

GENERAL INTEREST TOPIC

Masonry and the Modernist Ethic

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Frank Lloyd Wright, in his article “In the Cause of Architecture III: The Meaning of Materials-Stone” published in the early years of Modernism, is interested in uncovering the vocational role of masonry in historical traditions [Wright (1928), p. 270]. He noticed that in some architectural traditions, masonry was used to imitate posts: In Chinese architecture the construction of masonry imitated wooden posts and beams. Masonry was carved to imitate the less enduring wood. Masonry was used as an “ornamented stick” [Wright (1928), p. 270]. The Ancient Mesopotamians and Egyptians, like the Orientals, used masonry with great care and concern. In Mesopotamia, masonry was limited and hence used for only important parts of palaces and temples. The value of masonry was appreciated and used not only to secure permanence but also to express it. Masonry cladding was used where brick was not sufficient to emphasise the significance of the building. Unlike Mesopotamia, masonry was available to the Egyptian builders in abundance. They knew how to work it. They understood the functional properties of masonry: a beautiful, dense, durable material. Masonry was used to convey solidity and grandeur. For this reason the pyramids and temples to deities were completely built out of masonry. In dwellings, masonry was used in the lower courses and in columns. Only important houses were clad in masonry. The Ancient Greeks and Romans made excellent use of the functional properties of masonry. In Greece masonry was used as a construction material suited for carving, painting and rendering. Its use as structural masonry was controlled by a set of canons, the Orders. These canons were understood and developed by the Romans. Gothic architecture exploited masonry for primarily structural uses. Masonry used in Gothic architecture were selected for their technical properties. They used it in a way no other material could be used. John Ruskin wrote:

“Egyptians and Greek buildings stand, for the most part, by their own weight and mass, one stone passively incumbent on another; but in the Gothic vaults and traceries there is a stiffness analogous to that of the bones of a limb, or fibres of a tree; an elastic tension and communication of force from part to part, and also a studious expression of this throughout every visible line of the building” [Cook et al. (1912), p. 240].

Carving masonry construction with images of organic life came later. The exterior buttress to a Gothic Cathedral, designed to carry wind loads, was ornamented. Masonry was the conveyor of the symbols personifying human desires for a higher truth - God. Gothic Cathedrals are “a splendid song” of masonry [Wright (1928), p. 274]. This brief historical overview leads one to the inevitable question: What is the appropriate use of masonry in Modern architecture?

LOAD-BEARING WALLS ARE REJECTED; STRUCTURAL MASONRY IS LOAD-BEARING [WALLS]; HENCE STRUCTURAL MASONRY IS REJECTED

The context in which the Modernist idea of use of masonry matured was characterised by the state of architectural science where traditional load-bearing masonry gave way to non-load bearing applications. This shift in the philosophy of structure, which dominated the art and science of building since the neolithic revolution, is rooted in the advent of the steel frame and the demands for high-rise buildings.

Steel and concrete replaced masonry as wall construction systems shifted from load-bearing to non-load-bearing wall construction. Load-bearing walls were rejected by Modernism. With frame structures, steel and reinforced concrete replaced and fulfilled the duties of traditional masonry. Such structural materials are more efficient products than masonry especially in frame structures. Masonry is strong only in compression. It is not efficient in resisting bending forces. Its weakness in tension limits its use in flat arches, lintels, beams and floor slabs.

Frame structures rendered structural masonry redundant because it is not an efficient material to deal with the load distribution problem posed by such a modern structural solution. The ‘box’ frame structural system is an abstraction of the post-and-lintel system. Its roots in this system dates back to prehistoric times and survived as the main mode of structural solution up to Roman times. The lintel carries stresses to the post. Deformation or collapse of the lintel depends on its geometry and material fabric. Masonry is weak in bending and hence the lintel size must be short. Steel and reinforced concrete lintels, being high in both compressive and tensile strength and stronger in bending, span larger openings than masonry lintels. The

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post must transfer the stresses from the lintel to the ground without buckling or crushing. The former depends on the geometry while the latter on the material used. Similar to steel and reinforced concrete, masonry posts can easily carry the load due to their high resistance to crushing in compression. Despite their similar structural function, masonry posts are expensive in terms of economics of material and time. A classic example of the limitation of load-bearing masonry for tall buildings is the Monadnock Building (1889-91), the last tall load-bearing masonry building in Chicago, where the walls at the ground level are about 4.3 metres (169 in.) thick. Underlying the leap from masonry post-and-lintel system to frame structure system is a crucial concept in the philosophy of architectural science. Since frame structures are rigid, the concept of duality of post-and-lintel system was abandoned for a uni-system in which stresses are distributed throughout.

