Automata in history

Gustav Metzger

Technological art is kinetic art plus a lot of money. Whereas kinetic art can be produced by the artist in his studio, technological art depends on direct contact with industry and research laboratories. Its ascendancy is a factor in the disruption of the post-war art boom–dealers are unable to finance technological art, they lack the space to exhibit it, and it demands the extensive remodelling and updating of galleries. Furthermore, since, like automata of the past, technological art inherently tends towards obsolescence, dealers lose a strong selling line–the appeal to the urge to invest.

Making automata and related mechanical art was formerly an inter-media activity–mathematicians, scientists, artists, engineers, musicians, priests, astronomers, princes, skilled men from scientific instrument makers to goldsmiths, worked in collaboration. Automata have played a prominent role in some societies. Clocks and automata in ancient China, Greece, Islam, India, medieval and renaissance Europe, conveyed information about advanced technology. At times workers in this field became wealthy, influential members of society. There have been periods where the technological abilities of a society have not only been reflected in, but advanced by, kinetic art, whereas the gap that existed between kinetic art and science and technology in the nineteenth century has developed at an exponential rate ever since. [4 9 19]*

Twentieth-century kinetic art developed in a self-imposed insulation from a tradition going back at least three thousand years. In part, this was a form of self-protection–kinetic art had in the past achieved works that dwarf the scale and mechanical ingenuity of most twentieth-century efforts.

Now that we are in a *renaissance* of kinetic art, where we can surpass in dimension, complexity, and control, any previous automata, we can afford to face the challenge of previous achievements. A study of automata will clarify a number of technical and aesthetic issues, and, more important in an immediate sense, artists will acquire a greater confidence on rediscovering the important social function of automata in history.

Kinetic art failed to keep in step with an unprecedented technology that went through fundamental transformations every ten years or so. The equation of art media with present –and future–industrial and research techniques is the aim of technological art.

In response to nineteenth-century mechanization, England produced a violent reaction, led by Ruskin and Morris; whilst another extreme –but positive–response emerged in Italian Futurism. Of the several intermediate reactions that of Moholy-Nagy is the most balanced: 'This is our century: machine-technology-socialism. Come to terms with it, and shoulder the tasks of the century'.

Midway between this period and 1880 lies the Bauhaus. Here the various conflicting attitudes around the machine, science, and their social interactions, received intelligent, systematic, and intense, treatment over a period of thirteen years. The artistic and social ideals of Ruskin and Morris are in evidence in the Bauhaus manifesto of 1919 with its Feininger woodcut *The Cathedral of Socialism*. Itten's departure, March, 1923, signified the collapse of one of the factions struggling for control of the Bauhaus policy on mechanization and *rapprochement* with Capitalism. Itten said; 'I became conscious that our scientific technical civilization had come to a critical point. The slogans 'Back to Handicraft' or 'Unity of Art and Technology' did not seem to solve the problems'.[11] On the opening day of the Bauhaus Week, August, 1923, the policy crisis was seen to be resolved by Gropius's address 'Art and Technics, a New Unity'.

We cannot forget that between the embarrassing, unfounded, *Idealismus* of his 1919 manifesto, and the *Realpolitik* of the 1923 position, Gropius not only went through crises of conscience, but also suffered failures of nerve (1). The reputation of Gropius, along with that of other eminent figures in twentieth century design and architecture is due for major revision. It will be seen that, like others, he was committed to a safe career and the pursuit of a vast output. The compromises and capitulations such aims necessitate have left their mark not only on the individuals concerned, but on the movements with which they were associated.

The Bauhaus contribution in numerous directions; its publications, its service as a focal point for a variety of international developments, its establishment of a vocabulary of kinetic and op-art, cannot be overestimated. It failed in its aim of social change through art and technology, because that combination is insufficient for the task.[14] By supplying 'good design' it helped cement Capitalism, and enabled manufacturers and retailers to increase their profits. It encouraged the rise of designers as well as the (at first ancillary and later dominant) stylists and media manipulators, and, by developing advertising techniques, handed the established systems the instruments of mass-persuasion.

