The Dilemma of Media Art: Cybernetic Serendipity at the ICA London

Rainer Usselmann

ABSTRACT

One year after the 1967 Summer of Love and at a time of considerable political unrest throughout the United States and Europe, Cybernetic Serendipity—The Computer and the Arts opened at the Institute of Contemporary Art in London to much critical and popular acclaim. This paper outlines the conceptual framework of this seminal exhibition and looks at some of the accompanying press reception in order to address a key question: how media art deals with its own historicity and the underlying socioeconomic forces that render it possible. Presented 35 years ago and still paradigmatic for the ever-shifting boundaries between art, technology, commerce and entertainment, Cybernetic Serendipity epitomizes some of the complicated dynamics that delineate the gamut of media art today.

The coming together of digital communications technology and art in the second half of the 20th century has attracted a considerable amount of debate. Throughout the early years of what is now called media art, a sense of great optimism about the possibilities of the new medium prevailed. As recently as 1997, during the halcyon years of the technology boom, a sense of genuine excitement was palpable among theorists and practitioners. Hans-Peter Schwarz, one of the founding directors of the Zentrum für Kunst und Medientechnologie (ZKM, Karlsruhe, Germany), described media art as an "explosive charge" at the gates of traditional artistic establishments [1].

A few years later, in the aftermath of the dotcom bubble, Schwarz's explosive charge turns out to be a dud. The art establishment has not been blown to pieces; on the contrary, if anything, the enthusiasm for all things digital has suffered a considerable setback. But perhaps the time has come to debate the evolution of computer art with a greater sense of historical and critical distance. It is my intention to contribute to this debate with a review, 35 years after the event, of "Cybernetic Serendipity—The Computer and the Arts," an early landmark exhibition of computer art at the ICA in London. Often regarded as a key event in the institutionalization of media art, Cybernetic Serendipity has been the subject of a growing number of papers [2], to which I would like to add a critique of the concept, realization and media reception of this important show. By identifying some opportunities missed in the wake of this exhibition, I want to raise a number of key issues concerning media art in general.

Rainer Usselmann (art historian), 5 Normandy Street, Alton, Hampshire GU34 1DD, U.K. E-mail: <Rainer@usselmann.fsnet.co.uk>.

HAPPY ACCIDENTS

One year after the Summer of Love and at a time of considerable political unrest throughout the United States and Europe, Cybernetic Serendipity opened at the Institute of Contemporary Art in London on 2 August 1968 (Fig. 1). Under the curatorship of Jasia Reichardt, then associate director of the institute, the exhibition brought together work from a total of "130 contributors, of whom 43 were composers, artists and poets, and 87 . . . engineers, doctors, computer scientists and philosophers" [3]. One of the ICA's most successful projects, Cybernetic Serendipity drew an audience of between 45,000 and 60,000 [4]. According to Reichardt, the exhibition "had visitors of all ages, all types, all nationalities, all classes" [5]. The exhibition closed on 30 October 1968.

The title of the exhibition suggested its intent: to make chance discoveries in the course of using cybernetic devices, or, as the *Daily Mirror* put it at the time, to use computers "to find unexpected joys in life and art" [6]. It was structured into three main areas; the first was dedicated to computer-

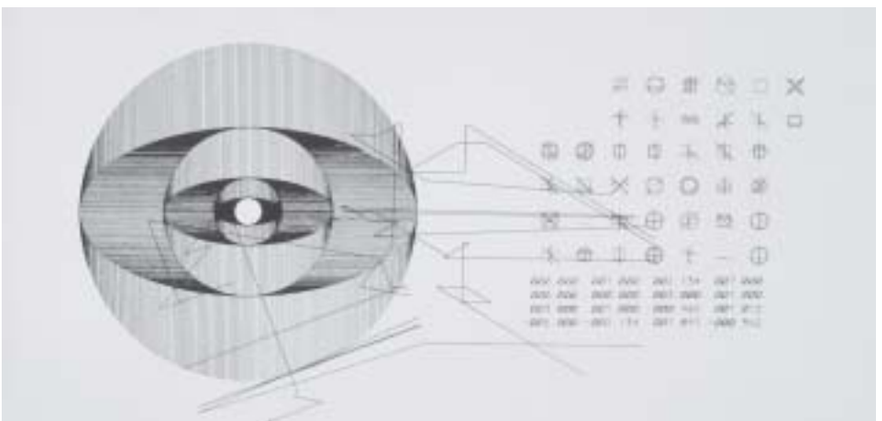

Fig. 1. "Cybernetic Serendipity," front of exhibition invitation by Franciszka Themerson. (© Cybernetic Serendipity)


SERIAL POEM

by Andrew Rawlinson (Cambridge)

This is a poem to be played
according to the rules of one's own invention.

