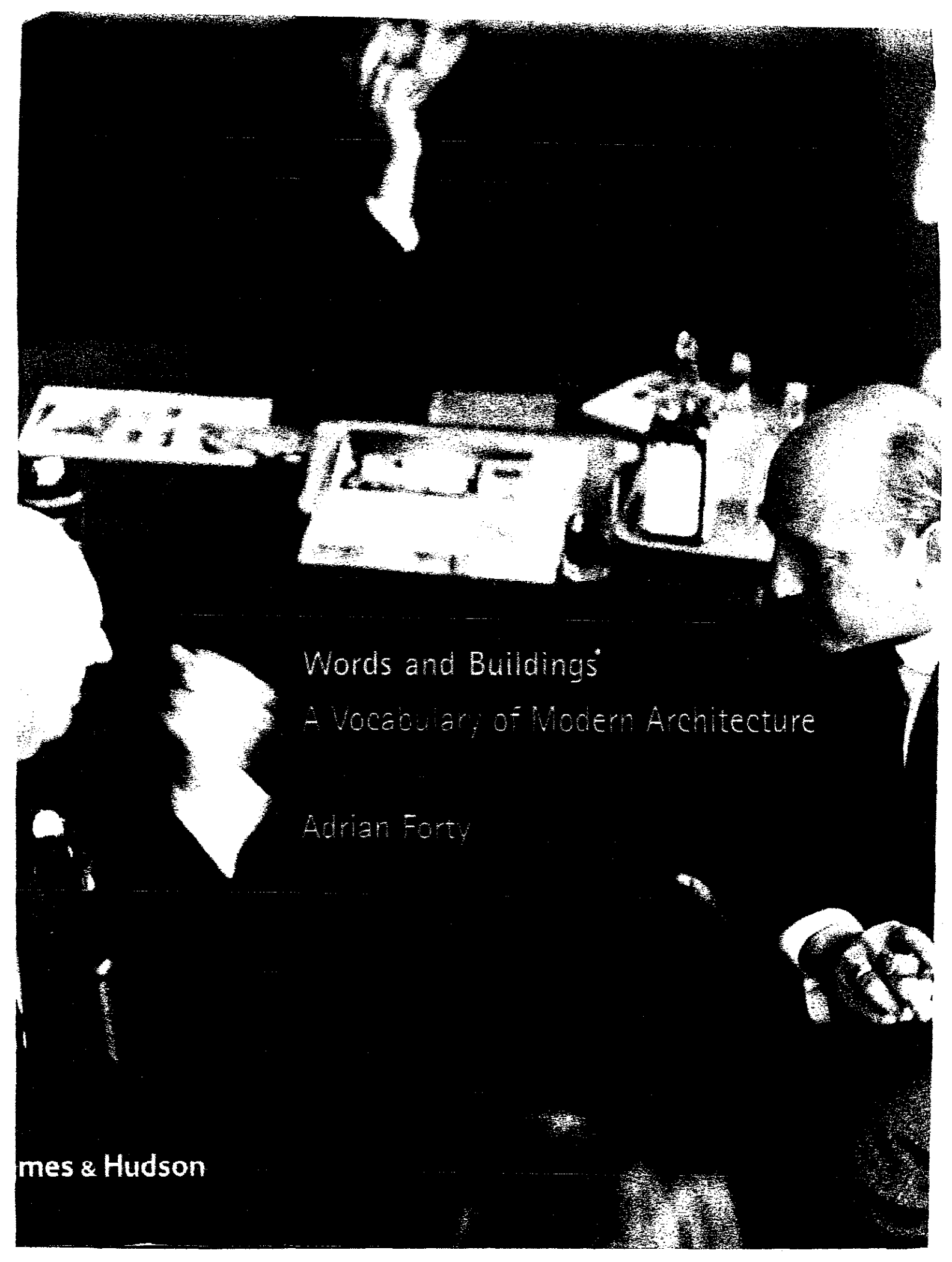

Words and Buildings

A Vocabulary of Modern Architecture

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Structure

In fact, all architecture proceeds from structure, and the first condition at which it should aim is to make the outward form accord with that structure. E.-E. Viollet-le-Duc, *Lectures*, vol. 2, 1872, 3

In the English language you call everything structure. In Europe we don't. We call a shack a shack and not a structure. By structure we have a philosophical idea. The structure is the whole, from top to bottom, to the last detail – with the same ideas. That is what we call structure. Mies van der Rohe, quoted in Carter, 1961, 97

One cannot speak about structures in terms of forms, and vice versa. Roland Barthes, 'Myth Today', 1956, 76

The architect is not meant to question structure. The structure *must* stand firm. After all, what would happen to insurance premiums (and to reputations) if the building collapsed? Bernard Tschumi, 'Six Concepts', 1991, 249

'Structure' in relation to architecture has had three uses:

1. Any building, in its entirety. For example, Sir William Chambers, 1790: 'Civil architecture is that branch of the builder's art which has for its object all structures, either sacred or profane ...' (83); or Sir John Soane, 1815: 'Inigo Jones, Sir Christopher Wren, and Kent have been justly blamed, their taste arraigned, their judgment doubted, because they sometimes blended Roman and Gothic architecture in the same structure' (600). Until well after the middle of the nineteenth century, in the English language, this was the only recognized architectural sense of 'structure'.

2. The system of support of a building, distinguished from its other elements, such as its decoration, cladding, or services. This is the sense implied by Viollet-le-Duc, in the quotation above. It entered general currency in the second half of the nineteenth century.

3. A schema through which a drawn project, building, group of buildings, or entire city or region become intelligible. The schema may be identified through any one of a variety of elements: the most usual are the arrangement of tectonic parts; the masses – or their negative, volumes or 'spaces'; systems of interconnection or of communication. None of these are themselves a 'structure', only signs that give cause for the perception of 'structure'. The main feature of the twentieth century has been the increase in the number of elements perceived as bearing 'structure'.