In the course of the past twenty years in which artists have strained to get nearer to science and technology, there has occurred a significant shift among some scientists. The *scientist's backlash* has its origin in the revulsion and guilt felt by leading physicists over the detonation of the atomic bombs over Japan. Having encouraged their construction, they now helped to establish and finance groups like *The Atomic Scientists of Chicago* (2). Since 1945, thousands of books, articles and speeches have been published by scientists and other specialists warning of the imminent collapse of civilization unless radical changes are made.[5] Research programmes into aggression and destruction in man have been established in universities. Within the *scientist's backlash* there is a direction which seeks to effect fundamental changes in science and technology. Our science is only one of numerous ways of manipulating matter; its development has been flawed by close associations with repressive and exploitative priesthoods and ruling classes. The ideal is to tap energy as directly as possible, with a minimum of plant, waste of raw material, and damage to man and any form of nature. This approach to the future of technology is in line with an ancient dream known as *paradise*–life in a temperate climate, with a minimum of shelter and clothing, food readily available, and work non-arduous. Instances of this kind of technology are the use of water and air, solar energy, and vibration within matter.

*Small numerals refer to bibliography. Numerals in parentheses refer to notes.

---

the cover for this issue.

ROBERT HUGHES has recently published his book *Heaven and Hell in Western Art* and is currently working on a study of Leonardo da Vinci.

DENIS DUERDEN runs the Transcription Centre, the aim of which is to promote African culture. He has published a book on Klee and he lectures extensively.

KEVIN GOUGH-YATES lectures in film and television studies at Hornsey College of Art, and is co-editor of *Screen*.

JONATHAN BENTHALL works with the Centre for Studies of Science in Art.

CHARLES HARRISON is assistant editor of *Studio International*.

Contributors to the Art Book Supplement are listed in the Supplement.

It is when we correlate the attacks on capitalism and mechanization in the writings of Ruskin, Morris, and Moholy-Nagy, with the *scientist's backlash*, that we reach the centre of the crisis in technological art. It is a moral crisis and hinges on the artist's social responsibility. There is a tendency for the artist to submit to and to be overwhelmed by the tremendous opportunity, challenge, excitement, and power of the new media. There exists a great danger that the artist will be eaten up by big business and manipulated by technology. *That would be catastrophic.*

Far more than the universities, big business is dependent on government contracts for its survival. This applies especially to the aircraft industry, the space programme, and other industries directly or indirectly concerned with 'defence'. Here advanced techniques are used, and it is these that particularly attract the artists. These industries, and many scientific establishments, would collapse if governments were to withdraw funds for–predominantly–war-oriented projects. The artists and the art and technology organizations must face these facts; and they must oppose the system. The artist who seeks to integrate with technology without realizing what is involved is behaving immaturely and dangerously.

At a time when there is a widespread concern about computers, the advertising and presentation of the I.C.A.'s 'Cybernetic Serendipity' exhibition as a 'technological fun-fair' is a perfectly adequate demonstration of the reactionary potential of *art and technology*. No end of information on computers composing *haiku–no hint* that computers dominate modern war; that they are becoming the most totalitarian tools ever used on society (3). We are faced by this prospect–whilst more and more scientists are investigating the threats that science and technology pose for society, artists are being led into a *technological kindergarten*, the idea being that the artist can amuse himself and some of the populace with the gadgetry of modern life (4).

The conflict of artist and machine is entering an extremely critical phase. For the artist formed on the Ruskin/Morris axis, our technology *is a defeat*. Very often, a defeated subject comes as close as possible to that force that has defeated him. He does so to exchange energies, discover the cause, probe the victor's weak spots–prepare for a new combat. This is only one–extreme–aspect of the present art and technology link, but it is not possible to understand artists' obsessive involvement without facing such facts of behaviour (5).