The traditional structural use of masonry was no longer required as load-bearing walls were banished from Modern architecture. In non-load-bearing walls, loads are carried by the structural frame. In both steel and reinforced concrete frames, the function of the wall is just environmental. Such walls provide a skin to the exterior of structural frames to keep out the elements and thus such environmental screens are frequently referred to as curtain walls.

Load-bearing walls carry loads imposed on the structure while non-load-bearing ones do not carry any. In the former type of construction the function of the wall is both structural and environmental. Masonry has to carry dead and live loads together with lateral loads. Openings in the wall weaken the overall resistance of the wall. Thus they impose limits on the optimum natural daylight factor which may be attained. In multi-storey buildings load-bearing walls must be continuous through all storeys. Large openings have to be placed one above the other in order to leave uninterrupted vertical wall space between them to transfer the loads to the ground. Such uninterrupted vertical wall acts effectively as a column. The number of openings is a function of the strength of the masonry and the stresses present in the wall.² The compressive strength of the masonry must be greater than the loads of the structure which it has to transfer to the ground. In frame construction, openings depend on the size of the bays. There is no structural need to be on one another provided that they are catered for at the structural design stage. Openings above one another is an effective economical decision because loads are transferred directly to the ground. Although this is an economical solution in structural terms, is it economical in environmental terms?

² Until 1851 the number and sizes of windows were controlled not only by engineering constraints but also by legal ones. A tax was levied on the number of windows present in a given buildings. The "Window Tax," as it was known, was introduced in England in 1696.

Load-bearing walls tend to have small openings and thus light entering the building through them is very minimal and often does not comply with the required standards of daylight factor.³ Frame structures may maximise the total uptake of daylight by having glass curtain walls. This reduction in cost of artificial lighting is highly offset by the running costs of air-conditioning systems. Glass curtain walls have undesirable thermal properties. Heat gains and losses are high and thus the internal environment of the buildings must be controlled through effective air-conditioning systems. With the advent of large bureaucracies and corporations came large office buildings. These buildings are thermally interior loaded so the problem of heat gain or loss at the curtain wall is minimised. This is also a reason for less masonry. The alternative for air-conditioning systems is the use of *brise-soleil*, a Corbusian Modernist solution of the 1930s, to provide shading in summer and the use of double glazing to retain heat in winter.

In frame structures, masonry is only appropriate to dress the skeletal structures. Compressive strength of the material is not critical since it only needs to carry the dead load of the material itself. Appearance is important when masonry is used to clothe a frame structure. This puts an entirely different set of requirements on the masonry. Colour, texture, and grain are crucial when the optimal criterion is appearance.

[ALL] ORNAMENT IS CRIME; MASONRY IS AN ORNAMENT; HENCE MASONRY IS CRIME

What is the idea of the Modern Movement with respect to the use of masonry in architecture? The reasoning underlying the Modern Movement's ideology with respect to the use of masonry might be summarised in the above syllogism.

In Modernism, masonry was not an approved material. It was traditional and thus an unprogressive material. It was contagious and treated with great caution because of its historic use as a conveyor of architectural styles. The Egyptians loved masonry, the Greeks abused it, the Gothic builders glorified it and the Modernists rejected it. Modernism is a term applied to twentieth century avant-garde movements in Western Europe at the turn of this century. These various strands of Modernism share three main characteristics: a rejection of historicism, a concern for utilising the new constructional technologies and materials and an ambition to produce architectural designs fitting for the spirit of the age. One particular strand of Modernism is

³ Other methods may be used to achieve the desired daylight levels. These includes the use of light wells, light shafts, etc.

represented by Futurism, an Italian movement dating from 1909 to World War I. The *Futurist Manifesto* called for an anti-tradition, historical continuity, an inspiration from mechanical world rather than natural one and, finally, a representation of speed and dynamism of 'modern' life. The *Futurist Manifesto* proclaimed:

“That ‘Futurist’ architecture is the architecture of calculation, of audacity and simplicity; the architecture of reinforced concrete, of iron, of glass, of pasteboard, of textile fibre, and of all those substitutes for wood, stone, and brick which makes possible maximum elasticity and lightness” [*Sant’Elia et al.* (1914), pp. 36-38].

