

Almost rectangular

Thinking beyond the commonplace

The rights of wrong-angles

While agreeing with Phil Steadman (*arq* 10/2, pp. 119–130) that most buildings are approximately rectangular, I find his sweeping argument about the assembly of cells far too limited and quite inadequate as a primary explanation of the issue. For a start I do not believe that many architects or builders begin a design by assembling shapes in plan on paper as if they were neutral and value-free containers: they are rooms with purposes and meanings which help determine their sizes and shapes, with relations to one another and to the outside world. Such considerations make the plan for many of us much more than a geometrical diagram, even when we are reading it on paper.

Second, Steadman underplays the technical imperative which is in some cases very compelling, and surely stronger with trees than with bricks, for it leads to a whole way of thinking in which the second layer of material crosses the first at a right angle, the third crosses the second, and so on. This is powerfully felt in the traditional architecture of China and Japan, combined with modular planning and pre-jointing. The odd hexagon or octagon extends the principle further, but departure from the technical method is unthinkable. On the other hand, Steadman's example of the southern French Borie is a vaulted building of continuous uncut stone, totally devoid of beams and actually needing to avoid square corners. Presumably also these buildings were never drawn except retrospectively by archaeologists. The amorphous shape has its own logic.

Third, Steadman's implication that the circular building is

primitive or merely based on a central pole misses the point of a whole alternative architectural principle with a compelling social basis: the Greek theatre, medieval chapter house, Globe theatre and round table, always with us and recurring in new forms, for we always need a sense of

togetherness. It may be exceptional, but it could hardly be considered 'pathological', particularly as it makes fruitful contrast with the usually dominant rectangles, often suggesting an appropriate hierarchical reading.

Fourth, Steadman dismisses rather lightly the explanation



Drawing of an Alsatian village derived from an official French map of 1830, from *L'Architecture Rurale Française: Alsace* (Paris: Berger-Levrault, 1978).

which Pierre Bourdieu calls ‘the body as geometer’. Bourdieu traces the three dimensions of perceived space back to movements of the body: forward and backwards, left and right, up and down. This relates them to our perception and understanding, the choreography of our actions, the structure of our metaphors, and in many societies also to the apprehension of the cosmos. This explanation is powerful in accounting both for the spatial understanding of remote societies studied by anthropologists and the worldwide recurrence in different times and cultures of rectangular grid-planned settlements.

Fifth, approximately rectangular is not fully rectangular, and just because rectangular is such a general rule, even small deviations from it are significant. Steadman and I probably look at a plan of an Alsatian village [1] rather differently. For him it could serve simply to confirm that most if not all of the buildings are rectangular and repeat similar types. For me the differences are precisely what give the place life, results of responding to neighbours or to established plot lines, and of building in stages with changes of mind – a continuing process, not a static masterplan. My career as an architectural historian – and as a designer – has been dominated by an interest in such irregularities and what they mean, and I have written endless case studies and even whole monographs justifying them. For me, educated at the AA in the late '60s, it was indeed an escape, but not from rectangularity – rather from the reduction of architecture to the abstract and meaningless grid. That was based on the Cartesian space model rather than Bourdieu's bodily axes. It got off to a strong start with Durand at the Ecole Polytechnique and still, it seems, haunts the Bartlett.

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The exception that proves the rule

I have always been curious about the expression ‘the exception that proves the rule’, and Philip Steadman's excellent foray into that most obvious question, ‘why are most buildings rectangular?’ (*arq* 10/2, pp. 119–130) offers a good test of the usefulness of this commonly stated but somewhat paradoxical phrase. Does the exception that

proves the rule mean that the exception highlights the existence of the rule (hardly logical), or does it mean that the exception establishes or confirms the rule for all cases other than those that are excepted, which I gather was the intention of the original Latin in this regard? Why did this expression occur to me when I engaged with Steadman's piece?

