

## NOTES ON THE ROLE OF FORM IN THE DESIGN PROCESS by Richard MacCormac

This essay first appeared in *Arena*, May 1967

This essay was the result of having to evaluate propositions about architecture which might have been taken for granted had they not been exposed to the opposite view. It was provoked by the experience of two very different, perhaps complementary, educational environments, the School of Architecture at Cambridge and the Bartlett School at University College. Broadly speaking these represent respectively those who believe in the primacy of form and synthesis, and those who emphasise analysis in the belief that architecture is sustained by a broad base of knowledge; a host of interrelated subjects replacing "architecture" as a unique subject.

The danger of the former attitude is that form may be considered for its own sake, isolated from the forces that generate it. The priority of aesthetic goals may be assumed (1) and little effort made to counter those who believe that such preoccupations are in direct opposition to the effective solution of the urgent physical requirements of our society.(2)

The danger of the analytical attitude is less easily defined. Directing attention away from solutions back to the disciplines that contribute to them, sociology, psychology, ergonomics, engineering and so forth, has enabled architecture to tap developable sources of knowledge instead of wallowing in rapidly obsolescent aesthetic theory.(3) But this very classification may mean that those areas of mental activity not readily accessible to analysis are sieved out and ignored. The word "architecture" itself may become an empty title because it seems to have obscured the assembly of subjects found to be its real content.

Arriving at the Bartlett in 1963 after three years at Cambridge, some of us adopted a partisan stance in favour of "architecture" in the rather confused sense that we understood it. We were aware that we had inherited a "lore" acquired empirically through the spatial and formal experience of studio design, rather than a systematic body of knowledge. Our aesthetic preoccupations soon convicted us of "formalism", but our relative success in solving organisational problems prompted us to consider whether the architects' traditional concern with pattern, order and simplicity was not effective in solving physical as well as aesthetic problems. We also wanted to know more about our compulsion to achieve elegant solutions, which contrasted with the cold blooded approach of our Bartlett contemporaries.

In a lecture to the ICA Dr Ross Ashby made an interesting hypothesis.(4) He suggested that there may be "survival value" for organisms that perceive "simplicities". Perceiving pattern, form, structure, allows us to translate many stimuli into a number that can be more readily handled by our intelligence: the nervous system, he suggested, is arranged to seek simplicities,(5) and when it succeeds we experience pleasure, as we do when we indulge in other activities designed by nature to prolong or procreate our species. Within this hypothesis one might consider production for aesthetic ends as an essential playing or exercising of vestigial survival mechanisms which require gratification in the same way as aggressive and competitive energies are sublimated in sports and games.

Jonathan Miller's talk to the AA, "The Shape of Size",(6) interpreted our formal motives another way. From clinical observations of patients suffering from atrophy of the brain he deduced that we resort to making models of order in our immediate environment when we are

unable to order the world at large. Patients tended to simplify the appearance of their personal possessions as far as possible, clothes folded in squares, eating utensils arranged at right angles.

Professor Wilhelm Worringer interpreted the geometric art of primitive man in a remarkably similar way: ". . . he snatches from the uninterrupted flow of events the individual objects of the outer world which he wishes to secure by fixing them intuitively. He frees them from their disquieting environment . . . and reduces their varying modes of appearance to certain decisive and recurrent characteristics, and these he translates into his abstract linear language . . . making them absolute and inevitable." (7)

Each of these interpretations suggests that our aesthetic tendency is deep seated. What is critical in a discussion of the design process is whether such an urge works in the direction of useful rather than purely aesthetic ends. Certainly at University College it was generally held that the scientific solution of problems could hardly accommodate such apparently emotional predilections.

This attitude perhaps fails to recognise that science itself has often depended upon the postulation of elegant constructs as well as on empiricism. John Rogers (Lecturer in Philosophy at the University of Keele) has suggested (8) that the innovations made by Galileo, Kepler and Copernicus were the product of aesthetic theory rather than experiments; their own sense of harmony and order led them to make certain hypotheses in spite of the lack of empirical evidence. Copernicus' criticism of the Ptolemaic system was in terms of elegance: "it seemed neither sufficiently absolute nor sufficiently pleasing to the mind" and he argued that the problem could be solved with "fewer and more simple constructions". Kepler was apparently "delighted by Copernicus" and "perceived how clumsy in many respects is the hitherto customary notion of the structure of the universe".

Rogers pointed out that information sought subsequent to the hypothesis is of a quite different kind, and more effective, than that sought for its own sake prior to it. Dr Abercrombie has made an analogous point about the perceptual experiment with "the Hidden Man". (9) Until the face in the picture appears we could endlessly attempt to classify the black and the white patches. As soon as we recognise the head and shoulders of a man we are able to be discriminate about the kind of information useful to us.

A conceptual approach to architecture has similar consequences; as soon as we impose a system upon a range of requirements the system modifies the kind of information we need. If we accept this it means that we should attempt synthesis at the beginning of the total design process so that we can collect the right kind of information, instead of frittering away time in an all-embracing analysis which is proved largely redundant when the solution is achieved.

In the examples that follow, the designer has recognised in the range of information before him some critical requirement which could determine the general form of the building. The forms adopted in each case have an immediate aesthetic appeal; they are generic, either linear or centroidal and the concept dominates the whole solution to the problem.

