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A Configurational Theory of Generic Meaning in Architecture, and its Limits

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'Once we have re-interpreted the optical image into a conception of space enclosed my mass, we read its purpose from the spatial form.'

(Frankl, 1914, p.1)

'Order, proportion, definite delimitation, and simple structure are usually taken as the characteristics of beautiful objects; yet these characteristics are obviously insufficient to comprehend all the elements which make up the aesthetically significant and effective. The definition fails to cover a whole class of phenomena whose reality cannot be disregarded by any observation unless it is dimmed by theoretical prejudice. The contemplation of beauty as harmonious proportion and strict unity of form does not awaken in us the deepest emotions of the soul or the most intense artistic experiences. A different and stronger emotional effect appears when, instead of unity of form, we are confronted with its disintegration, even with its complete dissolution.

(Ernst Cassirer, 1951, p.328)

1. Limits to the argument

This paper is about meaning. Its aim is to outline something like a 'configurational' theory of meaning in architecture. It can be thought of as a theory of *generic meaning*, by analogy with the theory of *generic function* in architecture, outlined in Chapter Eight of *Space is the Machine* (1996, p.216-261). *Generic function* meant the basic acts that people carry out in buildings before we consider the contents or purposes of their acts, so *occupying space* and *moving in space* are *generic functions*. *Generic meaning* is equally basic, and refers to certain simple social ideas that the masses and elements that make up the physical form of a building, especially its façade, can convey by being configured in one way rather than another.

There is a caveat. A theory of meaning, generic or otherwise, does not take us very far. Perhaps the most useful outcome of the paper would be to set limits of the idea of meaning in architecture. It aims to identify these limits by distinguishing the idea of *meaning* from the idea of the *aesthetic*

in architecture – or even its *poetics,* though, as we will see, using this term in a technical rather than rhetorical sense. These concepts, it will be argued, have a far greater potential than 'meaning' to clarify what can be conveyed to human minds by the manipulation of architectural form.

2. Preamble: most theories assume that architectural form is meaningless

We can begin by distinguishing two structurally different interpretations of the concept of 'meaning'. We can call them *significance* and *signification*. *Significance* is where we give something like a syntactic meaning to a form by comparing it mentally to other forms, as, for example when we compare the Doric order to the Ionic. We can say that the configuration of the form 'means' its own pattern in contrast to the other pattern, and so 'means itself', in the first instance. *Signification* is where a configuration is associated with something outside itself and quite distinct from itself as, for example, when we say that the Doric stands for manliness and the Ionic for femininity. In this sense, signification emulates natural language, where the sequence of letters or sounds that make up the word 'tree' signifies something quite distinct from itself, namely a physical entity with a trunk, branches and leaves. In *The Social Logic of Space* (Hillier and Hanson, 1984) it was argued – though without using the terms significance and signification – that natural language was unique in giving priority to signification over significance, because its fundamental aim was to make signification precise. Significance, or the syntax that arranges words into an order, was a means to that end, and so secondary. It was argued that this in this sense natural language was the only fully *semantic* language. Other language like systems, such as space, were *morphic languages*, and in these significance took precedence over signification, as these were first and foremost *syntactic* languages in which the syntactic pattern itself is the primary meaning. Here we will add architectural form to the class of morphic languages, and argue that here too significance takes priority over signification, adding that the limited degree of signification that we find in architectural form comes to us through its significance, that is, through its syntax.

This distinction reflects different paradigms of architectural theory and criticism. If we take the work of Colin Rowe (Rowe, 1947), for example, we find that in 'The Mathematics of the Ideal Villa', he addresses buildings in terms of their overall composition, following a long-standing tradition of architectural theory in seeking to account for similarities and differences through formalistic and even mathematical comparisons. The concept of 'meaning' is never mentioned, any more than it is in such texts as John Summerson's 'The Language of Classical Architecture' (Summerson, 1966) or Wittkover's *Architecural Principles in the Age of Humanism* (Wittkover, 1949), which locate in the same paradigm. All three are pre-occupied with the 'significance' of form rather than its 'signification', following a long-standing main-line tradition in architectural theory.

On the other hand, if we look at such texts as Alan Colqhoun's *Form and Figure* (Colqhuoun, 1978) we find that he addresses the building not through its formal structure but through its historically derived rhetorical 'figures'. Figures, in Colquoun's analysis, are not so much architectural elements as the way they are stylistically elaborated. Their 'meaning' is conventional, and so language-like, rather than 'natural'. In his essay 'Figure and form' he says: *'By form I mean a configuration that is held either to have a natural meaning or no meaning at all. By figure I mean a configuration whose*

meaning is given by culture, whether or not it is assumed that this meaning ultimately has a basis on nature'. He argues that the 'fundamental dialectic' in modernism was not between form and function, but between form and figure. Colqhoun's analytic paradigm is then focused on signification rather than on significance.

Without too much injustice, we could think of the Rowe (*ibid.*) view as the mathematical paradigm, and Colquoun's (*ibid.)* as the linguistic. Christopher Wren reflects both when he associates what he called 'positive beauty' in architecture with geometrical form, arguing that other aspects of beauty were conventional and depended on custom. Both 'paradigms', however, agree on one thing: that *the ways in which buildings seem to convey social and cultural ideas to observers have nothing to do with the essential forms of those buildings*. The mathematical theory de-socialises form, the linguistic theory finds social meaning outside form. Formal theories point to significance, and assume it lacks social meaning. Linguistic theories point to signification, and assume that it subsumes all social meaning. Both paradigms agree that in itself, *architectural form is meaningless.*

But in both cases, it is the paradigm that sets the question and generates the answer, and commonsense reflection suggests that the common answer is in fact decidedly odd. If we consider the range of built forms with which we are confronted at any time in history, it is hard to avoid the conclusion that a key way in which they convey to us ideas of cultural and social meaning are exactly to do with the overall form and composition of the building. For example, if we are travelling through a landscape and see a building in the distance [Figure 1] and ask 'what is that', 'it's a building' would be an absurd answer. What we expect is: 'it looks like an abbey'. We assume that somehow the overall form of the building will provide clues to its functional type, and this was the object of our question. It is not immediately clear how in the case of Figure 1 we would arrive at such a correct - judgement We would note perhaps the continuous line of the roof running the whole length of the building, and underneath an improbably large, more or less rectangular surface, uninterrupted by an entrance, and pierced by a series of windows more or less in alignment - and perhaps one might feel that the alignment is not weakened by its unevenness - and to the left a curved linear protuberance, running not quite through two floors, and having two openings aligned one above the other down the centre. It is not clear that any or all of these factors would be enough to identity the kind of building it is, but it does seem to be the case that this building is commonly correctly identified as what it is, a religious collective dwelling – in fact the Abbeye de St Hilaire in the Vaucluse region of France. Of course such judgements are also aided by what kinds of buildings we might expect to find in different landscapes, as well as by the scale and location of the building. But this does not alter the fact that initial judgements from a distance about what building is seems to come from the form of the building itself.

The Abbey of St. Hilaire in the Vaucluse region of France

Setting out from the fact that such judgements are normal and commonly correct, it will be argued in this paper that it is where both theoretical paradigms agree is where they are most obviously wrong, that is in the assumption that built form is in itself meaningless, with the implication that the study of significance and signification (in our terms) can be kept in separate boxes. In this paper, it will be argued that common sense experience - plus a new 'configurational' way of analysing some aspects of building forms - attests not only to significance being the most interesting thing about architectural, but also that significance is the *primary source of signification*, that is, that *social* meaning 'outside itself' that is conveyed to us by the building.

One reason this plausible idea has not been considered in the past is probably methodological: there has not been a means of capturing the configurational nature of architectural significance in such a way as to show how it is also the basis of signification. Here we argue that the notions of configuration syntax uses as the basis of the analysis of space, which seem able to capture key aspects of the social appropriation and use of space, can to some extent be adapted to the analysis of architectural forms in such a way as to express aspects of significance and signification.

3. Exploring the problem

Let me begin with a story. A very long time ago I had a crowded mantelpiece above my fire, and an enthusiastic cleaning lady. Each week she would take my disorderly array of objects on the mantelpiece, and re-arrange them for me with the largest in the centre, the next largest two at either end, and other objects graded for size in between, thus maximising bilateral symmetry. On arriving home, embarrassed by the symmetry, I would immediately go to the mantelpiece, and 'muss up' the arrangement, restoring some approximation of the original disorder. Now this story has two points. First, you, the reader, understand it. That is, you understand it not as a simple description of events but as a story about the taste of different kinds of people. You have in your heads it seems, some hidden prejudices, which show not only that you know about symmetry and non-symmetry, but that you are able to give these ideas in this case a social interpretation.

The second point is more intrinsic to our ideas of order and non-order. In fact, when I 'mussed up' the objects to eliminate the symmetry, I don't think I was placing them randomly. I think I was placing the objects rather carefully, seemingly trying to make the arrangement have as little symmetry as possible. What might this mean? Are all arrangements that lack perfect symmetry equally non-symmetrical? Or are some arrangements more non-symmetrical than others? Is there perhaps such a thing as the least symmetrical arrangement, or even a 'counter-symmetric' arrangement? Is there perhaps some mathematical value I was trying to minimise or maximise with my 'mussing up'?

A key theme of this paper will be that this is the case. It will be argued that we read objects and arrays of objects essentially as configurations, and that there are generic ways of configuring the masses and elements that make up an architectural form both to construct its 'significance' of an architectural form, but also the limited 'signification' that buildings possess. In the mantelpiece

story, both significance and signification are clearly present, and we will see that something like this is usually the case with architectural forms.