First, the question posed by Steadman, which on the face of it might seem rather obvious, is of perennial interest. Our contemporary cities just as much as our ancient cities provide abundant evidence that almost all but the most extravagant civic buildings are rectangular on all three Cartesian planes. While a dominant Modernist paradigm reinforced such geometrical strictures during a substantial proportion of the last century, it is a little less clear these days why this should remain the case. Gratifyingly, students of architecture around the world observe no such constraints, but the evidence of our built environment has led to Steadman's enquiry, and he furnishes some tentative answers to this question.

Three hypotheses are proffered. The first is that all this rectangularity might be instrumentally sponsored; architects have been traditionally bound to express their intentions using such physical artefacts as drawing boards and T-squares. He deems this first hypothesis inadequate based on the proportion of buildings built throughout history without the aid of drawings. His second hypothesis considers our Western mathematical conceptions of space founded on Euclid's *Elements*, and more recently the work of Descartes, but the ample evidence of rectangularity emanating from outside Western Civilisation points, perhaps, to something more deeply ingrained. His third conjecture is based on a phenomenological take on spatiality, and the body's innate engagement with the sense of upwards and downwards, forwards and backwards.

With his three hypotheses failing to provide Steadman with any definitive answers, his search proceeds by scanning both vernacular and historic examples of rectilinear buildings, while also offering an overview of others that do not fit the class – the exceptions. He provides André Bruyère's apartment buildings as an example, where the external appearance of being ‘freeform’,

with lavishly fondant exterior, nevertheless conceals an orthogonal plan. Ship layouts, too, are provided as examples of our innate desire to ‘rectangularise’, by showing that beyond those surfaces that need to adapt to the hull's double curvature the rest of the plan conforms rigorously to the right angle.

While Steadman does allow himself a slight diversion into *überpragmatism*, by considering the influence of manufactured materials, he does not follow this through to the builders' practices in assembling them. Rectangular bricks beget right angles in constructed walls; sheet materials come in rectangles; lengths of timber come as ‘parallelepipeds’; all of which have some relevance to the argument for rectangularity, but is this a chicken or egg situation? There are obvious advantages for materials being produced in this way, as Steadman points out, right through to the efficient cutting patterns for certain pre-industrial utilitarian garments and the layout of text using printers' typesetting.

However, in neglecting to reflect on the practice of building and favouring only a discussion of the rectangular nature of manufactured building materials a clue might have been missed that could possibly lead to a reorientation of his argument. As anyone knows when building off-square, and especially in situations devoid of symmetry, the carpenter's choices are severely restricted. Consider the difference in data required. A rectangular sheet needs only two pieces of data. If one face is accidentally marked or damaged, the other side may be a viable alternative. For the non-rectangular sheet, even with four rectilinear edges, five pieces of data are required, and there is no opportunity to reverse the sheet. Overly simplistic as this example might seem, it does at least demonstrate a significant factor of difficulty for the builder entangled with work more geometrically adventurous than the rectangular, and such extra challenges must be paid for.

Steadman's overview is an elaborate scene-setting for his main thrust: a shape grammar's take on the logical spatial syntaxes that emerge from comparing rectangular, triangular and non-regular tessellations or closely packed tiling. Indeed the argument for why humankind might have fixed on the rectangular in preference to the triangular, for



Antoni Gaudí, Colònia Güell. Interior and exterior of crypt

instance, is not only elegantly laid-out in Steadman's succinct explanation, but is compelling ... insofar as it goes.

Unfortunately the author's own unguarded predilections enter his argument, which encourages me to apply similar personal interests, and admit to the baggage I carry. My own quest is into the exceptions to the rule that emerge from the case he makes so well, rather than the rule itself. Why am I so interested in buildings that are not rectangular?

The first such hint of Steadman's apparently understated motivation occurs in the section of his essay where he confronts irregularity. Witness the phrase:

'And there is an infinite variety of irregular shapes that can fill the plane, examples of which form the basis of many of M. C. Escher's irritating puzzle pictures.'