This language is a universe.
A line in the language is part of the universe.
A line is any sequence of words curved or straight.

e.g. 1. I'm stainless men hello play cloud
2. lucifer frog trouble going coming perpetually son cyclops

lucifer morning glory buzz buzz from a
frog to a phoenix four kings for your
trouble he said i dont know where I'm
going speak family of the sun world stainless
coming down on a handkerchief so that men
perpetually falling rain punctuates play hello
son tomorrow the engine cloud turns thru
cyclops dew and we have gone where the
flowers are numa numa switch in the dark
mercy* eyes on the horizon falling in
drops the engle celtic trust 8 figures
waiting and now your father points theres
a big circle cut away shes sitting down
with nothing on frayed short plop mayfly
catches rose pink of dawn stars chicks dozy
good morning good morning good morning
good morning remember old women & the heavens
embroidered cloths for the conciliation of your
evening arm take pilgrims colorblind velvet
hill hill bespoke more old balloon and
you will see the weeping lord now maybe* time
and Mr.Mendel all in a solarhythm cloak

1. complete:
pink rose catches with
2. go from falling to falling in 10-15 steps:
falling
3. write opposite of:
TIMECLOAK
8
BESPOKE
the sun handkerchief
4. take Mr. Mendel on a trip to the dawn:

* merry maybe

this poem was dedicated by Andrew Rawlinson to Margaret Masterman

Fig. 2. Andrew Rawlinson, computer poetry, 1968. (© Andrew Rawlinson. Photo © Cybernetic Serendipity.)

generated graphics, film, music and poetry (see Figs 2–4). The second section provided a showcase for cybernetic devices, such as interactive installations, robots and painting machines. The third area was a "learning zone," which dealt with the history of cybernetics and the demonstration of uses for computers (see Fig. 5). The list of contributing artists included Bruce Lacey, Wen Ying Tsai, James Seawright, Nam June Paik, Jean Tinguely, John Cage and Lowell Nesbitt, who exhibited a series of opaque, monochrome paintings of IBM computers. Presentations by General Motors and Boeing concluded the exhibition.

The level of logistic complexity involved in organizing, mounting and maintaining the show was unprecedented. Instead of handling traditional artifacts, the administrators and curators at the ICA found themselves in charge of extremely fragile computer soft- and hardware, which proved difficult to set up and run. Interactive systems in neighboring exhibits interfered with one another, and sound insulation proved a major problem. Compared with those of traditional projects, the difficulties involved in keeping the exhibition in working order were greater by several orders of magnitude. Owing to the unprecedented cost involved in mounting Cybernetic Serendipity, the need for corporate involvement was considerable, possibly stifling a more critical approach. After some initial reluctance on the part of industry, funding, benefit in kind and participation was secured, most significantly from IBM, Boeing, General Motors, Westinghouse, Calcomp, Bell Telephone Labs and the U.S. Air Force research labs. All in all, the resounding success of the exhibition seemed to vindicate the project.

The media reception of Cybernetic Serendipity was on the whole extremely favorable. In a review symptomatic of much press coverage, the *Evening Standard* enthused: "Where in London could you take a hippy, a computer programmer, a ten-year-old schoolboy and guarantee that each would be perfectly happy for an hour without you having to lift a finger to entertain them?" [7] The *Guardian* agreed that it "lured into Nash House people who would never have dreamed of attending an ICA exhibition before" [8]. Cybernetic Serendipity promised fun for the whole family, not just an elite of art connoisseurs. "Children, scientists and the simply curious could spend fascinated hours in this world of computer art" [9]. The press celebrated the exhibition as an event that "guaranteed to fascinate anyone from toddling age to the grave" [10]. Even the writer in *The Lady* felt compelled to urge that "one must go to the present exhibition at the INSTITUTE OF CONTEMPORARY ARTS . . . not to understand in the least what is going on but to experience that particular tingle which is inherent in an act of threshold-crossing" [11]. Art critic Jonathan Benthall declared that Cybernetic Serendipity would be remembered as a "landmark," not least due to its "breeziness and catholicity" [12]. Others agreed: "For breaking new ground, revealing new fields of experiment, seminal importance, sheer hard work and enormous organization, the exhibition Cybernetic Serendipity . . . is arguably the most important exhibition in the world at the moment" [13]. According to Brent McGregor, "the status of the event was such that Umberto Eco came from Italy to view its wonders" [14].

Aside from the almost unanimous consensus that Cybernetic Serendipity was

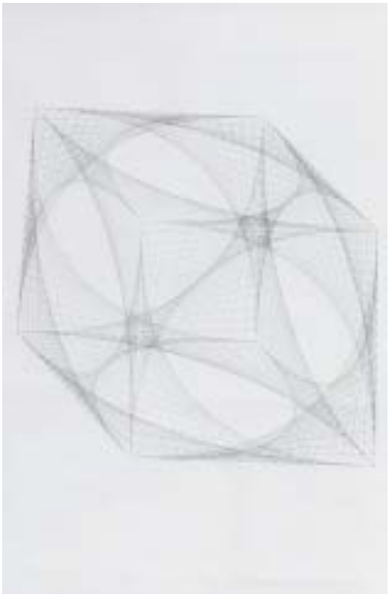

Fig. 3. Plotter print-out. Computer graphics by Peter Milojevic, McGill University, Montreal. Milojevic created his graphics program in Fortran on an IBM 7044, which was connected to a Calcomp 565 plotter. (© Peter Milojevic. While every effort has been made to locate the copyright holder for permission to use this image, we have been unable to do so. Photo © Cybernetic Serendipity.)

worth seeing, two recurring themes can be identified in the reception and presentation of the exhibition.

The End of Art?