4. Looking for 'systematic intent of the architectural kind'

How then should we begin to analyse buildings configurationally to identify their significance and signification? There is a fundamental difficulty at the outset: that formal order in a building can result from the laws of construction as well as architectural intent. How can constructional order then be distinguished from order intended to carry meaning? We suggest that the answer lies in the definition of architecture offered in the first Chapter of *Space is the Machine* (Hillier, 1996, p.10-38). Here it is suggested that architecture emerges from the act of building when the abstract and non-discursive 'configurational' properties of form and space are made object of conscious comparative thought, leading to 'systematic intent of the architectural kind'. Let us proceed by example.

In the Vaucluse region of the South of France there is a tradition of dry stone circular 'bories' constructed by corbelling, that is slightly off-setting a circle of stones inwardly at each level to define smaller and smaller circles until it is no more than a small hole to allow smoke to escape. [Figure 2] Such buildings in their constructional nature will tend to acquire simple symmetrical forms. We also find cases where the basic form has been developed into a external spiral to allow one to walk up the outside to carry out repairs, a clearly functional adaptation, with visual effects that *emerge* from functionality rather than being assigned by intent [Figure 3]. However, in Figure 4 there is no discernible functional reason either for the height of the 'spire' or the asymmetry and scaling of the entrances in relation to the spire. The symmetry of the spire is constructional, its height is not. It, therefore, looks as though it may be primitive architecture in the sense of 'systematic intent of the architectural kind'.

Figures 2-4. Dry stone circular 'bories', Vaucluse, France.

In contrast, consider **Figure 5**, an image of a village in the Tarn area of France. Here we see a selection of houses looking at their 'gable ends'. Because rooves tend to symmetry, each has an initially symmetric form. But if we consider the largely asymmetrical placing and shaping of windows, and the ways in which rooves are extended to form asymmetric shapes, we see no evidence of a mental intent to conserve or elaborate symmetry. So we do not read 'systematic intent of the architectural kind' into these forms.

Figure 5. Village in Tarn, France

Now consider **Figure 6**, a simple chapel in a Greek island. Although the symmetry of the form is far from perfect, its impact is heightened by two things: first the alignment of elements – the door, the light, the cross – along the axis of symmetry, reinforced perhaps by the *absence* of such elements on the two lateral masses that construct the bi-lateral symmetry: and the elaboration of the two roof diagonals so that each part complements a similar part on the other side. We could say that the pair of roof lines, by being elaborated in the same distinctive way, call attention to each other (as Roger Scruton says: 'provide reason for each other' – Scruton, 1979), and so draw attention to the – albeit imperfect – symmetry of the composition, as perhaps also do the twin figureless masses in either side of the axis of symmetry.

Figure 6. Greek chapel.

Now consider Figure 7, a shrine to someone who died on the road beween Athens and Sounion, and Figure 8, a church in Xoximilco, Mexico. Each can be described in more or less the same abstract terms as the Greek chapel, in spite of the differences in function and content, it is this abstract scheme that seems to give the form its significance, and in each case leads us to anticipate its signification as expressing some notion of the *sacred*. The configurational form seems to carry the 'meaning' and the

figural content is simply the means to this end. We have, it seems, something like a *formal genotype* for the expression of some idea of the sacred (perhaps not the only one, but a common one), and it is this that gives the form both its significance and its signification.

Figures 7, 8. On the left, a shrine in Greece; on the right, a church in Xoximilco, Mexico.

Figure 9 is then a view – a comparatively unfamiliar one - of the main entrance to Le Corbusier's Chapelle de Notre Dame de Haute at Ronchamp. At first sight it bears little obvious resemblance to any ecclesiastical precedent or cultural tradition. But for the entrance configuration, the compositional propositions that we explored for the Greek island church and the other two cases also seem to hold in large part. The twin uninterrupted masses either side of the entrance, and the sequence of differentiated element on the central axis, including the empty space at the top, re-express in a novel but completely clear way the 'genotype of the sacred'. The repetition of the same configurational genotype in the tower, again with different contents and this time accentuated by a deliberate asymmetry, leave us in no doubt that this is a religious building.

Figure 9. Le Corbusier's Chapelle de Notre Dame de Haute, Ronchamp; the main entrance.

In all these cases, the means by which the passage through significance to signification is achieved is by controlling the shape of the building, and elaborating it with figures in such a way as to give clear evidence of systematic mental intent of a certain kind. It could even be said to be a matter of emphasis: certain aspects of the form and certain relations between the elements are picked out for emphasis but not others. We can illustrate the principle in a simple diagram [Figure 10]. Reading from the left, we see a square shape that is, among other things, bilaterally symmetric, but we scarcely notice it. But if we add the inverted V-shape of the gable, we make the bi-lateral symmetry much more obvious. We can then emphasise the axis of symmetry much more by placing figures along it which are themselves bilaterally symmetric. The result is a form with clear 'systematic intent'. On the far right we achieve a similar effect by different means.

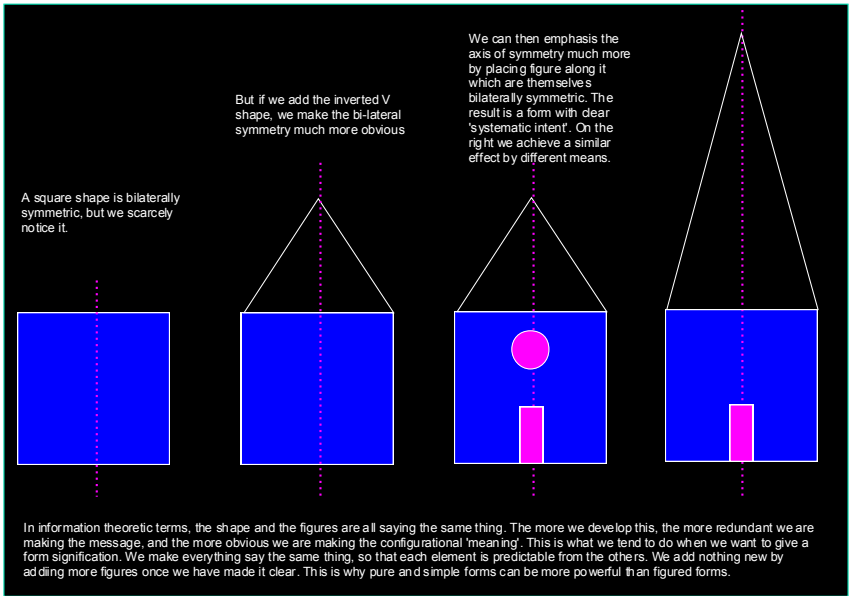


Figure 10. Emphasising symmetry.

Figure 11 then takes the basic form with its roof and adds a series of figures, which are all symmetric, but which have different relations to the axis of symmetry. The cases on the top line all obstinately look like houses, because the figures are symmetric without 'pointing to' the axis of symmetry. In the bottom line, reading from left to right, we have first a suspicion and then complete clarity that the building has a sacred intent as the 'genotype of the sacred' becomes clear as the shape and the figures, and the blank space either side of the axis, come to 'say the same thing', so, in information theoretic terms, adding structural redundancy to the message. In this way, we have moved through significance to signification. We note that it is not the symmetry of the form that does this, but the relations between the form and figures and the axis of symmetry.

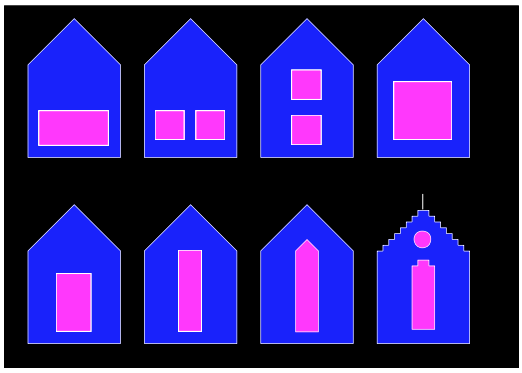


Figure 11. Figures within the basic form with different relations to the axis of symmetry.

Now consider another building of Le Corbusier: the monastery of Sainte Marie de la Tourette. [Figure 12] The abstract description we were able to give of the Abbeye St Hilaire in Figure 1 seems to capture the configuration of the form of la Tourette in the same minimalist way that the Greek chapel captured that of the entrance façade of Ronchamp. For the main bulk of the building, a powerful horizontal alignment dominates a large entrance-free rectangle of aligned windows, this time at several levels, separated by different repetitions of the horizontal element; while to the left we see a vertical protuberance centrally aligned in an otherwise pure mass, a clear case of the 'genotype of the sacred', but this time forming only part of the whole complex. As with St Hilaire, these broad and simple compositional points seem sufficient to ensure that the building reads as a religious dwelling. The main structure has a bilateral symmetry, but we do not notice it because nothing points to it. At the same time, the unprecedented vertical figure on the left building, not in itself but in its axial relation to otherwise blank masses, is sufficient to establish what this part of the overall building is: its chapel.

Figure 11. Le Corbusier's monastery of Sante Marie de la Tourette.

These two simple themes, either singly or together, both based on the line, but one vertical and orthogonal to the earth and the other horizontal and parallel, seem to be involved to a substantial degree in the ways in which we seek to impose order on buildings in order to make the passage through significance to signification. At the most primitive level, the vertical and orthogonal central axis and the horizontal parallel axis seem to be the two simplest ways of taking a collection of elements and making them read as a single object. In Figure 13 we take a square elevation and join another to it as its neighbour. It is unclear if it is one object or two. We then add a vertical line along the axis of symmetry. Now it looks like a single object because pointing up the axis of symmetry makes the two lateral elevations look like similar objects in a similar relation to each other, and to the axis of symmetry. Then, instead of adding a vertical line orthogonal to the earth we add a horizontal line parallel to the earth. Again, the two initial squares come to look like similar elements in similar relations, so again we have an overall 'order, and again this makes the composite object read as a single object.