The choice of the word 'irritating' is interesting; others might have used

the word 'fascinating' in its place, for Escher's graphical delving into 'n' dimensional space is surely extraordinary. In the final paragraph headed 'A parting shot', Steadman's other predilections emerge:

'Finally, why might we expect to find more departures from rectangularity in the work of "high architects" than in the run of more everyday buildings?'

Despite covertly proselytising a mathematically substantiated case for the flexibility of rectangularity as efficient and effective enabler of an economically favourable close packing of spaces, he alleges that 'high architects' who spectacularly fail to kowtow to the implicit authority of their orthogonal surroundings are motivated by their desire to escape from an 'irksome prison'. Read thus, Steadman's piece might be taken as his own scholarly and well-mannered attack on those

architects whose rebellion against geometrical conformity is so spatially and visually manifest: why, when rectangularity can be shown as both effective mathematically, and *de rigueur* historically, would such architects trouble with plainly spatially inefficient alternatives?

This is where we might have to show a leap of faith, and simply assume that architects of note deliberately eschew the lessons that could be so well learned from the abundance of rectangular organised precedents in order to be obviously different (i.e. 'original') from their neighbours. Or we could speculate that perhaps other worthy objectives are the motivators for identity, art for one. For me, as excellent as shape grammars might be for providing a sense of necessary order in the built environment, they also smack of the pragmatist's priorities. Once such a geometrically contrived system is established, design automation might even be promoted as a possibility, which as a humanist, I still find fairly frightening.

The essential dilemma remains. Steadman's core argument is absolutely beyond reproach if this is an issue about sustainability. Why indulge in resource-consuming paradigm shifting shape-busting when there are still rich opportunities for design choice through intelligent use of the rectangle in planning and spatial disposition, powerfully evidenced by vernacular architecture, with a manufacturing tradition that seems to be close to 100% in support? Surely, the answer is that as cultured beings we aim for a bit more than such well-motivated limitations: we demand to be delighted by spatial adventure regardless of whether it is the product of an architect's vanity and their vainglorious quest for recognition, or any other base motivation.

It is all very well to imply that a mathematical framework based on two-dimensional packing, which is admittedly computationally demanding despite its modest postulation, is sufficient for our creative spatial needs. We are surrounded, however, by spatial adventure in the natural world, none of which trends towards cubical packing. Quite the opposite, in fact, because as Gaudí showed, we may not choose to rely on such simple abstraction. His Church for the Colònia Güell (1898–1915) in the outskirts of Barcelona was based on a 1:10 hanging model. The model

interactively expressed the behaviour of mass under gravity-induced tension, which when considered inverted was taken to be a dynamic reflection of mass behaviour under gravity-induced compression. In this experiment in equilibrated structures, Gaudí showed that neither walls nor columns are naturally vertical, but complex resolutions of forces expressed as 3D vectors. And if none of the vertical elements is perpendicular, why should anything else be flat, let alone rectangular? Albeit completed only to the ground floor level, the interior of the crypt at least offers some indication of the proposed church as a completed whole [2]. I have always found this work of Gaudí's by far the most moving building that I have ever experienced. For me it is an exception that proves Steadman's rule.

While it would be tempting to close my brief reflection on Steadman's quest for answers on the subject of why most buildings are rectangular with this example from the portfolio of one of the world's most challenging architects, I have to admit to being a bit of a cross-dresser myself. Regardless of how much I tend to be viscerally drawn towards more intuitive 'art-based' composition, I am intrigued by the opportunities geometry offers for intellectual reductionism of complex questions and their interpretation as architectural values. Keeping on the subject of Gaudí, a comparison of the original plan for his Casa Milà and its built realisation (that he supervised under construction) reveals a difference between intention and constructional reality, even for him. One of the first commentators of his life's work, César Martinell, notes the difference between the blueprints Gaudí deposited for the project with the council as part of the building permit process, and the as-built drawings. 'It appears that even Gaudí was bound by the forces that ultimately influence us all, and that the economic imperatives for this building, which originally had an unconstrained budget, got him in the end; he was forced to build straight walls to form his otherwise voluptuous womb-like interiors, rendering them as faceted rather than freeform surfaces.'

