Not only computing—also art

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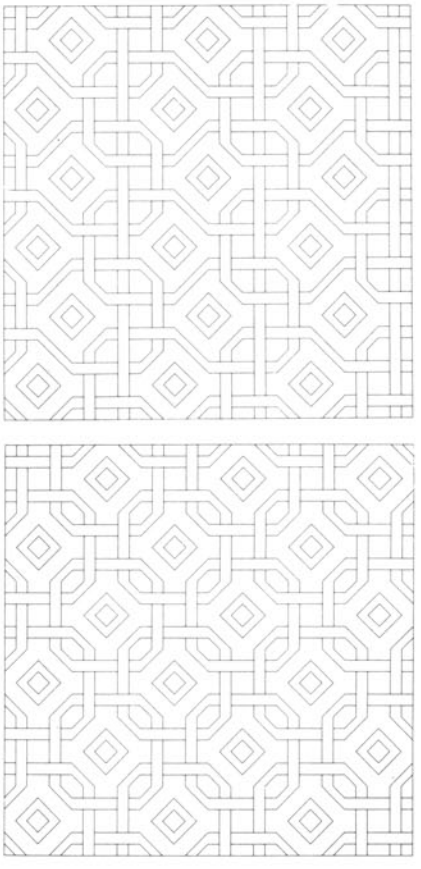
The return of the module

Ever since I first described in these columns how the use of 'modules' can be particularly effective in computer art, I have received a steady stream of graphics examples from artists using this technique. An interesting series of drawings prepared by Robert Colvill of ULCC was shown at a recent CAS meeting. These were based on the module I presented in the June 1977 issue of *Computer Bulletin*, and Robert had used this in a systematic way to produce a large number of, as it were, variations on a theme. He pointed out that, by combining orientations of the original module into larger units, it was possible to produce an apparently endless series of different, but related drawings (Figures 1 and 2), and castigated me for my statement in the September 1977 issue that there were only seventeen possible different patterns.

I realise now that, in attempting to give a shorthand note on patterns, I might have been slightly misleading, but there are indeed only seventeen regular basic patterns in the plane and these are shown together with a short and elegant proof in that excellent book, *The Geometry of the Environment* by March and Steadman (RIBA Publications Ltd, 1971). For example, even the most complicated regular wallpaper pattern can be shown to be one of these seventeen—though it's quite tricky to do so in some cases. Perhaps some patient reader would like to identify which of the seventeen patterns Figures 1 and 2 fall into. I think one of the interesting things to come out of the work so far is that even quite trivial modules, when properly combined, can produce fascinating images.

Figure 1
Figure 2

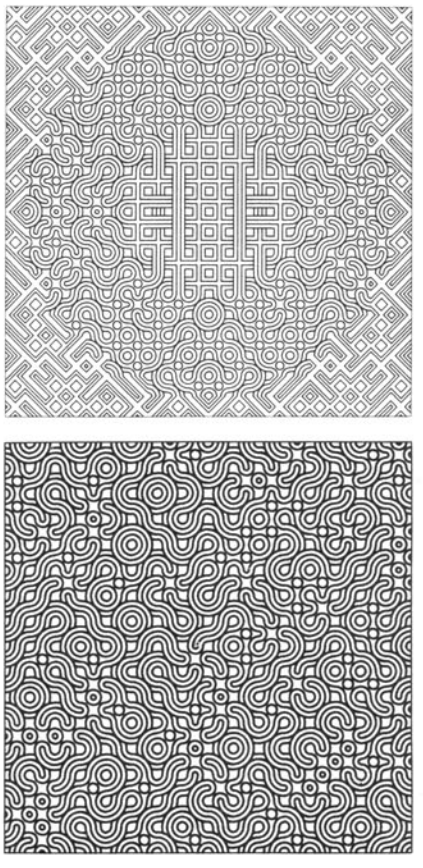


One = good, more = better

If using one, not very clever, module can produce interesting graphics, one wonders what the effect would be of using two or three more imaginative designs. Paul Brown of the Postgraduate Experimental Course at the Slade School has been investigating this point with striking results (Figures 3 and 4). Paul began consciously using modules in drawings, paintings and constructions in 1972. Originally his drawings were produced by hand—a long and difficult process—but, in 1974, as a sculpture student at Liverpool Polytechnic, he began using computers and, over the next three years, developed a number of works on a modular basis. These included some in the form of jigsaws which can be rearranged by the viewer—the most ambitious being 12 feet by 6 feet at which several people can work at the same time.