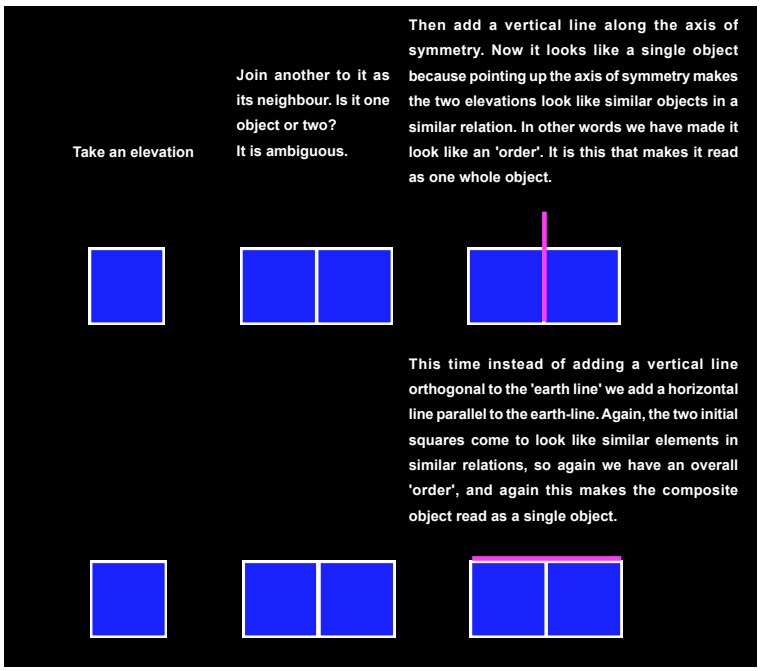


Figure 13. Collection of elements read as a single object.

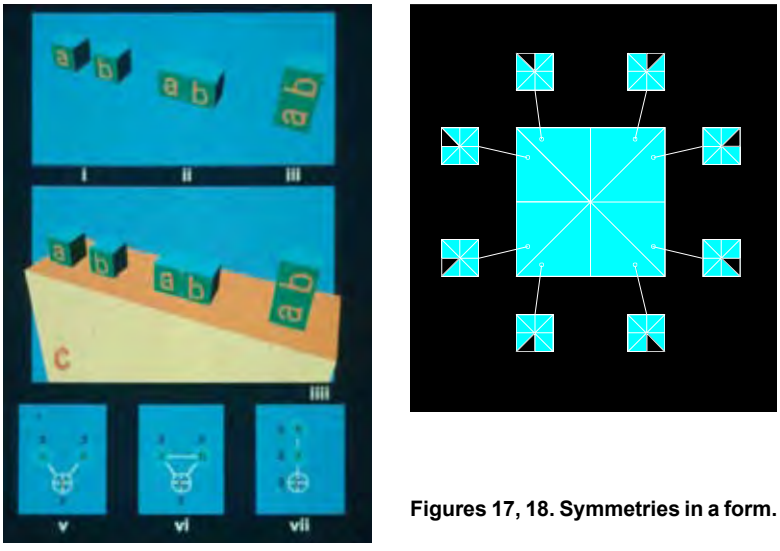
As simple as they are, these two linear notions seem to be central to the passage through significance to signification in many architectural traditions. For example, the European classical tradition uses both themes more or less equally, and both separately and in combination. To take almost arbitrary example, Figures 14 and 15 show the horizontal theme in the town hall, representing the political collectivity, and vertical theme in the church, representing the ideology, in the main square in San Gimignano, while Figure 16 shows both themes in the horizontal residential side buildings and the vertical building representing the university at the end of the campus at Charlottesville. These examples could be endlessly duplicated, all showing the passage from significance to signification through formal organisation based on verticality or horizontality.

Figures 14, 15 and 16. Horizontal and vertical themes in architecture; staring from the left, the Town Hall and church in San Gimignano, and on the right the University campus in Charlotesville.

Of course, we have pointed out nothing that is not familiar and clear, if not always explicit, to any student of architecture. As we said at the beginning, an analysis of signification in architecture does not take us very far. But two points are interesting. First, the passage from building to signification seems clearly to be by way of significance, that is, through the syntax of the form. In the context of twentieth century architectural theory, this is a non-trivial proposition. Second, the two fundamental themes we have identified, vertical and horizontal lines, seem, when they appear as dominant themes in an architectural composition, to point in different social directions. The vertical line seems always to point to an idea rather than to persons, to an absence perhaps, while the horizontal line seems to point to collectivities, and to their presence. In one sense we could say that the distinction reflects the philosopher's distinction between intension (the idea that denies a category) and extension (the entities that belong to that category). In another, we could say that it reflects Marx's distinction between the ideological superstructure of society (the vertical line) and the juridico-political superstructure (the horizontal line). A chapel is a building representing an ideology. A monastery is a building representing a political collectivity. We will see how these conjectures fare as we try below to give more architectural and numerical precision to these ideas.

5. Regular shapes as configurations

Can these ideas be taken farther by, as with space, capturing the logic of configurations in a numerical way? In principle, this seems possible. It was shown in *Space is the Machine* that the elementary definitions of configuration for space could be exactly reproduced for the arrangement of 3-dimensional physical forms [Figure 17] because 'above' and 'below' are asymmetrical with respect to the earth, just as 'next to' is symmetrical. It follows that measure of the syntactic 'integration' of a form should be straightforward. It was also shown that notions of symmetry could be precisely reproduced in configurational analysis. For example, by treating a square as an arbitrarily fine tessellation, there would be as many identical j-graphs as there were symmetries in the form [Figure 18], so arriving at an internal description of symmetry, in contrast to the more familiar external definitions. Since we have shown that the passage from significance to signification was dependent not simply on symmetries, but on relations between symmetries, would it be possible to develop measures of these.



Figures 17, 18. Symmetries in a form.

We can begin by looking at some simple shapes and considering the relation between their measurable properties, and how we read or recognise them. It turns out that we can use this to demonstrate in a very simple way why the difference between significance and signification is important to how we recognise objects. Figure 19 shows three figures, which are constructed by arranging thirty square elements in different ways. What does it means to say that we recognise these objects? It seems to happen in two stages. In the first stage, we identify a shape, in the second we assign that shape to a category, that is, we give it a name. In the first two shapes, we see just two shapes. We easily recognise the difference between the two shapes, that is, we readily make a purely configurational distinction between the two objects. But we have no category to which we can assign either object. The process of object recognition is therefore ended at the first stage. In the third shape we also see a shape, but this time we conjecture a category: the shape looks like an over-regularised humanoid, so we conjecture it is meant to be either a robot, a caricature human, or perhaps a toy. That is we have a second, semantic stage of recognition built on the first.

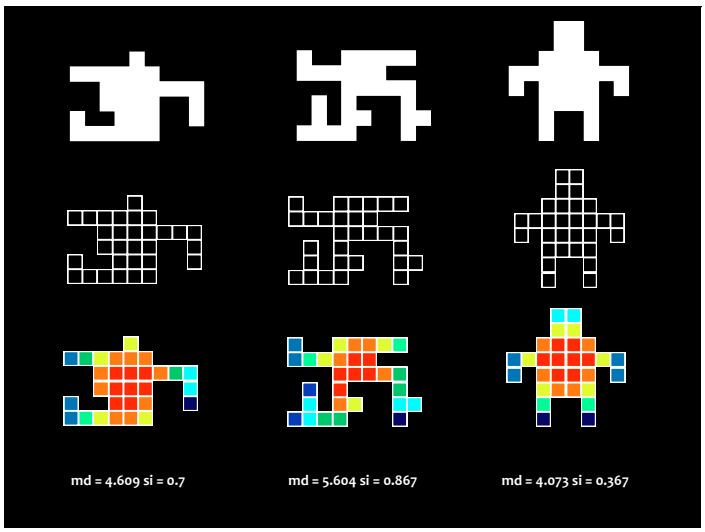


Figure 19. Different arrangements of thirty square elements.

The first is of course the syntactic, or *significance*, stage of object recognition, and the second the semantic stage, or *signification* stage. In both stages, forms of knowledge must be used, which are both non-discursive and abstract. The first stage must use something like knowledge of configurational possibility in order for shapes to be distinguishable. If it were not so we would not be able to tell the difference between semantic-free patterns. The second uses established knowledge of categories codified by language. What is it then that we recognise at the 'syntactic' stage of the process, that is, what does it mean to recognise a configuration.

One approach to this, which has proved its usefulness in the understanding of space, is to reverse the question and ask what properties configurations have that might allow them to be recognised? One way that immediately suggests itself, since we have already used it extensively, is to analyse the configurations as distributions of total depth, or integration, values. This gives us several kinds of useful information about the configuration. First, there is the distribution of integration in

each form, as shown by the red to blue pattern. Following the lessons learned from the distributions of these values in the analysis of spatial patterns, this can be thought of a *structure* within the shape. Second, there are the integration characteristics of the form, as indexed by the mean depth values, as shown beneath each form. We see that the third shape is more integrated than the second, which is more integrated than the first. These depth values seem to correspond to certain intuitions we have about the forms.