In the final analysis we are bound to simplify our formal desires within the bounds of current capability which is tempered principally by economics. By

adding a factor of 'high architect' chutzpah to the mix, society indulges such architects allowing them to create outside the usual rectangular strictures. No doubt, in the future, we will have economically viable building systems that are not predicated on rectangularity in any way. Perhaps we will find the termite mound more in keeping with our subconscious spatial desires, and future mega-3D printers will allow us to return to the cave, thereby rendering the era of rectangularity as little more than a temporary pragmatic aberration.

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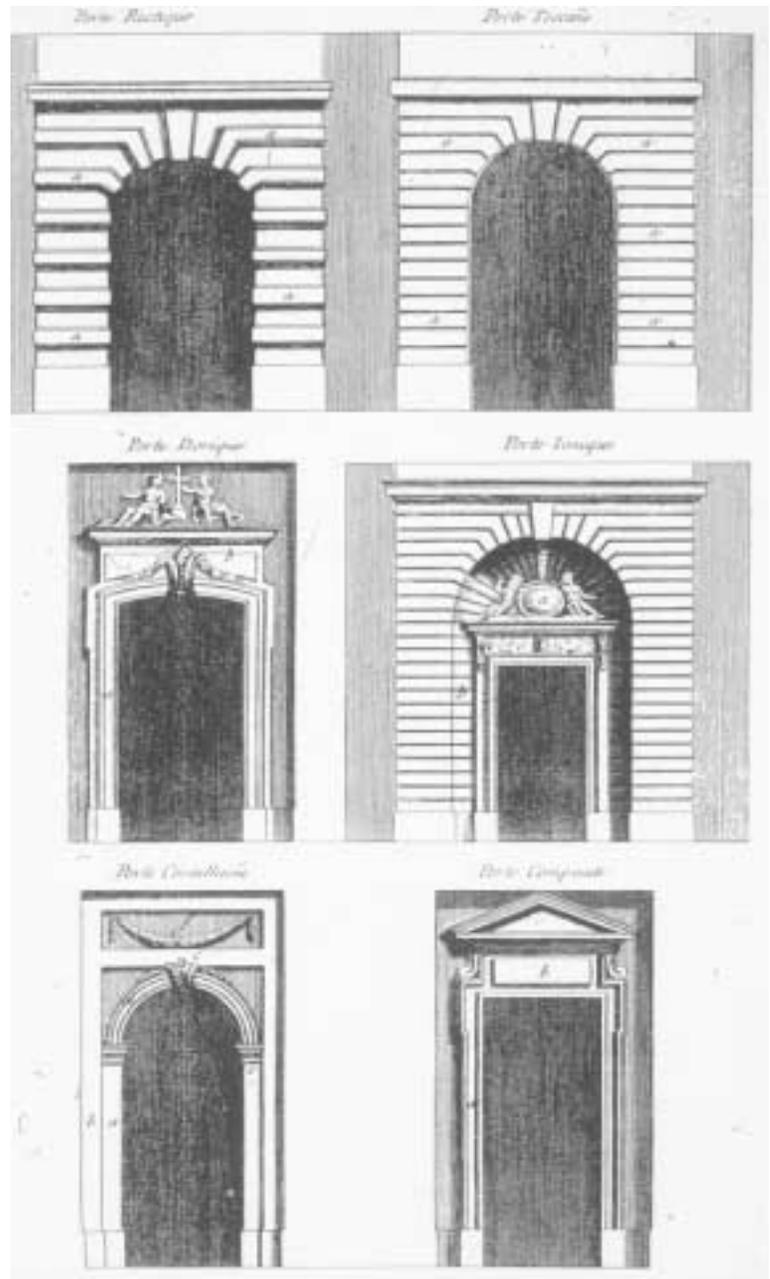
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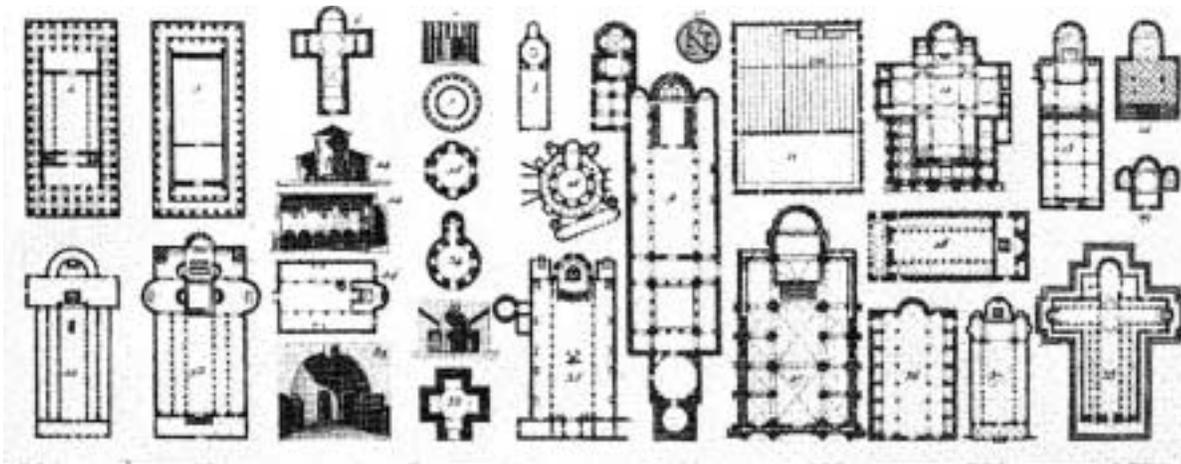
- 1 César Martinell, *Gaudí: His Life, His Theories, His Work* (Cambridge, MA: MIT Press, 1975).

