Cybernetics, art and ideas

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'One thing that foreigners, computers and poets have in common is that they make unexpected linguistic associations.' (Reichardt)

This volume of essays is the happy result of contacts and collaborations established during the three years devoted to the preparation of 'Cybernetic Serendipity'. Cybernetic Serendipity was an exhibition mounted at the Institute of Contemporary Arts in the summer of 1968, which dealt with the relationship of the computer and the arts. The exhibition, like this book, was concerned with the exploration and demonstration of connexions between creativity and technology (and cybernetics in particular), the links between scientific or mathematical approaches, intuitions, and the more irrational and oblique urges associated with the making of music, art and poetry. The title itself was intended to convey the fact that through the use of cybernetic devices we have made many fortunate discoveries for the arts.

The exhibition

Cybernetic Serendipity was mounted in a gallery of 6500 square feet (fig. 2), involved 325 participants and was seen by 60,000 people. The exhibits showed how man can use the computer and new technology to extend his creativity and inventiveness. These consisted of computer graphics, computer-composed and -played music, computer-animated films, computer-texts, and among other computer-generated material, the first computer sculpture. There were also cybernetic machines such as Gordon Pask's 'colloquy of mobiles', television sets converting sound into visual patterns, Peter Zinovieff's electronic music studio with a computer which improvised on tunes whistled into a microphone by the visitors; there were robots, drawing machines and numerous constructions which responded to ambient sound and light. Six IBM machines demonstrated the uses of computers, and a visual display provided information on the history of cybernetics.

Two aspects of this whole project are particularly significant. The first is that at no point was it clear to any of the visitors walking around the exhibition, which of the various drawings, objects and machines were made by artists and which were made by engineers; or, whether the photographic blow-ups of texts mounted on the walls were the work of poets or scientists. There was nothing intrinsic in the works themselves to provide information as to who made them. Among the contributors to the exhibition there were forty-three composers, artists and poets, and eighty-seven engineers, doctors, computer systems designers and philosophers. The second significant fact is that whereas new media inevitably contribute to the changing forms of the arts, it is unprecedented that a new tool should bring in its wake new people to become involved in creative activity, whether composing music, painting or writing. Graphic plotters, cathode-ray tube displays and teleprinters have enabled engineers, and others, who would never even have thought of putting pen to paper, to make images for the sheer pleasure of seeing them materialize. Many of the computer graphics made by engineers in Europe, Japan and the USA, approximate very closely to what we have learned to call art and put in our public galleries. This raises a very real question—should these computer graphics hang side by side with drawings by artists in museums and art galleries, or should they belong to another, as yet unspecified, category of creative achievement?

There are certain classifications to which we are all assigned according to what we do. These categories which relate solely to our work, or our professional titles, inform the outside world about our way of life, our abilities and creative propensities. The deductions based on these classifications are not necessarily accurate but they suffice to colour the picture of an individual sufficiently for him to be irrevocably labelled. These labels provide information which is accepted without question and without protest. Thus it is assumed that the electronic engineers represent a clever but an uncreative branch of society, whereas artists are exceptionally creative but it is unlikely that they should possess any technological skills. It is also widely assumed that to the engineer, scientist and mathematician, art is magic, and to the composer, painter and poet, technology is a mystery. These rough assumptions are very broadly true but not altogether true. Since the middle 1950s the relationship between art and technology has been increasingly in evidence through the advent of computer-aided creative design.