Mario Amaya, in the *Financial Times,* pondered: "I am left with the sneaking suspicion that much of this exhibition has little to do with art as such. In fact, the show seems to be telling us more about what art is *not*, rather than what it could be" [15]. More to the point, Michael Shepard in the *Sunday Telegraph* found that "this exhibition . . . serves to show up . . . a desolation to be seen in art generally—that we haven't the faintest idea these days what art is *for* or *about"* [16]. Robert Melville from the *New Statesman* went even further: "The winking lights, the flickering television screens and the squawks from the music machines are signaling the end of abstract art; when machines can do it, it will not be worth doing" [17]. According to Leslie Stack, the ICA's information officer, "people will not know what has been created by the scientist and what comes from artists" [18]. Reichardt related an experiment, carried out under the auspices of Michael Noll at the Bell Telephone Laboratories, in which a sample audience attempted to distinguish a genuine Mondrian painting from a computer fake of a Mondrian painting: "59% of the people who were shown both the Mondrian and one of the computer versions preferred the latter, 28% identified the computer picture correctly, and 72% thought that the Mondrian was done by computer" [19].

Computers Are Fun!

Lingering doubts about the merits of "artistic" experiments with computer hard- and software aside, many observers emphasized the sheer fun that could be had by putting art and science together. Nigel Gosling remarked that "this exhibition . . . could have been mounted with equal validity in the Science Museum, and discussed with equal . . . understanding by a science correspondent" [20].

The ICA's Leslie Stack declared:

> We want people to lose their fear of computers by playing with them and asking them simple questions. . . . So many people are afraid that computers will take over, but in this show they will see these machines will only do what we want them to. . . . Happy accidents . . . can happen between art and technology [21].

The *Daily Mirror* duly delivered a populist note: "Computers don't bite, for it is a joyous exhibition" [22]. Mario Amaya seemed to capture the atmosphere of Cybernetic Serendipity, describing it as "a veritable Luna Park of sideshows, display booths, and fun-houses, inviting visitors to touch, push buttons, talk or sing into microphones and television screens, or listen to speakers and earphones issuing sounds and information" [23]. The *Evening Standard* characterized the exhibition as "a kind of homage to electronics, with the emphasis on fun rather than art or technical achievement" [24]. Katharine Hadley commented that "if the exhibition's artistic achievement is controversial, for the sheer enjoyment of playing with some of 1968's most ingenious computer toys, Cybernetic Serendipity is unrivalled" [25]. Michael Shepard of the *Sunday Telegraph* described "the most sophisticated amusement arcade you could hope to find around, an intellectual funfair without parallel" [26], while John Russel from the *Sunday Times* saw "computers at playtime" [27].

Dissenting Voices

Overall, the praise for Reichardt's undertaking seems almost unanimous and the near absence of critical debate equally striking. Could it be that the ICA's "happy accidents" flourished so well because they were staged in an atmosphere of breathtaking naïveté? Only a few lone voices seem to acknowledge the more serious and inevitably unhappy accidents that litter the history of cybernetics. "Do not be fooled," cautioned Michael McNay of the *Guardian* in a rare critical review of the exhibition: "Norbert Wiener . . . knew better. He published the first treatise on the new science not very long after the holocausts of Hiroshima and Nagasaki, yet he felt able to predict for cybernetics a destiny as fate-

Fig. 4. Installation view. To the left, *Sidebands* by Hugh Riddle and Anthony Pritchett, 1968. These graphic forms are stills from a kinetic sequence using oscillographic techniques, which are used for frequency measurement. The system on display was originally developed to generate graphics for the television trailer of the BBC science-fiction series "Out of the Unknown." (© Cybernetic Serendipity)

Fig. 5. "Highlights of the History and Technology of IBM Computers from 1890 to the Present." The display was produced by IBM for an exhibition entitled "History and Technology of Computers," which was held at the Smithsonian Institute in Washington, D.C., in 1967. The IBM section won the gold medal as the most outstanding exhibit of that year at the 1967 International Display World Competition. (© IBM/Cybernetic Serendipity)

ful as for the atom" [28]. McNay correctly pointed out that "these words do not appear in the promotional literature for the exhibition, but in their shadow the jokes take on a pallid look" [29]. The writer in *New Society* put it more succinctly:

> The conclusion is a rather sinister one for those who believe that cybernation is *not* a neutral development, but an instrument of a growing technocratic authoritarianism, which deserves the critical resistance and not the consoling fellowship of our artists. When we ignore the total social context in which they work, and begin to accept the after-hours fun and games of IBM technicians as art, we are not all that far from admiring the aesthetic surface of thermonuclear mushroom clouds and ballistic missiles [30].

The fact that Cybernetic Serendipity enjoyed tremendous popularity in the late summer of 1968 in London, while, in the words of its curator, "the same venture in Paris would have needed police protection" does indeed raise some important questions [31]. Critics might argue that, in the United Kingdom, the subversive momentum of 1968 never unfurled in the same way, with the same force, as it did in continental Europe or the United States; that Britain's pathetic "revolt" hardly left the campus of the London School of Economics. Still, at a time of heightened global political awareness, not least in the wake of the American war in Vietnam, it seems extraordinary that the ICA did not deem it necessary to make any statements other than that "computers can be used for pleasure" [32]. Does this total lack of critical engagement with the socioeconomic sphere point to a wider dilemma in media art?

Technology, Art and Politics: From Norbert Wiener to the Millennium Dome

Far from being the first exhibition to showcase art and technology in the postwar years, Cybernetic Serendipity was one of many high-profile events staged towards the end of a first phase of innovation and experimentation. But perhaps more successfully than any other exhibition at the time, Cybernetic Serendipity, with naïve enthusiasm, managed to capture a snapshot of art, entertainment, science and politics, all mixed up in a curious amalgam that came to be known as media art.