The first meaning is straightforward, and little more need be said about it. The other two are where all the complications lie. The second and third meanings cannot be dissociated, for 2. is really no more than a particular case of 3., even though in practice they are often spoken about as if they were distinct. The confusion between 2. and 3., inherent to the modernist use of 'structure', is compounded further (particularly in English, where it is stronger than in other languages) by the existence of 1., giving rise to the impression that a structure is a *thing*, and moreover a thing over which architects have a peculiar claim to expertise. The resulting muddle is only too apparent in a sentence like the following, by the architect Nicholas Hare, writing in 1993 about the work of Peter Foggo for Arup Associates at Broadgate: 'on both the exterior and interior the parts are articulated with the greatest precision, yet ordered into a coherent whole through a hierarchical logic of structure and construction'. It is impossible to tell whether 'structure' here means the physical supports of the building, or a different, invisible schema manifested through some other element.

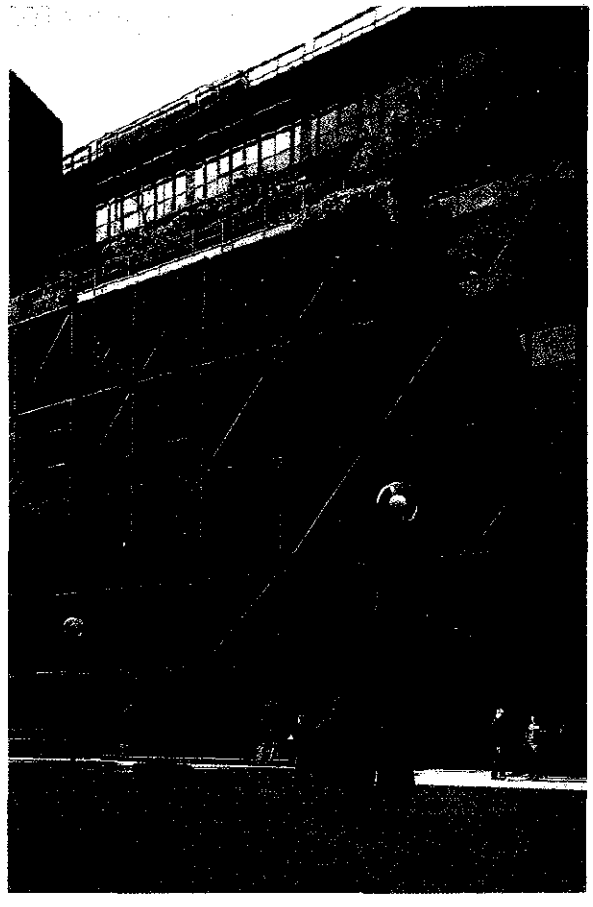
The key to untangling the muddle is to recognize

that 'structure' is a *metaphor*, which, while it may have started in building, only returned to architecture after much foreign travel. Furthermore, 'structure' is not one, but *two* metaphors, each borrowed from a different field: first from natural history, which gave it its nineteenth-century meaning; and second, from linguistics, which provided its twentieth-century meanings. Whereas in other fields – ethnography for example – when the new linguistic sense of structure was introduced, there was a vigorous campaign to cleanse the older biological metaphor from the discipline, in architecture this never happened; what has been remarkable in architecture has been the prolonged coexistence within a single word of two essentially hostile metaphors. No doubt this has much to do with the original, first sense of 'structure', which has permitted architects to claim a privilege in matters of 'structure'. Were the third, linguistic sense of 'structure' to be upheld to the exclusion of the others, this right would vanish, for an architect could no more claim to 'make' structure than might an individual by speaking a language.

Structure as that distinct element of the whole concerned with its means of support

This sense is principally associated with the French mid-nineteenth century architect and theorist Viollet-le-Duc, who, while he did not invent it, certainly popularized it, and through the wide readership that his works enjoyed not only in France, but also in translation in Britain and the United States, is responsible for its present familiarity. Viollet's view that structure was the basis of all architecture he expressed repeatedly, and was his justification for the superiority of Gothic architecture. Characteristic of his point of view is the following:

> it is impossible to separate the form of the architecture of the thirteenth century from its structure [*structure*]; every member of this architecture is the result of a necessity of that structure, as in the vegetable and animal kingdom there is not a form or a process that is not produced by the necessity of the organism ... I cannot give you the rules by which the form is governed, inasmuch as it is of the very nature of that form to adapt itself to all the requirements of the structure; give me a structure, and I will find you the forms that naturally result from it, but if you change that structure, I must change the forms. (*Lectures*, vol. 1, 283–84)

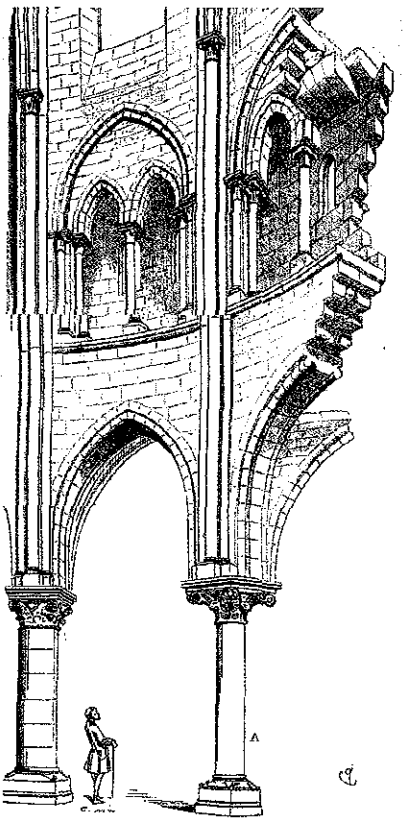


No. 1, Finsbury Avenue, Broadgate, City of London, Arup Associates, 1982–84. 'A hierarchical logic of structure and construction'. But can 'structure' be visible?