Excessively suitable

For a long time now – decades at least, maybe centuries – architectural thought has suffered a disabling distinction between accommodation and representation, or function and signification, as if 'mere' building were one thing and the 'art' of



The decorum of doors in Diderot and D'Alembert, *Encyclopédie*, 'Recueil de planches', vol. 2



Rectangular plans and circular exceptions in J.-B. Séroux d'Agincourt, *Histoire de l'Art par les Monuments Depuis sa Décadence au IV^e Siècle jusqu'à son Renouveau au XVI^e* (Paris, 1811–23)

architecture another. Let me give a well-known expression of this premise from a widely respected authority. Nikolaus Pevsner opened his famous *Outline of European Architecture* with the following assertion:

'a bicycle shed is a building; Lincoln Cathedral is a piece of architecture. Nearly everything that encloses space on a scale sufficient for a human being to move in is a building; the term architecture applies only to buildings designed with a view to aesthetic appeal.'

I suspect Pevsner felt no need to argue his point because by then the distinction had become a truism. Generally speaking, it still holds good today, not only in academic circles, but also in the arena of building production, where legal codes require that some, not all, designs bear the stamp of an architect. If I am not mistaken, a number of the essays in the last issue of *arq* (10/2) suggest ways of thinking through and beyond this commonplace.

Despite their distinct ends, when read together the papers by Anstey, Kohane and Hill, Rifkind, and Steadman, show us how we might ease the difference between accommodation and representation. Considered in concert, they argue for an enlarged sense of *decorum* or suitability. Appropriateness, it would seem, is the principle that governs decisions about a setting's usefulness. These articles suggest it sets the measure for more than that. The concrete or visible manifestation of suitable settings in walls, rooms, streets, and landscapes can be seen to also answer expectations for the sort of content Pevsner called 'aesthetic'. In the comments that follow, I will describe settings of this type as

excessively suitable, places that show suitability *in excess*.