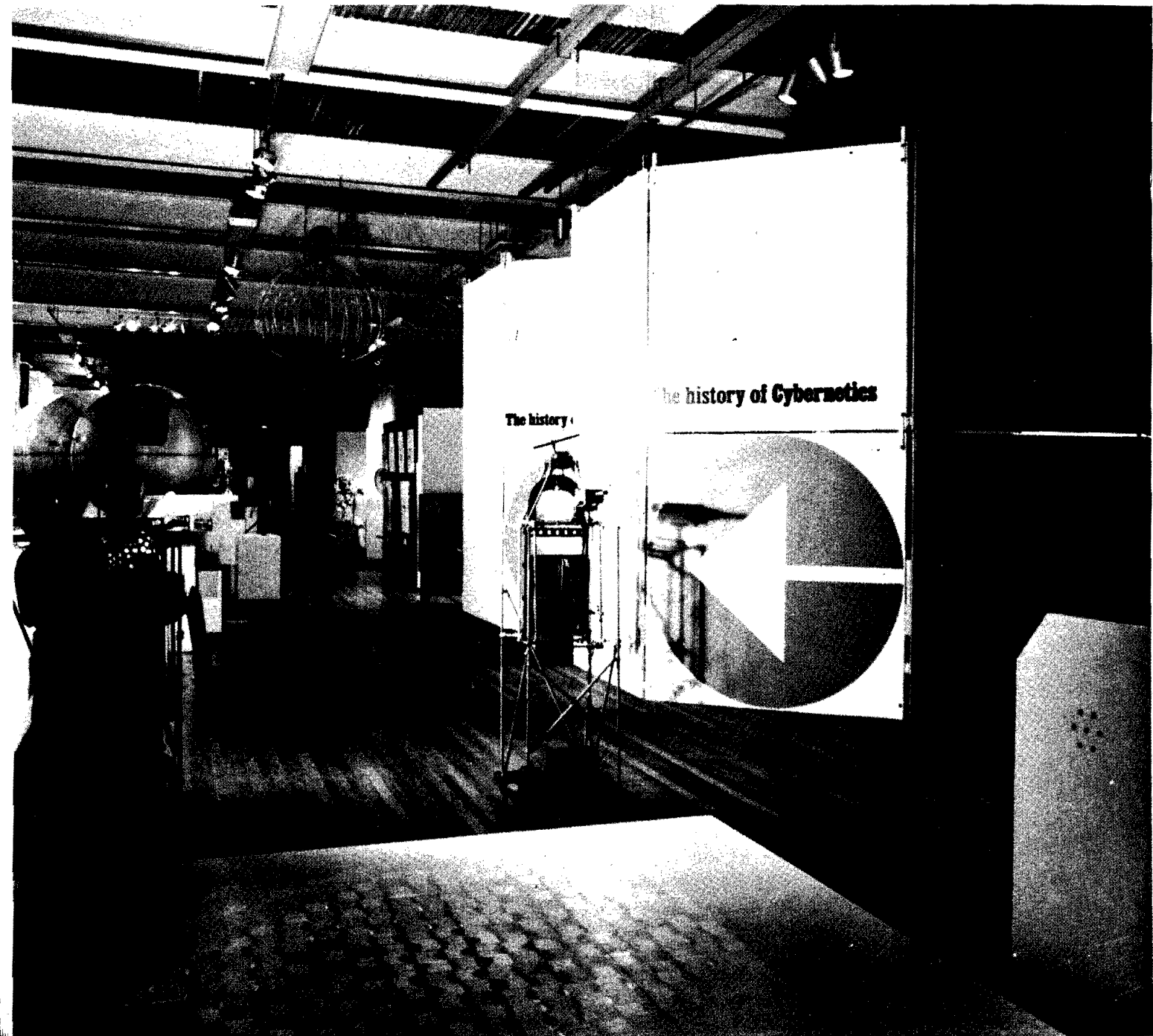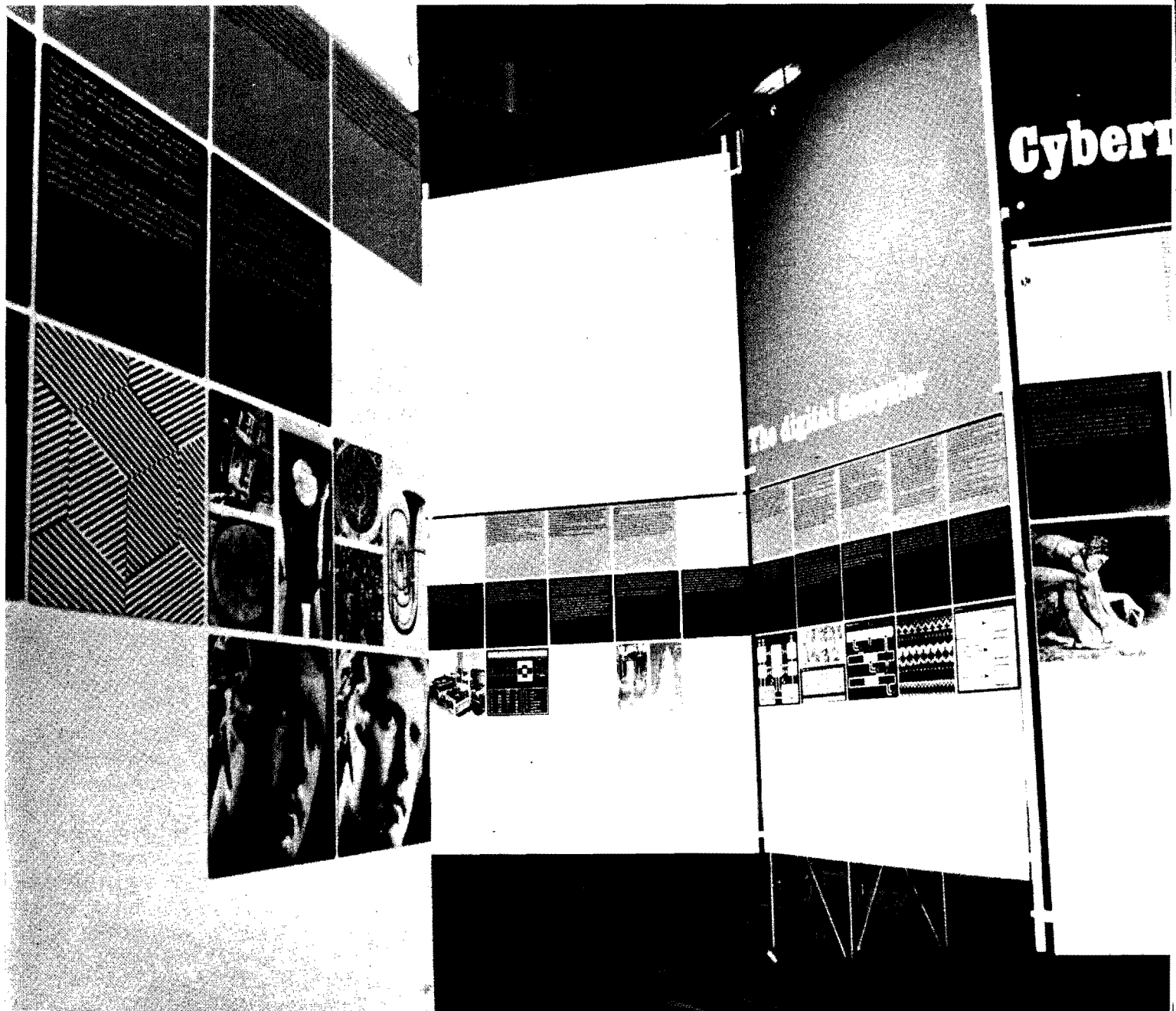Fig. 2 View of part of the Cybernetic Serendipity exhibition.