Can society afford to let artists have access to technology–*can it afford not to?* (6). Society is desperately in need of information about itself, needs to retain links with the past, demand the disappearance of the barriers between science and the arts. Technology is irreversibly transforming many facets of existence, and the extension of our minimal knowledge of what technology is, what it is doing–*and will do*–to people, animals, nature as a whole, is far more critical than its automatic replication; if society were genuinely concerned to avert self-destruction, it would spend the greatest part of its wealth on finding out why it is heading for destruction, and on measures to avert that fate. By giving artists unrestricted access to science and technology, society will benefit in numerous spheres; we can only consider two major areas.

In the fine arts there is an emphasis on public art, fantasy, and Utopian ideas. Artists want to make large and costly environments where people can go through regenerative, or mind- and sense-disorientating experiences. Artists are making spectacles midway between theatre and concert hall. There is a move towards large-scale activities like town and regional planning, art projects on the moon and in outer space, on and under the sea, and in deserts. There is an interest in biological techniques and miniaturization.[3 7 8 13]

The interest some artists had in the twenties in designing for industry and raising production had worked itself out (not surprising in obsolescence directed economies), but a *general impulse* to contribute to productive activity beyond the creation of art works persists–one outlet could be in the development of new forms of technology. The artist can play a part in research and development in two capacities: as a stimulant, and as inventor.

1. Like industrial production, research and development take place in a highly compartmented manner. The artist, primarily, and with the maximum possible freedom, following his own interests and work, can serve as a unique bridge between department and department in industry, and within a university, from one research laboratory to another. He can act as a bearer of ideas, information, intuitions, and techniques and materials; his presence can serve as a stimulant and irritant, his questions and ideas will tend to disorient, undermine and re-route established, ritualized, ways of thinking and doing. 2. Only artists with a certain aptitude will gravitate towards technology. The history of kinetic art shows that artists have occasionally been associated with the most advanced technology of their time, and besides, the history of art consists of a continuous invention of concept, form, and technique. Because his abilities and goals differ from other people, the artist is bound to go into new directions, and is likely to hit on ideas that have been missed by specialists.

Inevitably (and rightly) artists will explore the entire vast range of theoretical, aesthetic, and technical possibilities of art linked with science and technology; this is bound to lead into one of the most creative, original, phases in art history. A study of history (Assyria, Mexico, etc.) suggests that *great art* may result from a total integration with the mass-destructive drives in our societies. Can we afford art based on such foundations?

To fight the social system whilst also demanding unhindered access to expensive techniques, materials, sources of information, and technical and physical assistance, is too difficult a task for individual artists, but *collectively* such a programme is realizable; that is why political and moral issues need to come to the foreground in art and technology organizations. Such organizations whose programmes do not include a concern with fundamental social change are already out-dated, and may ultimately be discredited.

The waves of protest in the States against manufacturers of war materials should lead E.A.T. to refuse to collaborate with firms producing napalm and bombs for Vietnam. (Of course, practically any technically advanced industry in the big nations contributes directly or indirectly to war preparations–here is the *central and irresoluble* dilemma of technological art.)[6 16]

The most promising and important development now is that many people are preparing to take power out of the hands of rulers who have proved that they are unable to resolve social chaos. The belief that a re-structuring of knowledge and techniques is the basis for survival guides this development. It is here that the artist engaged with science and technology connects with the *scientist's backlash* to make direct contributions to social change; the *technology of paradise* is a step towards the salvation of the world.

It is also on this plane that links are made with artists using other mediums. As social ideals and moral questions again enter art; as a dealer–dominated period for whom these terms act as exorcisms is undermined–*Paris Milan/ Venice Hornsey/Guildford*–Ruskin and Morris continue their influence on modern art (7). Student Power and Revolt is one of the healthiest developments in the post-war period. Many students have an acute insight into social reality. They are *impelled to act* by deep biological tensions, above all the fear that they will be destroyed before achieving fulfilment (8). World leaders and government spokesmen have said too many times that they are unable either to control war, or defend their nations from annihilation in a nuclear war. The young, by aiming for control of society, are acting in the best interest of all.

