



Dieter Daniels
Strategies of Interactivity

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1. Ideology or technology – Brecht or Turing

Is interactivity an ideology or a technology? The question goes back to the 1930s, and can be identified in the opposing stances of Bertolt Brecht and Alan Turing. Brecht demanded in 1932: 'Change this apparatus (the radio) over from distribution to communication. [...] By submitting constant, incessant suggestions for improving the usage of the apparatus for the general good we have to rock the social foundations of this apparatus, to discuss how it is being used to further the interests of a few.' [1] From 1935 onward, Alan Turing worked on his theory of a universal machine that later culminated in the famous question: 'Can machines think?' This included the problem of possible ways of establishing a connection between artificial intelligence and human consciousness: 'We may hope that machines will eventually compete with men in all purely intellectual fields. But which are the best ones to start with? Even this is a difficult decision. Many people think that a very abstract activity, like the playing of chess, would be best. It can also be maintained that it is best to provide the machine with the best sense organs that money can buy (...) I think both approaches should be tried.' [2]

Either position had its origin in wholly divergent discourses. On the basis of pure mathematics, Turing developed the scientific fundamentals of the technological feasibility of man-machine communication up to a level where it would be impossible to distinguish one from the other. Brecht, in contrast, transposed his theory of theatre onto the media, and recognized the social and political effects of human-human communication shaped by ever-more perfect media machines. The breadth of the field marked by the cornerstones of technological as opposed to social notions of interactivity has continued to define the debate surrounding Cyberspace and the Internet and the associated question of the reciprocal influence of media technology and social structure. <-

2. Open or closed systems – John Cage or Bill Gates

Despite the allegedly depersonalizing force of new communications technologies, individual names today stand more than ever for ideas and programmes – in politics as much as business and the arts. This is why two names also stake out the territory for a closer examination of the ideology and technology of interactivity. The mottoes pointing to their common ground might read, 'programmes instead of instruments' or 'software, not hardware'. This aesthetic stance made John Cage the precursor of the New Music and intermedia art of the '60s. Bill Gates, in contrast, realized the economic potential of this perception and in the course of the '90s multimedia boom became the richest man on the planet. Certainly, either figure attached a different meaning to these statements, as becomes obvious from their radically different concepts of 'interactivity'.

Most of Cage's compositions do not define a precise musical human-instrument interaction, but open up a field of possibilities to be interpreted by the performer of his composition and producing each time, through elements of chance and variation,

differing results. [3] Some pieces modify the instruments (prepared piano) or leave the choice of instruments up to the performers. Through the performance process, the individual's freedom to modify the structure results in a social interaction in the group of musicians. This non-hierarchic form of creativity can be compared with the 'bottom-up' structure by which an open-source software such as Linux is constantly further developed by its users. In either case, it is possible to vary and re-interpret a specified code with the result that the boundary between author and user becomes fluid. The opposite model would be a 'top-down' structure as represented by the precise notation of a classical composition as well as the proprietary software developed by Bill Gates' Microsoft Corporation, for which the secrecy of the source code is the basis of a capitalist monopoly. Program users work in line with the patterns of interaction decreed by the software industry, just as the classical musical composition specifies as exactly as possible the usage of musical instruments.

The purpose of composition, as Cage saw it, was not to deliver an optimum 'operating system' for musical instruments, but to initiate an individual and social creative process which successively detaches itself from the intentions of its author. By contrast, the software of Bill Gates and other proprietary systems keeps users in the dark about the structures 'inscribed' by its writers. A model derived from the time-honoured, idealistic notion of art – that of the deep mystery inherent to all creativity – is being kept alive solely by artificial secrecy. Instead of serving the sacred goals of the genius, it panders to the mammon of monopolists. Cage's concept of interactivity stems from an aesthetic and ideology leading to the dissolution of the boundary between author, performance and audience. That was why he deployed media technologies like radio, record, tape and, later, computer – through the information structures of such apparatus, the interference of musical production and reception became possible. Technology could not only replace human labour, but also open up a creative sphere. [4] For Gates, by contrast, interactivity is an economically and technologically determined pattern according to whose specifications millions structure their workflow – a view he pinpointed in an in-house paper stating that Microsoft treats human users like it does computers: it programs them. [5]

While the computer is indisputably replacing the piano as the most-used keyboard instrument in the home, liberation from the often tortuous obligation to practise has not reached young people in an open, Cagean form but instead in the voluntary self-conditioning of interaction with industrial software such as computer games. This admittedly bold comparison serves to bridge the gap between Cage's art and Gates' technology in order to show that ultimately their conflicting models of interactivity stand for two different blueprints of society. The respective principles of openness and closedness could act as a leitmotif for the changing meaning of the term 'interactivity' from the '60s to the '90s. [6] <-

3. Shifting paradigms of interactivity from the 1960s to the '90s

In the 1960s, interaction among audience, artwork, and artist became a defining element of an aesthetic aspiring to the ideal of a new art-form that would leave behind established genres, categories and institutions. This artistic field is most aptly described by the term 'intermedia'. The origins of intermedia art as inspired by John Cage and moulded by Fluxus and Happening lie in the decision to replace an autonomous, finished work with an invitation to the audience to essentially self-determine its experiences with of the artwork. This 'un-bordering' was supposed to engulf the boundaries between artists and audience and those separating the genres. The suspension of the difference between production and reception in the arts has many parallels with the demand of the '68 political activists for consumers to take over the production means.

