serendipity

Not only computing – also art

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Breaking the code

One of the pleasures of being in a profession as young as computing is that it is possible to have met many of its founding figures: Konrad Zuse, for example, the German engineer who could fairly lay claim to being the first to have made a computer; Edmund C. Berkeley, the US writer who recently visited the BCS; Stanley Gill, a pioneer who also did much to help start the Computer Arts Society; as well as numerous BCS members whom I see from time to time. Computing and mathematics became central to my interests too late for me to have met Alan Turing – but I do know some who were well-acquainted with him from their work at Bletchley during the war or, in the following ten years, at NPL or Manchester. I first became aware of him in the mid-'fifties after reading his article on solvable and unsolvable problems in the *Penguin Science News*. This was published in February 1954 and, as he died in June 1954, it must have been one of his last works. But it was not until the publication of his mother Sara's biography of him in 1959 that I realised what an important and interesting figure he was.

In many ways, his mother's book raised more questions than it answered – particularly about the curious circumstances of his death which she refused to believe was suicide and thought had something to do with his secret wartime work. So fascinated was I with her belief that something sinister was involved that, when working with a fringe theatre group fifteen or so years later, I even sketched out a rough scenario for a possible performance about his last days. However, it wasn't until Andrew Hodges' excellent biography was brought out on 1983 that we saw a clearer and definitive picture of Turing's strange life and personality.

Using Hodges' *Alan Turing: the enigma of intelligence* as a foundation, Hugh Whitemore has written a play about Turing which is currently being performed at the Theatre Royal, Haymarket in London and which all of us at my office recently went to see.

Calling *Breaking the Code* – a reference both to Turing's wartime work at Bletchley and to his apparently overt homosexuality – the play attempts to outline something of what Turing did and was. The part of Turing is taken by Derek Jacobi who holds the stage compellingly for most of the work – although is called on once again to deliver his *I Claudius* stammer from time to time, something that I can do without. From all accounts, however, Turing was not such a likeable figure as Jacobi makes him. The playwright has done a wonderful job of conveying the gist of Turing's contribution to mathematics and computing. This would be difficult enough in a fringe show where multi-media and all sorts of polemical and pedagogical devices would be acceptable – doubly so in a conventional West End theatrical setting. But Whitemore's handling of time is far from conventional and the action skips backwards and forwards through key points in Turing's life in a way which both illuminates and intrigues. More might, I think, have been made of the quarrels with authority at NPL and Manchester as well as the interaction with von Neumann: in this way both the man and his work might have been more fully drawn. He was obviously difficult to work with and, had he been less so, his computing work might have been better advanced.

Whitemore concentrates most on Turing's outspoken-ness (which he sees more as his 'truthfulness') and uses this as the motivating force behind all the character's actions. Some, I think, might have seen arrogance and unawareness of the feelings of others as the more plausible force. But my greatest unhappiness with the work comes from the portrayal of Turing's mother as a soap opera suburban housewife who seems neither to care for nor understand about Alan's work. This is not the impression one gets

Figure 1. Joanna David (Pat Green) and Derek Jacobi (Alan Turing) in a scene from Breaking the Code

from her biography where she appeared to be articulate, intelligent and caring – not just as a mother who had lost her son in an untimely way but also as a biographer who felt that her subject needed to be understood. Of course, she would not have known in detail what Turing was doing – especially at Bletchley – but she clearly comprehended its broad significance and scope. Sara Turing is, I think, done an injustice here: as is, so we now understand from correspondence in the press, Dillwyn Knox, who is one of the other main characters. But all in all, *Breaking the Code* is an impressive work, brilliantly and convincingly acted by all concerned. It should be seen by everyone who cares about the history of ideas.

Electronic kaleidoscope

Two Computer Arts Society members, husband and wife team David and Chris Brownrigg, have been developing an approach to picture-making based on the modification of video input and they recently sent me some examples of their work together with a description of their technique. They work with a BBC model B computer driving a Pluto II graphics processor and use this system to experiment with colour table and image manipulation of photographs. Frame grabbing as an art concept was discussed in the last issue of *Computer Bulletin* and the Brownriggs exploit a video camera technique to provide them with high-quality black and white input to use as their starting point.

Colour table modification is a way of using a wide range of colours with a minimum amount of memory – a technique frequently employed in computer graphics generally. It is achieved by having each bit in the picture mapped not to a full 24 bits per pixel of memory but to one of a lesser number of positions in a table which sets the colours needed. In the case of the Pluto II, a full 24 bit store would require 768 × 576 × 24 = 10.6 million bits or 1.3 Mbytes of picture store but, with a colour table, this is reduced to 768 × 576 × 8 = 432 Kbytes for the picture store and 256 × 24 = 768 bytes for the table. The eight bits of map address the 256 positions in the table. Even in these days of comparatively cheap memory, this represents a substantial saving. Of course, the effect is to reduce the number of different colours that is possible to see on the screen at any one time. A full colour map of 24 bits makes it possible to have 16.7 million colours available. (Note that only 768 × 576 = 432K different colours could be put on the screen at once – even if every pixel was different. Furthermore, the eye can only distinguish about two million colours anyway.) The arrangement in the Pluto II allows the simultaneous display of 256 colours out of the notional pallette of 16.7 million and the selection of 256 can be altered very quickly by substituting one table for another.