In the decades immediately after World War II, an increasing curiosity and competence began to emerge among artists, focusing on technology as a new means to facilitate exploration of and interactions with the physical environment. An interest in the use of industrial materials, chemical processes and state-of-the-art engineering practices characterizes many artistic experiments in the 1950s and 1960s. In the wake of these explorations, artists appropriated modern materials, equipment and scientific know-how, often in partnership with business corporations, research institutes, technicians and engineers. The utilization of scientific know-how, however, did not simply lead to a re-valorization of the art object and the materials that could be made of it. On the contrary, the integration of technology engendered a growing interest that went beyond a strictly object-oriented approach toward practices that focus on process, ideas and (inter-) actions. Concomitant with experiments in participation and interaction, with happenings, performances, land art and conceptual art, media art is often regarded as a conclusion of the dematerialization of the art object [33]. What better way to conceptualize the art object than to program a machine in a grammar of pure electronic differences [34], zeroes and ones?

Back in the 1940s, Norbert Wiener's new science of cybernetics evolved from military experiments with feedback loops [35]. Wiener devised a tracking mechanism for anti-aircraft guns, feeding information about the predicted flight path of an enemy plane back into the system so that the gun could change its position accordingly. The whole contraption, including the gunner, could be defined as a goal-driven, dynamic system that responded to environmental changes in order to achieve predetermined objectives. The anti-aircraft gunner as part of an integrated, nervous—if not downright twitchy—system (Wiener's "hunting" [36]), an early cyborg of sorts, constitutes a striking image for the emerging theory of cybernetics (see Fig. 6 for an exhibit that provided a prescient connection with cybernetics in the case of "Joey").

Owing to its broad remit, cybernetic thinking lent itself to an extremely wide range of interdisciplinary practices and scientific discourses. Cybernetics promised to constitute nothing less than an integrative lingua franca, which biologists and mathematicians, economists and anthropologists were invited to take up and use [37]. By the mid-1950s, artists and composers also began to explore and engage with cybernetic thinking. Unlike mechanical technology, however, electronic hardware could only be obtained and manipulated in collaboration with industrial corporations. Engineers, whose help became indispensable, began to develop an interest in the work of artists.

When E.A.T. (Experiments in Art and Technology) formed in 1967, it was founded on the strong belief "that an industrially sponsored, effective working relationship between artists and engineers will lead to new possibilities which will benefit society as a whole" [38]. In-

dicative of the pitfalls that lie ahead when art, technology and entertainment are married under industry patronage, the E.A.T. project climaxed with the commission to build the Pepsi-Cola Pavilion at the 1970 Osaka World's Fair. Literally an inflatable edifice of smoke and mirrors, E.A.T.'s dome merged the psychedelic with the corporate, resulting in an experience akin to imagining Richard Wagner on acid. Gene Youngblood's call for a "practical utopianism" by means of "perpetual fog banks and krypton laser rainbow light showers" [39] adds an almost tragicomic footnote.

In the British art scene, it was perhaps one individual, more than any others, who contributed to the spread of cybernetic thinking. In a letter to the editor of *Studio International* published in July 1968, Roy Ascott claimed precedence "as the artist responsible for first introducing cybernetic theory into art education in this country (Ealing 1961) and for having disseminated the concept of a cybernetic vision in art through various art and scientific journals in recent years" [40]. Ascott's Groundcourse, a unique program of study at Ealing School of Art (1961–1964) and later at Ipswich Civic College (1964–1967), incorporated innovative methods, such as behavioral psychology, chance operations and interactive collaborations. Groups of six students functioned as integrated units of self-regulation, who had to react to environmental stimuli according to predetermined parameters. Ascott's 1964 show "Diagram Boxes and Analogue Structures," at the Molton Gallery in London, presented "a cybernetic model of art as an interactive system" [41]. For Ascott, the participatory nature of his art suggested a model in which environment, artist and audience were all part of the same *system*. Tellingly, however, Ascott's innovative practice was not considered suitable for Cybernetic Serendipity.

Nonetheless, the exhibition's pseudo-progressive message, wrapped up in a fun-fair of blinking, hooting robots, hit upon an impressionable sociopolitical and cultural environment. For the first time since the end of the war, Britain was experiencing a rapidly rising standard of living and the emergence of youth culture. Labour's election victory in 1964 had put a modernization program at the top of the political agenda, and the prime minister's call for a technological utopia is unforgotten. Outlining his vision of a modern Britain, Harold Wilson described a country "forged in the white heat of this revolution" where there would be "no place for restrictive practices or for outdated methods on either side of industry" [42]. If Britain were to remain a player on the world stage, it would have to embrace modern technology, modern practices and modern thinking.

