Art, Technology and Creative Computers

By DR ALAN LEE*

The relation between art and technology is undoubtedly complex from any point of view, and it is also potentially confusing. My aim here is to develop a general idea about this relationship, though I want to focus attention on the particular issue of computer art. For it is the computer which seems to offer the revolutionary prospect of a technological innovation which can play an intrinsic role in the creation of art.

The various kinds of art/technology interactions can, I think, be ranged along a spectrum depending upon the degree to which the technology enters into the artistic process. At the end of the spectrum most distant from computer art there are cases in which technology is important but quite extrinsic. This is so with the technology of sound recording when it is used to transmit a musical performance to an audience not present in the concert hall. In the visual arts there is a parallel to this where the technology of photographic reproduction serves to multiply the image of a particular painting, thereby making it available to an unlimited public. In both these cases the technological process is intended to be as 'transparent' as possible so that we have access to a complete and undistorted facsimile of an original work which has an independent existence.

Even when technology is deliberately kept separate from the artistic process, it is clear that there can be significant, indirect influences. The conception we have today of the history of art depends very much upon the ready availability of faithful colour reproductions; what André Malraux has called 'the museum without walls'. And with the proliferation of art journals, every aspiring painter can work with a view over the shoulder of his successful contemporaries.

But a technology will not of itself determine the degree to which interaction is possible. In different contexts the technologies of sound recording and photography do play a part in creative work (and hence take a place a little further along the spectrum of interaction). The producers of pop music have never felt it necessary to maintain a separation between the performance and the recording process. With a combination of multiple tracks, perhaps duplicating the singer's voice, we end up with a piece of music which could not be matched in a live performance. And the technology of photography, which is a passive medium for the reproduction of paintings, can itself be an artistic medium. In which case we do not simply look *through* the photograph but we look at the image the photographer has created. We learn to appreciate the photographer's choice of a point of view and the use of a particular lens, and perhaps we also see how the image has been carefully modified in the darkroom.

Although examples where the greatest potential for genuine creative interaction with artists, it is clear that they can more easily be put into service as a mere tool. A group in the United States has recently developed a computer graphics system designed for the painter. It requires no prior knowledge of computing and the novice only needs 20 minutes of orientation to learn the system. He then works with a 'palette' of 16 million colours and has complete flexibility in designing and modifying a 'painting' displayed on a video screen. There is a range of variable 'brush strokes' which can be used to mix and change colours, and erasures can be made just as easily. At the end, the finished work is automatically printed out in a permanent form. The system is already being used by students in an undergraduate studio art course. Even though it costs $20,000 the designers clearly have a market for their idea.

Such a system is, however, nothing more than a very sophisticated tool which bypasses the real potential of computer art. The idea of a systems analysis of creative practice is almost a contradiction of terms. What has apparently been analysed is the range of manipulations employed by painters, particularly the manipulations typical of formalist abstraction in the past 30 years. Such a package will at once seem to offer complete artistic and creative freedom, while unobtrusively easing its user into a straightjacket. The ironic aspect of this whole approach is that artists are invited to be creative with a predetermined system — and effectively encouraged to remain ignorant of the technology they are using.

The most ambitious computer art has been motivated, I believe, by a different assessment of the computer's potential. Rather than merely providing an enhanced facility in the manipulation of form and colour, it promises to assist the artist in processes of thought, and thus seems capable of participating in the art of creation itself.

There is a limitation, however, in that computers do not have human powers of thought, and so they may not be able to take full partnership with the artist. This becomes clear when we consider the case of literature. Although there have been experiments with computer-generated poetry, such exercises are no more than a manipulation of words according to rules of grammar. The appreciation of such poetry depends upon reading a meaning into the words which the computer cannot have put there. And there is a limit to how long we can maintain an interest in reading such work. No one claims that a computer can really understand language, and therefore no one expects a computer to write a great novel, or even a third-rate detective story.

Computers have some thought-like powers which are superior to our own, but they do not have those general powers that would allow us to make serious attributions of consciousness, perception or intention. We know that computers can be programmed to play chess, and they play very well. This

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capacity is one which we regard as requiring a high degree of intelligence in a human. Yet there are innumerable ordinary human abilities which are far beyond the powers of any present-day computer system. Consider, for example, the everyday but remarkable human ability of being able to recognise a face in a crowd.

The computer artists then, must try to discover some aspect of artistic activity which is within the powers of a computer. Attempts along these lines have been underway for more than 20 years. Nevertheless, computer artists still talk in terms of the potential of what they are doing, rather than positive achievements. Generally speaking the artworld has not taken great notice of this work. There is no sign that the results are being taken more seriously by art critics, galleries and dealers in the way we should expect if we wanted to argue that clear progress was being made. I want to consider here some possible explanations for this apparent lack of success.

The application of a computer to any complex problem depends upon a successful analysis of the task which is to be undertaken, so that it can be formulated as a program for the computer to execute. The limit in applying a computer to a problem today is more likely to arise from an inability to formulate a program, rather than the lack of a sufficiently powerful computer to do the job. When we have set the computer to perform some well-defined task, such as guiding an aircraft in flight or maintaining the accounts in a bank, it will become clear after a while whether the system actually works. But no such empirical test faces the computer artist. If he begins with a misconceived analysis of the nature of art, the products which come from his computer are unlikely to show him the error of his ways.

