

# A (Cybernetic) Musing: Architecture of Distinction and the Distinction of Architecture

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## Introduction

I have not written about architecture in *Cybernetics and Human Knowing*, although my last column was about design (and architecture is at very least an artefact of design). Yet I have earned my living teaching architecture. Architecture can provide a very rich model of (almost) everything, allowing the teacher to teach (almost) anything they chose! In a world where the academic possibilities for working in cybernetics are slim, this was one strategy I could use at the start of my career to allow me to continue working in cybernetics. But my involvement was not solely mercenary. Amongst other things, I found a remarkable connection between cybernetics and how we experience architecture, which I present here as a precursor to a column I intend to write on George Spencer Brown's (1968) *Laws of Form*. Because I am writing about an intimate and personal revelation, I write this column in a more personal way than usual.

The column may also interest readers who, perhaps, are not so well informed about the material at the heart of architecture, and/or architecture as understood by an architect.

## Making Architecture

Even though *Cybernetics and Human Knowing* boasts columns written by perhaps the greatest living authority on Spencer Brown and his *Laws of Form*, Lou Kauffman, I intend to write about the subject in a forthcoming column. Amongst my earliest papers were some observations about the *Laws of Form* which are, I believe, still valid, and which point to a particular and persistent difficulty we face in second order cybernetics.

There is, however, one outcome of these criticisms that surprised, and became enormously important to me—important enough to completely change a basic (lack of) understanding. Although the sequence may be back to front, I propose to write about this outcome here, before I write about the *Laws of Form*. The outcome of course concerns architecture, a subject that I and many others have argued is a natural bedfellow of cybernetics.<sup>2</sup>

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2. I recently edited a double issue of *Kybernetes* on this theme (Glanville, 2007). Apart from my own work, early protagonists include Russ Ackoff, Gordon Pask, and Nicholas Negroponte and the Architecture Machine.

I studied architecture at the Architectural Association School (AA), in London, when it was enjoying one of its creative highs, and when London was, culturally the centre of the universe—or so we believed. We also believed the myth of scientific omnipotence and limitless technological possibilities. We were naive, but out of that naivety came my interest in cybernetics.

We students at the AA believed architecture could be anything and that architects could do anything. I expressed this belief in my studies by expending most of my efforts on avant garde music. I composed, I constructed (electronic pieces), I wrote frameworks for others to improvise in, I had a performance group, I played with other groups and I put on concerts at the AA. My contribution to the end of year show was likely to be a musical score. When I left the AA I had no more idea of what proper architects did, and of what architecture was concerned with, than when I went there.

The AA had a policy of inviting the most difficult (as well as the most talented) students back to teach. I, the most difficult, was invited to teach with a group of the most talented, including Grahame Shane and Leon van Schaik (who I wrote about in this journal—Glanville, 2006b). I learnt that I hadn't learnt, and therefore began a series of investigations with my students to understand the material of architecture that I had so singularly failed to study as a student, myself—space. Since they were first year students, we were operating at the same basic level of knowledge! The resulting material and what I learnt from it became the substance of my second PhD (*Architecture and Space for Thought*, Glanville, 1988).

This PhD recorded a sequence of experiments marked by their consistent failure. What I learnt from these experiments was that they provided no answers to the questions I was asking, although each directed me towards the next experiment. Rather, they taught me about common approaches that I learnt were alien to the way we understand space—about inappropriate pre-suppositions. In each experiment I changed pre-suppositions, for instance from deconstructing experience into a form of description based on *perceptual atoms* (qualities caught in words) to accepting experience as wholistic (a gestalt) and finding ways to explore and show this quality. Yet I never felt I understood architectural space, at least in a way which was not an intellectualisation but which related to my experience.

And then I went to Mexico. Visiting the Mayan site of Palenque, I was propositioned by a man offering to be my guide. He was the local maths teacher, and what he said fitted exactly the interpretations of Spencer Brown I had been developing, showing the interpretations at work in the Mayan temples. Suddenly I had a way of coming to understand architectural space.