The classical, bourgeois notion of culture concedes a low ranking to the participation of spectator, reader or listener, demanding that paintings, books or concerts be enjoyed with a kindred understanding of an original work tampered with as little as possible. Popular-cultural forms – such as vaudeville, circus or, more recently, the techno DJ – establish intensive exchange with audiences. The attempts to make interaction a means of avant-garde art in the '60s show the desire to depart from the confines of a bourgeois culture felt to be elitist and instead influence mass culture. Further ideals can be circumscribed with Umberto Eco's notion of the 'open work', as well as the 'domination-free discourse' first expounded by the German philosopher Jürgen Habermas. The common enemy of all these artistic and theoretical approaches is the passive cultural consumerism felt to be a product of the mass media in general and of television in particular. [7]

Similar models of open interaction were therefore developed in the arts and with a view to changing the role of the media. Drawing upon Brecht in 1970, Hans Magnus Enzensberger proffered the theory that the electronic technologies harboured the potential to emancipate through non-hierarchic communications. For the same reason he saw the media, were they to be liberated from their perverted usage by the agents of capitalism, as potential stimulus and instrument of social upheaval. 'The open secret of the electronic media, the decisive political factor, which has been waiting, suppressed or crippled, for its moment to come, is their mobilizing power.' And this power would enable people to become 'as free as dancers, as aware as football players, as surprising as guerrillas'. [8] Comparable ideals are to be found in the anti-industrial media criticism given a forum in publications such as, from 1970 onward, 'Radical Software'. The computer hacker personifies a synthesis of these utopias. With roots stretching back to the same period of unrest, the 'hacker ethic' still includes the following statement: 'You can create art and beauty on a computer.' [9] Just like the intermedia art of Fluxus and Happening, the political movement of the '60s took a critical approach to technology, but around 1970 the realization was dawning on activists in art and politics that an unadulterated rejection of media amounted to nothing less than self-incapacitation. The

emergence of the phenomenon today known as 'media art' is rooted in this interference of social theory and mass-media technologies.

By combining ideological strategies with technological means, the movements of the '60s were aiming to link the power of art and media. The social and cultural utopias delivered the objective of a future media role expected to trigger a macro-change in society. This relation has been turned on its head in the '90s: media technology is now often seen as the leitmotif from which all social, cultural and economic changes shall emanate. Today, for instance, the meaning of 'interactivity' is essentially defined through the electronic media. Interface and software designs specify the framework of this technologically determined interaction from human to human via a machine, or solely between human and machine. The 'mobilizing power' of the media, in which Enzensberger was still able to discern potential for attacking the dominance of industry, has long since become fuel for advertisements plugging telecoms shares or mobile telephones and deploying the same heroic images of dancers, footballers or guerrillas.

The same is true of the concept of the 'interdisciplinary', a cultural paradigm re-defined in the '90s to become one of technology. In the digital realm, the difference between text, sound and image is apparently reduced to varying data storage-space requirements. To combine various media in a single multimedia program is in line with the basic principle of digital technology, and therefore requires no aesthetic legitimization. Admittedly, there is a connection between the subdivision of artistic genres and the specific media deployed, but the belief that a shared media platform alone could facilitate or even implement a cultural exchange has proved, by and large, to be an illusion encouraged by the superficial resemblance of various interfaces. [10]

The '90s attitude that grasps social and cultural transformation as an effect of the media, contrasting with the calls in the '60s for media to be the instruments of such change, is not without historical roots. These extend from the Italian Futurists' fascination with technology to Marshall McLuhan, who already in 1964 described the media as being the de facto realization (that solely artists refused to accept) of the dreams of a new perceptual form first devised in the arts. [11] The contemporary scientific follow-ups are such media-theoretical approaches as that of Friedrich Kittler, according to whom it is only possible to 'continue mistaking for art the output of media because the design and nuts and bolts of technical devices ensure they remain black boxes'. In Kittler's view, artists are forbidden from opening up the covers of the appliances, this privilege being reserved, 'as the warning signs make very clear, for qualified specialists. What goes on beneath the covers, in the actual circuitry, is not art but the end of the same in data processing that takes its leave of humanity'. [12]

