Not only computing—also art

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In May of this year I was with nearly 600 other architects and planners from 30 countries who gathered in Berlin for an International Conference on the Application of Computers in Architecture, Building Design and Urban Planning (PArC 79). It was perhaps the first major international conference specifically aimed at informing practising architects and planners of the scope and potential of computer aids in their professions and, as the conference chairman, John Chalmers of the UK Property Services Agency, pointed out in his closing address, it had both the problems and promise of any prototype. The problems were exacerbated by the conference being one of the first to be held in the almost completed International Conference Centre (ICC)—a monumental complex with facilities for over 20 thousand delegates and costing 800 million D-Marks (£250 million) to build. Opened only the month before, the ICC was still presenting the 1500 workers needed to run it with learning problems and this, coupled with the somewhat idiosyncratic layout of the building, made the conference a little less manageable than the organisers—Online Ltd and AMK—might have hoped. The promise however was certainly there and it seemed that most people, beginners and experts alike, found something to stimulate or inform.

The most striking aspect of the deliberations was the concern with architectural and social rather than purely computing matters. This concern however tended to be polarised between two viewpoints. The viewpoint of many of the German delegates was that computers would bring about redundancies in architectural and planning practices. The viewpoint of most of the others, particularly the British and American speakers, was that the public was not getting the quality of architectural and planning services it deserved and that computing techniques were necessary to assist in improvements. The theme of improving the quality of decision making to produce optimal designs in new ways ran through many of the presentations. John Gero of Sydney University put forward the concept of Pareto optimality in designing. Essentially this means arriving at a state where it is impossible to improve further the quality of one aspect of a design without detriment to some other aspect. He described his work which helps to create sets of Pareto optimal design solutions from which the designer is free to select a particular one to suit his special needs.

Many of the design decisions architects have to make arise from 'fuzzy', that is, fairly imprecise and difficult to quantify, concepts. In design we tend to use such words as 'very large', 'better', 'nearly' and 'almost' rather than precise numbers. Hitherto these imprecisions have been difficult to incorporate into computer programs but Bob Phillips and Dan Richardson of Bristol School of Architecture outlined their AESOP system which allows the use of such fuzzy concepts. Using their system one can, for example, find materials whose thermal properties are 'approximately 0.7' or even 'very good'. Although this approach is experimental, it is likely to lead to computer systems which are more responsive to the needs of designers than many created so far.

Perhaps the surprise of the conference, however, was the interest displayed in techniques for generating designs according to rules. Bill Mitchell of UCLA, George Stiny of The Open University and John Frazer of Ulster Polytechnic all dealt with such matters and much lively discussion ensued. Sceptics who fear that architectural thought will disappear with the widerspread use of CAAD might be interested to know that the architect most referred to was the sixteenth century Palladio!

Significant form

The reason for this concern with the works of the long-dead Italian architect arose from George Stiny's presentation on ways of generating Palladian villa plans by computer. Palladio, who restricted his villas to a range of rectangular plans formed from a basic grid of square cells—the minimum rectangle being 3 × 3 cells and the maximum 7 × 5—published his ideas in his *Four Books of Architecture*. Using the implicit and explicit rules given in those famous volumes, Stiny and Mitchell derived what they called 'shape grammars' and used these to enumerate all possible layouts that might be generated (twenty for 3 × 3 cells to over a million-and-a-half for 7 × 5). Indeed they have published a complete catalogue of 3 × 3 and 5 × 3 layouts of which there are 230 in all. Of course, Palladio was able to design and build only a small fraction of the possible configurations and clearly preferred some designs to others as he built some of the layouts more than once. Using a measure which related the amount of information necessary to describe a layout to the amount of information necessary to generate it, Stiny found