The first example is a Bartlett fourth year design project for a joinery works by Robin Webster who had been at Cambridge until Intermediate. We were presented with an existing building consisting of two sheds which shared a common slot of space. The designer proposed to use the first shed as the machine shop and the second for joinery and its attendant machines and it was perceived that common to both these requirements were several linear systems.

These included trunking to extract sawdust and carry it to the boiler, and timber stored on a continuous rack served by a gantry immediately adjacent to both machines and joinery benches. The "one off" nature of different jobs meant that priorities in the production and assembly of joinery changed from day to day. There would always be unfinished components standing by machines and being overtaken by other more urgently required orders; the result, in the existing joinery works, being considerable congestion. Complicated attempts were made by some students to analyse these fluctuations, but in this example it was observed that the linear form enabled the machines to be separated out from the parking of trolleys carrying components, and the single line of machines in echelon enabled components to move down the line by passing those which were inappropriate and visiting any machine without being swivelled through more than 45°, an important requirement with long pieces of timber and one which would not have been met had the machines been arranged in parallel ranks. In this way the linear theme provided an appropriate spatial model for several processes.

The Marina Towers in Chicago take similar advantage of a centroidal form. The problem was to provide shelter for people and cars with the most direct communication between them on a small site. The solution was remarkably elegant because it was found that both kinds of accommodation and their respective kinds of access could be provided by the geometry of the cylinder. The flats utilise the radial segmental characteristic of the circle, the cars its projection into a helix, and the structure, services and communication between flats and cars are accommodated by a cylindrical core.

The discovery of a form which can meet a number of requirements simultaneously seems to require two distinct faculties. In the first place the designer must be able to project alternative spatial models for organisational requirements and, subsequently, be able to recognise that the form chosen can accommodate systems to suit others.

In the limited competition for the new history library at Cambridge, James Stirling's building was favoured because all the book stacks could be supervised from the reception desk. The radial form which achieved this was found to meet other organisational needs. By associating the entrance with the reception desk and arranging the supplementary accommodation, staff rooms, seminar rooms, common rooms and so forth, radially along two sides of the reading room, all the main destinations can be perceived and reached directly from the same point, which becomes a reference for the whole building. In addition the galleries overlooking the reading room provide visual contact between the supplementary functions and the *raison d'être* of the faculty.

The roof structure is a product, rather than a determinant, of the form. As the volumetric expression of the radial idea the value of its shape is obviously aesthetic rather than utilitarian.

But one feels, nevertheless, that it was the result of the same kind of recognition as that which correlated the physical systems of the building. The radial property of the form has been employed for both useful and expressive ends: there is correspondence rather than conflict between functional and aesthetic intentions.

The simplicity (10) of these schemes suggests a hypothesis: if several systems have to be accommodated by a design there is a greater probability that a simple form will provide for all, than will a highly determined form derived exclusively from one set of criteria.

If this is so the designer should be ready to sacrifice individual requirements initially, if in so doing there is less sacrifice than would otherwise occur in their mutual interaction. This is presumably the principle which lies behind the completely uniform gridded master plan

proposed for Loughborough University by Arup Associates, and the similar system proposed for the Oxford University laboratory sites by Sir Leslie Martin.<sup>(11)</sup> It is these generalised systems which are best able to provide for unpredictable growth and change.

The other implication of this hypothesis is that the powerful aesthetic motive toward formal simplicity and conceptualisation should not be considered an obstruction to solving practical problems but a valuable, if little understood, aptitude.

Although no general theory could be deduced from such elementary and rather specialised examples the relation between visual clarity and the order of structure, services and circulation, which they illustrate, suggests that any theory of form in architecture should be as much concerned with the role of form in the design process as with the way in which the final product is perceived.

#### REFERENCES

- (1) For example see an article by a one time research student at Cambridge which was almost entirely concerned with the symbolic and perceptual attributes of form. "Towards an Understanding of Form", Peter D. Eisenman, *Architectural Design* Oct. 1963.
- (2) For an example of this false antithesis see a Young Fabian Pamphlet by Paul Thompson with the remarkable title "Architecture: Art or Social Service?" (Fabian Society, March 1963).
- (3) Lord Llewelyn Davis: Inaugural Address in *The Transactions of the Bartlett Society*, Volume 1, 1962-3. (University College, London, 1964.)
- (4) "Art and Communication Theory", a talk given by Dr A. W. Ross Ashby to the ICA 7th April 1960.
- (5) cf Gestalt perceptual theory.
- (6) Published in *Arena : Architectural Association Journal* Jan. 1966.
- (7) "Form in Gothic" p. 18 (Tiranti, 1957).
- (8) "The Hypothesis of Harmony". *The Listener*, Feb. 18, 1965.
- (9) Abercrombie. *MLJ* 1960. *Arena : Architectural Association Journal*, June 1966.
- (10) See Rudolph Arnheim's discussion of Simplicity in "*Art and Visual Perception*", pp. 37 50. On p. 41 he says "In a relative sense a thing has simplicity when it organises complex material with the smallest number of structural features." This could be a definition of effective design.
- (11) *Architectural Design*, December 1964.