Measured against such a view, some of the interactive forms tried out and developed in '90s media art may indeed seem naive and, above all, wholly dependent on technological specifications. Yet a glance back at the pioneering forms of artistic, media-based interaction reveals that in many cases they penetrated far below the equipment cover plates. Indeed, long before the pre-fabricated media were packed inside casing and became commodities, artists were drafting new models of perception and action that would decades later become part and parcel of mass-media routine. Walter Benjamin already saw the Dadaists' montage of language and images as anticipating the media effects used in films. [13] Ever since the Futurist movement, avant-garde art has envied technology for its effect on the masses, while at the same time displaying vast far-sightedness with regard to technological effects and evolutions. For the same reason, the debate surrounding interactive art in the '90s can be truly understood only against the backdrop of the preceding developments, especially those in the '60s. <-

4. Media-based interaction in intermedia art of the 1960s and '70s

Compared with the visual arts, music requires for its electronic processing considerably lower data volumes and storage capacity. That is why radio came before television, and the tape recorder before the video cassette recorder. For the same reason, numerous artistic approaches to media clearly emerged first in work with music. [14] This is also true of the notion of 'interactivity', as demonstrated by John Cage's pioneering role. Yet Cage's point of departure was not technologically defined; on the contrary, he started with silence. His piece '4'33' (1952) can be seen as the ideal 'open work' precisely due to the absence of instruments. In it, nothing is fixed, everything depends on the conditions of the respective performance. The accidental sounds of the audience and environment are the content of four-and-a-half minutes of heightened sensibility. During the same period, Cage began to devise pieces that transferred the same principle of open interaction to the deployment of electronic media. In 'Imaginary Landscape No. 4' of 1951, twelve radios are used like musical instruments to produce an interplay of composer's specification and frequency-band offerings that in the USA of 1951 no doubt sounded very different than a contemporary performance of the same score in any country. TV zapping, another form of 'interactive' media perception likewise produced in real time by individual selection, namely by 'assembling' a new 'film' from the on-air TV programmes, is based on the same synchronism and redundancy of available channels as Cage's 'Imaginary Landscape No. 4'. This analogy between experimental composition in the '50s and day-to-day reception in the '90s would serve as a good example of the way artistic models prefigured media effects.

Cage's approach was indeed seminal for the entire field of intermedia art in the '60s, but Happening and Fluxus scarcely

picked up the media-related issues he addressed. A major exception is Nam June Paik, who in the title of his 1963 show 'Exposition of Music – Electronic Television' in Wuppertal [MKI] already indicated his crossover from New Music to the electronic image. [The various ' participation TV' models presented in that show were the first blueprint for viewer interaction with TV pictures. By manipulating the electronic circuits of normal TV sets, Paik was able to achieve complex visual structures that viewers could alter and which anticipated by decades the industry-marketed video and multimedia devices serving similar ends. [15] Since only one TV channel existed in Germany until (by coincidence also in 1963) a second public broadcaster, the ' ZDF', went on the air, actuating the ON/OFF switch had until then been the TV viewers' only possibility of interaction.

The uncompromising openness and infinite indeterminacy of the Happening and Fluxus ideal of an art that has no creator/spectator hierarchy proved to be a transitory phase. Although these movements made a vital contribution towards changing the static notion of a work in the visual arts, they delivered no sustainable model for tangible results. Above all, such an ideal was unable to satisfy the recipients' need for symbols and fictions. As the Happening of the '60s progressed to become the Performance of the '70s, audience interaction was either no longer desired, or else underwent severe ritualization and formalization. Bruce Nauman expressed this change unmistakably: ' I mistrust audience participation.' [16] Nauman's closed-circuit installation ' Live-Taped Video Corridor' [Photos] of 1970, developed from Performance, can be seen as a precursor of an attitude producing the very opposite of creative participation, namely the radical conditioning of a viewer through a work that forces him to fall back on his own experience of body and image. [17] Artists including Dan Graham, Peter Campus and Peter Weibel used video technology in similar fashion in the '70s in order to confront viewers with their own image by means of closed-circuit installations [Photo]. [18] Such works were, together with Nauman's corridor, without doubt the first interactive installations that were suitable as art exhibits. They were no longer designed to solicit the spectator participation aspired to in the '60s, however, but constructed situations reflecting upon the relationship between viewer and medium. At the same time, they marked an attitude of resignation towards video's potential for mass-media broadcasting, perpetuating instead, in almost symbolic fashion, the ' closed circuit' of the art system.