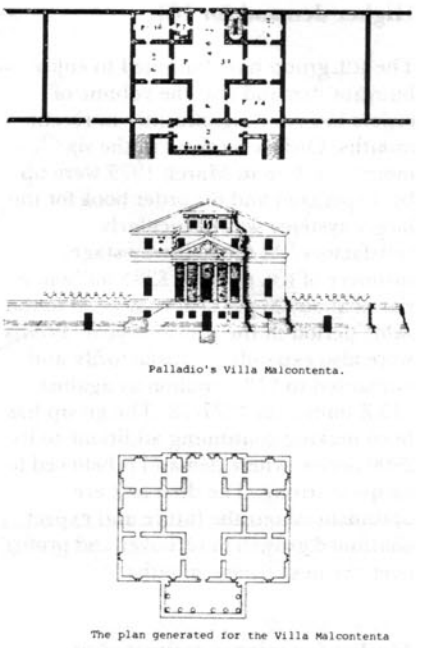

Figure 1 Villa Malcontenta

that, in many cases, the plans that Palladio actually preferred had significant scores and that arguably one of the finest of his schemes, *Villa Malcontenta*, scored best of all (Figure 1).

This beautiful result, that the most desirable plans can be generated with the least instructions, in a sense confirms what artists have always believed about unity and variety in art and will undoubtedly give further impetus to procedural and generative techniques. Anyone wishing to examine more of Stiny's fascinating work should read *Algorithmic Aesthetics: Computer Models for Criticism and Design in the Arts* (George Stiny and James Gips: University of California Press, Berkeley 1978) as well as the Proceedings to the PArC 79 Conference.

Credit where due

Last year, under the auspices of my firm, System Simulation Ltd, a number of Computer Arts Society members spent hectic weeks working on the computer animation for the new Twentieth Century Fox film *Alien*. This film, directed by British director, Ridley Scott, has already surpassed *Star Wars* in box-office takings and is a well constructed, though rather frightening, work. Not being aware of the special negotiations that have to go on to get mentioned in the titles of a major picture, we were unable to get credit for these hard workers. This is a pity, as the

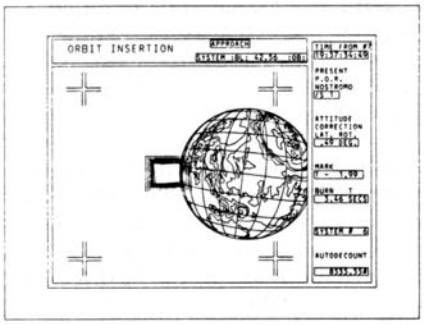

Figure 2

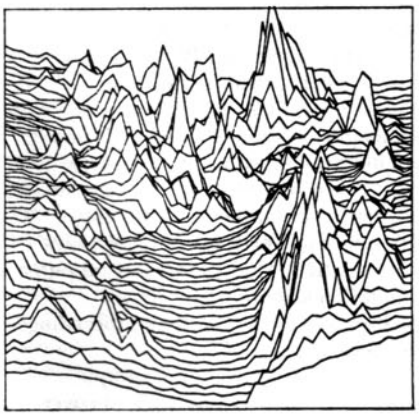

Figure 3

computer animation sequences form an integral and exciting part of some scenes (Figures 2 and 3). I mention this as an awful warning to others who might be asked to work on films—particularly with the growing interest in science fiction epics in which computers figure: make sure that you negotiate your credits even before you talk about money!

The animation was carried out on a number of different machines: a Prime 400 with FR80 plotter (by kind permission of the Rutherford Laboratory), the Computer Aided Design Centre's Bugstore, a Tektronix 4051, an Intecolor 8051, and an Altair microcomputer. CAS members involved (in alphabetical order) were: Robert Colvill, Colin Emmett, Voyciech Krawczyk, Robert Lansdown, John Lansdown, Chris Logothetis, George Mallen, Tony Pritchett, Mike Stapleton, Alan Sutcliffe and Brian Wyvill. Spare a thought for them and the midnight oil they burned as the Alien frightens you out of your wits!

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