Figure 1: The Temple of the Inscriptions, on the Great Pyramid, Palenque, Mexico. Note the thick wall visible in the five openings. (From a colour photo by Ranulph Glanville)

Here's what my guide did. He asked members of the small group I was in whether we understood the mathematical concept of zero. He pointed out that zero is a number with unique qualities, being neither positive nor negative: it is the number between. Zero marks the mathematical space between positive and negative numbers, but is not really a member of either: it creates class of its own with very peculiar behaviours. We recognise this in our calculations of the number of years between a year on the positive side and one on the negative side. The number zero was invented in Meso-America by the Olmecs about 400 BC, contemporaneously with the (independent) Indian development of a similar concept of zero.

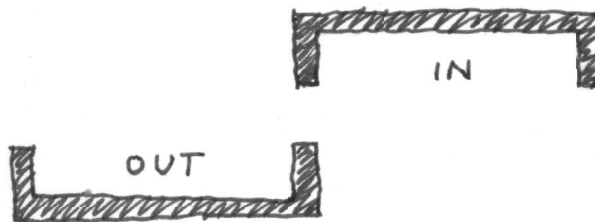


Figure 2.1: In and out, with a normal wall. From Glanville (1988)

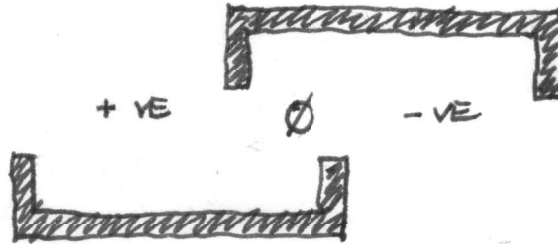


Figure 2.2: In and out, with +ve, -ve and (at the overlap)  
 0 space: the basis of the wall. From Glanville (1988)

Then my guide pointed to one of the openings in the front wall of the Temple of the Inscriptions, on top of the Great Pyramid. Walking up the gigantic steps of the pyramid, he asked why the wall was so thick. There is no structural reason to have a wall over a meter thick: structurally, the wall could have been much thinner. Getting no answer, he announced that the wall itself was considered a space. The Maya had, he claimed, taken the wall to embody the number zero, with “positive” space inside and negative space outside.<sup>3</sup>

Wanting us to understand this, the Maya made openings in the thick wall, a wall so thick that you had to step in the space within the wall, the opening—you could not step over it. Thus, you stepped into the space of the wall, the “zero space,” the space between inside and outside (see fig. 3).

Thus, I began to understand architectural space, because I could at last see a connection with the act of defining boundaries, edges and thresholds—and in a manner which reflected my understanding of Spencer Brown’s *Laws of Form*. I was enormously excited: for the first time, my two fields—cybernetics and architecture—came together in my understanding in a clear, explicit and experiential manner, and for some time afterwards I developed the concept of zero space, and illustrated it in lectures.

And then I found another interpretation from the same source, George Spencer Brown’s *Laws of Form*.

I would not normally write such a personal and autobiographical story. I do so because it shows a process of discovery linked to a process of self-discovery.<sup>4</sup> And because it sets the scene for me to explore the workings of the *Laws of Form/My Adventures in Typology* as a way into understanding architecture and architectural space, which I do in the rest of this column. I will argue the relationship to the *Laws of Form* in a later column.

3. Or, perhaps, the other way round: I was so excited at the zero space idea that I didn’t pay enough attention to which was which.

4. It would be better, but clumsy, to refer to invention rather than discovery, as Heinz von Foerster insisted.



Figure 3: An Arcade at Palenque: space in a thick wall.  
(From a colour photo by Ranulph Glanville)

### **Lines, Walls and Mexico**

The artist Paul Klee was one of the deepest thinkers about the elements of pictorial art, particularly the function of the line, and how it cleaves space. In his lecture notes (long before Spencer Brown's work, and collected as *The Thinking Eye*, and *The Nature of Nature*) he explores the line in great detail and with exquisite logic. He summarised some of this work in the *Pedagogical Sketchbook* (Klee, 1953) in which he makes perhaps his most famous quote: a drawing is "taking a line for a walk." Studying Klee (Glanville, 1966) strengthened my own long term interest in lines and boundaries, perhaps preparing me for George Spencer Brown's work.<sup>5</sup>

Lines are what we use to mark spaces, thus articulating them. A line divides a plane into at least two spaces. Even if it does not close in on itself, or go from one

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5. For instance, early in my student career I made a map of the town of Kirkbymoorside using many different criteria and so drawing many different lines. The boundary of visibility, the parish, memory, trade boundaries (which were international!), etc. (Glanville, Hambury & Woolston, 1967). Together they provided a rich description of the town and its edges, leading to a fuzzy definition before fuzzy was invented.

edge of the plane to another, it makes spaces. A short line placed on a plane creates different spatial zones, albeit they may bleed into each other (are not totally distinguished), one from another. But the line also has qualities of its own: colour, texture, width, brokenness. Klee explores both these aspects: the line as dividing a plane, and the quality of the line in itself. He also explores what happens when we project a line “upwards”, out of the plane: when we move from a planar 2D world to a voluminous 3D world (in architectural terms, when we build the line upwards to make a wall). For architects, most lines on plans indicate a threshold, or edge, and most of those thresholds and edges are embodied in walls.