Valie Export's ' Tap and Touch Cinema' (1968) [MKI] delivered the antithesis of such essays in self-reflection through the aesthetics of the media. Describing her outdoor action as an ' expanded movie', she strapped a box to her chest and allowed passers-by to poke their hands through the curtain covering the front of the box in order to feel her breasts. ' As always, the screening takes place in the dark. Only the picture-house is a bit smaller. There's only room for two hands,' wrote Export. [19] This was an even more drastic conditioning of the viewer than in Nauman's ' Corridor', and again the boundary between public and private space was placed in question. [20] Now that the relation to the film medium had been placed on a metaphorical plane, the sensory deprivation of the seat-bound passive cinema or TV viewer was all the more distinct. As a direct sensory experience in Export's action, ' interactivity' was the counter-model to one-sided, mediated perception. The ' tactilism' the Futurists demanded back in 1921 as a way of expanding the spectrum of arts was transformed by Export into a critique of art's social role. That her street action took place in 1968 was certainly no coincidence, but expressed an aspect of the calls for a ' structural transformation in the public sphere' (to cite the title of a book by Habermas) that led to the '68 movement. <-

5. Fiction and function of multimedia technology and Cyberspace

Most of the examples presented so far involved interactive re-applications of media primarily serving the purposes of distribution and reproduction (video, TV, radio). The underlying artistic approaches deliberately worked against mass-media consumerism by modifying, to a less or more subversive degree, the consumption of the media in which the works were produced. From Brecht to Paik, such approaches demanded the alteration of the one-way structure of such mass media. In computer-based multimedia technology, by contrast, the interaction of user and apparatus is integrated in the medium itself. Networking makes the computer an interpersonal communication medium in which all previously separated media converge. The current technological development of networked virtual reality merges the two formerly separate development strands of computerbased simulation and communication. These spaces for a new experience, as virtual as much as they are real, are becoming tangible in the late '90s. That their roots stretch back to the '60s is evident in the way present-day ideas regarding Cyberspace were anticipated in the technological blueprints of that period, but even more strikingly in the theories regarding potential social, aesthetic and political implications.

Well into the '60s, most computers were, to briefly recapitulate the technical history, abstract computing machines used to process columns of figures and punched cards. With the introduction of the monitor, the first step was made towards visual display. The first possibility of graphic interaction in real time had emerged in the 1950s with the conjunction of visual display unit and light pen on the Whirlwind computer developed for air-defence purposes in view of the nuclear threat. [21] The dissemination of similar principles in the '60s and '70s opened up the option of visual, intuitive, instantaneous man-machine dialogue. When in 1966 Ivan E. Sutherland linked up the head-mounted display developed for military purposes with the simple computer-generated wireframe representation of a three-dimensional space, his combination already contained the essential elements of virtual-reality technology, lacking merely faster computing speed and sufficient storage capacities. What would later turn into the Internet also began in the '60s on the basis of the decentralized ARPA Net installed

in 1968 in order to safeguard military communications in the case of a nuclear attack. Both components of Cyberspace today enabling the networking of virtual spaces are therefore products of Cold War anti-nuclear defence strategy.

There was an astonishing synchronism between such technological blueprints and the artistic theories regarding their potential. Ivan E. Sutherland's first description of an 'ultimate display', written in Harvard in 1965, shows considerable similarity to a concept for a 'bio adapter' drafted in the same year by the author Oswald Wiener in Vienna. [22] According to Peter Weibel, this concept was the 'linguistic draft of a data suit'. Interestingly, Sutherland was working on the technical implementation of a man-machine interface while Wiener, wholly independently, was investigating the cultural consequences of a synthesis of this kind. The difference between technological practice and theoretical analysis did not lie in the belief in feasibility, but in the expectations this feasibility roused.

In this respect, Oswald Wiener began with the following finding: 'the new branches of science known by the collective term cybernetics have produced sentences that can be applied virtually unchanged to sociological matters within so short a time that it is reasonable to suspect the formulators had in mind the establishment of fundamental correlations between the requirements of technology and those of the state.' [23] The logical conclusion Wiener drew from all this was the 'liberation of philosophy through technology', by means of the 'bio adapter' that 'for the first time fulfils the healthy-heroic ideal of a homo sapiens who governs the universe, namely by drying out the cosmos on the one hand, and by liquidating the homo sapiens on the other hand'. [24]

Even if affirmative in tone, Wiener's well-nigh nihilistic scepticism contrasted with the naive enthusiasm for technology of many other artists, an attitude which was presumably closer to the utopia visions fostered by the developers of the technologies. Nicolas Schöffer's 1968 manifesto 'The Future of Art', for instance, reads: 'The information networks must be opened up for the true aesthetic products. This however requires a new art-technology and a complete transformation of the relationship between the producing artist and consuming audience. [...] Today we can envision with certainty for the future a room that replaces the small screen and wholly envelops the consumer. In this room the consumer will be surrounded by audio-visual, (olfactory, tactile) programs, will bathe in a truly, consistently aesthetic climate he is able to dose, re-assemble and program according to his own wishes. This bath will put him in a position to continuously advance and perfect himself, to sensitize, concentrate and express himself; it will lead to a new notion of human hygiene. This aesthetic hygiene is likewise indispensable for the those communities, or social groups, living in urban areas of various size.' [25] What Schöffer chose to ignore (in best Futurist fashion) was the marginal role art and artists would play in the de facto development of the world-model he outlined. Indubitably, the contemporary ear detects a sinister undertone to the technology-based 'aesthetic hygiene' he propagated.

