

to relate extremely specific operational policies and assessments of functional content to appropriate and economical building forms. While the capital cost penalties of misguided choice of form may not be as great as in other building types, the operational strains may be very damaging, even to the extent of influencing the hospital's success in care and therapy. Running costs of hospitals are very sensitive to badly distributed medical and logistic functions. Design difficulties are also caused by the speed with which hospital techniques change, linked to extended periods of time between the making of a design decision and its final physical commissioning.

Again, in higher density housing for local authorities, mathematical structures of the kind outlined could offer the designer and researcher great opportunities to explore the physical and cost consequences of a projected new design standard, or to describe and evaluate theoretically attractive forms of site layout against a particular brief and site. The relative absence in housing design of design information about the operational, that is to say the social, systems to be accommodated makes it at once important and difficult to search out quickly the implications of new standards and the way they interact with the old. An inappropriate choice of dwelling or layout form carries with it relatively greater cost and social penalties than in a university or teaching hospital, yet design methods of a comprehensive kind are less developed.

This is a unique and remarkable document, not only because of the wide range of sources of information and method that have been tapped or the theoretical fluency with which these have been applied, but also because of the rigour of the research process and of the care and frankness which have gone into the authors' description of it. It differs sharply from most academic building research, which is often narrow in scope, increasingly scientific in method and carried out by non-designer specialists for largely academic motives. This research, on the other hand, is broad in scope, technological rather than scientific in nature, and is specifically useful to the practising designer. In these respects, it approaches closely the type of research that could be expected within a large designer-client organization, such as a government department or a large local authority. Here its expenditure on non-project-oriented design research can be set directly against savings in the capital and running costs of its own buildings.

Although widely used in planning and transportation system design, computable models of buildings and their relations with the institutions they accommodate have not been available at all to the designer. Many individual, unrelated techniques using computers have been devised to tackle small parts of the designer's problem, however, and this report refers to many of them, as well as describing the authors' own efforts in this field. Existing computer applications to buildings have been as much in the cost control, managerial and administrative functions of building professionals as in their role as designers. It is good that this first attempt should be one that is so theoretically articulate on the design process, and one that indicates such clear procedures for the designer and client.

In the attempt to show how information about "needs" can systematically be interpreted into information about "forms", the authors may well be seen by some artist-architects as invaders of their special territory. The more explicit, external and reproducible a cycle of design becomes, the less call there must be for the exercise of internal, personal and subjective judgment, which is what an artistic role implies. It will be interesting to trace the impact of this book on the course of design of universities and other complex buildings, and on research methods and objectives in design.

JOHN BUNNEY

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Battery and Free Range Eggs

SIR,—Dr Dennis Jones claims, after full investigation, to have shown that there is no basis for the preference shown for free range eggs. In fact, all he did was to compare the cholesterol content of the yolks of six pairs of eggs, and the fatty acid ratios of 11 pairs, from one breed of hens. His investigations of embryos, chicks and earthworms, though interesting, are not really relevant, and he made no observations on the whites or on flavour.

He found appreciable differences in the cholesterol and fatty acid content of free range and battery eggs, but he concludes that these differences are only of academic interest on the grounds that battery eggs sometimes hatch better and that "essential fatty acid deficiency has never been demonstrated in man, or in adults of any other species".

Thus his conclusions are based, not on his findings, but on the *a priori* grounds that such differences are of no importance. With this approach to the problem, it is difficult to see why he carried out the investigation.

The most serious criticism, however, concerns his dogmatic statement that "there is *certainly* (my italics) no reason why they (free range eggs) should have more flavour". This is the point of most general interest, and yet it is one on which he has absolutely no evidence.

I personally have no views on the matter, but there are many people who have, and if they are to be told they are wrong on such evidence as this, they may well say "You can prove anything with statistics".

Yours faithfully,

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SIR,—A healthy scepticism is a valuable product of a scientific training, but I find disturbing the tendency to read confirmation of one's doubts in limited and in some cases almost irrelevant investigations.

In his article in *Nature*, on battery versus free range eggs, Dr Jones finds positive differences even in his experiment and dismisses these as "academic" which sounds more dogmatic than scientific. Furthermore, for most free range birds the diet is probably different from both that of battery birds and that of his experiment. Thus the distinction may be only coincidentally associated with the housing arrangements or alternatively it may be that it is largely one of freshness because free range eggs are often obtained from small suppliers after very brief storage periods. In addition, the experiments reported concerned only one type of bird and controlled conditions, very different from those of typical free range birds. Whatever the reason, I can assure Dr Jones that there is a distinct difference of taste between the free range eggs which I and my family and associates consume and the battery products normally available commercially. If it is of any help to him, I suspect that there are other differences also, such as a tendency for free range eggs to have a deeper and more "orange" coloured yolk and a rather less fragile shell. Whether these effects are real and if so whether they correlate in any way with flavour I am not certain, but I would suggest that the experiments