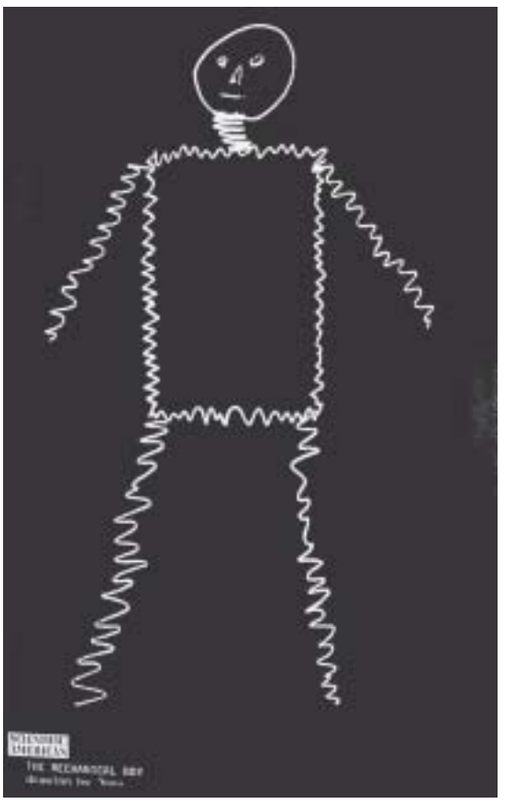

Fig. 6. The Mechanical Boy, drawing by Joey. In 1959, Bruno Bettelheim published an account of "Joey," a boy who thought of himself as a robot. Joey constructed machines in his bedroom and attempted to connect himself with imaginary wires to power outlets in order to perform basic bodily functions. Bettelheim argued that Joey's autism was caused by his unloving parents. Joey's drawing shows a man whose body is formed by electrical wires. (© "Joey." While every effort has been made to locate the copyright holder for permission to use this image, we have been unable to do so. Photo © Cybernetic Serendipity.)

Against this backdrop, Cybernetic Serendipity fitted in extremely well, as it offered a lighthearted view of the modern world without raising too many (if any) objections or stirring fears. Rather than focus on the technocratic, threatening or plainly vacuous elements in Wilson's vision, the exhibition merged science and technology with great entertainment and a dash of art. Staged when computers consisted of large, centralized mainframes guarded by a caste of stern programmers, Cybernetic Serendipity succeeded in injecting an overdue element of fun into the information-technology sector. Perhaps for the first time, it could be considered "cool" to be involved with computers. Especially for the young and impressionable, Cybernetic Serendipity provided a sense of excitement, much needed if Britain was going to compete successfully in the new age of digital computing.

According to Roger Beard in a 1968 issue of *Technical Education & Industrial Training*, the National Computing Centre (NCC), a government agency set up in 1965 to encourage the growth of computer usage in the U.K., "might well take a leaf from the ICA's book" [43]. Beard attested to a widespread lack of "computer appreciation" in society and endorsed the ICA exhibition as "required viewing," since it achieved "in an instant" what the unwieldy, technocratic NCC could only dream of: a "re-definition" without which it was "undoubted that the computer will remain in an exclusive . . . field which the bulk of the next generation will no more understand than we do" [44]. Judging from the public reception of the exhibition, Cybernetic Serendipity certainly succeeded in increasing "computer appreciation." More interestingly, however, it did so by transforming the austere "modernist computational aesthetic" [45], with its mainframes and technician programmers, into a new kind of cool, entertaining and decidedly postmodern spectacle.

Over 30 years on, Britain's trendy media and IT industries were once again at the heart of government drives to promote an image of cutting-edge art and technology as national assets. Tony Blair's "Cool Britannia" project and a plethora of new art and technology initiatives put New Labour's new millennium into sharp relief. From dotcom start-ups around London's Hoxton Square to the

newly built Wellcome Wing of the Science Museum, the alliance between computers and art was portrayed once again as integral to the notion of a modern nation with a bright and prosperous future.

New Labour's Millennium Dome project, however, came to epitomize the fallacy of "irrational exuberance" [46] and empty political rhetoric, a bubble that burst soon after the millennium fireworks had gone off. Packaged as a family-friendly exhibition of digital wizardry and sponsored by corporate business, the Dome project failed to recoup its cost and remains, to this day, a liability to the public purse. The magic formula that combined, in one big spectacle, science, entertainment, art and politics seemed to have lost its pulling power. However, in science museums, educational establishments and media art institutions around the world the spirit of Cybernetic Serendipity lives on. Interactive theme parks and digital teaching aids have become standard fare, except that, after over two decades of exposure to digital consumer products, the visiting public is perhaps less impressionable. If you own a PlayStation 2, why get excited about an interactive museum display unless you get blown away by more bang for your buck?

Cybernetic Serendipity, Supervening Social Necessity and Database Politics

Contrary to the assumptions made in Cybernetic Serendipity, science and technology are not self-sufficient, immune from outside influences, political pressures and economic interests. On the contrary, technological developments are symptomatic in character, and the socioeconomic conditions that drive scientific progress must be understood if technology is to be brought to bear within artistic practice.

Why is it, for instance, that Charles Babbage's proposals for an analytical engine in 1833 were only realized some 100 years later in Vannevar Bush's Differential Analyzer? According to Brian Winston, technology is far more implicated in the social sphere than is usually acknowledged. He proposes a model that illustrates his point:

> In this model, the "accelerator" is the supervening social necessity transforming the prototype into an "invention" and pushing the invention out into the world—causing its diffusion. But there is also a "brake": this operates as a third transformation, wherein general social constraints coalesce to limit the potential of the device radically to disrupt pre-existing social formations. I will refer to this particular "concentration" of determining social factors as the "*law" of the suppression of radical potential* [47].

The success of an invention or a prototype, according to Winston, depends upon its perceived threat to institutional politics and associated business interests on the one hand and its perceived benefit on the other. Only if an unequivocal supervening social necessity becomes apparent can the invention enter into the phase of diffusion. Powerful factors, however, jeopardize the success and dissemination of the invention for some time. Winston argues: "Understanding the interaction of the positive effects of supervening necessity and the brake of the 'law' of the suppression of radical potential is crucial to a proper overview of how telecommunications technologies develop" [48].