It is tempting to place the technical enhancements of man-machine interaction in relation to the 'un-borderings' of '60s art. Towards the end of the same decade, this synthesis was promoted by the first manifestations of Art & Technology. [26] There are undeniable similarities between the technological futures mapped out by Schöffer, Sutherland and Wiener, but their theories regarding the social, psychic and political effects were radically different. We are reminded, once again, that interactivity always stands both for a technology and for an ideology. Either field has continued to overlap with the other up to the present-day. The term 'Cyberspace' was coined by science-fiction author William Gibson in the early '80s, and the emphatic, sometimes even ecstatic, books by scientists like Donna Haraway or popular authors such as Howard Rheingold were more conducive elements of '90s cyber euphoria than the general public's hands-on experiences with technology of this kind. Yet this hype, for its part, stimulated the technological developments and, above all, the need for the same. In this area, it follows, there is a very close reciprocal relationship between fictive visions (be they expressed in literature, science, or art) and the creation of the technological functions these visions describe. The fiction and function of Cyberspace evolved in a process of constant feedback.

Nevertheless, it is possible to plainly state the real motives for the creation of VR technology, and with them the ideological background. From the 1960s onward, the practical implementation of such blueprints was financed almost exclusively by military budgets. Regardless of whether the philosophical and aesthetic designs originated from scientists, writers or visual artists, their ideological basis clearly differed from that of their practical realization. One ideology was trying to remove the aesthetic boundaries between individual and collective, or between producer and recipient, while the other – wholly contrarily – was aiming at the military transgression of a frontier shielding an enemy defined by this very ideology. Since the aesthetic ideal of un-bordering was depending upon the apparatus developed for other purposes, art was now suspected, not without justification, of recycling or even pseudo-legitimizing, military technology. Computer games, as one example, represent the broadest worldwide usage of these technologies. While as games their combinatorics give them some relation to the arts, most of them have an ideological and psychological basis making them notorious illustrations of the military origins of their technologies. [27] If artists are unaware of the inherent contradiction of using means developed for military purposes to advance their aesthetic aspirations towards un-bordering, then they are naive at best, opportunists at worst. [28] <-

6. Examples of media-assisted interaction forms of the 1980s and '90s

'Virtual Reality and Cyberspace are '60s ideas, even if their technology was first implemented in the late '80s,' asserts Peter Weibel. [29] Like Jeffrey Shaw and Valie Export, he counts among the artists whose work with different forms of interaction spans the divide between the approaches of the '60s and '90s. With the same statement, however, he joins Shaw and Export in ignoring the paradigm shift between the removal of aesthetic and social boundaries in the '60s and the technological interactivity of three decades later. [30] This might be partially explained by the fact that the notion of interactivity only re-emerged in the '90s as a result of technological development, after being almost entirely absent from the Conceptual and Minimal art dominant in the '70s, as well as from the postmodern retrospection of the '80s.

Towards the end of the '80s, realistic 3-D animation in real time became possible thanks to higher computing speeds and storage capacities. Interfaces like data gloves and cyber helmets could now be used for physical immersion in data space, and presented the basis on which in the following decade various models were developed for the interaction of man and machine, of real space and data space. The capacity of elaborate technology was the hallmark of most of the models produced in collaboration with media institutions, universities or companies. Commentaries accompanying the art-related projects all emphasized the aspects of technical-aesthetic innovation and of the joint research conducted by engineers and artists. The emancipationist or media-critical approaches that were obligatory in the video art of the '60s and '70s now almost disappeared. Several typical models of man-machine interaction are outlined briefly below and placed in relation to parallel developments outside the field of art. <-

i. Interaction with a video story through multiple options

Counting among the first successful examples of technology based interactivity, these works of the '80s are strictly speaking not part of the Cyberspace domain. They connect video and computer technology in order to enable a plot with several variants and loops that, unlike linear narration, offer the viewer options for the further progression of the story. Grahame Weinbren's installations develop complex relations between several plot levels, and point towards the interactive cinema of the future ('The Erl King', 1986; 'Sonata' 1991/93). From a playfully feminist stance, Lynn Hershman addresses in her installations primarily the sexual and erotic dimension of interaction, turning the viewer into participant or voyeur ('Deep Contact', 1989/90; 'A Room of One's Own', 1992). The potential to expand such approaches for collective productions was demonstrated by the 'Videolabyrinth' jointly developed in 1988 by video filmmakers Rike Anders, Ilka Lauchstädt, Mari Cantu and programmer Martin Potthoff [MKI]. Their labyrinth contains three interactive plots subject to interruption by questions, quiz assignments, or scoreboard readings. [MKI] As a West German production, it still had to rely on computer-controlled videotapes that entailed long waits between the sequences. Weinbren and Hershman, by contrast, deployed the videodisk technology that was already available in the USA but failed to succeed on the mass market. With the launch of the CD-ROM in the early '90s, the first interactive medium became commercially available, but its storage capacity was insufficient for longer video stories.