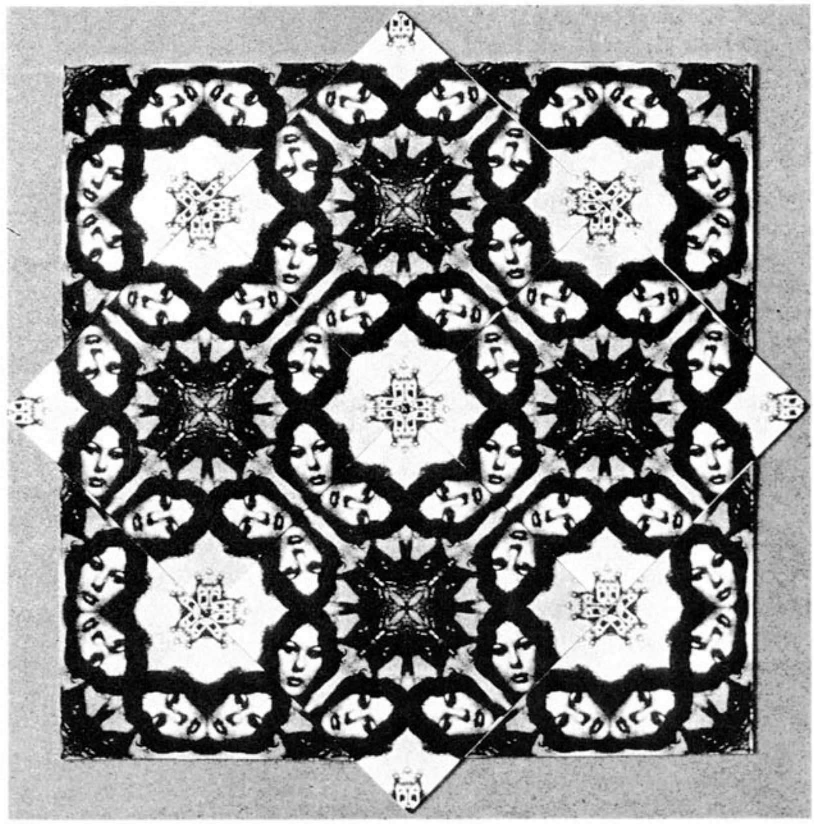

Figure 3

In the Brownriggs' case, a pictorial image is grabbed into the system and each pixel of this is automatically classified in one of 128 levels of brightness. Each number representing pixel brightness can then address one of the positions in the colour table thus allowing the picture to be false-coloured to choice. By careful selection of the brightnesses in the colour table, various forms of contrast enhancement of the image are possible. It is, for example, easy to increase or decrease the contrast in the lighter parts of the original, or in the darker, or in the midrange, or overall. This much is done simply by applying fairly standard image processing techniques. By using colour tables with non-standard relationships of brightness, pictures can be solarised or contoured in various ways. But the main manipulation to the images that the Brownriggs use is to copy parts of the pictures on to the whole. This is done either as a bordering device, as in Figure 2, or kaleidoscopically using a program that David has devised, as in Figures 3 and 4. In colour, the effects of these manipulations are quite striking and their potential for further development of new imagery is undeniable.

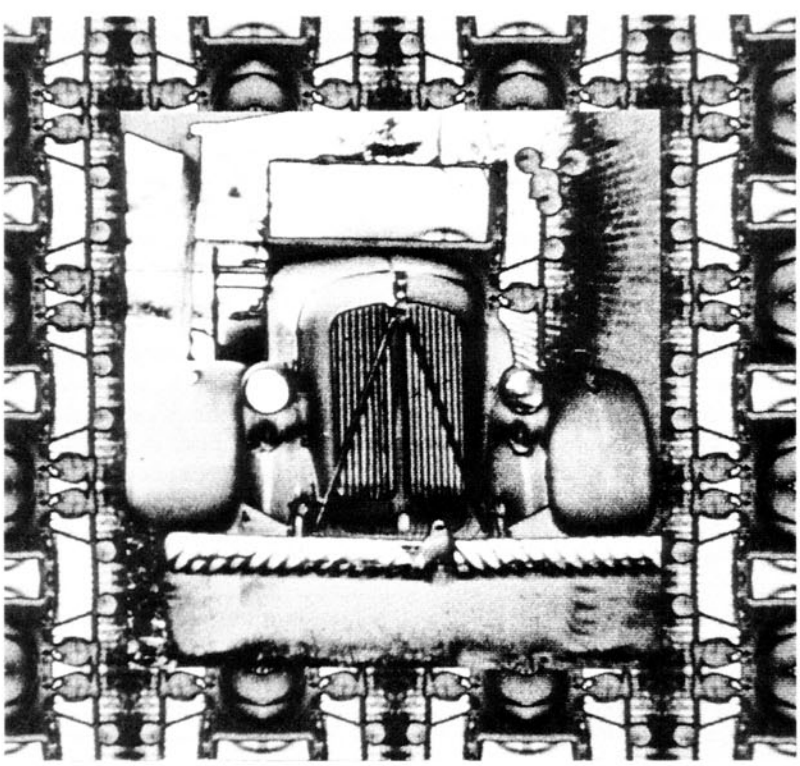

Figure 2

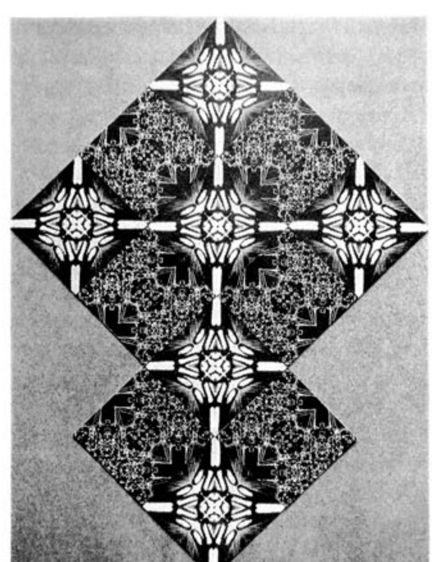

Figure 4