Before commenting on the essays, though, I think I should state my own premises. I have three. First, the successful architectural work, like the world of which it is a part, is greater than our concepts of it. Its richness cannot be comprehended by any one of our categories of appreciation, nor by their sum total. My second premise is this: there is no essential conflict between matters of ethics and aesthetics, between decisions about practical affairs and concerns for a work's beauty. Here, obviously, I disagree with Pevsner. The task of architectural design, as I understand it, is to give durable and visible articulation to ethical choices. These choices arise in everyday affairs, and their translation into architectural terms are the settings we inhabit. And now my third premise, which merely combines the first two: good settings possess more content than we expect of them, more than we have become used to, or could name as our requirements. This is because each is necessarily enmeshed in a set of relationships that transcend its own economy. The successful work always gives more than it shows; the deficient one provides exactly what we had in mind.

Turning to the papers published in the issue, let me try to describe *excessive suitability* a little more fully. Philip Steadman ends his study by invoking a distinction I have already introduced, the distinction between 'everyday buildings' and the works of 'high architects'. As a postscript to his study he asks why we find in the plans, sections and elevations of this second group no more departures from orthogonality than in those of the

first. Obviously, deviations from the right angle do exist in what Steadman calls 'single-room structures' (the museums of Gehry, Hadid, Libeskind, etc.). No topic is quite so exciting for contemporary journalists. But 'multi-room structures' by these same figures revert back to orthogonality. Steadman asks why. His answer, the ease of 'close-packing', is economic, in the broad sense of the word. Kohane and Hill also turn to this aspect of suitability in their essay, treating symmetry as both a principle and a technique of compartmentation. The parts of a door or window are suitable when they fit together with the others in the composition. Coherence of compositional pattern, or agreement, is at issue in both cases. In both 'close-packing' and *symmetria* fitness is determined not with respect to purpose or place, but to the other elements in the design. Here, the frame of reference does not extend beyond the work. This form of suitability is achieved through processes or means internal to the professional practice of design. But internal economy is not the only form of suitability in a successful work. Other frames of reference, no less a part of the work's meaning and purpose, introduce other issues of appropriateness.

The author of the first modern treatise on architecture, Leon Battista Alberti, used the Latin term *quid deceat* to name what is appropriate in the art of building. The author of the only treatise to survive from antiquity, Vitruvius, used the word *decor*. Tim Anstey's careful parsing of the differences between these terms and their several meanings clearly shows his familiarity with not only their writings but also the rather large

secondary literature this topic has generated. A third author also figures prominently in Anstey's account, the great Roman orator Cicero. The latter is important in this context because his writings elaborated the distinctions between an ethical and rhetorical sense of *decorum*. The norms of the first, which Anstey labels morals, describe what is fitting because they follow 'prescription, custom, or nature'. So Vitruvius maintained. Rhetorical *decorum*, however, tolerates what is unauthorised, unprecedented, and unnatural for the sake of effective communication. The fascinating case Anstey describes is Brunelleschi's dome of the Florence Cathedral. Departures from norms were tolerated – even praised – because appropriateness in (architectural) rhetoric was determined with respect to the aims of persuasion. What is fitting, then, is what moves, convinces, or sways an audience. While I think Anstey underestimates the role of 'discovery' and imagination in ethical decision-making, his distinction between ethical and rhetorical *decorum* does point toward two (non-professional) frames of reference for the evaluation of suitability: historically and culturally constituted patterns of behaviour within a building, and social and political meanings outside it. Neither of these conditions is authored by the architect, but both enter into the determination of whether the design is suitable. In that sense the design exceeds its 'internal' order and reaches into the fullness of its practical (ethical) horizon.