Attempts by the entertainment and TV industries to make interactive film and TV a mass medium have not succeeded so far. [31] This may be partially due to the still complicated operating conditions, but the commercial failure of all interactive mass media models to date (from CD-I to digital TV) might be taken as an indication that audiences prefer linear narration. [32] The dramatic structures of interactive narration likewise remain in the early stages. Zapping, which remains the most popular form of interaction with linear programmes, is an anarchic form of personal montage that eludes all control or structuring. Oliver Hirschbiegel's TV thriller 'Mörderische Entscheidung' ('Murderous Decision') was an attempt to transform the destructive principle of zapping into a constructive method of interaction. Its two plot strands were transmitted concurrently on ARD and ZDF, the first and second German channels, in 1991. Similarly, the non-linear film 'nomad' (1998) by Petra Epperlein und Michael Tucker [MKI] uses DVD technology to offer the viewer a choice among three versions running parallel to each other but allowing no interaction. <-

ii. Interaction with a closed data world through which the viewer can navigate

This is the classical model of basic 3-D interaction, such as presented in Jeffrey Shaw's installations 'The Legible City' (1988) [MKI] and 'The Virtual Museum' (1991) [MKI]. [MKI] The viewer passes through an unchangeable data landscape, which is not unlike being on a tour round a town or museum. Decisive in Shaw's works is the quality of the interface that, moving away from the keyboard or mouse, places the spectator on a bicycle or reclining chair and so enables everyday physical movements to be intuitively transposed into the data world. These installations have a certain resemblance to information systems such as museum guides on CD-ROM or interactive maps that navigate a driver through the streets of an unknown city. The forerunner of all such systems was the 'Aspen Movie Map' developed in the late 1970s by the Architecture Machine Group at the Massachusetts Institute of Technology (MIT) in Cambridge. The notion of a 'virtual museum' has become particularly popular, with museum visits being deployed as metaphors in products ranging from demo programs to science CD-ROMs for a general audience. With digital technology, it would seem, the ideal medium for the 'museum without walls' ('musée imaginaire') envisioned by André Malraux is available for the first time. One way of compensating for the lack of

communicative processes with the 'museum-like' data world is to heighten the illusionist quality and in this way extend the sensations to bring about a complete immersion of the viewer. Such hi-tech installations are situated on the fringes of the art context, however, and often find more appropriate appreciation as scientific visualizations. [33] These products slot into a tradition stretching back to the 19th-century panorama. [34] At the same time they make it clear that, ultimately, illusion and interaction are mutually exclusive. <-

iii. Interaction through body interfaces

All virtual-reality techniques constitute an expansion of perception and establish a connection between data structure and body. The development of such interfaces represents one of the most creative intersections of artistic and technological approaches in the 1990s. The classical set composed of data glove and VR spectacles proves impracticable for exhibitions, conflicting as it does with the habits of museum visitors and only able to be used by one visitor at a time. ART + COM [MKI] delivered a paraphrased version of the museum situation with 'Zerseher' (1990–91) in which a Renaissance painting ('Boy Holding a Child's Drawing' by Giovanni Francesco Caroto) is dissolved as a digital reproduction through the gaze of the spectator. [MKI] An eyetracker developed for medical and military purposes records the motions of the eye within the field of vision, and in this way makes possible, at least in a symbolic destruction, the technical implementation of the active role of the art observer. Peter Weibel's installation 'The Tangible Image' (1991) [MKI] permits direct, haptic access to a digital image. [MKI] This work can also be viewed as the man-machine version of the man-man interface delivered by Valie Export's 'Tap and Touch Cinema'; again, the paradigm shift from the '60s to the '90s becomes clear. [35] Weibel carries forward this fusion of image and spectator in 'The Curtain of Lascaux' (1993) [MKI] , and embeds it in a philosophical concept taking in the history of human perception from prehistoric paintings through Plato's cave to Cyberspace. [36] A feedback between body and data takes place in Ulrike Gabriel's installation 'Breath' (1992/93) [MKI]. Via a sensor belt, the viewer's breath influences the computer-generated projection of crystalline-amorphous visual structures and the soundtrack. The visuals and sound are designed to affect the viewer and initiate a bio-feedback between user and machine. Experiments with interactive choreography took the first step toward connecting human and technical action. David Rokeby's sound installation 'Very Nervous System', whose 'body-language' reaction he continuously advanced from 1983 to 1995, was a pioneering work of body-sound interaction deployed both as an exhibit for interaction with visitors and for performances with musicians and dancers. 'Electro Clips' (1994) by Christian Möller [MKI] and Stephen Galloway, as well as 'Binary Ballistic Ballet' (1994) by Michael Saup and William Forsythe) [MKI] , were both the products of collaboration between a media artist and a choreographer. <-

iv. Data structures subject to dynamic self-development and influenced by interaction