Paul says: *I have never heard a mathematician claim his work to be 'computer maths' and I am reluctant to describe mine as 'computer art'. The computer allows me to do things which would be inconceivably time-consuming, monotonous, difficult or inaccurate if done by hand. As such it is a valuable tool and one which I suspect will play an increasingly important role in future art activity.*

Figure 3
Figure 4



A prize worth winning

If I were a manufacturer in Northwest England, I'd be trying especially hard to export everything I made. Not only because that's what the country needs, but because I would want to win the CBI Northwest Export Award trophy designed by Paul Brown. The trophy (Figure 5) has, built into its pyramidal shape, a kinetic display—essentially a square comprising 32 triangular sections. These are illuminated to form a three-segment 'worm' which appears to travel about the display until it becomes trapped in a corner where it dies only to be born again at the centre.

At the heart of the device is a 1702A EPROM configured as an 8 × 32 array of 8 bits each. Bits 1 to 5 control the lamps, bits 6 and 7 control the direction of travel and bit 8 deals with the edge conditions. Altogether sixteen companies contributed help, advice, services and gifts to make this beautiful object. Congratulations to all concerned.

A country without a prophet

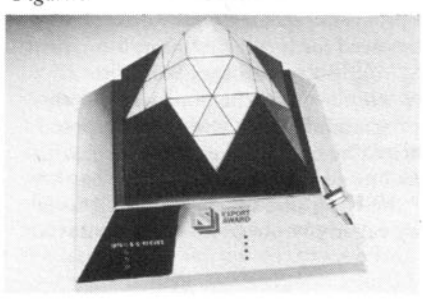
In November last year, I was lucky enough to be in Amsterdam to see Harold Cohen's latest art work—a concept which, together with Edward Ihnatowicz's Senster, is likely to have a profound and far-reaching effect on the way art develops over the next few years. Essentially, the work consists of a device for making drawings under computer control and, whilst the main feature of the idea is the program, for exhibition purposes Harold Cohen (Figure 6) has designed and built a little

robot turtle which can draw freely on a floor area of about 200 square feet.

What distinguishes this from a normal plotter is not only the size of the drawings it produces—I saw it making drawings about 15 feet long by 8 feet high—but more fundamentally, the type and manner of drawing which is unlike anything normally associated with computer art, even by readers of these pages (cover). As can be seen, the drawings are childlike and arise from an exploration by the computer not of a repertoire of forms but a repertoire of about 300 rules which it knows. These rules control the machine's responses to particular states which arise in the making of the drawing, and every response to a recognised state changes the overall state of the drawing. The program is then event-driven. What is implied by this is that the program's understanding of the drawing is characterised by the states it is capable of recognising, just as its responses are determined by what it is capable of doing. In general terms this involves simulating low level perception such as the ability to differentiate between figure and background, between open and closed forms, and between insideness and outsideness. Much of the behaviour of the program is dedicated simply to manifesting its awareness of these dualities, to saying 'Let me tell you what I know about . . .'. As it sets up the drawing, it seemed to me to sketch out areas where it would and where it would not draw, and spent some time apparently contemplating what it should do.