The analytical drawings with which Viollet illustrated his writings to show the 'structure' of ancient buildings make it clear how far 'structure' was an abstraction: under the eyes of onlookers, substantial masses of masonry dissolve into nothing, leaving only a pure system of thrusts and restraints, invisible in life. Viollet's conception of 'structure' was quite rapidly taken up in the United States, and made use of by the Vienna-educated architect and theorist Leopold Eidlitz, and his friend the influential critic Montgomery Schuyler, best known for his reviews of Adler and Sullivan's office buildings. Eidlitz, in his book *The Nature and Function of Art* (1881), took from Viollet the notion that 'structure' was basic to architecture, but employed it within a framework of German philosophical idealism. Instead of perceiving the perfection of 'structure' as the subject of architecture, Eidlitz saw 'structure' as the means by which the underlying Idea was represented; as he put it, 'It is the problem of the architect to depict the emotions of the structure he deals with; to depict as it were, the soul of that structure' (287). Much of what Eidlitz was concerned with was the relationship between Idea and 'structure'. Montgomery Schuyler, preoccupied with the search for a 'modern' architecture, had a conception of 'structure' rather closer to Viollet's; and we also see plainly in what Schuyler writes the blurring of tectonic abstraction with physical component that is so characteristic of the English use of the word: for example, in his 1894 essay 'Modern Architecture',

> The real structure of these towering buildings, the 'Chicago construction', is a structure of steel and baked clay, and when we look for an architectural expression of it, or an attempt at an architectural expression of it, we look in vain. No matter what the merits or demerits may be of the architectural envelope of masonry, it is still an envelope, and not the thing itself, which is nowhere, inside or out, permitted to appear. The structure cannot be expressed in terms of historical architecture, and for that reason the attempt to express it has been foregone. (113–14)

Like Viollet, Schuyler conceived 'structure' in terms of biology: 'In art as in nature an organism is an assemblage of interdependent parts of which the structure is determined by the function and of which the form is an expression of the structure' (115), and he proceeded to quote from the biologist Cuvier. Viollet's best-known English disciple was W. R. Lethaby, who characterized the



Sanctuary, Saint-Leu d'Esserent (Oise). In Viollet-le-Duc's analytical drawings, substantial masses of masonry dissolve to the point of instability before the spectator's eyes, so as to reveal the 'structure'.

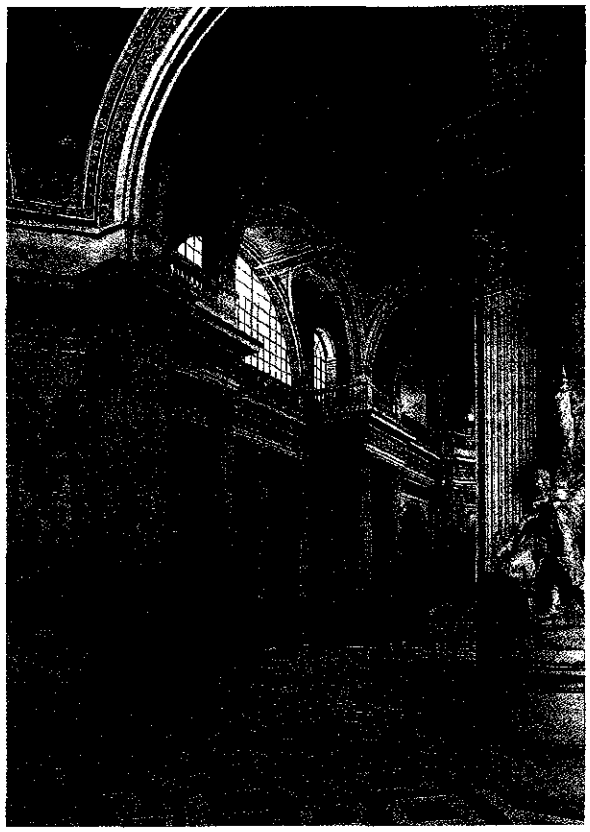
history of architecture as 'the delight in experimental structure' (70). In France, Viollet's influence was extensive: of the proto-modernists who absorbed his ideas, Auguste Perret is perhaps the best-known – and in describing his approach, Perret habitually used the category 'structure' as he had learnt it from Viollet. For example, 'The great buildings of our day permit the use of a body-structure, a framework in steel or in reinforced concrete, which is to the building what the skeleton is to the animal'.

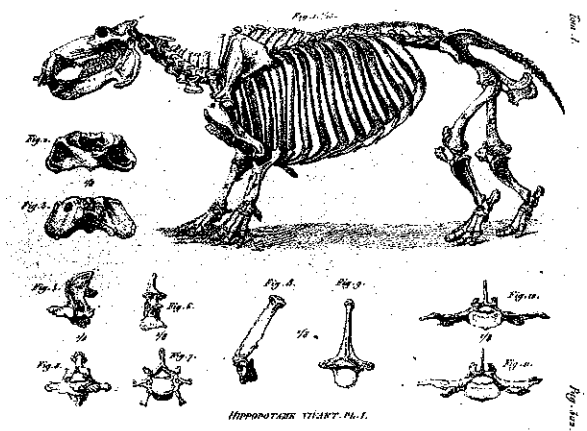
The distinction between the 'structure' and the outward appearance of the work of architecture, the essential issue with which all these post-Viollet architects and writers were concerned, is not as natural as it might now seem. Accustomed as we are to the professional separation of structural engineers from architects, it is easy for us to talk of the 'structure', the system of

support, as a property apart from the rest of the building. While it was Viollet who introduced this way of thinking into general currency, and who popularized 'structure' as the name for this abstraction, he was only able to do so because of developments within French architecture and engineering in the latter part of the eighteenth century. As Antoine Picon has shown, a capacity to describe and analyse the system of support independently of the conventions of building, and of assumed notions of 'stability' – in other words to think about the system of support independently of any actual building – was an achievement of the late eighteenth-century French engineers.[1] While there exist earlier precedents for this approach, in the work of Sir Christopher Wren, and of Claude Perrault, it only developed as an effective way of perceiving architectural issues in the debates around the the work of the architects Soufflot, Patte, and of the engineer Peronnet in the late eighteenth century. Within these debates, there was a marked hesitancy to depart from the accepted conventions of what *looked* stable, and only Soufflot and particularly Perronet were prepared to take this risk. What is significant is the way in which Perronet presented his arguments: in a letter of 1770 supporting Soufflot's slender piers at Sainte Geneviève, Perronet praised the qualities of Gothic buildings:

> The magic of these latter buildings consists largely in the fact that they were built, in some degree, to imitate the structure [*structure*] of animals; the high, delicate columns, the tracery with transverse ribs, diagonal ribs and tiercerons, could be compared to the bones, and the small stones and voussoirs, only four to five inches thick, to the flesh of these animals. These buildings could take on a life of their own, like a skeleton, or the hulls of ships, which seem to be constructed on similar models. (Picon, 1988, 159–60)

While this sounds like the well known passage where Alberti compared the construction of buildings to the skin and bones of animals (Book III, chapter 12), the underlying purpose was entirely different.[2] Whereas Alberti was concerned with the connectedness of the parts of the construction, Perronet was more concerned with their lightness, relative to conventional norms of building. Two things in particular about Perronet's remark are worth noting in the present context. The first is that it was natural history, not the simple, load-bearing systems of building construction, that provided Perronet with his model for 'structure'. And as we have seen from the previous quotations, a great many architects who





(top) Interior, Sainte Geneviève (Panthéon), Paris, J.-G. Soufflot, begun 1757. The slenderness of Soufflot's columns gave rise to concerns about their stability, and led to comparisons with the 'structure' of animals.
(bottom) Skeleton of Hippopotamus, from Cuvier, *Ossemens Fossiles*, 1821, vol. 1. The hippopotamus's great weight was borne on the tiniest bones.

subsequently adopted the 'structural' thesis went out of their way to draw attention to the fact that it was a biological, not a building metaphor.[3] It would appear, then, that 'structure' as term for the support system in architecture was originally a metaphor drawn from biology, and not from building – even if the biological usage may itself have been borrowed from building.

This brings us to the second point raised by Perronet's quotation, one that explains why he, and others, were so keen on the biological sense of 'structure'. According to Antoine Picon, what Perronet wanted was a theory of construction – or 'structure' – distinct from the practice of construction, or building. *Construction*, a term long familiar to architects, comprised the whole generic practice of building, combining not just principles, but also conventions, and labour practices; thus, in mid-eighteenth-century France, Blondel divided architecture into 'distribution', 'decoration' and 'construction', a division which roughly corresponded to the Vitruvian triad of commodity, firmness and delight. But for Perronet and subsequent rationalists, the categorization of everything to do with stability under the heading of 'construction' was not satisfactory, because 'construction' was encumbered with all the know-how, and prejudices, of building; for 'construction' as J. N. L. Durand put it at the beginning of the nineteenth century 'expresses the meeting of the different mechanical arts employed in architecture, such as masonry, carpentry, joinery, ironwork etc.' (vol. 1, 31). The significance of 'structure' was that it allowed them to think about the system of support without the interference of two thousand years' worth of accumulated customary wisdom derived from the knowledge of existing objects. Although implied by Perronet in the 1770s as a means to think about architecture free from traditions of the various mechanical arts, he did not in fact use the term 'structure' relative to building – later in the same letter to Soufflot, he retained the term 'construction' – 'In imitating nature in our constructions [*constructions*], we could make very durable works with a lot less material'. When exactly 'structure' started to be used to describe the abstraction of the system of support is not clear: Rondelet's *Traité Théorique et Pratique de l'Art de Bâtir* (1802–17), for example, did not use the word, and called the subject we would now recognize as 'structure' '*théorie des constructions*'. One of the first people to make use of the modern concept of 'structure' was an English author, Robert Willis, whose analysis of Gothic architecture was clearly influenced by French rationalist ideas – but he still hardly used the word itself. Writing in 1835, he used the phrase 'Mechanical Construction' to signify what would later be called 'structure'. Willis explained his category as follows:

> there are two things to be observed in the construction of a building; how the weights are really supported, and how they seem to be supported. The first I shall call the *Mechanical*, or actual construction, and the second the *Decorative*, or apparent construction, and it is necessary to make a strong distinction between them. (15)

Willis did occasionally use the term 'structure' instead of 'construction', but always qualified it with the adjective 'mechanical' when he meant by it the 'real' system of support: evidently Willis did not expect his readers to understand 'structure' on its own in the modern sense. Pugin, whose famous formulation at the beginning of *The True Principles of Christian Architecture* (see p. 298) was likewise derived from French and Italian rationalism, used the word 'construction', not 'structure', which would, on its own, have been meaningless in Britain in 1841 in the sense he intended. Even into the 1870s, English authors continued to use the phrase 'mechanical structure' when they wanted to signify the system of support independent of material substance. There is no doubt that it was Viollet-le-Duc both in France, and in English translation, who was responsible for popularizing 'structure' as a free-standing metaphor.

Once it became possible, and later customary, to conceive the mechanical system of the structure apart from the material facts of construction, most controversy about 'structure' became concerned with how far it should, or should not be visible in the resulting work. This has been a familiar modernist debate: consider for example Mies van der Rohe's 1922 article 'Skyscrapers', which presented the issue in terms that Viollet-le-Duc (and even more Leopold Eidlitz) would have approved:

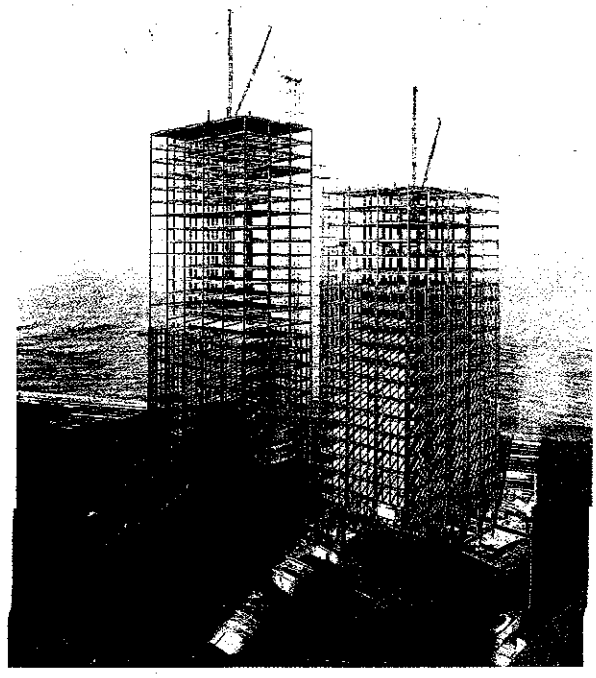
> Only skyscrapers under construction reveal the bold constructive thoughts, and then the impression of the high-reaching steel skeletons is overpowering. With the raising of the walls, this impression is completely destroyed; the constructive thought, the necessary basis for artistic form-giving, is annihilated and frequently smothered by a meaningless and trivial jumble of forms. (Neumeyer, 240)

While Mies clearly conceived of the structure as idea, 'the bold constructive thoughts', which he saw as quite

distinct from their actual physical manifestation in the building, this distinction, particularly in English, is always collapsing, however often it is reconstituted: what Willis and others had been so keen to establish, that 'structure' was an abstraction, a relationship between parts, not visible in reality, always ends up regarded by modern architects as a physical object, a thing. Mies's remark about huts and structures, quoted at the beginning of the entry, draws attention to this paradox.

The primacy of mechanical, or tectonic 'structure' put forward by Viollet-le-Duc, and subscribed to by Mies van der Rohe and a great many other modernist architects, was by no means universally accepted. In the nineteenth century, the entirely different theory of architecture of Viollet's German contemporary, Gottfried Semper, attached minimal importance to structure, and treated it as entirely secondary to the primary purpose of creating enclosed space. Thus in *Der Stil* he wrote, 'The structure that served to support, to secure, to carry this spatial enclosure was a requirement that had nothing directly to do with *space* and the *division of space*. It was foreign to primitive architectural thinking and was in the *beginning not a form-determining element*' *(vol. 1 §60,* 1989, 254). Semper's Viennese disciple Adolf Loos showed a similar indifference to structure: 'The architect's general task is to provide a warm and liveable space', to which carpets and tapestries contribute. 'Both the carpet on the floor and the tapestry on the wall require a structural frame to hold them in the correct place. To invent this frame is the architect's second task' (1898, 66). More recently, the relegation of tectonic structure to an obviously subordinate place has been the most literal sense of architectural 'Deconstruction'. For example, the Viennese partnership Coop Himmelblau (whose approach has an uncanny similarity to that of their compatriot, Adolf Loos) declares that 'In the initial stages structural planning is never an immediate priority, but it does become very important when the project is being realized' (Noever, 23). It is ironic that the work of Coop Himmelblau (see ill. p. 282), and of other deconstructive architects, often turns out to demand far more structural ingenuity than works developed with a 'rational' approach to structure. As Robin Evans remarks, 'What follows from the architect's emancipation from structure is the architect's release from it, not the building's' (1996, 92).

None of this grapples with the more fundamental problem of why a separate category called 'structure' should be there at all. For, as we have seen, 'structure', far from being a divinely ordained category, is an abstraction,



860–880 Lakeshore Drive, Chicago, under construction, Mies van der Rohe, 1950. 'Only skyscrapers under construction reveal the bold constructive thoughts...'

invented in the late eighteenth century out of a metaphor from natural history, so as to free architects from the normalizing constraints of the word 'construction', the everyday practice of building. The remarkable feature of this term is that what began as an abstraction, whose very significance lay in its invisibility, has been turned in modern parlance into a *thing*.

'Structure' in fields other than architecture

At the same time as 'structure' became part of the architectural vocabulary, it was also undergoing development in other fields. It is worth considering briefly what it was about the notion of 'structure' within natural history that offered such a potent image both for architects and others.

The main work of eighteenth-century natural history was in the classification of species. The initial method, established by Linnaeus, was to classify a specimen through the visual evidence of its parts, each assessed according to four values: number, form, proportion and situation. These four values comprised the *structure*: 'By

the structure of a plant's parts we mean the composition and arrangement of the pieces that make up its body' (Tournefort, 1719; quoted in Foucault, 1970, 134). Michel Foucault has argued that what this method entirely failed to do was to distinguish the property of *life* in the plants or animals so classified; indeed, as described by these natural historians, they might as well not have been living things at all.[4] It was the attempt to overcome this fault, and to describe the quality of life in plants and animals, that distinguished the work of the later eighteenth-century naturalists, Lamarck, Vicq d'Azyr and Cuvier; the parts, previously classified on visual evidence alone, were now classified within a hierarchy of their relative importance to the organism as a whole, a scheme which necessarily involved defining them according to their functions. Within this method, 'structure' now became the feature that conveyed the relative functions of the parts, and it ceased to be a property based upon visible criteria alone. The result, as Foucault puts it, was that 'To classify ... will mean ... to relate the visible to the invisible, to its deeper cause, as it were' (229). 'Structure' is what makes possible this relationship of the visible to the invisible, and it becomes the way to define 'life', the organic property of living things.

In its appeal to Perronet and the engineers, and later to Viollet-le-Duc, the significance of the naturalists' notion of 'structure' was first of all that it allowed them to conceive buildings as hierarchically arranged relationships of functional parts, and to disregard the evidence their appearance presented to the eye; and secondly, that it allowed them to think of buildings as like living things, whose forms were not fixed according to some predetermined ideal, but might vary according to the relative functions of the parts. The attraction of this notion of 'structure', as the property of life in organic things, is obvious to anyone who, like the late-eighteenth-century architects and engineers, wanted to question the formulae prescribed by the conventions of the classical tradition. It was from the naturalists that architects, by an analogy, developed their notion of 'structure' as a relationship of the mechanical functions of parts, a relationship that is perceived independently of the visual evidence of the building.