After Turing, the ability of machines to learn was always considered to be an essential condition of Artificial Intelligence. Even on the level of low-tech, a number of models were created that assigned to a 'work' a life of its own in interaction with the spectator. Based solely on language, Peter Dittmer's installation 'The Wet Nurse' (1992–94) [MKI] over the keyboard involves the user in a complex dialogue potentially culminating in the computer becoming agitated, resulting in the symbolic spilling of milk into a large glass cabinet. The software's conversational skills are continuously expanded and enriched through usage. Thanks to the modest storage requirements of text, no more than a PC is required, but the sculptural appeal of the whole makes up for the lack of hi-tech equipment. It is a clear demonstration of the basic principle of the Turing Test with its distinction between rational and libidinal function – while it is possible to mistake the machine for a human being in the course of a two-way conversation, no such confusion is likely to occur with the milk served by the 'wet nurse'.

Daniela Plewe's installation 'Muser's Service' (1994–95) [MKI] is likewise based on linguistic exchange. Unlike the impertinent answers of the 'Wet Nurse', however, the PC in this case provides assistance to daydreamers, or musers, by freely associating between two keywords entered by the user. [MKI] That computers take over human chores is commonplace – but what about daydreams or even fundamental decisions? The latter are served by the model Daniela Plewe presents in 'Ultima Ratio' [MKI] , whose various modi range between 'cascades of doubts' and 'war of convictions'. [MKI] The artist states: 'In contrast to classical logic (but in unison with other AI systems), the (modified) decision-support system of Ultima Ratio tolerates contradictions and exceptions to rules. (...) The visitors are required to explain their intuition, and in doing so possibly feel the desire to continue refining, ad finitum, an ultima ratio that slips out of control again and again. It was not primarily a question of practising AI, then, but of using software and its syntactical units (rules, exceptions, contradictions) to vary and comment upon something of the culture that surrounds us.' [37]

When artists decide to incorporate self-developing dynamics into graphic-spatial displays, the technical requirements escalate. The installation 'A-Volve' (1994) by Christa Sommerer and Laurent Mignonneau invites visitors to sketch on a monitor the outline of small, artificial beings, whose subsequent brief digital lives in a virtual aquarium are guaranteed only by the pseudo-caresses of their creators. Instead of the linkage of 'art and life' propagated in the '60s, the concern is now to overlap technology with biology in order to simulate artificial life. Yet the entertainment aspect partially invalidates the

character of scientific visualization that is being aimed at.

The degree to which dynamic processes in computers can be considered 'creative' was the subject of partly serious, partly ironical, debate. As early as 1985, Richard Kriesche presented the following radical theory: 'As long as natural and artificial intelligence are two separate properties, art will remain a mystery,' and their synthesis might however be achieved, 'thus rendering art unnecessary'. [38] Following this line of thinking, Turing's question, 'Can machines think?' would now have to read, 'Can machines make art?' <-

v. Dialogue-based models

Such concepts replace man-machine interaction with man-medium-man interaction. The simplest models are telecommunications works with live video or TV links between two exhibition sites (on different sides of the world, or across the street). Douglas Davis began in the '70s to use television for live art actions enabling in part authentic dialogue ('Talk Out!', 1972) or otherwise metaphorically, if not to say metaphysically, staging a pseudo-telepathic connection ('The Austrian Tapes', 1974). With the proper presentation, technically flawless pieces like Paul Sermon's 'Telematic Dreaming' (1992) and 'Telematic Vision' (1993) [MKI] today attract maximum audience participation. While the telematic expansion of everyday situations such as sitting on a sofa or lying in bed is unlikely to rouse technological inhibitions, the possible dialogue remains on the playful communicative level of 'hello there'. Agnes Hegedüs' installation 'Between the Words' (1995) [MKI] places directly opposite each other two conversational partners, separated only by a wall housing the interface in which virtual gestures are superimposed over real physical expressions. [MKI] This lyrical approximation of virtual and face-to-face encounter became a drastic message in the 'cybersex suits' presented by the artists Kirk Woolford and Stahl Stenslie in 1994. [39] More effort, it would seem, is being put into similar models for practical application outside the art world. The press coverage granted to such experiments seems to point to a virulent area of the collective subconscious. All these dialogue-based approaches tend to exaggerate the symbolism of media connectivity. Douglas Davis, for instance, in 1975 described the feedback obtained from his work as, 'Knowing that I am involved in the evolution of a deeper, more diversified system of communication, between myself and the world and back. It has nothing to do with specific response.' [40] Fresh illustration of McLuhan's statement that 'the medium is the message', but nothing more.

