Not only computing—also art

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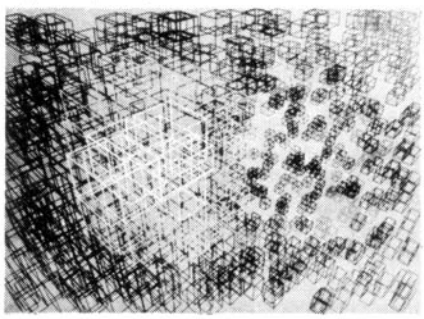
Yugoslavian first

One of the pleasantest things about being Secretary of the Computer Arts Society is that my Russell Square office is often first port of call for overseas computer artists passing through London. During the summer, I receive a stream of visitors bringing slides, tapes or catalogues of their work, news of developments in their country as well as other interesting intelligence. Recent visitors have included Manfred Mohr; a severely jet-lagged Dick Land from MIT on his way to a Sabbatical in Australia (I kick myself for not enquiring why anyone should spend a Sabbatical in Australia: suggestions please!); and, a few days ago, complete with knapsack, having just hitchhiked from his native Yugoslavia, Tomislav Mikulic.

Tomislav had come on a weekend visit to England to see what developments there were in computer animation here and was able to see some of the works of Colin Emmett and Tony Pritchett done on the Rutherford Laboratory's Stromberg Carlson 4020 and the newer FR80 microfilm plotters. He was mightily impressed by these efforts as he felt his own work had been restricted by lack of equipment. Nonetheless, he *had* produced the first Yugoslavian computer animated film which had its premiere on 13 May 1976 in Zagreb. This film (Figure 1) together with animated titles for TV (Figure 2) had been produced on a Tektronix 4012 terminal driven by an HP 2000F time sharing system and were simply photographed from the screen on 16mm black and white film filtered to give colour separation negatives. The language used was Basic.

Figure 1
Figure 2 (below)



His work was an object lesson in making do with limited resources—and, the way things are going, this is a lesson we are all going to have to learn: Dick Land said that, even in the US, funding for all sorts of university work was very difficult to come by with the result that computer art was going to be particularly hard to finance in the next few years.

Some years ago, Philip Hendren of the University of Texas described how, when walking down one of the corridors of his university he found a new colour computer display in pristine working order but discarded as surplus to the requirements of some US Navy research: he commandeered it. Clearly those days are gone.

The voice of the turtle

An exciting creative use of computing and one which, if further work confirms its initial promise, will bring considerable hope to the parents of autistic children, is outlined in the DAI Research Report No. 15 of the Department of Artificial Intelligence, University of Edinburgh. The report is titled *Using LOGO to catalyse communication in an autistic child* and describes work carried out in Edinburgh by Sylvia Weir and Ricky Emanuel making use of Dr Jim Howe's turtle—a small robot which responds to computer commands given in the LOGO language. The turtle can be made to go forward, backward, to the left or to the right and, because it carries a retractable pen, can make a drawing of the path it covers. In addition, it is able to hoot.

Weir and Emanuel describe seven sessions in which they used the turtle with seven year old David, a child who showed all the classical symptoms of autism. The report says: *Inhibited and withdrawn, he avoided eye contact and responded to questions with a stilted high pitched unnatural voice. He showed a striking reluctance to commit himself to anything. If requested to point to a particular object, he would comply only after repeated insistence.* David could read and write a little but he would never speak to anyone unless he was under stress or after considerable prompting. His favourite occupation was drawing and, when doing this, he would talk to himself but in a way that was difficult for others to understand. Beginning nervously, David soon learned the remote push button controls of the turtle, FORWARD, BACK, LEFT, RIGHT, PENUP, PENDOWN and HOOT, and particularly liked the hooting which he could accurately imitate—indeed he started off each session except the last by hooting a greeting to the machine. By the last session his behaviour had been transformed: he began to talk to the experimenters in a more natural voice, demonstrating and verbally describing the capabilities of the turtle, inventing games, actively seeking eye contact and acting out imitations of the turtle's movements!

I was disappointed that the report didn't say whether any part of David's improvement carried on after the sessions ended but work reported by Colby and mentioned in the report suggests that, of the 17 nonspeaking autistics he worked with, 13 of them improved in language development after between 50 to 100 halfhour sessions of computer interaction. Weir and Emanuel say that David's improvement arose from *the self-validating effect of understanding and being understood*—that *the highly structured but open-ended nature of the LOGO environment, in which the crucial step of seeing what is relevant is made transparently easy*, enabled David to share a sense of relevance which his day-to-day dealings with people somehow did not provide.

I read a large number of research reports: this is the first I've read in a long time that makes me want to give a round of applause.

Making further arrangements

Two more correspondents have sent me their views on the '15 rooms' problem originally posed last year (*Computer Bulletin*, June 1975). J.L. Seldon of BFPO 18, late of Brunel University, has programmed an algorithm in Jovial which deals with part of the problem in that it lists the basic layouts of the four-door room and its four adjoining rooms, avoiding rotations and mirror-images. The algorithm generates a 'house code' which can be used to examine further layouts avoiding duplicates.