The other main field where 'structure' was to be important (apart from linguistics, which will be discussed in the next section) was sociology. Here again, it was the naturalists' notion of 'structure' that provided the model for the study of sociology. The key figure in this development was Herbert Spencer, for whom the study of

Funder-Werk 3, St Veit/Glan, Austria, Coop Himmelblau, 1988–89. The architect's emancipation from 'structure' is not necessarily the building's.

society was not distinct from the study of natural history: as he put it, 'just as Biology discovers certain general traits of development, structure and function, holding throughout all organisms ... so Sociology has to recognize truths of social development, structure, and function' (1873, 59). 'Structures' for Spencer were the functional units of society, and he distinguished between those that were 'operative' (i.e. productive), and those that were 'regulative', institutions like the church, the law, the army. As societies grew in size, and became more complex, so too did their structures: 'It is also a characteristic of social bodies, as of living bodies, that while they increase in size they increase in structure' (1876, §215, 467). The 'structure' was always the outcome of a particular function: 'distinct duties entail distinct structures' (§254, 558); and 'Changes of structures cannot occur without changes of functions' (§234, 504). In Spencer's theory of 'structures' we see what we have already seen in the biological, and the architectural theory, the notion of a direct and determinate relation between 'function' of the organ or building component, and the structure. Spencer's mechanistic notion of 'structure' is worth drawing attention to if only because it underlines the extent to which the concept of 'structure' developing out of biology was linked to 'function'; however, as he was very widely read in the late nineteenth century (both Louis Sullivan and Frank Lloyd Wright mention him), if one is looking for metaphors for 'structure' outside architecture, Spencer may be as influential as the earlier biologists in giving 'structure' its modern significance. Spencer's theory of

society also happens to be the underlying object of attack in the notion of structure to be discussed next.

'Structure' as the means by which things become intelligible

Whereas previously biology had provided the model for 'structure', in the early twentieth century its place was to be taken by linguistics, which henceforth provided 'the true science of structure' (Barthes, 1963, 213). Saussure's proposition, that 'Language is a system of interdependent terms in which the value of each term results solely from the simultaneous presence of the others' (114) suggested that the study of language could be approached by asking not *what* words meant, only *how* they carried meaning. What made language intelligible was not meanings attached to particular words, but the system within which they were used. The 'structure' of language ceased to be a matter of a functional relationship between words and what they signified, but became the study of the system of differences within language. This uncoupling of 'structure' from 'function' has been fundamental to the remarkable development of linguistics in the twentieth century, a field distinguished by the creativeness of its practitioners in the invention of alternative models for the structure of language. Of all the other disciplines where there has been developed the understanding of 'structure' as an intellectual schema through which things are made intelligible, none has attracted more notice than structural anthropology. Whereas traditionally anthropologists and sociologists had, like Herbert Spencer, approached the study of societies by asking what their institutions and practices were *for*, what function they served in the organization of society, structural anthropology ignored this, for it led to a purely empirical, anecdotal description of societies. Instead, structural anthropology treated all products of social activity as inherently transferable, and interchangeable; it is the system within which these products, be they rituals, institutions, or artefacts, are transferred and substituted that reveals the structure, indeed the 'life' of the society, rather than any particular meanings or functions that might be attached to them. 'Structure', considered in these terms, ceases to be a property of objects, though it may be perceived through them.

The most promising material for the application of the linguistic sense of 'structure' lay not in architecture, but in space. While interior space has routinely been discussed in terms of a biological/mechanical metaphor of structure – for example, Rowe and Slutsky's remarks about 'the spatial structure' of Le Corbusier's Villa Stein at Garches (1963, 168–69) – the linguistic sense of structure offered the possibility of a wholly different order of analysis. Space, like language, is not a substance, and, when considered as 'social' space rather than as enclosed 'architectural' space, is one of the properties through which societies constitute themselves. The anthropologist Claude Lévi-Strauss remarked on this, writing that

> It has been Durkheim and Mauss's great merit to call attention for the first time to the variable properties of space which should be considered the structure of several primitive societies ... There have been practically no attempts to correlate the spatial configurations with the formal properties of the other aspects of social life. This is much to be regretted, since in many parts of the world there is an obvious relationship between the social structure and the spatial structure of settlements, villages or camps. (1963, 290–91)

As he went on to say, though, the absence of any obvious relationship between social space and social structure in other parts of the world, and the complications it presented elsewhere, made it very difficult to devise any sort of structural model for it. Nonetheless, his own analysis of the South American Bororo villages, described in *Tristes Tropiques* (284–320), was an elegant and persuasive example of the potential for the structural analysis of social space, and was an inspiration to the development of research into the morphology and structure of space.

A slightly different, more obviously poetic, account of the relationship of 'structure' in its new linguistic sense to objects was put forward by Roland Barthes:

> The goal of all structuralist activity ... is to reconstruct an 'object' in such a way as to manifest thereby the rules of functioning (the 'functions') of this object. Structure is therefore actually a *simulacrum* of the object, but a directed, *interested* simulacrum, since the imitated object makes something appear which remained invisible or, if one prefers, unintelligible in the natural object. Structural man takes the real, decomposes it, then recomposes it.