However, there is another intuition, which is not expressed in these measures. It is obvious that the third shape is more 'symmetric' than either of the other two, since it has the property of bilateral symmetry. However, while the first and second both lack formal symmetries, they do not seem to be entirely equivalent from this point of view. The second figure seems to have a greater degree of irregularity than the first, in some sense that does not seem too far from the distinction between both and the third shape. In effect, the first shape seems to be closer to symmetric organisation than the second. Can we quantify this property?

6. A symmetry index

Let us look more closely at our 'internal' definition of symmetry based on j-graph isomorphism. Suppose, for example, we did not require j-graph isomorphism, but the same total depth. This would seem to offer a weaker form of a symmetry-like property. For example, if we load a simple linear shape with two sets of four by two cells, one horizontal, the other vertical, but each joined to exactly two cells in the basic form, the two end shapes created will have different distributions of total depth values, but all the values in the basic shape are paired in that each cell has exactly one other cell which is 'symmetrically' located and has the same total depth. This total depth equality seems to give a precise meaning to the idea of 'balanced asymmetry'. [Figure 20] (see for example, Tabor, 1982).

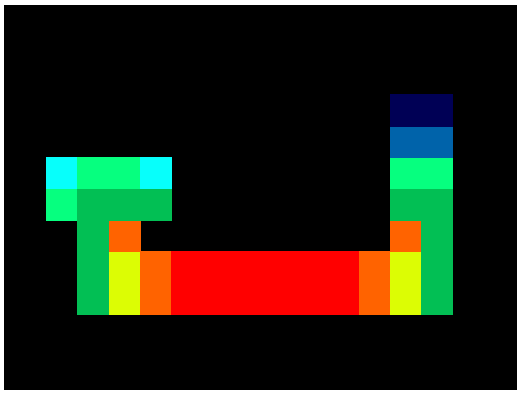


Figure 20. A simple linear shape showing 'balanced asymmetry'.

We can then apply this analysis to the three shapes shown in Figure 19 in Figure 21. Each time a shape has cells with identical total depth values we mark it with the same number, from the most to the least integrating. We see that the first shape has far more equal total depth values than the second, and in the first the equal values reach well into the integration core of the shape, whereas in the second they are distinctly peripheral. Both of these properties, as well as the degree of integration, can be represented through a simple statistical device: the line chart in which each shape is represented by a series of i-values, plotted from most to least integrated (shown as least to most depth), together with a series representing the six by five rectangle (shown as circles) to provide a baseline for comparison. The first shape is represented as diamonds, the second by triangles, and the third by

squares, with the 6x5 rectangle as circles. The overall degree of integration is indexed by the location of the series on the vertical axis. Thus, the rectangle is the most integrated, the third shape next, then the first and finally the second. Also, the shapes diverge as they move from integrated to segregated elements, so that the most integrated elements in each shape are much closer together than the least.

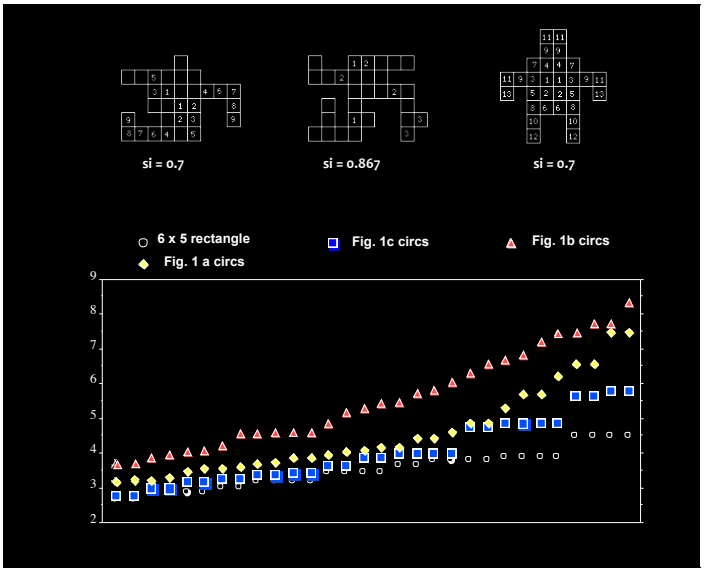


Figure 21. Graph of Total Depth Values for shapes in Figure 19.

The line charts also show graphically the degree to which j-graphs in the shape have the same i-value (or total depth from others), since identical values will be plotted at the same level and thus, form a distinct 'step' in the distribution. The ratio of the total number of elements to the number of elements that form part of such lines will index the degree to which values are the same. We can think of this as indexing something like the amount of 'weak symmetry' (i.e. with the same total depths but not necessarily isomorphic j-graphs) in the shape. Identical i-values will include both those resulting from perfect symmetry as shown by isomorphic j-graphs, and those that only share the same total depth. This may be thought of as a kind of *symmetry index*, in which a low value indicates similarity in how the parts relate to the whole (few different values compared to the number of objects), and high values indicates many differences in how the parts relate to the whole (many differences compared to the number of objects).

7. Buildings as oriented shapes

How useful are these properties in the analysis of architectural forms. First let us think about shape. If there is a configurational logic to shapes, can this be usefully applied to the analysis of the arranged masses that make up architectural shapes? This question has of course always much exercised architectural theory. One element in the 'classical theory' has been the idea that pure geometric forms lie behind the capability of built forms to communicate to our intelligence and emotions. The starting point of this belief is probably a passage in Plato's *Philebus* in which Socrates is discussing the nature of pleasure. Pleasure, he argues, is 'mixed' where it is interdependent with something unpleasant, such as relieving an itch through scratching, and unmixed where it comes through the senses from the 'beauty of colour and form... smells... and sound'. He goes on: 'I do not mean by beauty of form such

beauty as that of animals and pictures, but ..... straight lines and circles, and the plane and solid figures that are formed out of them by turning lathes and rulers and measurers of angles, for these I affirm to be not only relatively beautiful, like other things, but ... eternally and absolutely beautiful' (*ibid.*).

This passage has caused endless confusion in architectural theory, partly through the confusion of these 'Phileban' forms with the regular, or 'Platonic' solids, but more through the sheer difficulty of accounting for more than a small handful of built forms through these simple geometrical ideas. Even so, it is hard to rid the mind altogether of the suspicion that simple geometric forms do sometimes play a significant role in architecture. In design terms, also, it is not easy to dispense with the idea that simple geometric forms are implicated in the fields of possibility that the designer manipulates in the search for form.

One reason for optimism about configurational descriptions of shapes is that they take into account all the space of the form, that is the periphery, the centre, and all the space in between the two, rather than just the outline. Configurational description captures topological properties of, for example, circular or square forms which are not explicit in their geometrical description, but which can be critical to the way shapes can be useful to us – for example, the way we shape and use tables. Perhaps then, the configurational analysis of shapes can lead us to useful propositions about architectural forms.

However, we must begin by acknowledging that buildings are not simply shapes, in the geometric sense of free-standing forms in a uniform context, but *oriented* shapes, in the sense that they are oriented towards - and away from - the ground on which they stand. For example, experientially a square façade standing on the surface of the earth does not read as a shape with 8 symmetries, but more as a bi-lateral symmetry, which we relate to the bi-lateral symmetry of our own bodies, and this is perhaps a principle reason why we cannot use pure geometry to inform architectural intuition of the field of possibilities. This effect can be shown clearly by configurational analysis. On the left of **Figure 22** is a depth analysis of an 8x8 square shape, showing the pattern of mean depth from red for low through to blue for high. It shows the expected centre to edge pattern, with the lowest values in the centre and the highest in the corners. To its right is the same form with a line representing the surface of the earth – and earth-line - added. The pattern of depth now reads clearly as a bi-lateral symmetry, a remarkable but life-like effect.

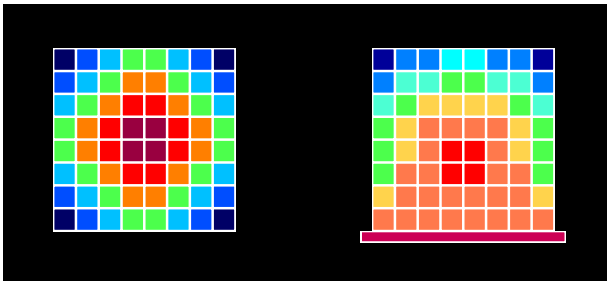


Figure 22. On the left the analysis of a 8x8 square shape; on the right the analysis with the earth-line added.

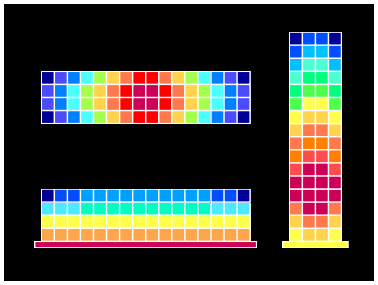


Figure 23. The same analysis (as in fig.22) for a 12x4 shape.