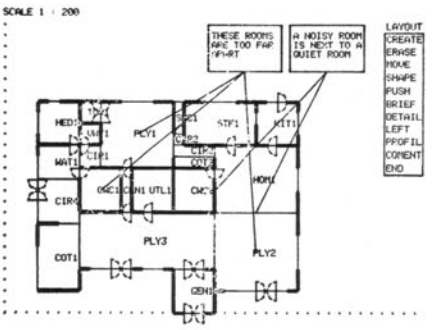
M.G. James of Manchester University Department of Physics has sent me two Fortran programs which effectively enumerate *all* the solutions, of which he claims there are 50,076 including rotations and mirror-images! This is *substantially* more than I expected and perhaps as many as 200 times more than Duncan Grant, the artist who originally brought the problem to me thought possible. The two programs both perform the same task, but

Figure 3 Typical step
Figure 4 (below) Final design

one—the fast program—is very much more efficient than the other. The essential steps in the method are:

1 Each of the 15 rooms is assigned a number. The actual assignment method is not important but James uses a system based on a binary representation of the presence or absence of doors. Room 15 is the one with all four doors.
2 A procedure is defined which represents every layout by a unique permutation of the numbers 1–14. Not all permutations of numbers, of course, represent a feasible layout so that, after each permutation is generated, it is tested to see if it can conform to a possible layout.
3 This procedure has two connected parts:
a) to express a layout uniquely as a permutation of the numbers 1–14, and
b) to try and express the permutation as an acceptable layout.

The procedure which James uses to deal with 3*a*) and *b)* is ingenious but unfortunately too long and complex to describe here. The complete description will be included in a future copy of *Page*, the Bulletin of the Computer Arts Society and I refer you to this for complete details. The output of the programs consists of a numerical listing of the acceptable permutations and the faster of the programs takes just over two hours to run on an HP 2100A. Assuming it takes only 2 seconds extra to output each drawing of a house (which would be very fast indeed), I reckon another 14 hours would be needed. No wonder Graham Grant found the problem difficult. If he was to



make a painting representing each layout taking only one day per painting and working 200 days a year, he would need four lifetimes to complete his task!

Taking part is all

One of the major problems an architect has to face in designing any building is that the product of his labours is going to be used by a large number of people most of whom will have no opportunity to influence the way the design is created. In the distant past, this problem was not too much of a defect in that virtually everyone accepted that, for reasons of prestige, grandeur, Glory of God, or other qualitative criteria, inadequacies of building performance were to be tolerated as a reasonable price to pay for the overall effect achieved. Thus in grand houses such as Blenheim or Castle Howard, the kitchens were a day's march from the dining rooms but presumably the building's owner found this defect acceptable as it kept the functions of reception suitably segregated from cooking. The servants presumably agreed, although how they kept the food warm on its journey from one place to the other is a mystery to me.

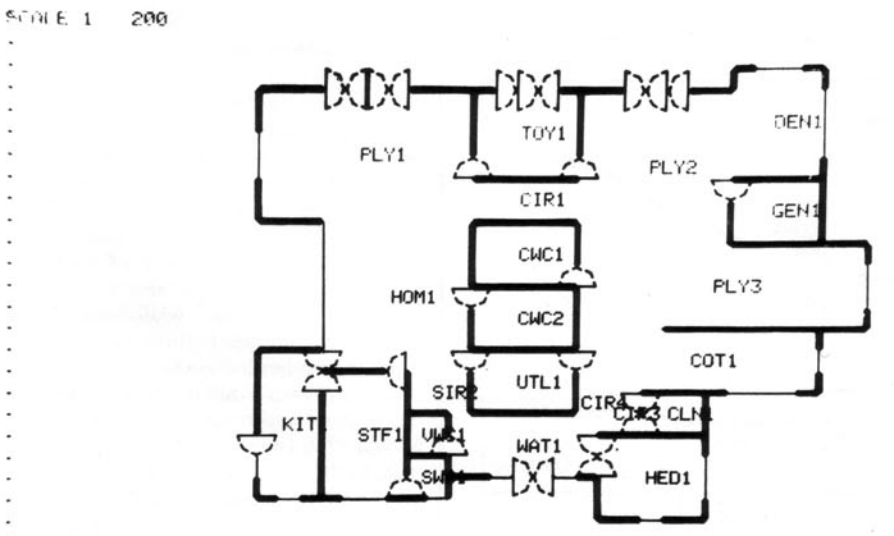
However, circumstances have changed and qualitative criteria have changed with them. People in general are dissatisfied with the present efforts of architects and planners, and require to be consulted much more than they once were. Many architects welcome this consultation—but find most of the mechanisms for consultation either nonexistent or impossible to operate. A few of us look towards computers as a tool to facilitate the participation of users in the design process and the ABACUS unit of the University of Strathclyde have a Science Research Council grant to explore and develop some computer aided techniques for participation. Robert Aish of the unit has devised a program PARTIAL, (PARTicipation In Architectural Layout) which enables both professional and naive designers to create building layouts under computer guidance. The program is in three parts:

Partial 1: which sets up the building type, allows selection of the various performance measures, and the tutorial and advice options.

Partial 2: which the participant uses to generate and interactively modify a design, evaluating it according to the various performance measures set up in Partial 1. For example, the participant can indicate which rooms will be noisy and which quiet, and obtain an acoustic appraisal of the design based on these considerations.

Partial 3: keeps a history of the participation activity and allows one to examine such things as, for instance, whether a designer improves his design by changing its geometry and configuration, or by relaxing his performance requirements.

The program has been used by nursery school teachers to design nursery schools and Figure 3 shows a typical step in the process, whilst Figure 4 shows a final design. As one of the SRC committee who originally approved the grant to ABACUS for this research, I am excited by the prospects that this line of exploration opens up. I will keep you informed of future developments.



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