Structural activity, says Barthes, is 'a veritable fabrication of a world which resembles the primary one, not in order to copy it but to render it intelligible' (1963, 214–15). Barthes's own example of this is presented in his essay on 'The Eiffel Tower' (1964), in which the literary bird's-eye view of Paris and of France presented by Hugo and Michelet respectively

> permits us to transcend sensation and see things *in their structure*. ... Paris and France become under Hugo's pen and Michelet's ... intelligible objects, yet without – and this is what is new – losing anything of their materiality; a new category appears, that of concrete abstraction; this, moreover, is the meaning which we can give today to the word *structure*: a corpus of intelligent forms. (1964, 242–43)

The possibility that architects might themselves make 'structure', in the sense that Barthes suggested that writers and other artists could, is one that intrigued and fascinated from the late 1950s, when structuralism and semiology became widely studied. The interest in this linguistic metaphor is discussed at length in chapter 5. An example of the way this perceived analogy between architecture and linguistic structure was developed is illustrated by the group of Dutch architects whose work was published in *Forum* magazine, and in particular Herman Hertzberger. Hertzberger's view was that the forms produced by architects were cold and lifeless, repressive rather than liberating; his aim was to develop forms that would be interpreted and completed by the occupants of buildings in their own way. To describe what he meant, he suggested the relationship of available architectural forms and their capacity for individual interpretations might be understood as like that between language and speech; and within this framework 'we assume an underlying "objective" structure of forms – which we call arch-forms – a derivative of which is what we see in a given situation' (144). The architect, as he saw it, was committed to working within this existing structure of socially established 'arch-forms', and could never create anything totally afresh, but might nonetheless realize objects that could be reconstituted by the users of buildings to mean new and unexpected things. While amongst these Dutch architects, the presentation of this relationship between social perception and architecture as one of 'structure' in a linguistic sense was never more than the loosest of analogies, it should be stressed that this 'structural' impulse, this desire to discover a system that would render the world intelligible and to reconstitute it in architectural form, was a major preoccupation of architecture in the late 1960s and 1970s.

The turning against structuralism, on account of its own self-confessed contradictions, and of its tendency to render the world as an abstraction, was also a major feature of the late 1960s and 1970s, particularly evident in the writings of Henri Lefebvre and Jacques Derrida. Whereas Lefebvre questioned the turning of life into an abstract concept, Derrida disputed the notion of 'intelligibility' on which structuralism was predicated (see particularly Derrida's essay 'Structure, Sign and Play in the Discourse on the Human Sciences'). Both arguments attracted some interest in architecture, where linguistic models and structuralist thinking had been so attractive in the 1960s.

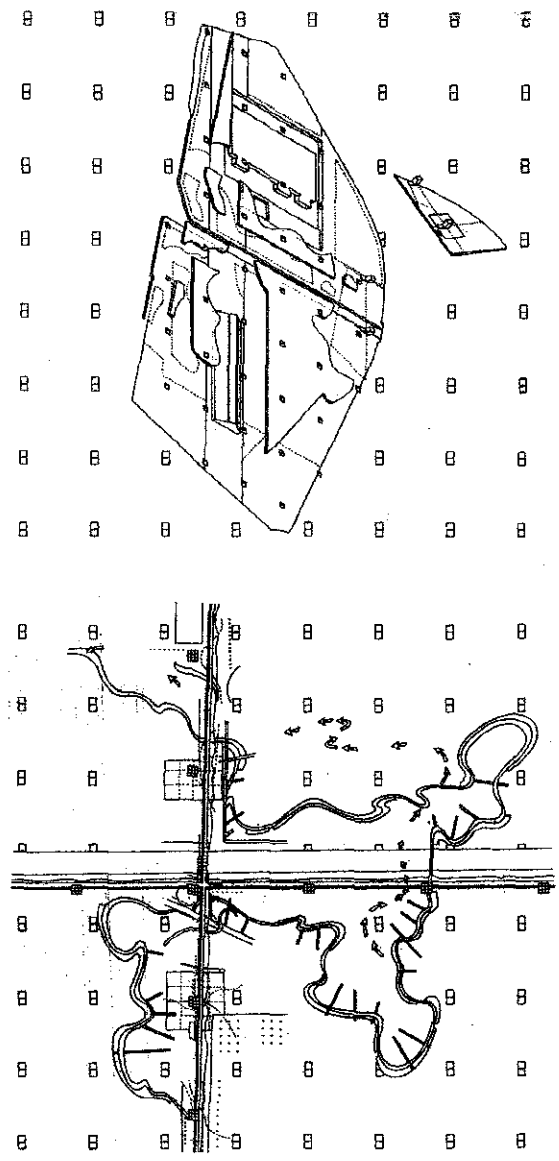
Bernard Tschumi's work and writing in the 1970s were motivated by his objections to the structuralists' tendency 'to dematerialize architecture into the realm of concepts', to make a 'split between discourse and the domain of daily experience' (1976, 68, 69). From early on, Tschumi made 'structure' a particular object of contempt: '*language* or *structure* are words specific to a mode of reading architecture that does not fully apply in the context of pleasure' (1977, 95). Of his various strategies, the questioning of 'structure' was a major theme, as in the Parc de la Villette scheme:

> We know that architectural systems are always noted for the coherence they represent. From the Classical era to the Modern Movement ... the notion of an incoherent structure is simply without consideration. The very function of architecture, as it is still understood, precludes the idea of a dis-structured structure. However, the process of superimposition, permutation and substitution which governed the Parc de la Villette plan could only lead to a radical questioning of the concept of structure... (1986, 66)

However, it is far from clear in what way Parc de la Villette 'questioned structure': the fact that the scheme has three superimposed systems (a grid, movement patterns, surfaces) if anything confirms, rather than casts doubt upon, the necessity of 'structure'. But more than this, the scheme ignores the problem of how far a percept, a mental 'structure', is necessary for this scheme, or any other piece of a city, to become intelligible to its occupants, and of whether that 'structure' is in any way within the architect's competence. Jacques Derrida was, according to Tschumi, surprised when Tschumi expressed interest in 'deconstruction', and asked him 'But how could an architect be interested in deconstruction? After all, deconstruction is anti-form, anti-hierarchy, anti-structure, the opposite of all that architecture stands for' (1991, 250). Derrida's initial surprise remains. Would the practice of architecture survive the elimination of 'structure'? What would the result be? The answer is as ambiguous as 'structure' itself, and depends entirely to

which metaphor, biological or linguistic, the question is addressed. If to the biological, it would lead to the collapse of buildings, formlessness, chaos; or if to the linguistic, the result would be blindness, incomprehension and ultimately the annihilation of the subject. As neither prospect will be tolerated, 'structure', in all its ambiguity, seems unlikely to be displaced as an architectural concept.