The program runs on a PDP 11/40 with a minimum of 64K of memory and disc operating system. It was written in the language C under the UNIX operating system, and for exhibition use, a load-and-go version runs under a minimal operating system written for the purpose. Development work on the program has been going on for five years. It is interesting to note that the turtle is not an *x-y* device: the computer controls it by sending out commands to the two stepping motors which

Figure 5



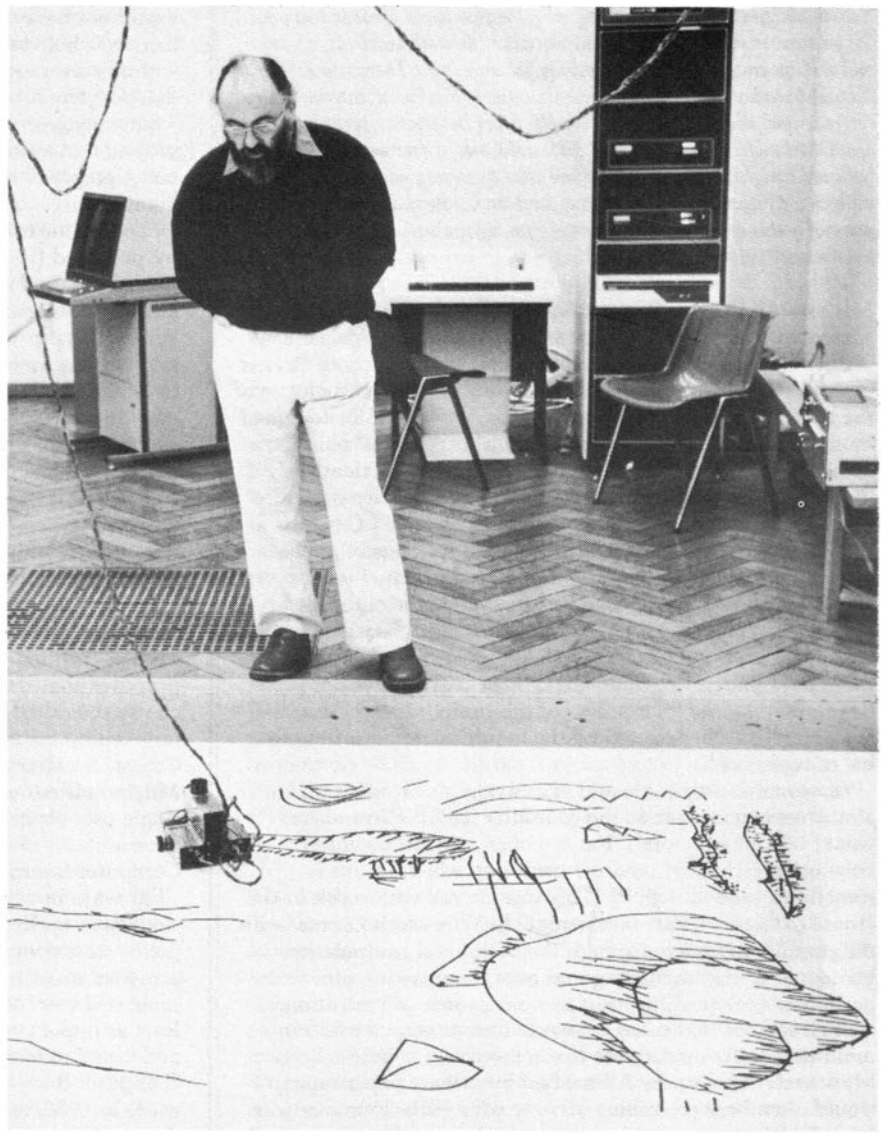


Figure 6

independently control its two wheels. Because the wheels tend to slip on the paper, the computer has then to enquire where the turtle has got to. In order to facilitate this, the turtle has a sonar navigation system controlled by a specially constructed 8080 microcomputer. Twenty times a second the turtle emits a burst of ultrasonic noise and simultaneously four counters are set running. As each of the four microphones situated at the corners of the drawing hears the noise it switches off its counter, and from the four counts, the 8080 computes the turtle's position. This method ensures accuracy to about .2 inches in sixteen feet.

For the moment at least, we will not be able to see the machine in Britain. Harold Cohen, who now lives in California, is a major force in modern art and it is to the shame of those who organise exhibitions over here in his native land, that his work is not more widely shown. Truly no man is a prophet in his own country. That's always to the country's loss. Can't we do something about it?