuity of space," "mobility of space," "expansion of space" and "over-lapping and tied-together space-volumes" are no doubt harmless justifications for an exceptionally lavish use of glass, yet when one of the great Rococo exponents described the new idea in 1737, he wrote simply that "the mirrors make a mutual reflection between each other, thus prolonging the view and producing a very pleasant effect."<sup>26</sup> It is difficult to see why anyone need say more than that.

Giedion's terminology will probably persist, whatever interpretation we give it, because of the modern credulous appetite for pseudo-scientific mumbo-jumbo; and the fact that it was used recently to explain traditional Japanese archi-

ture and its relation to Zen Buddhism will occasion no surprise.<sup>27</sup> It is even to be found outside architectural writings, as for example in a recent periodical where, in an article entitled "A Study of Free-Time Activities of 200 Aged Persons," their Space-Time activities are carefully described.<sup>28</sup> Yet here, on close examination, it is apparent that "space-time activities" was simply a misprint for "spare-time activities," and one may perhaps be excused for wondering whether a similar typographical transposition has not occurred in one or two recent books on modern art.

#### NOTES:

1. *Canadian Architect*, March, 1959, p.65. The most recent thorough exposition of the relationship between Space-Time and the International Style occurs in William H. Jordy's article on the PSFS Building in the *Journal of the Society of Architectural Historians*, vol. xxi, No. 2, p. 75: "To ensure their dynamic, space-time equilibrium, Howe & Lescaze utilized the full range of space-time architectural devices. There is the extravagant transparency of sheets of glass extending the here beyond. There are open forms, like the cantilevers and the abrupt termination of the projecting columns short of the parapet at rooftop, there are continuities where one might expect breaks, like the windows bent and folded around corners. There are interpenetrations and interlockings. There are violent juxtapositions wrenching the eye from one shape to another. Finally, there is the intrinsic lack of interest and articulation of the unembellished parts which encourage the eye to abandon the part for the ensemble."
2. J. Burchard and A. Bush-Brown, *The Architecture of America*, pp. 317, 429.
3. S. Giedion, *Space, Time and Architecture* (1956 ed.), p. 432.
4. *Ibid.*, p.431.
5. *Ibid.*
6. *Ibid.*, p. 432.
7. *Op. cit.* (1956 ed.), p. 5.
8. Cf. previous article in AR, August, 1960, p. 101.
9. *Op. cit.*, p. xiii.
10. *Op. cit.*, p. 8.
11. S. Giedion, *Ibid.*, p. 431.
12. L. Moholy-Nagy, *Vision in motion*, p. 256.
13. S. Giedion, *Ibid.*, pp. 518-9.
14. Le Corbusier, *Oeuvre complète de 1929-1934*, p. 24.
15. S. Giedion, *Ibid.*, p. 489.
16. *Ibid.*, p. 431.
17. Cf. P. A. Michelis, in *Journal of Aesthetics and Art Criticism*, viii, pp. 71-86.
18. L. Moholy-Nagy, *Ibid.*, p. 244.
19. Cf. Hegel's *Philosophy of art* (1920 ed.), pp.91-7.
20. H. Wölfflin, *The Sense of Form in Art* (1958 ed.), p. 67.
21. H. Wölfflin, *Principles of Art History* (Dover ed., n.d.), p. 223.
22. O. Spengler, *Decline of the West* (1926 ed.), p.224.
23. J. Summerson, *Heavenly Mansions*, p. 189.
24. H. Wölfflin, *Ibid.*, p. 223.
25. W. Herrmann, *Laugier*, p. 121 and footnote 72.
26. J. F. Blondel, *Décoration des Maisons de Plaisance*, i, p. 27.
27. N. H. Carver, *Form and Space of Japanese Architecture*, p. 130.
28. *Sociology and Social Research*, xiv, p. 157.