The *Futurist Manifesto* objected to the use of masonry as a construction material because it is subject to the “law of historical continuity,” and, in terms of speed and energy, it is a ‘slow’ medium [*Sant’Elia et al.* (1914), p. 35]. Why does Modernism need to substitute masonry with a new construction material such as reinforced concrete? A preoccupation of the *Futurist Manifesto* is the renewal of architecture: “Architecture is breaking free from tradition. It must perforce begin again from the beginning” [*Sant’Elia et al.* (1914), p. 35]. Futurism was interested in construction methods free from any associations with the classical milieu and the various feelings and sensations that they might auger. Masonry is a traditional structural material heavily associated with ornamental use in construction. In Modernism, the new materials of reinforced concrete and steel were approved materials because they were never used to create a pleasing architecture. Is the debate on stripping ornament from architecture a truly Modernist issue? How does the debate fit with the Modernist agenda?

Arguments about ornament were debated seriously in the nineteenth century by both British and German scholars and critics. The former was characterised by writings of Augustus Welby Northmore Pugin, John Ruskin and Owen Jones while the latter by Gottfried Semper, Otto Wagner and Adolf Loos. There seems to be a consensus among architectural theorists, dating back to Pugin, to consider ornament to be more related than decoration to the mode of construction. For Pugin “all ornament should consist of enrichment of the essential construction of the building” [*Pugin* (1841) p. 1]. For Ruskin architecture is the art that “impresses on its forms certain characters venerable or beautiful, but otherwise unnecessary” [*Ruskin* (1849) p. 61]. It is embedded in nature, the source of decorative motifs and spiritual nourishing. According to Ruskin, artists may be classified into two categories, those who attempt to improve nature and those who believe that nature should improve them. Architects trained in the Classical tradition belong to the former while architects trained in the Gothic tradition belong to the latter. Prior to discussing the various styles of ornament, Jones states a number of general “propositions” underlining his study [*Jones* (1856)

pp. 5-8]. Proposition 5 states “Construction should be decorated. Decoration should never be purposely constructed” while proposition 8 states “All ornament should be based upon a geometrical construction” [*Jones* (1856) p. 5].

On the German side the attack on ornament was waged by Loos in his article entitled “Ornament and Crime” [*Loos* (1908)]. Loos’s arguments are related to arguments advocated earlier by Semper and Wagner. In his article, translated into French by Le Corbusier, Loos associated ornament with crime. At the time the article was written many individuals, including a number of architects, thought of design as a collage of ornamental details. Loos banned all traditional ornament, claiming that, for any given culture, ornament is inversely proportional to civilisation. He suggested that love for ornament was pathological, quoting as evidence to his argument the fact that most convicts had tattoos. Loos was a protomodernist “par excellence.”

The First World War and the subsequent economic crisis were fertile grounds to the utilitarian ideals of the Modernists. The main aim of the 1920s and 1930s Modernism was “to try to evolve a new architecture fitted to the twentieth century, based on new materials, new techniques of construction and a rethinking of the uses of buildings” [*Conway et al.* (1994) p. 25]. Modern materials and methods captured their imagination. They advocated fasting from ornament. Utility is the objective. A particular mystique surrounding the engineer developed. Reyner Banham wrote that

“The mystique of the engineer as the noble savage of the machine age: a mystique owed partly to Adolf Loos who always admired what he believed to be unselfconsciousness in design, and partly to the Futurist Movement who professed to see in engineers the outlines of an alien culture “the gift of mechanical prophecy, the flair for metals”” [*Banham* (1975) p. 44].

In the inter-war period moral, economic and historical arguments were used by Modernists to strip ornament and decoration from buildings. Honesty to structure and materials was their ideal, an ethos carried forward to the post-Second World War period. Most buildings constructed along the Modernist ethic were not ornamented in a traditional way: Loos’s Muller House (1929-30) in Prague and Erno Goldfinger’s Willow Road Houses (1934-37) in London. In the Muller House, screen-like facades and extended walls are intrinsically non-traditional ornaments. Goldfinger’s Houses were an attempt “to combine sensibility and the culture of modern architecture” [*Withers* (1995) p. 69] Materials and modern building techniques are integrated in a highly innovative contextual design.

In the Modern Movement there was no explicit reference to historical styles. This condition was more pro-

found than just 'style'. It was a change in thought patterns that placed value on utility over appearance. Eighteenth century science was still governed by appearance. As morphological distinctions gained importance so did utility. The Modern Movement did not choose to not differentiate itself with 'style'; it thought of the building in a whole new way where differences in appearance based upon style ceased to be useful. What was previously understood by ornament was replaced by something else. The inter-war Modern architecture of Le Corbusier, Mies van der Rohe, and Goldfinger included classical references. To justify its philosophy and the accompanying stylistic vocabulary, the post-war British Modern Movement resuscitated Pugin's ideas of honesty to structure, function, materials, and spirit of the times [Bianco (1998)]. Being denied ornament as a means of embellishing buildings, Modernists turned to construction methods and materials to create new ornamental emphasis: Mies van der Rohe's Barcelona Pavilion (1929) and Tugendhat House (1928-30) at Brno in the former Czechoslovakia. As the architect Hans Poelzig explained the issue at the time,

"The play of ornament, surface, and decoration in the earlier [pre-modernist] sense is now so to speak forbidden. But has it really, totally ceased? Instead of hand-wrought, or even machine-produced ornaments, we now see the use of valuable materials: lacquer, glass, metal, masonry. The interplay of these different surfaces now replaces the interplay of ornament. ... Having been denied the use of ornament by the development of present-day [Modern] architecture, [the Modernist architect] will begin to play with construction methods instead" [Poelzig (1975) p. 75].