Babbage's analytical engine could not have been built in 1833, due to the absence of a supervening social necessity. Only with the increasing complexity of the American population census in the late 19th century and the emergence of a modern business culture could an impetus emerge. Yet it had to come to the "firing table crisis" in the United States and the ENIGMA blackouts in Britain during World War II for Winston's "law" of the suppression of radical potential to be crushed by emerging supervening social necessity [49]. The need for military processing power had become overwhelming. Towards the end of World War II, the first electronic computers were operational, ready to be fully deployed in the nuclear arms race of the Cold War. The military-industrial complex had become the main driving force in the development of computer science. Michael De Landa warns that

> we may easily dismiss the role that the military played, arguing that without the intensification and concentration of effort brought about by the war, the computer would have developed on its own, perhaps at a slower pace. And I agree that this is correct. On the other hand, many of the uses to which computers were put after the war illustrate the other side of the story: a direct participation of military institutions in the development of technology, a participation which actually shaped this technology in the direction of uniformization, routinization and concentration of control [50].

While it may be simplistic to maintain that computer-scientific activity took place exclusively for and within the military sector, Arthur L. Norberg and Judy E. O'Neill point out that throughout the Cold War a strong "partnership" was encouraged between the military and the academic community [51]. The main driving force for military-technological developments was the Advanced Research Projects Agency (ARPA), which was founded in the aftermath of the Sputnik shock of 1957:

> When the space program accelerated . . . in 1957, digital computers became an integral part of that activity as well. The more sophisticated the various military systems became, the greater the demands placed on their computing elements [52].

Responsible for coordinating the academic research effort in electronics and engineering was ARPA's Information Processing Techniques Office (IPTO). According to Norberg and O'Neill, three major branches in computer science benefited from the massive injection of government money through the IPTO": computer graphics—"the fundamental concepts behind the remarkable computer graphic images we encounter every day emerged primarily from research projects funded by the IPTO'; artificial intelligence—"IPTO . . . was the largest funder of AI in the world for at least a decade and a half after 1962—providing an amount far greater than the total provided by all other groups"; and networking—"It is well to remember that the basis for this program to connect us to the 'Information Superhighway' is only the latest chapter in the story of invention, development, and implementation of networking, a technology begun by IPTO" [53].

Here, then, we have the "happy" ingredients of Cybernetic Serendipity's success: funny-sounding robots, interactive computer graphics, simulators and systems that react to the environment; in a word, a re-packaged and sanitized arsenal of high technology, straight from the laboratories of the American military-industrial complex. And not a single mention of the real driving force behind computer technology of the 1940s, 1950s and 1960s can be found in the exhibition catalogue or in most of the accompanying press coverage: the demands of the U.S. war economy. Concerning computer technology's supervening social necessity of the late 1960s, Cybernetic Serendipity excelled only in its conspicuous silence (see Fig. 5). This glaring omission is particularly poignant at a time of heightened global tensions, war in the Far East and political unrest in most major Western capitals. Cybernetic Serendipity, without doubt, failed to address what needed addressing; it did not

balance the potential for entertainment with the need for critical reflection. It created a huge amount of enthusiasm about technology without revealing its hidden agenda or indeed its true potential.

Clearly, an analysis of the aesthetics of media art must recognize and acknowledge some sort of critical framework; it must investigate how, if at all, art and technology can engage with the supervening social necessity of its time without playing into the hands of those whose economic interests bring about the evolution of technology in the first place. An emergent medium founded on technologies of modern warfare must problematize issues that established artistic media need not take up. But if scientific progress is predetermined by socioeconomic forces, as proposed by Brian Winston, where exactly does that leave media-artistic practice? Can media art hope to escape the gravitational pull of the techno-economic sphere?

Media art is implicated in the process of organizing and perpetuating technological innovation and commercial dissemination in a way that traditional media such as painting and sculpture are clearly not. At the same time, however, it is ideally placed to put to use, disrupt or re-represent the streams of data that connect the economies of the information age. In a regime of ubiquitous consumption of content, media art could help augment criticality by subverting, disrupting and revealing the "total flow" of corporate data and by allowing connections and associations to be made where these are otherwise denied or obscured [54]. Media art could help recover and "augment" self-awareness and the importance of point of view. When cybernetic systems from electronic banking to interactive doormats become ubiquitous, data emerges as the key currency enabling the ebb and flow of information. Abstract and pristine in mathematical structure, and traveling with the speed of light through nodes and networks, data must be re-represented for human consumption as a sensory stimulus, as image, sound, smell, touch or taste. Media art can problematize this process of re-representation; it can discuss how meaning is constructed, how social realities are revealed and how subjectivity can be undermined or re-affirmed. Sensory stimuli that re-translate bits of information back into human bandwidth do not need to dumb down, immerse and pacify the human recipient. Media art can recover "statistical representation as political performance" [55], it can introduce database politics as the site for critical practice, operating from within an all-encompassing "information paradigm" [56]. At a time when the interface between human and computer begins its evolution into an alluring, multi-sensory spectacle, not least thanks to willing media artists such as Youngblood, Cybernetic Serendipity does not address the need for such practice. On the threshold between modernist computing with its towering stacks of punch-cards and the rather more entertaining, corporate kind of immersive computing, the ICA exhibition presents art as the willing progenitor of the latter.