NOTES

1. The unearthing of the facts behind the writing of the 1919 manifesto is one of the prime tasks of Bauhaus scholarship. Otto Stelzer says that the manifesto was determined by tactical considerations.[10] 'It was the particular genius of the Bauhaus founder, architect Walter Gropius, that he should win the absolute loyalty of men as diverse in talent and temperament as the painters Klee, Kandinsky, Feininger and Moholy-Nagy, the mystical theorist Itten, the pragmatist Meyer

and Van der Rohe (*sic*), and the experimenter Schlemmer.' Edwin Mullins. *Sunday Telegraph*, London, 22.9.1968. There is plenty in the writings of the Bauhaus masters (Claude Schnaidt's book on Meyer, London, 1965, for instance) to jar the carefully-fostered image of Gropius the benign *Bauhaus Vater*.

Here is a sample of the Bauhaus polemic on mechanization and Capitalism, from the writings of a prominent pupil of the Bauhaus, who attended the metal workshop between 1922 and 1925 and thus studied under Itten *and* Moholy-Nagy: 'Our industrial products are actually nothing but a waste of labour and materials, to preserve a system which acts destructively and deterioratingly, just as bad films and illustrated papers do.' Wilhelm Wagenfeld, 'Artistic Collaboration in Industry', Zürich, 1960.

2. The revolutionary significance of this group lies in having established the principle where each profession warns society about those dangers of which it has specialized knowledge. It is evident that of all artists, those engaged with science and technology must take a lead in this crucial new form of social agitation.[2]

3. 'Secret knowledge is the key to any system of total control... Until printing was invented, the written word remained largely a class monopoly. Today the language of higher mathematics plus computerism has restored both the secrecy and the monopoly, with a consequent resumption of control.'[18]

Norbert Wiener, who had supported the construction of the two large computers used in the American war effort, had doubts and fears when the war ended.[24]

'But, more seriously, the real danger that cybernetics–the science of controlling information and communication–may bring about, and indeed already is, is that it makes more likely and more easy the establishment of a fascist autocracy; a community wholly controlled by central government... I've always thought that this is one of the biggest dangers of the subject and it's connected with what the students are on about in British Universities.' Extract from interview 'Towards Machine Intelligence' with Professor Frank George, Director of Institute of Cybernetics, Brunel University. *Science Journal*, London, September, 1968.

4. Whenever you see–or hear–a statement about the *neutrality* of science or technology–*reach for your gun*!

5. The strength of Ruskin and Morris lies in their visionary power. They foresaw the consequences of science and technology in the hands of Capitalism. When they condemned mechanization they were looking beyond their century; when Ruskin is saddened by dirt from a railway soiling the country miles from the tracks, his mind is fixed on the Los Angeles of today. In a pamphlet dated 1868, he sums up the possibilities of mechanical power supply in order of preference: 'There are three great classes of mechanical power namely, (*a*) vital muscular power; (*b*) natural mechanical power of wind, water, electricity; and (*c*) artificially produced mechanical power.'[20] Note that Ruskin supports electricity –the basis of our century–four years before the first large-scale use of electric filament lighting (St Petersburg docks), eleven years before the exhibition of the first electric railway (Siemens, Berlin), and twenty-two years before the manufacture of the first a.c. motors (Westinghouse, U.S.A.). Ruskin's advocacy of 'vital muscular power' will seem less funny in 2068 when the inability of vast numbers to adjust to universal automation will have created insoluble problems. Black Power with its rejection of 'White' mechanization is relevant to a reassessment of Ruskin and Morris.

6. 'Let it be noted that the development of science is a control and communication process for the long-term understanding and control of matter–in this process fifty years are as a day in the life of the individual. For this reason the individual scientist must work as a part of a process whose time scale is so long that he himself can only contemplate a very limited sector of it.'[25] Wiener's statement is in complete contradiction with the reality, ably summarized by Professor Paul Sears, the American authority on conservation; 'Part of the blame lies with a society which regards profit as a supreme value, under the illusion that anything that is technically possible is, therefore, ethically justified.' *Daily Telegraph*, 3.12.1968, p. 22. As a result of solar activity leading to the dehydration of earth, our planet will become uninhabitable, and it is eminently reasonable to prepare for this period millions of years ahead so that humanity might transfer to other planets; but what are the connections of this *long-term plan* with the present *race* to land men on the moon? ('Mr Nixon would do well to regard the space race as a matter not only of scientific advancement and prestige but of sheer survival.' From Leader, 'Imperialists in Space', *Sunday Telegraph*, 19 January, 1969.) See Sir Bernard Lovell's article 'The dangers of polluting the planets', *The Times*, February 10, 1969, p. 9.