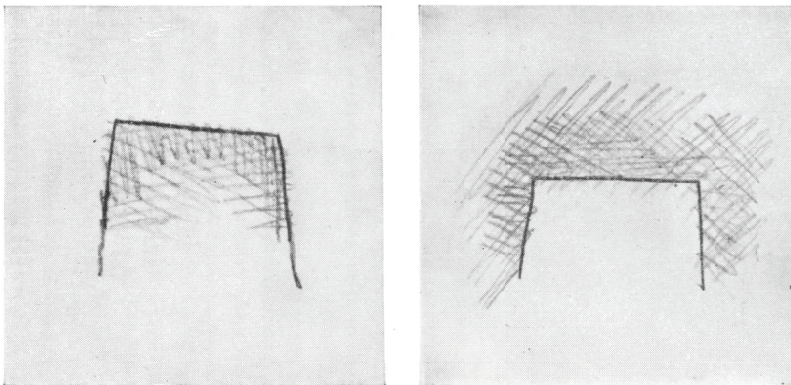


Figure 4: Endotopic (left) and exotopic treatment of a line on a plane, implying space within (endotopic) and without. From Klee (1961)

Let us, for a moment, consider a planar world (I have in mind a world like the world of Edwin Abbott’s *Flatland*, originally published in 1884). Flatland is an invented world which only exists on a plane, although the author, in order to describe it, has a privileged and omnipotent position above the plane and thus out of the world.<sup>6</sup> (This ties our discussion in to discussions of the place of the observer in cybernetic systems.) When we think of a line dividing and containing a space in this planar world, we can think of it, topologically, in two ways: as a circle or as an infinitely thin Möbius strip, that is, what I will call a Möbius line. A circle divides a planar space in two: the space inside the line, and that outside. These spaces are not connected: they are completely distinct, separated by the line. A Möbius line, although it seems just like the circle, does not divide the space at all. If you follow the outside of the circle round (trace it with your finger), you will remain outside. If you follow round (what you think of as) the outside of a Möbius line (a strip with a half twist in it), you will end up seeming to be “inside”: following further round, you will re-emerge on the “outside.” This trick is achieved by the Möbius line not actually

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6. Abbott also discusses Pointland, Lineland and Spaceland. His book was subtitled *A Romance in Many Dimensions*. To discuss a line (1 dimension) you need a plane (2 dimensions) in which the line can be drawn: and to discuss this you need, in the conventional view, to stand in space, above the plane (3 dimensions).

creating an in- or out-side: that's what is being demonstrated as your finger follows the strip.

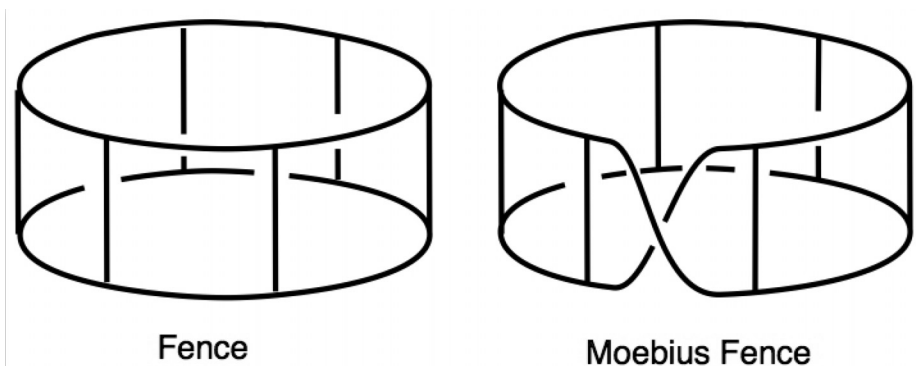


Figure 5: A fence and a “Moebius” fence, drawn by Louis H Kauffman for this column.