If we now take a 12x4 shape Figure 23, and add an earth line, first to the short side, creating a vertical form and then to the long side, creating a horizontal form, we find equally life like effects. In both cases the bi-lateral symmetry of the square shape has all but disappeared, and in its place we have, in the vertical form, strong differentiation from bottom to top, and in the horizontal form, strong similarities from bottom to top. These visual effects are confirmed by the numbers. Figure 24 shows mean depth and the symmetry index for the square and rectangular forms without the earth-line. The square has of course lower mean depth (more integration) than the rectangle, and also more symmetry. When the earth line is added to create three forms, [Figure 25] the square becomes less integrated and less symmetrical (more differentiated), the vertical form becomes a little more segregated, and markedly more differentiated (less symmetrical), while the horizontal form has become markedly the most integrated and least differentiated (more symmetrical) of the three. So verticality segregates and differentiates, while horizontality integrates and makes symmetric.[1]

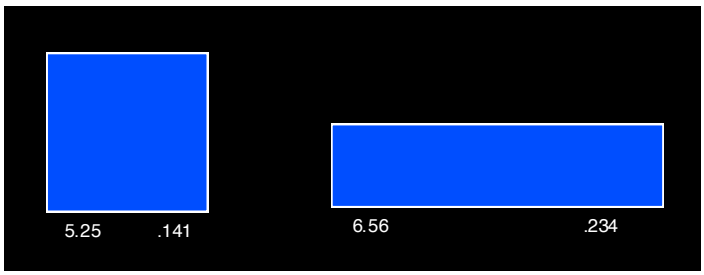


Figure 24. Mean depth and symmetry index for the 8x8 and the 12x4 shapes of Figures 22-23.

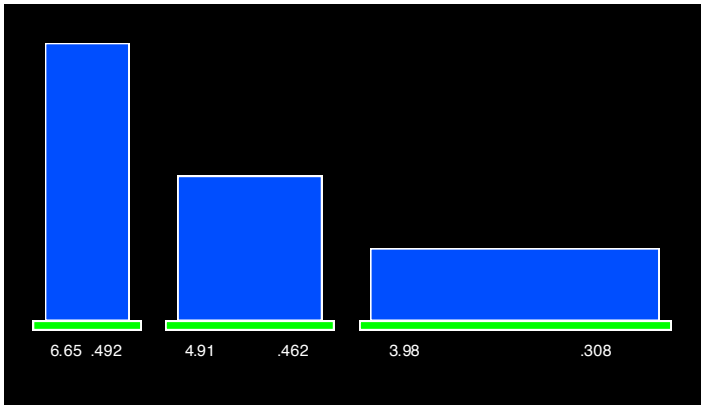


Figure 25. Mean depth and symmetry index for the 8x8 and the 12x4 shapes with the line-earth added.

See Note 1
Relevant examples: San Sebastian Design by Alberti and Mies van der Rohe's Barcelona Pavilion.

We believed these numbers reflect the intuitive semantics of these forms. In the horizontal form, insofar as elements are horizontally related, they will tend to become more similar to each other, by virtue of their closeness to the earth-line. This corresponds to the intuition that the more shapes are aligned along a surface, the more equal they become. Formally, the relation of elements approaches that of 'neighbour', which is a symmetrical relation in that if 'a' is 'b' 's neighbour, then 'b' is 'a' 's neighbour. In contrast, the vertical dimension stresses difference, in that the relations of above and below are asymmetrical. Horizontality, we may say, equalises, while verticality differentiates. Both effects will in due course be shown to be critical to the sense that buildings can convey significant information to us through their forms.

8. Complicating forms and adding figures

Even the simplest aspects of shape, then, have the potentiality to pass from significance to signification. But so far our argument has been confined to orderly forms. What about less orderly and more complex forms? And what about the relation between forms and figures? In what follows we will explore some ways in which we can exploit the two configurational measures of integration and symmetry index to take the argument a little farther. Suppose, for example we add sub-forms, such as vertical or horizontal sub-forms, to the original form. In what follows, various ways of elaborating regular forms will be examined, though always within the envelope of a 64-cell form with an earthline, to preserve comparability with the forms so far analysed. For example, in Figure 26 horizontal 8x2 sub-forms are added to a 16x3 rectangle in various locations from edge to centre, and in Figure 27 the 8x2 forms are added vertically, again in various locations from edge to centre.

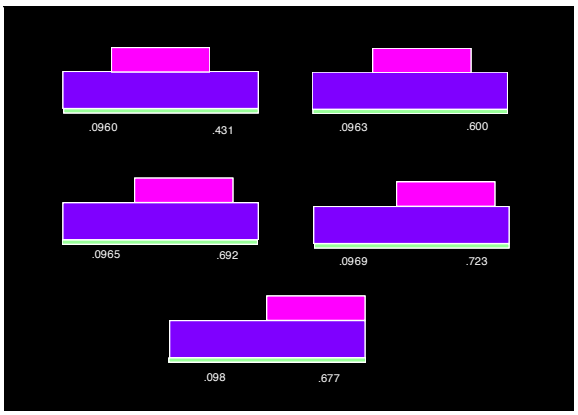


Figure 26. 16x3 rectangles: horizontal addition of 8x2 sub-forms.

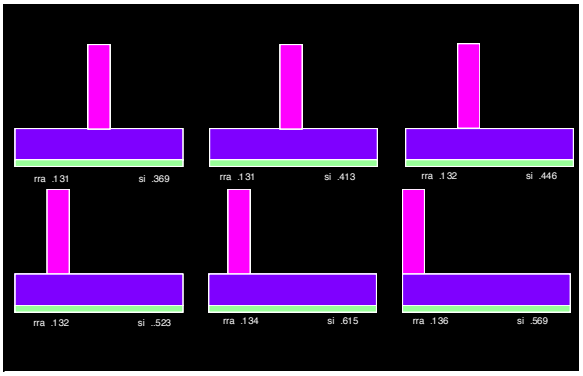


Figure 27. 16x3 rectangle: vertical addition of 8x2 sub-forms.

The effects of these elaborations on integration are, of course already known from the 'partitioning' theory for space in Chapter Eight of *Space is the Machine* (Hillier, 1996, p.216-261). Adding sub-forms centrally will be more integrating than adding them at the edge, and horizontal additions will be more integrated than vertical additions. However, the effects on the symmetry index are less simple. Differentiation (low symmetry index) is minimised when sub-forms are added centrally, but maximised towards the edge, but not at the edge. The effect is most clearly shown in Figure 28 in which symmetry index is plotted for both sequences against the distance from the edge counted as the number of cells. Both sequences show a curve that rises from centre towards the edge, but then falls again as the edge is approached. The curve formed by the vertical additions shows that the horizontal

sequence has a higher peak of differentiation, a higher overall degree of differentiation, and a more rapid descent towards more symmetry (lower symmetry indices) at the centre. The vertical sequence has a lower peak, and lower overall differentiation, but follows a similar, though gentler, curve. In both cases, differentiation is maximised towards the edge but not at the edge. Again, this seems to agree with intuition.

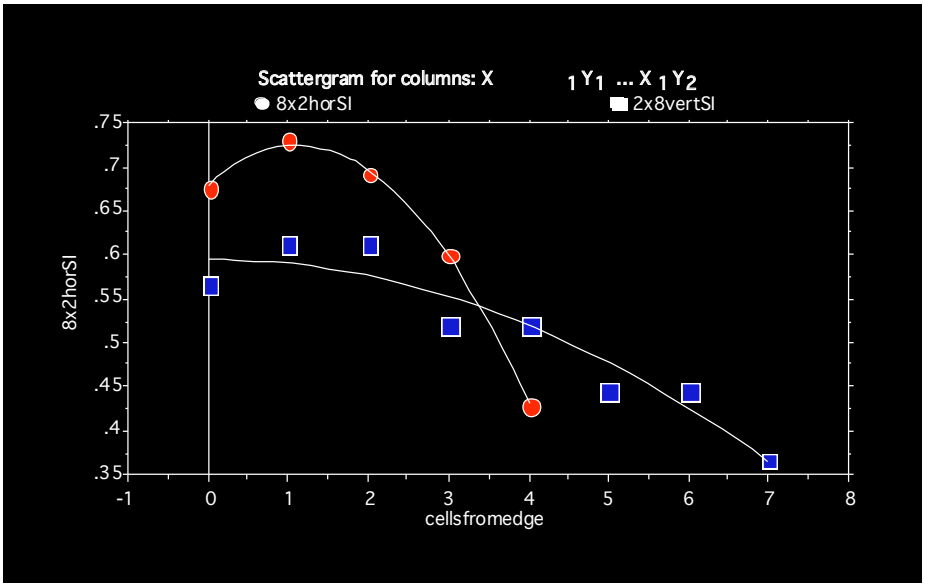
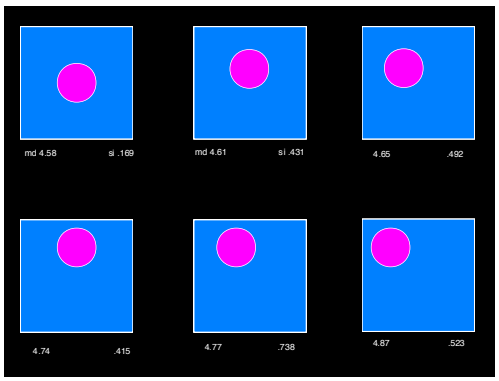
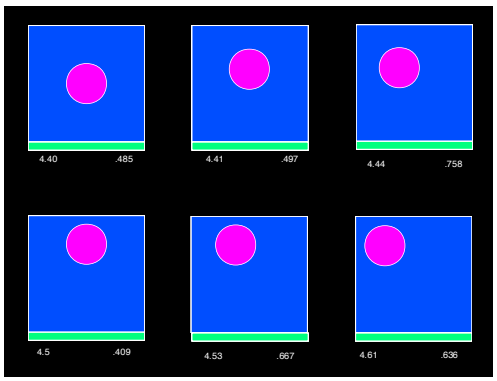


Figure 28. The effect on the symmetry index by the elaborations in Figures 26 and 27.