The most direct test might seem to be a survey of the past 20 years of computer art, which would allow us to judge for ourselves whether the works show a high degree of artistic merit. However, a superficial survey is liable to be misleading. Even the most sympathetic viewer must admit that the work is disappointing when it is realised how little of what looks good has been contributed by the computers. At first the diversity of the work might suggest a considerable degree of success. When we inquire into the origins of this diversity we discover that it is almost entirely due to the human contribution. The artist himself has chosen the forms that are to be used and the kinds of transformations they are to undergo. In one sense the diversity is to the credit of the artists, but at the same time this only shows the relative poverty of the computer's contribution.

Computer artists have always been active in publishing accounts of the systems upon which their work is based.[1] Although the matter is too complex to argue here, I believe these systems are largely misconceived. They depend somewhat uncritically upon mathematical and psychological theories about the nature of art. Such theories lack empirical support, and generally are not highly regarded in the wider critical literature of art theory and aesthetics. The work also depends implicitly upon the unquestioned prestige of non-objective art.

Computers cannot generate any kind of pictorial representations; their abilities here, as in language, do not approach those of a young child. Thus computer artists are limited to the non-objective realm made respectable by such artists as Kandinsky, Mondrian, Malevich and Klee. Furthermore, as I have suggested already, computers have not been able to generate new styles but are invariably given the task of working out the compositional variations in a style devised by the artist. In this matter I have some empirical evidence of my own which suggests that the artistic significance of compositional variation in abstract art has been greatly overrated.

In 1980 I was involved in research on the Dutch artist Piet Mondrian who, along with Wassily Kandinsky, is chiefly credited with the first development of non-objective painting in the early years of this century. The works of his mature style are simple grids of horizontal and vertical black lines on a white or grey ground, with some of the rectangular areas painted red, yellow or blue. He is said to have taken infinite pains over the composition of these works, making minute adjustments to the positioning of these lines, and to their thickness.

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In studying the considerable literature about this artist, along with his own theoretical writings, I came to feel that the central issue about his art was invariably avoided. It seemed that no writer was prepared (or able) to give a straightforward and detailed explanation of what artistic principles Mondrian had discovered, and what were the merits of any particular painting. Critics and art historians suggest that the paintings possess a precise balance of horizontal and vertical elements, and that there is a hidden compositional complexity beneath the apparent simplicity. Thus, typically, one authority assures us that with his simple elements Mondrian 'constructed two-dimensional designs arranged in such subtle asymmetrical balances of line, colour, and area that even slight changes destroy the composition'.[2] Another authority, discussing the hidden complexity of his works, makes the following claim: 'Strange as it may seem, Mondrian's exquisite sense for non-symmetrical balance is so specific that critics well acquainted with his work have no difficulty telling fakes from genuine pictures.'[3] Although they claim in this way that the merits of his paintings are obvious to sensitive viewers, no historians cite empirical evidence to back up their claims.

So I decided to test the matter for myself. I designed a simple program for generating pseudo-Mondrian paintings. It took the form of a set of explicit instructions for arranging the basic elements of lines and colours, but with all the decisions about proportions and placing, the choice of colours, and the modification of line thicknesses, being determined by random numbers. The program was so simple it did not require a computer; it incorporated no design rules, and it did not embody any of the compositional qualities which are held to be so important in Mondrian's own works. Here all the different elements were unco-ordinated because they were independently determined by chance.

I took the first eight of these random compositions and carefully painted them up, and then to the same scale I made exact copies of four of Mondrian's own compositions. I used this as my test, asking people to judge which four of the 12 compositions had been designed by Mondrian. As test subjects, I sought out people who could be considered expert in judging qualities of composition and design, and who would know Mondrian's work. My subjects included professional designers, art school lecturers, an abstract painter, a museum curator and a professor of visual arts. None of my subjects was able to pick out the genuine Mondrians with confidence, and in making the best judgements they could they made no more correct choices than could be expected by chance. Furthermore, no one was able to explain why they were unable to see the qualities Mondrian's works are reputed to have. When I explained the details of this experiment my subjects were generally prepared to admit that I had designed a fair test. I went on to repeat the test with larger groups of art students, using different pseudo-Mondrians along with copies of other originals. Over all Mondrian's works were chosen no more often than the randomly-generated compositions.

These results suggest that insofar as people have appreciated Mondrian's art it has not been the specific qualities of his individual paintings, despite what the critics claim. Rather it has been some much more complex conception, embracing the whole idea of his artistic endeavour, including his life as an artist. If this is the real foundation of the prestige of non-objective art, it is clear why computers cannot make even this form of art. A computer is not needed to simulate the compositional structure within Mondrian's paintings, and no computer is able to engage in the human activities upon which his fame really depends.

Therefore my conclusions about the possibility of computers contributing creatively to any artistic endeavour must be largely negative. Nevertheless, it is precisely genuinely creative innovations which cannot be foreseen. By giving the most austere account of the prospects for computer art I may at least supply a background against which innovations will show up clearly. So it is my role here to be proven wrong.

Notes

1   Jasia Reichardt (ed.) *Cybernetic Serendipity*, Praeger, New York, 1969; Ruth Leavitt (ed.) *Artist and Computer*, Crown, New York, 1976; Frank J Malina (ed.) *Visual Art, Mathematics and Computers*, Pergamon Press, Oxford, 1979; George Stiny and James Gips, *Algorithmic Aesthetics*, University of California, Berkeley, 1978.

2   Helen Gardner, *Art through the Ages* 6th edn, Harcourt Brace Jovanovich, New York, 1975, p. 735

3   H.W. Janson, *History of Art*, 2nd edn, Prentice Hall, Englewood Cliffs, New Jersey, 1975, p. 658

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