Kohane and Hill also point to conditions outside the building in their study of the *decorum* of windows and doors. This wider horizon becomes clear at the outset of their essay, when they make distinctions between suitability according to use, ornament, and symmetry. In each case, a solution's aptness is measured by internal and external requirements. Among the latter are the social order of the city and the 'public choreography of power', to use a phrase by Charles Burroughs. Plates from Serlio's treatise suggest that the lack of symmetry in a facade was judged to be a 'public offense'. In this case, and many others adduced by Kohane and Hill, suitability is sought in and outside the building, at not one but several scales. A passage from their conclusion summarises this point clearly: 'Doors and windows at every stage

seem shaped by this idea [*decorum*], from the basic issue of entry and light to the intricate considerations of proportion and ornament. *Decorum* underpins the subject, while also making it difficult to discuss in isolation, the focus constantly slipping – from the opening, to the building, to the city, and back again.' Their discussion of the cathedral door makes another point, however. Their first observation is obvious: the building's central portal is larger than all the rest, which made it suitable for processional entry. Yet, more than accommodation is at issue here; size is *significant*. Empowered by St. Peter, the founder of the Roman Church, the Pope held the keys to the cathedral. Insofar as the church was a terrestrial equivalent to the heavenly Jerusalem, the keys and the Pope opened the threshold to both a building and a city. Suitability, in this case, was measured according to an extra-mundane frame of reference. Portals were sized according to an imagined city. Not only is professional knowledge exceeded in this case, but also practical and social understanding. Thresholds that are fitting for situations such as this one accommodate and represent exemplary or heroic conduct. More simply, the frame of reference for the cathedral door is neither instrumental, practical, nor social; it is a condition that depends on recollection and desire, recorded in fictions of one type or another, that have the task of enriching or enlarging everyday reality.

One does not have to accept the tenets of any particular ideology to see its ideas as a frame of reference for assessments of suitability. Such is the case of Terragni's Casa Del Fascio, described by David Rifkind. The author describes his study as an attempt to discover the ways that political values are revealed through a building's furnishings. The values of the Party, the presence of Il Duce, and images of national identity are apparent, Rifkind maintains, in the workings of the doors in unison, the modernity of the materials and their finishes, the widespread transparency, the 'rational' structure, and the somewhat uncomfortable chairs. In each case practical requirements are acknowledged, but exceeded by expressive or rhetorical intentions. Rifkind, like many scholars before him, observes the several ways the building is at once modern and ancient, headquarters to a

revolutionary party and an elaboration of the traditional palazzo, even *domus* type. The ambiguities of the tiny *sacrario* make this conjunction of contemporary and ancient conditions vividly apparent. However, what seems important to me is that suitability in this instance is not determined by the economies of design technique, nor by conventional practice, nor by public expectations. If the public has any sense of this space it is because it awakes long-forgotten memories. Appropriateness in this design is measured according to a standard recorded in myth, *decorum* in some of its parts was determined with respect to an essentially fictional frame of reference. In fact, references of this kind, pertaining to the past preserved in memory and to the potentialities offered by fiction, occur in all works of architecture, and in this context this greater horizon of reference is one of the dimensions of a beautiful work's excessive suitability, one that is no less important than social, practical, and instrumental concerns.

The suitability of a single door or window in a building is undoubtedly measured according to the pattern of the work's overall composition. However, the door or window is also a place for the enactment of a culturally constituted pattern of behaviour, and it will be judged appropriate if it accords with the spatial, dimensional, and material premises of those enactments. Because each of our actions carries with it its past and its possibilities, the settings which make those actions possible also carry with them (or are carried by) a landscape of recollections and anticipations. As the four papers I have briefly discussed show, buildings exceed what we think of them. It is precisely this excess that makes them suitable for what we expect of them and for what we will find delightful.

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