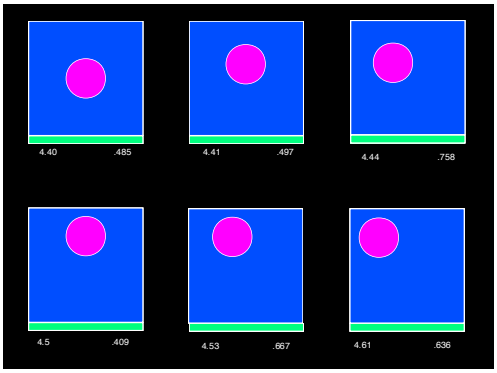
9. Adding figures to forms: is there an opposite to symmetry?

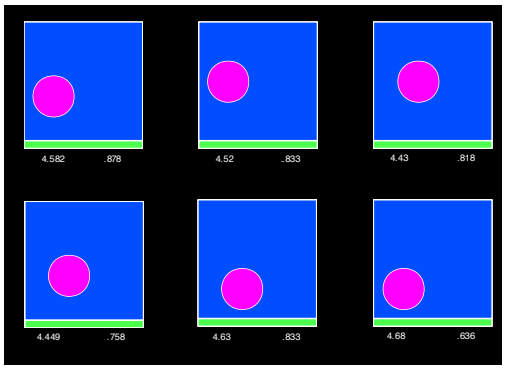
What about adding figures to forms? Suppose we first consider the effect of adding a single architectural 'figure', in the form of a circular window, to the square form without an earth-line. [Figure 29] It is clear that symmetry will be greatest (the lowest symmetry index) when it is centrally placed. But where will this value be at its highest, that is, where can we place the figure to achieve the least symmetry? The results are fairly commonsense. Symmetry is minimised when the figure is placed at the edge midway between centre and corner. But if we add an earth-line, as Figures 30 and 31 show that symmetry is not longer minimised in this location, but when the figure is close to the edge just below the horizontal centre of the form. This does seem to reflect intuitions about least ordered forms. The same is the case for horizontal shapes with an earth-line. [Figure 32] Symmetry is minimised when the figure is placed a little way in from the edge rather than at the edge. In contrast, symmetry is maximised in the vertical form when the figure is put at the top of the form, and minimised at the bottom. Figure 33 then summarises the locations where a single circular figure maximises and minimises the symmetry index on vertical, square and horizontal forms. These results are very preliminary, but do suggest there is an opposite to symmetry – counter-symmetry perhaps – though how stable these results would be under different scales of tessellation is uncertain.



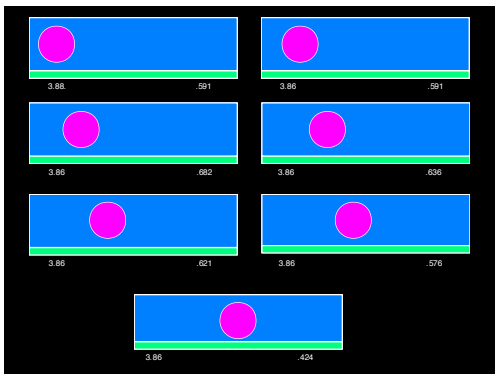


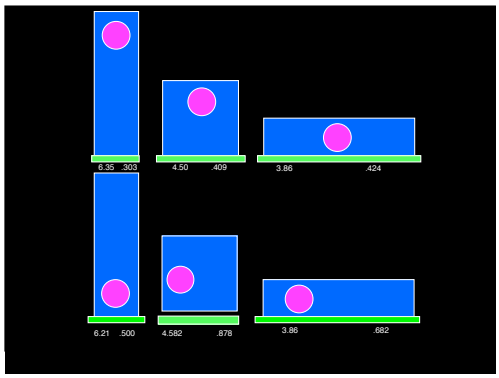
Figures 29, 30. Adding figures to forms.



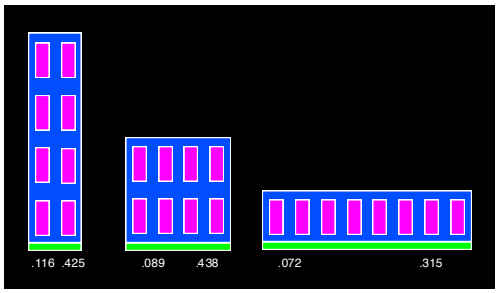


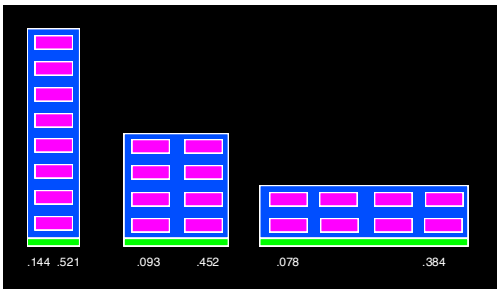
Figures 31, 32. Adding figures to forms.





Figures 32, 33. Adding figures to forms.





Figures 34, 35. Adding figures to forms.

It is also striking and intuitive when we examine the effects of multiple uniform figures on the basic forms. In Figure 34 and 35 we add vertical and horizontal figures to vertical and horizontal forms. For the already differentiated vertical form, vertical figures reduce differentiation, while horizontal figures increase it. For the – already symmetrical - horizontal form, horizontal figures decrease symmetry while vertical figures increase it.[2]

Figure 36 then shows that in general if horizontal strips are added to a vertical form, differentiation increases, while if vertical strips are added to a horizontal form, differentiation decreases. Again, these are powerfully intuitive effects. In general, vertical forms minimise integration and maximise differentiation, while horizontal forms maximise integration and minimise differentiation. This is why the horizontal forms we initially noted in the landscape seemed so apt at signifying collectivities of equals.[3]

See Note 2
Relevant example: The AEG Turbine Factory by Behrens.

See Note 3
Relevant example: Wells Coates' Isokon Building, Hamstead London.

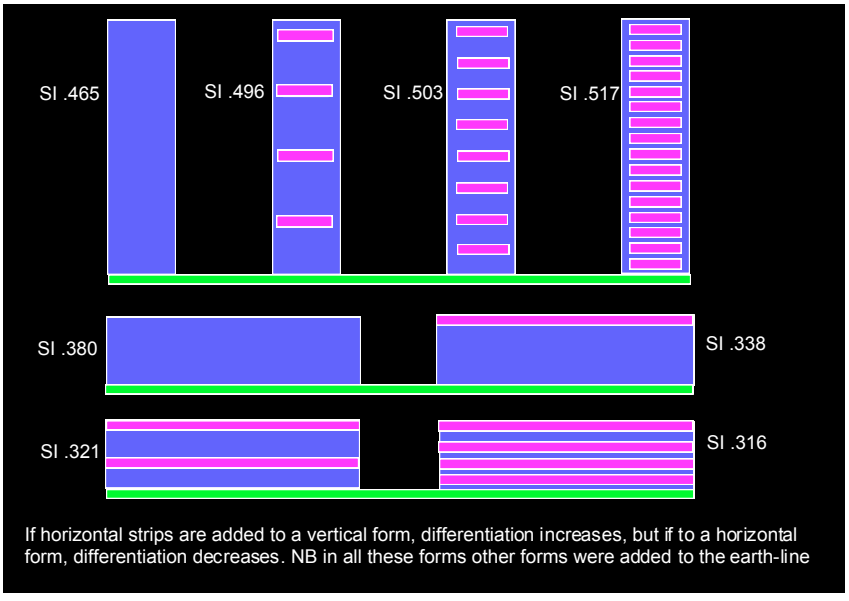
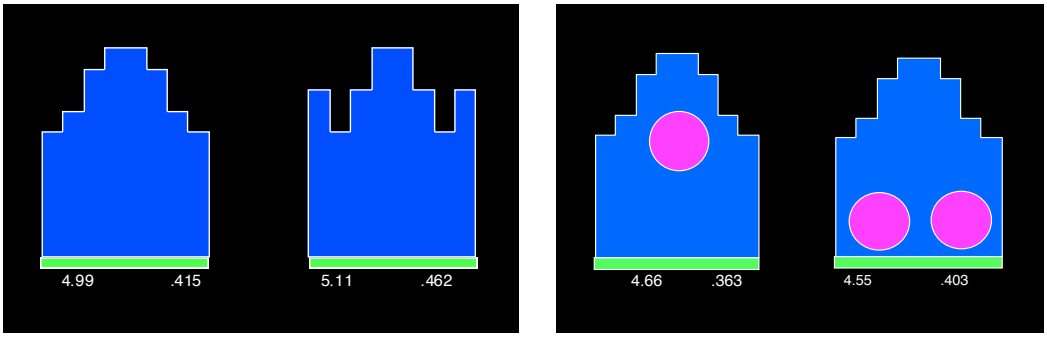


Figure 36. Effects on differentiation by horizontal additions to vertical and horizontal forms.

Finally we may return to one of our first forms, the Greek chapel. Figure 37 shows that the serrated roof line of the chapel increases symmetry more than the form shown on the right, and Figure 38 shows that a circular figure placed high on the central axis creates more symmetry than two circular figures either side of the axis. A high figure is also more symmetric than an identical figure low on the axis. It seems that the creators of the 'forms with sacred intent' that we saw were making correct judgements to increase the symmetry of the form.



Figures 36, 37. Symmetry of the Greek chapel.

10. Beyond meaning

These are no more than preliminary results from what would be a large and complex field of research, and it must be stressed again that, however intuitively clear, it is uncertain how stable these results would be under different scale conditions. But the results we have do seem to support three key conjectures in principle. The first is that the pathway to social signification in architecture is first and foremost by way of significance, or, put another way, that, unlike natural language, the pathway to semantics is by way of syntax. The second is that symmetry has an inverse, one that can play a key role in architectural meaning as well as in the meaning of arrays of objects. The third is that the kind of meaning that architecture transmits is not meaning in the sense of natural language, but something else, which we might plausibly call 'generic meaning'.