Fig. 3 History of cybernetics display, showing two parallel texts.

Fig. 4 'King of the Shouting House' by John Wood. A ritualistic pantomime for twenty-seven characters whose continuous movement in concentric circles and opposite directions, is interrupted at random by a computer-controlled sound. At that moment one of the various stages of the game is enacted and the circular movement is started again. Neither the outcome of the game, nor the steps by which it develops are computer-controlled, merely the timing of the actions.

Today these categorical assumptions about our various talents, functions and possibilities are less accurate than ever.

Thus Cybernetic Serendipity was not an art exhibition as such, nor a technological fun fair, nor a programmatic manifesto—it was primarily a demonstration of contemporary ideas, acts and objects, linking cybernetics and the creative process.

The computer arts and the public

As a child I remember being told a story about a machine into which one could put dirty linen and within minutes retrieve all the clothes clean and ironed. This was only one of many fairy stories, all of which were equally credible. In the face of the evidence of washing hanging out on a line as usual, the washing machine was just as real, or just as unreal, as the mirror in *Alice through the Looking Glass*.

A five-year-old in the 1970s knows that machines can do everything, and is merely surprised if there is some task that a machine cannot perform. No child of that age today is surprised that certain drawings, poems or tunes were produced with a machine, or by a machine. At the Cybernetic Serendipity exhibition, the only members of the public who displayed that traditionally childlike quality of wonderment were those adults who were unfamiliar with the possibilities of computer technology in the arts.

The advent of the computer is directly responsible for the emergence of computer poets, artists and composers, many of whom would not have found it possible, or desirable, to work with conventional media and techniques. A child, of course, would find nothing extraordinary about this. Those six-year-olds involved in experiments at MIT to find out how children can learn to communicate with a computer would no doubt have very sophisticated views about the possibilities of the machine as a robot or an artificial brain. The so-called 'controversial' questions asked by journalists with great predictability, whether the computer 'thinks' or whether it will replace man, are designed to fog the issue with emotional overtones rather than discuss it, and would probably not even occur to a young audience.

The intelligent layman finds himself right between these 'controversial' questions of mass media and the technical language which may present such a great obstacle to conveying simple information that any desire to learn about, or even to approach, the stronghold of art and technology is discouraged. When discussing this very subject John Pierce once told me a story about a man who went to confession and having asked the priest about a point in the *New Testament*, was told that any explanation could be given only in Latin.

To avoid the problem of offending the expert and nevertheless informing the layman, in the Cybernetic Serendipity exhibition, the section dealing with the history of cybernetics contained two parallel texts, one using technical terms and the other avoiding them (fig. 3).

In the arts, however, the demystification of the process will not do away with the mystery of the results. The fact that we are presented with a flow-chart, program and output of a composition by Iannis Xenakis, for instance, will not diminish or increase the impact of the composition when it is performed. Intellect has its own pleasures but these are not a substitute for a direct emotional response. The central core of a work of art, which is the transformation of the material which makes up the sum of its parts, has so far defeated all analytical attempts. Both Max Bense and Abraham Moles approach such an analysis from the peripheries of the structure of the work, but to this day there isn't a single masterpiece that has been made according to the principles of generative aesthetics. This essential core of a work of art remains still to be fragmented, rationalized and reconstructed.