Modernist designs showed a preoccupation with proportion. Modular harmonic proportions such as Le Corbusier's *modulor*, could be regarded as a form of ornament. Further, the structure emerged as the ornament. Such is the case of the mullions of Mies van der Rohe's Seagram Building (1956-8), acknowledged to be the model for the Economist building (1962-64). The Seagram building, as the Economist building, is an illustration of how decoration with structure can be achieved. "But structural or not, those mullions serve the same decorative purpose as the fluting of an Ionic column - they emphasise verticality" [Brolin (1989) p. 642]. So does Smithson's vertical limestone cladding, more dominant in the spandrels of the bank and the residential blocks than in *The Economist* tower, serve the same ornamental function as the fluting of a Greek column. In this sense one may use Lethaby's philosophy of architecture and speak of masonry as ornament with "a utilitarian purpose, that of carrying over the virtues of the things imitated to the things made" [Lethaby(1911) p. 15]. Lethaby, an original thinker of the late nineteenth and early twentieth century, influenced the architectural thinking current in the inter-war era.

ATTITUDE TOWARDS THE USE OF MASONRY AS ORNAMENT IN POST-WAR BRITISH ARCHITECTURE

The modernist design principles were introduced into British construction in the post-war years. Modernism, with its inherent antagonism to masonry construction, became the dominant style in Britain in 1956. A key historian and art critic of inter-war and post-war Britain is Sir John Summerson. Being the assistant editor of *Architect and Building News* from 1934 until 1941, he had first hand knowledge of the architectural trends of the time, mainly focusing on the importation of Modernism to Britain from the Continent. Summerson, in an essay entitled "The Mischievous Analogy" based on a lecture given in 1941 at the Architectural Association, stated that ornament in Modern British architecture is "one aspect of architecture where historical analogy has wrought indescribable confusion" [Summerson (1949), p. 216]. In this essay Summerson argues that ornament of historic traditions includes at least two distinct types: "surface modulation" and "subjunctive architecture" [Summerson (1949), pp. 214-217]. The former signifies decorative facing of masonry while the latter signifies "the architecture of *as if*." The latter form of ornament includes plagiarism of natural forms, imitation of structural features of a material into another material and the use of architectural forms for decorative purposes. Loos did not differentiate between these two unrelated forms of ornament and in banning ornament he banned both the surface and the subjunctive.

On surrendering to Loos thesis to eliminate ornament, Summerson argued, British Modernists managed to eliminate subjunctive architecture completely but in the process they also attempted to eliminate surface decoration. Such ornament could not be eliminated. British Modernism did not free itself from the issue of surface decoration because in the anxiety to eradicate subjunctive architecture Modernist architects accepted uncritically Loos's thesis. The way ahead for post-war British architecture was to adopt a positive attitude to surface modulation:

"... Whereas "the subjunctive" is something of which architecture has divested itself with genuine relief and advantage, the modulation of surface is still a teasing and embarrassing problem which cannot be solved in a negative way and demands that change-round from negative to positive, from subtraction to addition ..."[Summerson (1949), p. 217].

⁴ Lethaby uses this statement with respect to decoration. Since he tends to use the terms "decoration" and "ornament" interchangeably, it was used at this stage with respect to ornament.

CONCLUSION

Modernist ethic with respect to masonry is grounded in the following two syllogisms:

Load-bearing walls are rejected;
Structural masonry is load-bearing [walls];
hence, Structural masonry is rejected ... **S1**

[All] ornament is crime;
Masonry is an ornament;
hence, Masonry is crime ... **S2**

These two syllogisms, S1 and S2, sum up the vocational role of masonry in strands of Modernists such as the 'Futurists'. The 'Zeitgeist' of Modern Age is rooted in the science of new materials and new structural solutions. With the advent of steel and ferro-concrete frame structures, the traditional vocational role of masonry was exiled from architecture by the Modern Movement. Thus, the use of masonry, the conventional conveyor of architectural styles and structures, was not approved in Modern architecture.

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