What exactly is 'generic meaning'? To give a clear definition, we need to look at the relation between mind and world in which language intervenes. A key relation of the human mind to the world is captured by the notion of *attention*. When we pay attention to something, we focus our minds on it, and momentarily exclude everything else, at least at that level. But what we attend to is not all we experience. At the same time as we focus our attention we are also aware at a much lower level of a vast number of other things in the field around us. Part of the reason we can move our attention from one thing to another so quickly is that we have this low level awareness of much more than what we are focusing our attention on.

Attention and awareness seem to work in different ways and it is tempting to follow cognitive science in describing the difference through a computer analogy. Attention is said to be 'serial', in that it happens in well-defined sequences, while awareness is 'parallel' in that a large number of things happen at the same time, if at the lower level. The coexistence of the two is explained in terms of computational necessity in the human brain: *'The contents of conscious experience, which are usually conjunctional, must first pass through a serial processor that focuses attention on specific combinations of features. The only processors in the human brain that do this are re-entrant thalamo-cortical loops. Parallel processors outside these loops perform pre-attentive sub-conscious computations, but*

serial processors embodied by the loops perform attentive conscious ones. (Kong H More Self than Self: at Autism's Edge, p.243). Pinker adds: 'Parallel unconscious computation stops after it labels each location with a colour, contour, depth and motion. The combinations then have to be computed, consciously, one location at a time' (Pinker 1997, p.141). The sheer combinatorics of the parallel world forbid its processing into serial form other than highly selectively. Hence, the permanence of the attention-awareness pairing.

Now natural language is attention-like in the sense that within a huge field of linguistic possibility, which must in some sense exist in parallel form in our minds, it outputs a serial pattern of elements, which represent some kind of order in that field. More remarkably, does so with considerable precision. On reflection, it is surprising that language is able to convey meanings as precisely as it does. If we bear in mind that nearly all words in language are abstract universals – 'between' is as much a universal as 'bird' or 'thought' – and that most words (as dictionaries attest) stand for a list of possible meanings, and which is to be used only becomes clear in the context in which it is being used at that moment, it is remarkable that language does manage to output serial patterns of words that make such clear, attention-like sense of the ambient world. Against the odds, sentences in natural language manage to be *phenotypical* in that they refer to the world, as it actually seems to be at any moment in time.

This is what we mean when we say that natural language is unique in giving priority to signification over significance: no other alleged language works in this way. The patterns constructed by the 'language' of space, for example, relate to basic types of human activity, not, other than contingently, to actual events in the world, and this is what we mean by 'generic function' in space. In this paper we have seen that something similar is the case for the 'language' of architectural form. Meaning is generic, not specific, genotypical not phenotypical. It refers to the *kinds* of things that are found in the real world, not to actual events. The reason this is so is fundamental. Architecture is not serial. It is parallel. It exists in the first instance as non-discursive order in the pre-attention parallel world. Whatever meaning it has does not take the form of serial propositions, but that of pre-attention intuitions of order in the parallel world.

This is why the pursuit of meaning in architecture by analogy with natural language leads us away from the real nature of architecture and what is communicable by architectural means. But acknowledging the reasons for this can lead us to a much more promising and precise analogy: between architecture and poetry. There are clear analogies that can be made between what poetry does and what architecture can do. But, as we will see, the resolution between the two is not on the terms of poetry. It is on the terms of architecture. Poetry, it will be argued, is language used in an architectural way, or, more generally, poetry is language used as a morphic language. The argument I will construct to support this proposition will depend, critically, on distinguishing 'meaning' from what I will call the aesthetic. Meaning, it will be argued, is necessary to architecture at the generic level outlined in this paper, but if it is taken farther in the direction of signification – that is, striving to make architecture stand for something outside itself – it tends to trivialise architecture, and distract it

from its richer purpose in the realm of the 'aesthetic'. The definition of the aesthetic cannot be given at this stage, since it is in a sense the culmination of my argument, and many prior definitions must be in place before I can attempt it. But put crudely, we can say that 'meaning' is about trying to make architecture work like a language in the everyday sense, while the aesthetic is about trying to make architecture work, in a technical sense, in the way poetry works. To make this argument clear, we will make comparisons between architecture and both poetry and science as linguistic techniques, and show how both can be brought together to arrive at a definition of the aesthetic in architecture, which will serve our purposes.

11. Poetry as a linguistic technique

So what is poetry as a linguistic technique? It is often thought that poetry is a special kind of self-expression, and so should take the form of a clear representation of the poet's thoughts. This is of course a perfectly good way of looking at natural language, with its serial and attention-like focus, but if we examine poetry carefully, it seems unlikely that any of these three aspects – self-expression, clarity and the pre-existence of the thoughts expressed – are necessary to a definition. What distinguishes poetry from the ordinary use of natural language, according to Mallarme, is that 'Poetry is not written with ideas, it is written with words'. By this he means that poetry is not so much the use of words to *express* meaning but the use of words to *create* meaning. It uses the rich potentials of words in unprecedented combinations, and so creates new and unprecedented meanings. Put another way, while natural language extracts seriality from the parallel world, poetry uses words and combinations to take the reader or listener back into the parallel world to find new connections and new richness. In natural language, the ideas determine the words; in poetry the words also determine the ideas.

So while the ordinary use of language limits our awareness momentarily, poetry tends to expand it. It does so not by pointing to more things in our ambient circumstances, but by using language to create a more multi-dimensional awareness. It does not replicate the complexity of our awareness, but creates a momentary situation in which such a world is brought into existence. It does so with a specific technique: to maximise the dimensions of abstraction (or 'meaning') that reverberate from the verbal means that we use. This implies yet another concept of meaning: one which it is not given prior to expression, but *created out of expression* and which probably cannot be transcribed into any other form. Seen this way, it is clear that the non-transcribability of poetry is one of it principle merits. We cannot create by other means what we find in poetry, since that complex of meanings, far from existing in advance and being expressed through the poem, only exists by virtue of the existence of the poem.

This can be formulated an information-theoretic terms. The redundancy, or necessary structure, in speech (or writing), in the sequencing of letters or words, refers to those aspects which are governed by the nature of the language, that is the rules governing the combination of letters into words and words into meaningful sentences; while those parts not so governed represent the choice the speaker (or writer) has and so convey the *information* content of what is said. The degree of freedom of choice exercised by the speaker is therefore related to the degree to which the hearer's (or reader's)

uncertainty is reduced by what is said. It was for this reason that the information content of language could be quantified as *entropy*, since it is represented by the degree of choice that the speaker has at every point and the relative improbability of those choices. A successful poet at each stage of the poem is able to substantially expand this field of possibility by selecting words outside the normal frame of reference given by the transition probabilities in everyday language. That is why one of the pleasures of poetry is the hearer's surprise at the unexpected use of words. By using words, the poet expands the information content of what is said by increasing the hearer's degree of surprise. Put simply, poetry expands the information content of language, and so shifts language towards greater entropy.

But there is a caveat. The poet does not simply use unexpected words. In two senses this is not enough. First, the poet must not lose the thread of meaning, the sense that the words used make sense in relation to each other. A computer could select a series of words in which their unexpectedness in relation to each other is maximised, but they would be unlikely to be heard as poetry because in the loss of the continuous thread of meaning the reader would fail to see evidence of 'poetic intent'. Just as architecture engages the viewer with the cerebral processes of the designer by showing in his buildings, however unexpected, evidence of 'systematic intent', so the poet need to persuade the hearer that he or she is more or less in control of the flow of meaning through poetic intent. So in expanding the field of possible words at each stage of a text while 'not losing the thread' of meaning, the poet in effect re-balances the structure-choice (or redundancy-entropy) content of language.

12. Architecture as poetic technique

We can say then that whatever its essential nature, the *linguistic* nature of poetry is to use language to create, rather than simply to reflect, meaning. Once this is said, it is clear than this is *in general* what morphic languages do. They do not simply aim to express a pre-given meaning in the manner of natural language, but to create a meaning out of an assemblage of elements and relations. We could perhaps qualify this in the case of architecture by suggesting there are two pathways of systematic intent from building to architectural form. The first is where the possibilities of building shape and figuring are used in such a way as to support each other, so that each confirms the effect of the other. In such cases, the different layers of form 'say the same thing'. The second is where the different layers are used in different directions, so that tensions are created between the different layers of the form. The first pathway, it might be suggested, is the pathway to meaning. The correspondence between the layers of the form eliminates ambiguity, and give rise to the sense that the building gives a strong sense of what it is.

The second pathway might then be seen as the pathway towards what I will call the 'aesthetic'. The lack of correspondence between layers creates ambiguity at the level of any simple meaning, but at the same time creates more complex possibilities of adumbrated meanings, in much the same way as good poetry creates fields of possible meanings, rather than simple and precise meanings in the manner of everyday language. An example is the protuberance in the chapel at La Tourette.

The 'meaning' is simple. The placing of the element on the axis of symmetry against an otherwise blank background, make the 'genotype of the sacred' unmistakeably clear. But at the same time the form against which it is placed is strictly rectilinear, and with a powerful horizontal line at the top, the whole part of a regular box-like structure. This both creates a tension between the form and its figure, but also reverberates in other parallel realms, which have no reference to the sacred, creating a complex semantic. So architecture as the aesthetic is doing for syntax what poetry does for semantics. [4]

See Note 4
Relevant examples: Le Corbusier's Villa Stein and Villa Savoie, and Mario Botta's House at Massagno.