A Möbius line does not create a circle. That is clear in the topology of both, described above. Abbott’s *Flatland* is a parable, and I intend the circular and Möbius lines to be taken metaphorically rather than literally. When viewed from above, as Abbott does, I propose it would be very difficult to see the difference. Consider if these lines were made of string: I think we would not easily be able to tell which was which, to distinguish between them. Furthermore, to Abbott (and the traditional scientific observer), looking from above, both seem to divide the plane into two areas, the inside and the outside.

But the Möbius line does not divide the plane. Following the Möbius line around, the Flatlander will find himself “inside” the space, and later “outside” again, which is not the case with the circle. We can think (metaphorically) of the circle as doing something: it distinguishes two spaces. Through that, it creates some value. We could say the purpose of the line is to separate inside from outside (Glanville, 1990). If that is so, how do we conceive the Möbius line? It has no value in separating space (even if to the observer viewing from above it seems to do so). So what might its purpose be, where might its value reside? The way I conceive this is that its value is in itself. Since it distinguishes itself rather than inside and outside spaces, what else could be its value? All it does is be itself: it has no being through its effect on the plane. The circle’s edge may be interpreted as separating spaces, but the Möbius line is just itself. In terms of Spencer Brown, the mark that, metaphorically, is the circle creates the value that is making the inside (and outside), whereas the mark that, metaphorically, is the Möbius line can only create the value of being the Möbius line. The value lies inside (and outside) the circle, the value lies in or on the Möbius line.

Let me bring this back to architecture and the experience of space. I return to Palenque, in particular, to the walls—the upward projection of lines—in the Temple of the Inscriptions.

My guide had told me the thickness of the wall embodied the number zero. Zero is interesting in several ways and has unique properties. For the Maya, this strange

number between the positive and the negative was celebrated in architecture by being understood not just as an edge, but as a threshold—a space in its own right. The value of the wall is in its self, and not just in the way it divides inside from outside. It is a *thick* wall, existing in its own right.

If this sounds odd, think of castle walls, within which people move and live, and then think of rooms such as long galleries, familiar in British country houses, where the (conceptual) thick wall is hollowed out to form a long space, substituting for the outdoors. In the extreme, almost any building can be considered as a thick wall.<sup>7</sup>

These are walls that mark themselves as spaces in their own right. Their value is in themselves, in the spaces they are made of. They are, in this respect, metaphorically similar to the Möbius line, which ties them in with Spencer Brown's logic (which many take to capture acts of perception and cognition). With this way to understand the making of space and the function of thresholds and edges, my appreciation of architecture had begun.

So what about the edge of the wall (the circle metaphor)? Here I have to jump a little ahead of myself: I will make the argument when I discuss the *Laws of Form*, although I have dealt with aspects of this in my memorial piece for Francisco Varela (Glanville, 2002) in this journal. In that column, I reported on a paper in which Varela and I argued the process of distinguishing value from mark goes on forever. Every time I draw a distinction, I must redraw it, creating another distinction. (This is a way of stating the act of conservation in the constant object at the heart of Piaget's description of the process by which we come to populate, from the Heraclitian stream of our experience, our world with its objects.) Every time we observe the wall acting as an edge, we redraw the distinction that has its value in the space created: We recreate and confirm that space (and, hence, that wall).

Much architecture is highly decorated, with walls articulated into many *layers*. If you go into even the plainest gothic cathedral, you will find this: ribs, alcoves, columns, statues, seats—the wall is not one plane but many. I understand this as an expression in built form of the process of distinguishing value from mark, going on forever. It is not possible in the physical world to endlessly carve and mould, and the process is slow. Physically we can't build endless layers. My interpretation is a metaphor, the complexity of the layers of the built form pointing to this constant re-distinguishing, bringing it to the forefront of our minds—that is, in our mental world—so important in the act of designing. This is how I have come to understand and value complex, decorated surfaces.

I was educated, in the UK, within the modernist tradition at the point of a catastrophic cusp. We were instructed “decoration is a sin,” so this understanding was a big step. Having understood, I could reconsider the pundits' key icon of functionality and simplicity in modernist architecture, Mies van der Rohe's Barcelona

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7. Ashby suggested cybernetics is the science of all possible machines. In cybernetics we consider structure and mechanism. Thus we leave space for other aspects, which is a source of the freedom cybernetics gives. I have not mentioned the quality of feeling “inside” a space, to complement the cybernetic mechanism by which we justify the spatial notion of inside. In the case of most houses, I doubt many of us feel we are in a thick wall.