1 See Picon, *French Architects and Engineers*, 1992, especially chapter 7.
2 The various translations of Alberti's *De Re Aedificatoria* indicate the difficulties caused by the historical shifts in the meaning of 'structure'. Book III chapter 4 opens with the sentence '*Reliquum est, ut structuram aggrediamur*'. Bartoli, in 1565, translated this as '*Restaci a dare principio alla muraglia*', which Leoni in 1726 translated into English as 'We now come to begin our wall'; Rykwert, Tavernor and Leach in 1989 translate the original Latin as 'It now remains for us to deal with the structure'. While this would have been acceptable in the eighteenth century, it runs the risk of being misunderstood by a modern reader, who might be led to think, wrongly, that Alberti had a conception of 'structure' in the modern sense of an abstraction of the system of support. In another place, Alberti wrote '*structurae genera sunt haec*' (Book III, chapter 6), which was translated into Italian as '*Le maniere degli edifici sono queste*'; Leoni translated this as 'The different sorts of structures are these'; and Rykwert et.al. more accurately translated the original Latin as 'These are the kinds of construction' – which, since the passage refers to methods of building walls, is undoubtedly what '*structura*' means here in modern terminology.
3 Steadman, *The Evolution of Designs*, 1979, chapter 4, elaborates on this point.
4 See Foucault, *The Order of Things*, 1966, 160–61; see also 132–38 and 226–32 for the argument on which this discussion is based.



B. Tschumi, 'La Case Vide', drawings for Parc de la Villette, Paris, 1985. Tschumi's scheme for Parc de la Villette questioned received notions of both 'order' and 'structure'.
(top) 'The points, a grid of *folies* superimposed on the surfaces.'
(bottom) 'The lines and points combine – the Gallery and the Cinematic Promenade collide with the *folies*'.

Studies in Tectonic Culture

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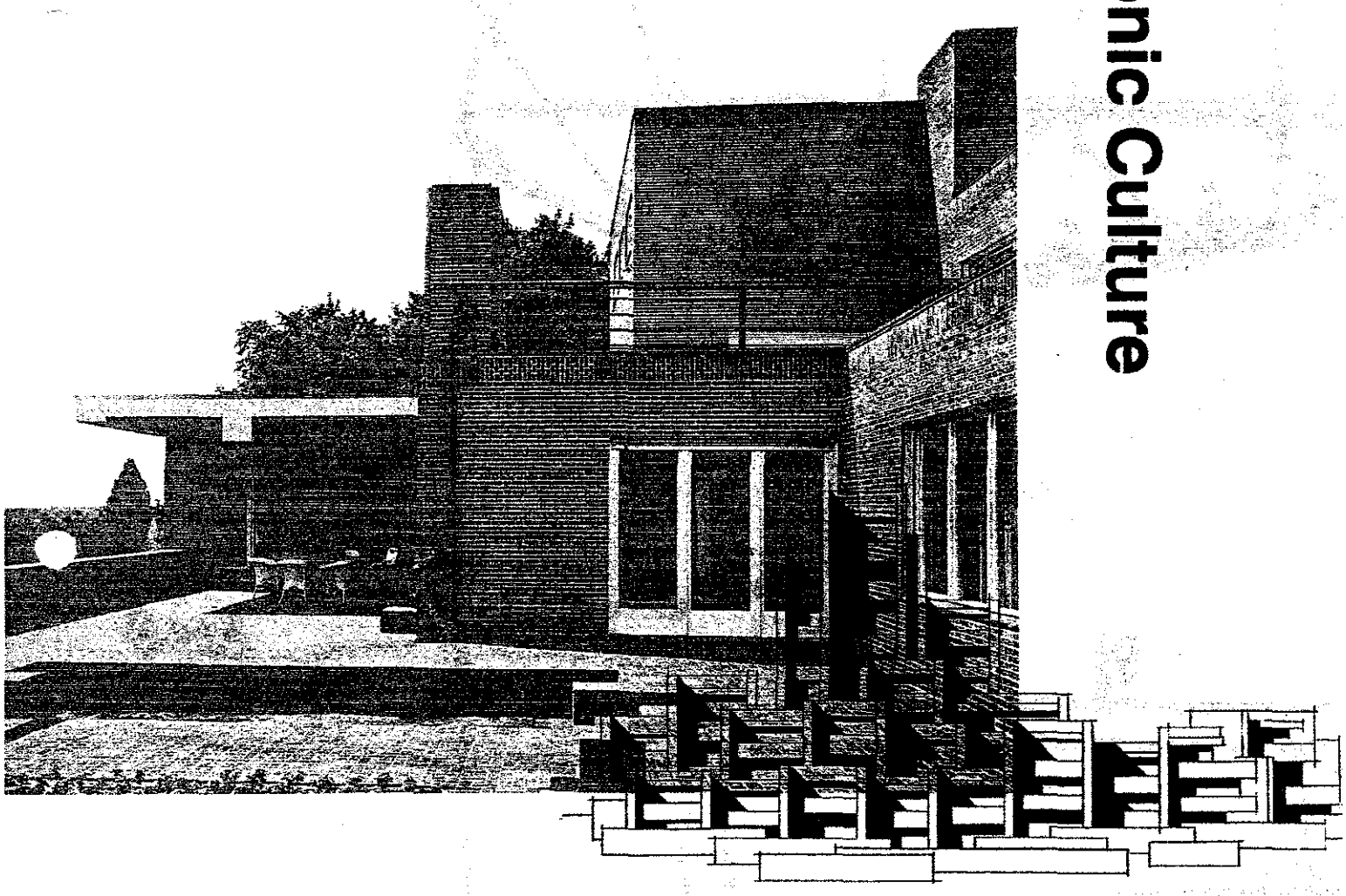

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