Can we further clarify this notion of the 'aesthetic'? Let us start by looking in an unexpected place: the relation between aesthetics and science. As is well known, science has built into it an analytic principle, which is also a normative principle: theoretical statements must be as economical as possible for the phenomena they cover. If two theories account for the same phenomena, one simple and one complex, then we must prefer the simple one. As Ockham's razor has it: *entia non sunt multiplicanda praeter necessitatem* (entities are not to be multiplied beyond necessity). Often this is expressed by scientists as an *aesthetic* preference: theory 1 is preferred to theory 2 'aesthetically' because it is more elegant. This is an interesting use of 'aesthetic'. It implies 'simplicity', or at least economy of means. We could hardly say that we preferred theory I to theory 2 because it was more 'byzantine'. The very nature of science forbids us to say that we preferred a theory, which, while 'explaining' the same phenomena, was more complex than another.

This notion of the aesthetic is of relevance because there seems also to be an – unstated - Ockham's razor for art. Just as the criteria of the 'scientific' implies the simplest possible genotypes (i.e. theoretical entities) covering the maximum number of phenotypes (concrete entities), so the criterion of the 'aesthetic' seems to imply the least number of phenotypes to create the maximum genotypical complexity – that is the minimum of means in the form of concrete elements and relations to create the maximum ends, in terms of complexity of meaning. This seems clearly to be true of poetry. By the use of words out of their normal context and combination, poetry creates complexes of meaning – or abstract entities – which are outside our everyday experience but which by being inscribed in the poem become part of our experience. To the extent this is done with an economy of means, we think of it as better technique, and if there is a superfluity of means it seems to be much less 'poetic'.

In effect, the poet both takes advantage of the indeterminacy of meaning in words, and the richness of their potential connotations, to put them in new combinations in which each words takes on a new life by becoming part of the configurational context for others. So poetry specifically exploits the raw materials that language offers to do something quite different, namely to create rather than to reflect meaning, and for this to be effective it must conform to the 'inverse Ockham's' principle:

maximising the meaning we extract from words, and minimising the number of words. So this inverse principle is as much in the nature of poetry as the original is in the nature of science.

So we might suggest that in general, and in particular for poetry and architecture, that the aesthetic can be distinguished from meaning as follows*: aesthetic objects (including and perhaps especially architecture) become oriented towards meaning to the extent that they use more phenotypical means to construct genotypical simplicity and towards the aesthetic to the extent that they use the simplest phenotypical means to create the greatest genotypical complexity*. So in science the rule is many phenomena with few abstractions, while in art the rule is many abstractions with few phenomena. This is why a distinction between meaning and the aesthetic in architecture suggests itself. Meaning means using the layered potentials of architecture in correspondence to clarify one abstraction. The aesthetic means using the layered potentials in non-correspondence to create abstract complexity.

13. Finally

One thing is clear: the notion of meaning in architecture as it has been canvassed on the basis of the analogy with language, is largely misconceived, and for fundamental architectural reasons. It is the very generality of meaning and its syntactic nature, which conjointly give architecture its most powerful property: its syntactic allusiveness, which, because it is multi-layered, can be made to reverberate with unexpected references. If meaning in architecture were like natural language this would not be possible or useful. Buildings would have to 'mean' by making everything point one way. By using its very imprecision architecture acquires the character, which comes to be called poetic. This is not an imprecise word, not because in this architecture is imitating poetry but in that in using words poetically language is imitating architecture, that is not conjuring precision of meaning out of imprecision by the use of context but by conjuring richness of layered meanings out of simplicity. In this sense poetry is language used architecturally, that is as a configurational language in which the primary sense of meaning comes from the order and structure inherent in the form itself, not from its links to some pre-given realm of meaning. Architecture is fundamentally a language of significance rather than signification, and insofar as signification is found it is only as an outcome of the pathways offered by the field of possible significance.

Notes: Sophia Psarra's Comments

[1] Examples of this gravitational impact of the earth line on built form are found in many classical buildings 'siting' on a platform of steps (known as the stylobate), which accentuates the bi-lateral symmetry of a building, and expresses the 'anchoring' of the form onto the earth as a configurational effect based on marked integration [Figure c1, San Sebastiano, design by Alberti, 1460]. Barcelona Pavilion designed by Mies van der Rohe, is another example in which a raised platform is used to emphasise the horizontal elongation of the form and its gravitational attachment to the earth-line [Figure c2].

Figure c1. San Sebastian, Italy, Design by Alberti

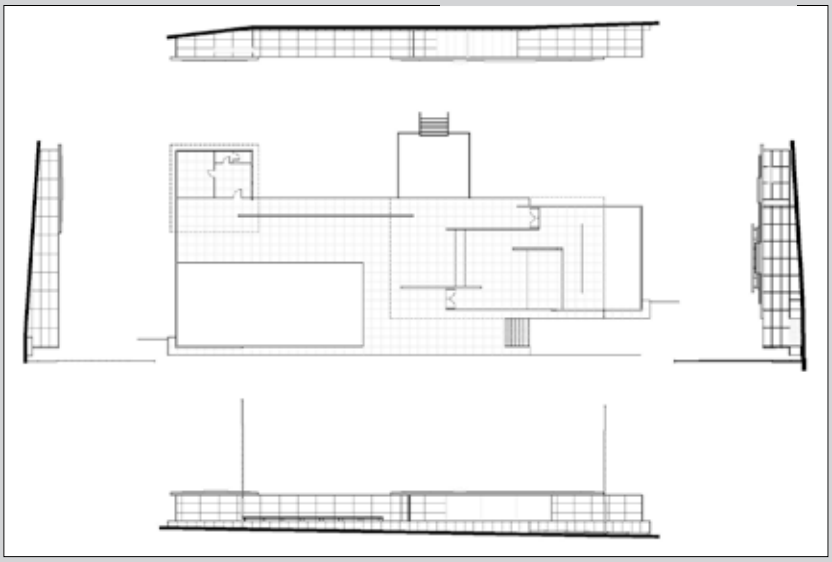


Figure c2. Mies van der Rohe's Barcelona Pavilion.

[2] A characteristic example of a horizontal form with multiple uniform vertical figures (the third form in Figure 34) is the AEG Turbine Factory by Behrens, a maximally integrated and least differentiated form resembling a compositional typology of a Greek temple and intending to elevate the factory type to a cultural standard [Figure c3].

Figure c3. The AEG Turbine Factory by Behrens.

[3] The horizontal extension of forms is often encountered in modern housing blocks (though linear elements of deck access) as an expression of collectivity, reflecting the belief of many modernist architects that the design of housing projects were capable of shaping society into ideal social communities [Figure c4. Wells Coates' Isokon Building, Hamstead London].

Figure c4. Wells Coates' Isokon Building, Hamstead London.

[4] This 'lack of correspondence between layers' can also be seen at the front elevation of Le Corbusier's Villa Stein, where the linear extension of the ribbon windows is in tension with the central placement of the terrace opening, and the symmetrical positioning of the balcony and the canopy either side of the central axis [Figure c6]. Villa Savoie is another example constructing a tension between the elongated form of the piano nobile (emphasised by the linear extension of the ribbon window) and the central organization of the ground floor volume [Figure c7]. Finally, Mario Botta's House at Massagno is an example where an elongated form is contrasted by a centrally placed circular opening. The composition balances not only the tendencies of linear extension and central organization, but also symmetry and differentiation, as the location of the central opening maximizes symmetry but the effect of the sloping earth adds more differentiation to the façade [Figure c5].

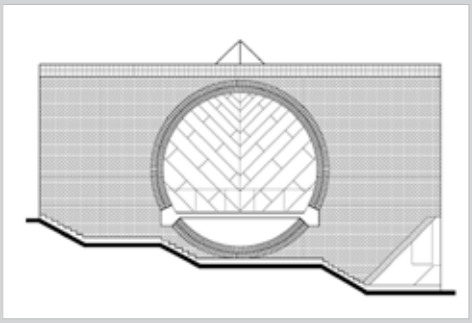


Figure c5. Mario Botta's House at Massagno

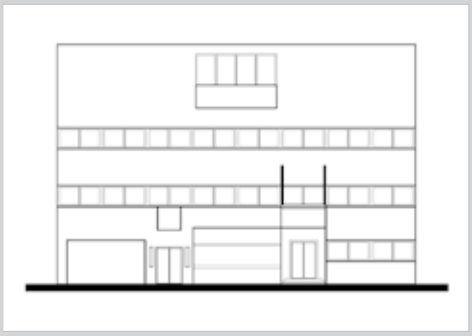


Figure c6. Le Corbusier's Villa Stein.

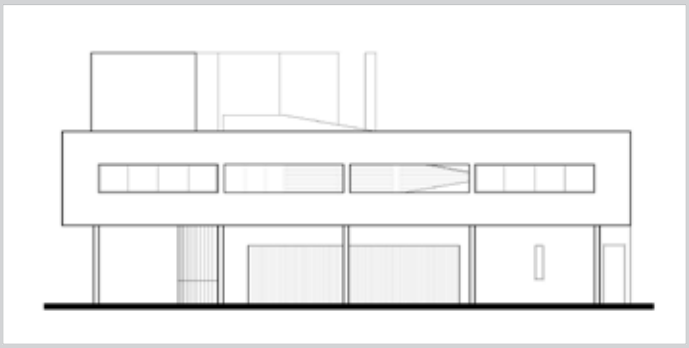


Figure c7.
Le Corbusier's Villa Savoie.

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