Conclusion

To be sure, the ICA exhibition represents an early landmark in the evolution of digital media. Paradigmatic for the institutionalization and commercialization of media art over the last decades, Cybernetic Serendipity anticipated the blurring of boundaries between art, science, technology and entertainment, between corporate interests and artistic integrity. Exemplary for the appeal of the great promises made early in the computer age, Cybernetic Serendipity epitomizes the dilemma much of media art faces today: its complicated relationship with the socioeconomic environment, the difficulty of engaging with its own historicity and transcending mere techno-fetishism, and the all-too-familiar sense of a naïve, unbridled optimism with its inevitable pitfalls and false dawns.

If exhibitions must pull crowds, however, Cybernetic Serendipity was a resounding success. Completely unlike the dour and self-referential hermeticism of conceptual art in the late 1960s and early 1970s, Cybernetic Serendipity pointed far ahead to the more recent phenomenon of interactive scientific theme parks and popular blockbuster exhibitions. The exhibition generated a sense of excitement about technology, especially amongst a younger audience, to a degree that can only be described as "unheard of" in the context of an arts institution. However, the widespread absence of critical debate in the wake of this exhibition represents a serious omission on the part of the organizers and points to a wider dilemma that media art needs to address in order to be taken seriously.

Acknowledgments

I am grateful to Steven Johnstone and David Evans for their suggestions and Jasia Reichardt for her invaluable help and generosity.

References and Notes

1. Hans-Peter Schwarz, "Discourse 1: Media Museums," in Rebecca Picht and Birgit Stöckmann, eds., *Media Art History* (New York: Prestel, 1997) p. 11.

2. P. Brown, "30 Years On: Remembering Cybernetic Serendipity," *Outline, The CTIAD Journal* **6** (Autumn 1998) pp. 3–5; Mitchell Whitelaw, "1968/1998: Rethinking a Systems Aesthetic," *ANAT* (Australian Network for Art and Technology) (June 1998) <http://www.anat.org.au/archived/deepimmersion/diss/mwhitelaw.html>; Brent MacGregor, *Cybernetic Serendipity Revisited* (Edinburgh, Scotland: Edinburgh College of Art, 2002).

3. Jasia Reichardt, "'Cybernetic Serendipity'— Getting Rid of Preconceptions," *Studio International* **176**, No. 905, 176–177 (November 1968).

4. The figures are somewhat contradictory. Jasia Reichardt counted "more than 60,000 visitors during the eleven weeks of the exhibition." Reichardt [3] pp. 176–177. Michael Kustow, however, then director of the ICA, in an interview with the *Guardian*, cited a much lower figure: "In eleven weeks 45,000 saw it, it is now touring America, and with luck it will lose no more than £4,000." In Terry Coleman, "Wild in the Mall: Terry Coleman on the ICA's Financial Crisis," *Guardian* (5 December 1968).

5. Reichardt [3] pp. 176–177.

6. David Clemens, "Scene," *Daily Mirror* (9 August 1968).

7. "Fun by Computer," *Evening Standard* (2 August 1968).

8. "Happy and Unexpected Discovery Closing," *Guardian* (19 October 1968).

9. Katharine Hadley, "Serendipity with Cybernetics," *Hampstead and Highgate News* (9 August 1968).

10. Michael Shepherd, "Machine Mind," *Sunday Telegraph* (11 August 1968).

11. "In the Art Galleries," *The Lady* (15 August 1968).

12. Jonathan Benthall, "Lucky Computers," *The Listener* (15 August 1968).

13. Shepherd [10].

14. MacGregor [2].

15. Mario Amaya, "Software in the Mall," *Financial Times* (13 August 1968).

16. Shepherd [10].

17. Robert Melville, "Signalling the End," *New Statesman* (9 August 1968).

18. Leslie Stack quoted in Linda Talbot, "Meet the Friendly Robots," *Hampstead and Highgate Express* (26 July 1968).

19. Jasia Reichardt, "Computer Graphics—Computer Art," in Jasia Reichardt, ed., *Cybernetic Serendipity—The Computer and the Arts,* exh. cat. (London: Studio International Special Issue, 1968) pp. 70–71.

20. Nigel Gosling, "Man in an Automated Wonderland," in *Observer* (4 August 1968).

21. Talbot [18].

22. David Clemens, "Scene," *Daily Mirror* (9 August 1968).

23. Amaya [15].

24. *Evening Standard* [7].

25. Hadley [9].

26. Shepherd [10].

27. John Russel, "The Art of the Computer," *Sunday Times* (4 August 1968).

28. Michael McNay, "Blind Idiots Need Not Apply," *Guardian* (2 August 1968).

29. McNay [28].

30. "Aesthetic Gadgetry," *New Society* (8 August 1968).

31. Reichardt [3].

32. Talbot [18].

33. Jack Burnham, "Systems Esthetics," *Artforum* **7**, No. 1 (September 1968) p. 31.; Lucy **R.** Lippard, *Six Years: The Dematerialization of the Art Object* (New York: Praeger, 1973).

34. Roy Ascott, "Is There Love in the Telematic Embrace?" *Art Journal* **49**, No. 3 (1990) p. 241.

35. Norbert Wiener, "Introduction," in Norbert Wiener, *Cybernetics: Or Control and Communication in the Animal and the Machine* (Cambridge, MA: MIT Press, 1999; originally published 1948) pp. 11–12.