7. The impulse to break up a diseased art world, sponsored by nationalistic art commissars, and catering to a nineteenth-century ego cult, is to be encouraged. For a general statement.[21] Documentation on Milan and Venice.[1] *New Society* and *The Listener* have carried articles and editorials on Hornsey and Guildford since June 1968. It is not accidental that a quotation from William Morris takes up one page in 'Documents prepared by the forty dismissed teachers of the Guildford School of Art'. October 30, 1968.

8. 'Time is short; we must work rapidly within the natural process of evolution; we MUST accelerate evolution'. From the foreword to the *pre-publication* of 'Man, His Environment and The Future?' by Robert D. Underwood, the student-organizer of this Architectural Association Lecture Series, London, February–June, 1968.

Forty-five professors at M.I.T. have announced a one-day 'research stoppage' for March 4 in protest against government misuse of science and technology. They will be joined by professors at Cornell and Yale.

[1] bt. Milan. Vol. 2. No. 3. June, 1968.

[2] Bulletin of the Atomic Scientists, Chicago Vol. 3. No. 7. July, 1947, includes policy statement.

[3] M. Brodey and others. 'Art, Technology and the Architect'. Architectural and Engineering News. Upper Montclair, N.Y. Vol. 10. No. 2. February, 1968.

[4] Alfred Chapuis, Edouard Gélis. 'Le Monde des Automates'. Paris, 1928. 2 vols.

[5] Barry Commoner. 'Science and Survival'. London, 1966.

[6] Fred J. Cook. 'The Warfare State'. London, 1963.

[7] Douglas M. Davis. 'Art and Technology: The New Combine'. Art in America. New York, January/February, 1968.

[8] Marcel Duchamp. 'The Bride stripped bare by her bachelors, even'. London, 1962.

[9] Franz M. Feldhaus. 'Die Technik der Antike und des Mittelalters'. Potsdam, 1931.

[10] Wulf Herzogenrath, Ed. '50 years bauhaus'. Catalogue. Royal Academy, London, 1968, p. 36.

[11] Johannes Itten. 'Design and Form'. London, 1964, p. 11.

[12] Herman Kahn and Anthony J. Wiener. 'The Year 2000'. London, 1967.

[13] Gyorgy Kepes, Ed. 'Vision and Value'. London, 1966. 6 vols.

[14] Lothar Lang. 'Das Bauhaus 1919–1933'. Berlin, 1965, p. 40.

[15] Marshall McLuhan. 'The Mechanical Bride'. London, 1967.

[16] Gustav Metzger. 'Machine/Auto-Creative/Auto-Destructive Art'. ARK, London, No. 32, 1962.

[17] William Morris. Collected Works. London, 1910. 24 vols. See vols. 22 and 23.

[18] Lewis Mumford. 'The Myth of the Machine'. London, 1967, p. 199.

[19] Frank Popper. 'The Origins and Development of Kinetic Art'. London, 1968.

[20] John Ruskin. Works. Library Edition. London, 1903. 39 vols. Vol. 17, p. 543.

[21] Claude Schnaidt. 'Architecture and Political Commitment'. ULM, No. 19/20. Ulm, 1968.

[22] Dennis Sharp, Ed. 'Planning and Architecture'. London, 1967.

[23] Alan F. Westin. 'Privacy and Freedom'. New York, 1967.

[24] Norbert Wiener. 'Cybernetics'. New York, 1948, p. 38.

[25] Norbert Wiener. 'Some Moral and Technical Consequences of Automation'. Science, Washington, Vol. 133, 6, May, 1960.