Pavilion,<sup>8</sup> and could see how the historical photographs failed to tell the experiential story, presenting little other than modernist propaganda—for this building is arguably the most sensually rich building of the 20th century. How is this achieved? Through reflection on and in surfaces such that almost every plane is ambiguously located and includes aspects of other planes reflected in it, often even appearing to be “outside” the building. The building offers a veritable festival in the constant re-distinguishing of space and wall, of layers and what, when carved in mediaeval stone, is called decoration.

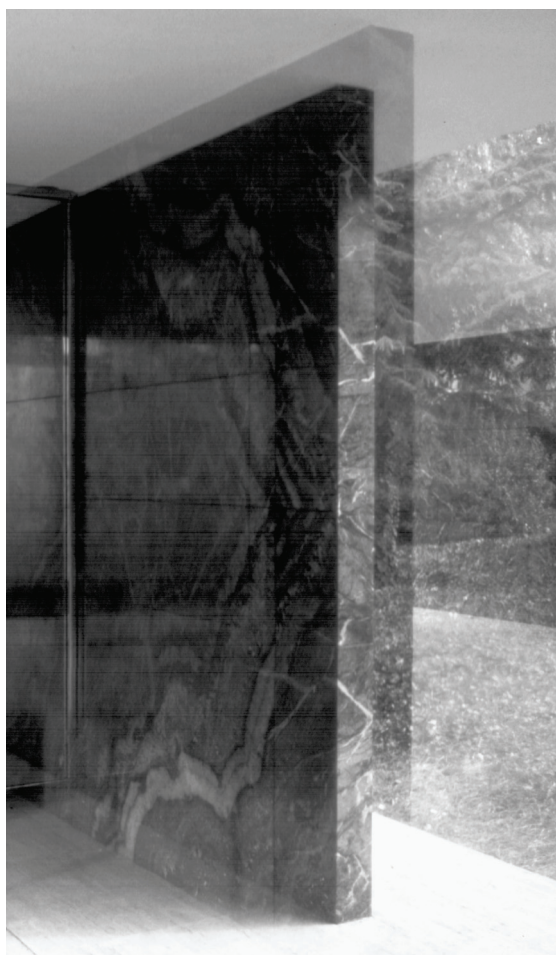


Figure 6: Multiple reflections on and in glass, and on polished onyx, in the (reconstructed) German Pavilion (the “Barcelona” Pavilion, architect Mies van der Rohe), bringing spaces into each other through reflection and transparency. (From a colour photo by Ranulph Glanville)

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8. Mies van der Rohe’s German Pavilion was built for The Barcelona World Exposition. It was open May 1928 to January 1929, when it was torn down. It was reconstructed in 1986. For more see [http://en.wikipedia.org/wiki/Barcelona\\_Pavilion](http://en.wikipedia.org/wiki/Barcelona_Pavilion), and google images.

## Conclusion

Let me end making a point. I do not claim the Maya had read George Spencer Brown's Laws of Form. That would have been beyond even their magical powers! The point is not the intentions of Mayan architects, but how I can understand their (and, by implication, all) architecture—and how I can bring together two disparate areas of interest, creating a pattern that connects. I argue this is the key human quality: man the pattern maker, *homo designans*.<sup>9, 10</sup>

The key to analysis, I was taught by the composer Harrison Birtwistle, is that it is not about understanding the composer, or his music, but about understanding myself, and how I understand the music. This, too, ran counter to what the modernists at the AA told me: that “post-rationalisation is a sin.” (Modernism was very moralising, and defined many sins!) I do not suggest that the way in which I have come to understand architecture will have meaning for you. Only that it is a way that one person came to develop an understanding, which might or might not help others, either by showing how I found this understanding, or by your resonance with what I present as my understanding: but this appreciation cannot lie with me.

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- you promised to add a reference for a diagram from the *Thinking Eye*

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9. See Glanville, 2006a. The point is also made in my inaugural lecture at University College London, “Freedom and the Machine,” given 10 March 2010.

10. Translation provided for my inaugural lecture by my colleague Maria Wyke, professor of Latin at University College London.