The processes involved in making computer art are best suited to those who follow an analytical approach in their work, who are concerned with permutational procedures, serial techniques or the transformations of images from one finite state to another. Sometimes, it is true, the computer is used when the throwing of a couple of dice would serve equally well. To use the computer implies a concern with technology, an up to date outlook and the admittance of the possibility that the computer will one day be something in the nature of a household appliance. It is primarily the demonstration of an attitude. Recently even a children's game, called 'King of the Shouting House' by John Wood, has made use of computer controlled random interruptions (fig. 4).
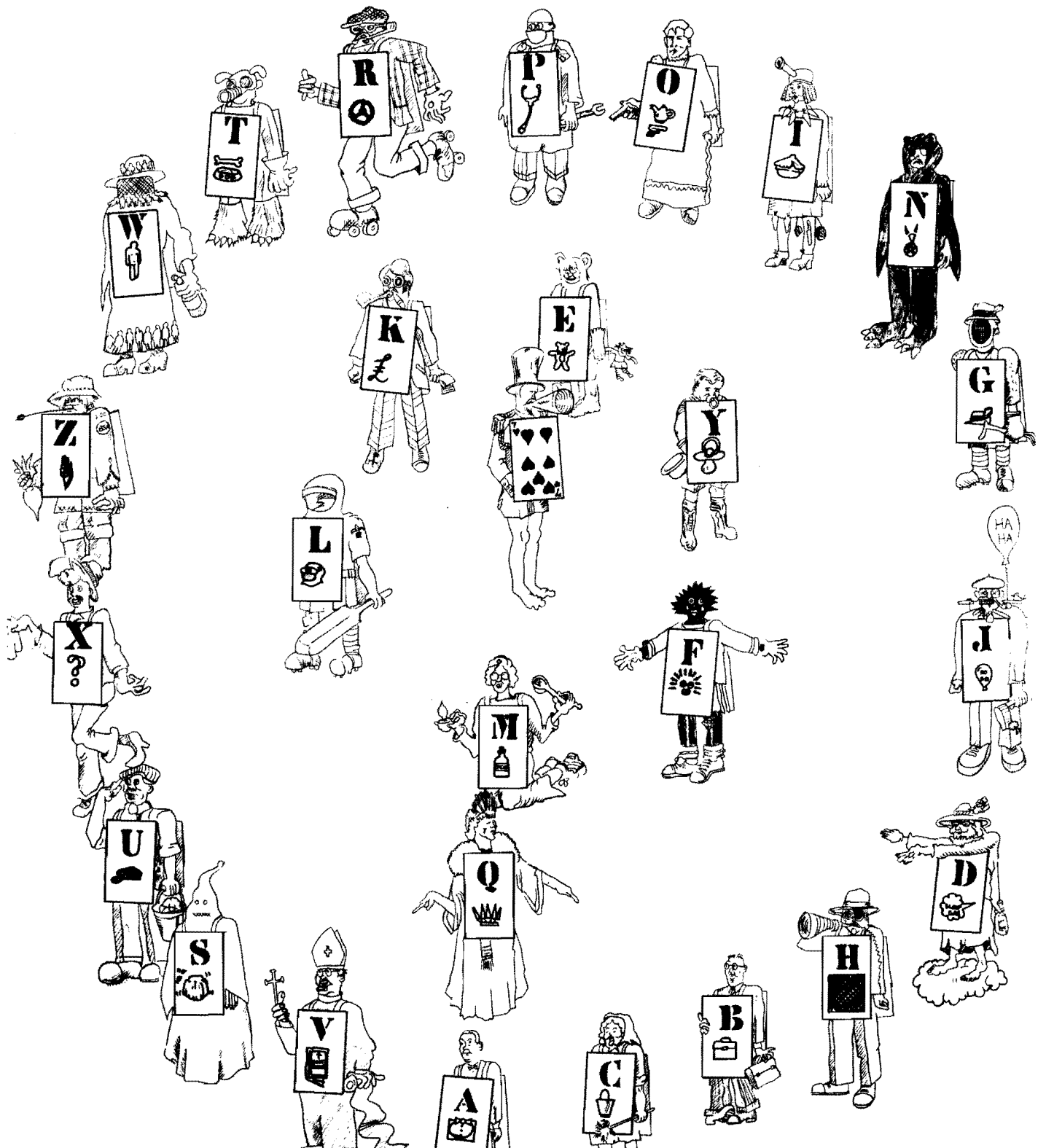
The importance of the computer in the arts has wider implications than those suggested by the material which has been produced so far. The computer, as Abraham Moles points out, is not only a tool for making serial pictures, or transforming an image, but is above all an instrument of democracy. He describes the imaginary museum which contains all possible copies and variations of all works of art, which can be acquired as cheaply as groceries by those who want them. He dismisses the authenticity of a work of art and substitutes it by the authenticity of situation—the confrontation, and all that it implies, between a person and the copy.

Among computer graphics are simple designs that could have been done as easily and even as quickly by hand. This, however, is not the point of experiments with computer art—the point is nothing less than the measure of possibilities for the future. In the visual arts and in poetry, the computer as a medium is far more limited than in music, since the digital to analog conversion can produce any sound whatever. In the visual arts, the terminals for picture making are still very limited in possibilities of variation. Little, so far, has been done with colour or the third dimension.