36. The term "hunting" is used in mechanical engineering to describe pathological oscillations between two fixed points. The mechanism, due to its initial inertia, overshoots the target coordinates, but receives instant feedback resulting in an overcorrection in the opposite direction and so forth. Wiener and Rosenblueth saw a connection between this and other mechanical phenomena and symptoms in patients with neurophysiological damage. For an early appraisal of these ideas, see Arturo Rosenblueth, Norbert Wiener, and Julian Bigelow, "Behavior, Purpose and Teleology," in *Philosophy of Science* **10** (1943) pp. 18–24.

37. Steve J. Heims, *Constructing a Social Science for Postwar America—The Cybernetics Group 1946–1953* (Cambridge, MA: MIT Press, 1993; originally published 1991) pp. 27–28.

38. Billy Klüver and Robert Rauschenberg, *E.A.T. News* **1**, No. 2 (June 1967).

39. Gene Youngblood, "The Open Empire," *Studio International* **179**, No. 921, 177–178 (April 1970).

40. Roy Ascott, "Cybernetics—Letter to the Editor," in *Studio International* **176**, No. 902 (July/August 1968) p. 8.

41. Roy Ascott, e-mail to the author (2000).

42. Harold Wilson, "Speech by the Rt. Hon. Harold Wilson MP," in *Report of the Annual Labour Party Conference* (London: Labour Party, 1963) pp. 135–140.

43. Roger Beard, "Editorial: The Computer," *Technical Education & Industrial Training* **10**, No. 9 (September 1968).

44. Beard [43].

45. Sherry Turkle, *Life on the Screen—Identity in the Age of the Internet* (New York: Simon & Schuster, 1997; originally published 1995) pp. 18–36.

46. Alan Greenspan, Speech to the American Enterprise Institute (1996).

47. Brian Winston, *Media Technology and Society—A History: From the Telegraph to the Internet,* (London: Routledge, 1998) p. 11. For a diagrammatic rendition of Winston's model, see Figure 7 on p. 14.

48. Winston [47].

49. For the production of so-called firing tables, a huge number of differential equations had to be calculated. Goldstine recalls that "a typical firing table required perhaps 2,000–4,000 trajectories" and quotes from a working memo from the Ballistic Research Laboratory in Aberdeen, Maryland, of 1 February 1944, stating that "'even with the personnel and equipment now available, it takes about three months of work on a two shift basis to turn out the data needed to construct a director, gun sight, firing table. . . . The number of tables for which work has not been started because of lack of computational facilities far exceeds the number in progress." Quoted in H.H. Goldstine, *The Computer from Pascal to von Neumann* (Princeton, NJ: Princeton Univ. Press, 1993 [1972]) pp. 138, 165–166. The firing table crisis eventually led to the development of ENIAC (Electronic Numerical Integrator and Computer). The British equivalent of the firing table crisis was of course the crucial effort to crack the German Navy's ENIGMA codes in the U-boat war. Alan Turing's efforts in Hut 8 at Bletchley Park succeeded by May 1941, enabling British intelligence to read all U-boat messages within one day. Yet improvements in German encryption efforts led to a number of ENIGMA blackouts, when, once again, Allied intelligence could not decode German radio traffic sufficiently speedily to influence decision-making on the ground. Turing and his team decided to solve the increasing mathematical complexity of code breaking by building Colossus, an advanced electronic computer, which was completed in 1943.

50. Manuel De Landa, "Economics, Computers and the War Machine," in Gerfried Stocker and Christine Schöpf, eds., *Infowar* (New York: Springer, 1998) p. 167.

51. Arthur L. Norberg and Judy E. O'Neill, "Introduction," in *Transforming Computer Technology: Information Processing for the Pentagon 1962–1986* (Baltimore, MD: Johns Hopkins Univ. Press, 2000) p. 1.

52. Norberg and O'Neill [51] p. 4.

53. Norberg and O'Neill [51] pp. 151–197.

54. A compelling example of disruptive strategies can be found in Brecht's "Epic Theatre." Rejecting "culinary" consumption, Brecht favored interruption over intoxication; he juxtaposed more than he fused together in order to make the audience realize, recognize and respond, rather than dream and escape in theatrical pseudo-reality. See Bertolt Brecht, "A Short Organum for the Theatre," in John Willett, ed. and trans., *Brecht on Theatre—The Development of an Aesthetic* (London: Methuen, 1990; essay originally published 1948) p. 194.

55. Natalie Jeremijenko, "Database Politics and Social Simulations," in Barbara London, ed., *Technology in the 1990s: Natalie Jeremijenko,* MOMA (2000) [originally published 1995]; <http://tech90s.walkerart.org/nj/>.

56. N. Katherine Hayles, "Virtual Bodies and Flickering Signifiers," *October* **66** (Fall 1993) pp. 69–70.

General Bibliography

Briers, David. "Star Dot Star," *Art Monthly* **219** (September 1998) p. 50.

Burnham, Jack. *Beyond Modern Sculpture* (London: Penguin, 1968).

Burnham, Jack. "Art and Technology: The Panacea That Failed," in John Hanhardt, ed., *Video Culture* (New York: Peregrine Smith Books, 1986).

Shanken, Edward A. "From Cybernetics to Telematics: The Art, Pedagogy, and Theory of Roy Ascott," in Edward A. Shanken, ed., *Telematic Embrace: Visionary Theories of Art, Technology, and Consciousness by Roy Ascott* (Berkeley, CA: University of California Press, 2001).

Manuscript received 22 June 2001.

Rainer Usselmann is the recipient of the 2003 Art Journal Award. He teaches theory and practice of photography and media art at the Arts Institute at Bournemouth, U.K.