In Tokyo a complex console holding paint-brushes and containers with paints was attached to a computer to produce suitably random results. The pictures were made on the spot in a gallery. This type of electronic action painting, however, represents only a peripheral exploration of the medium. A more logical exploration of the possibilities belongs more readily to the work of such artists as the Swiss constructivist Richard Lohse, who in 1952 set down the rules for progressive art:

'Progressive art must searchingly analyse its means, and build a critique of form resting upon valid principles. It must aim at a synthetic approach to the means and to the picture space if the artist is to operate on a higher level. The basic analysis should include:

1   Relations of formal elements to their spatial boundaries.
2   Form variables.
3   Theoretical and practical study towards a typology of forms.
4   Colour variables in connexion with various forms.
5   Objectification of the pictorial elements.
6   Interrelations of colour, form and picture space.
7   Research into the problems of dimension of pictorial elements and picture space.'

The artist, William Turnbull, had another idea about using the computer. He thought of analysing the work of an artist over a period of years in order to predict what he would do next. It would certainly be interesting to compare the computer's prediction with the artist's own ideas as to the sort of work he might be doing in the future.

At the one end artists seek technological means to develop or amplify their ideas and projects; at the other end artists whose work is quite removed from what technology implies have been influenced by its jargon. Cybernetics as a descriptive term has been applied to sculptures operating on a feedback system as well as assemblages using cogs and wheels. 'Stochastic' and 'aleatory' have been used to describe paintings which incorporate chance images, and 'topology' for pictures with obscure perspective. The terms 'information theory', 'metaprograms', 'strategy', 'entropy', 'hardware' and 'real time', are to be found in manifestos which have little to do with the sort of art to which they could possibly apply. These terms serve to create an atmosphere rather than convey concrete information. Their use demonstrates the artist's desire and need to be involved in a world of human aspirations, other than those dealing with art.

John Cage once advised the Korean artist Nam June Paik to write as much as possible before his English improved, because, in Paik's own words 'broken English is rich in semantics'. One thing that foreigners, computers and poets have in common is that they make unexpected linguistic associations. And indeed, even with a simple scheme such as that described by Margaret Masterman in relation to computerized haiku, and even with a small and deliberately selected vocabulary, there are some poetic or grotesque associations of words which are not to be found in standard English usage. It is these gratuitous moments when a logical, deterministic procedure yields a line of poetry, or where as in Stefan Themerson's 'Nonobody' the dance is a solution to a mathematical problem, that stimulate the imagination.

In this volume the machine is seen in various contexts—

as a competent assistant to man, a conversational companion, a tool, a background against which human frustrations and hopes are seen in a different light, as a labour-saving device, as an instrument for improvisation, as an instrument for amplifying happiness and promoting pleasure, as a means of democratizing art, as a tool for making art, as well as learning something about how it comes about and how it functions.

The machine as a creative tool is neither an original nor a new concept; nor is the comparison between the way a man and a machine function. In 1931 Ozenfant in a book on art, wrote: 'We are machines which demand attention and also special "instructions for use".' He went on to advise the artist to work regularly because the muse can be made to be punctual and arrive at any given time. He advocated control in all aspects of creative activity. It is true, inspiration can be harnessed, intuition can be developed, and creativity provoked, so long, however, as we approach them obliquely and do not attempt to work out an absolute formula for

generating and disseminating masterpieces. This is unlikely to succeed.

The machine and technology, in general, are part and parcel of contemporary sensibility. This implies not only the functional, sociological or physical aspects but very often also the ethos, the atmosphere and the misunderstandings which arise. In art there are no rules defining its proper realm or specifying prescribed attitudes to technology and the world at large. Finally there is no reason why significant works should not be based on misunderstandings and partially digested information, although this is not a prescription.

The essays in this volume deal with aspects of the relationship between technology, contemporary life and creativity. I hope the reader will find them as thought-provoking and stimulating as I have, and perhaps that he or she may get as much out of this volume as I did out of *The Scientist Speculates*[1] in 1962, without which many of the connexions between art and technology would have passed me by.

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[1] *The Scientist Speculates, an anthology of partly-baked ideas*, general editor I. J. Good. London: Heinemann, 1962.