vi. The 'exemplary viewer'

In the installations described so far, the visitor takes on a new role: not just spectator, but also performer. Yet this self-evident explanation of the term interactivity disregards a second, equally (if not more) important change in the viewer's role. Due to the fact that most interactive installations allow only one viewer to act, the viewer occupies a specific position and is a part of the work's completion. The spectator becomes the 'exemplary viewer', is not just one viewer among many, no longer part of a group assembled in front of a work and walking round it at individual leisure.

In the hi-tech simulations of the '90s, the exemplary viewer acts as the link between data space and the real world. The meeting between visitor and mediated image in the closed-circuit video installations of the '70s was comparable. In the Cyberspace installations, that element of self-duplication termed 'video narcissism' by Rosalind Krauss in her analysis of 1976 produces the symbolic loneliness of the viewer in virtual space. [41] The same applies to telecommunications projects in which two viewers are placed in relation to each other but the actual fascination is due precisely to the insurmountable spatial and physical separation that accompanies the intensive connection. Along these lines, Paul Sermon's telematic linkage of two people in two beds for the purpose of televisual pseudo-physical contact ('Telematic Dreaming') is also a rejoinder to the media role shown in Valie Export's 'Tap and Touch Cinema' of 1968.

At an exhibition, the actual situation of the exemplary viewer is of course often anything but lonely. Other visitors perhaps observe the interaction, offer advice, laugh, or wait impatiently for their turn to come – queues are frequently a problem at popular shows. Jeffrey Shaw's account of an experience with his 'Legible City' during a show with late-night opening demonstrates that isolation in front of the apparatus is one of the central experiences with this form of interactivity. Suddenly, Shaw saw his own installation on its actual plane of experience – that of cycling by night through a deserted city. [42] Loneliness, then, extends into the visual realm of the works. In none of the numerous virtual museums on offer will a visitor bump into other visitors. [43]

Almost all of the models of interaction described so far are implemented in installations that remain bound to real space. This physical relation enables the works to be placed in art contexts with their site-specific valuation criteria of being more, or less, prominent exhibition venues. Their technical complexity, however, makes the installations considerably more difficult to transport than pictures or objects. Ironically, the price of a 3-D animation computer generally surpasses by far the potential market value of an artwork realized with the aid of the same machine. The paradoxical relation of media and market seems to be that virtual-reality pieces cannot be sold because their price is too high for the average collector or museum budget,

whereas artists' videotapes were too low-priced to be taken seriously as art. Even more crucial is the fact that illustrations fail to bring over essential aspects of hi-tech installations in the way of traditional, static artworks, meaning press reviews convey only a fraction of the whole. The most elaborate media inventions are precisely the ones which exceed the capacities of the mass media, and are therefore neglected by media coverage. Ironically, the anachronistic result is that the viewer wishing to experience the actual interactive quality must travel to festivals and media-art exhibitions, just as formerly people travelled for the sake of art. The stationary interactive installation has essentially proved to be a dead-end due to these distribution problems in conjunction with its dependence on technology and the limitedness of its interaction potential. <-

vii. Collective structures in the media realm

Through the interconnection of several users as part of a collectively developed structure, the electronic realm can be transformed into a social, to some degree even public, domain. Complex communications structures of this nature began to emerge, mainly in the form of text-based systems, even before the Internet boom. Long before then, the 'cadavre exquis' of the Surrealists had already demonstrated the poetic potential of collective authorship. Roy Ascott's 'La Plissure du Texte' (1983) or John Cage's 'The First Meeting of the Satie Society' (1986) can be viewed as initial efforts at networked authorial processes by artists, followed in Germany from 1988 onward by the project 'Pool-Processing' of Heiko Idensen and Matthias Krohn [MKI]. [44]

As a collective form of communication, networked writing has now become an everyday form of discourse on the Internet. The textual worlds of the 'MUD' (Multi-User Dungeon) and 'MOO' (MUD Object-Orientated), which were originally created as networked games, are becoming part of the Net way of life together with chat rooms and mailing lists in the tradition of the once famous Californian 'The Well'. [45] Even these game worlds, which were for a long time areas of non-compromised creativity, are now being commercialized and so duplicating to an ever-greater degree the banality of real life with their mixture of trivial conversation and heavy-handed come-ons. It makes sense, then, for a project like Evelyn Teutsch's 'FOOGUE' (1996 onward) [MKI] to use the safe world of art even in this virtual terrain, without however reproducing the art world's hermeticism but instead approaching a genuine collective spirit within the medium. For her installation ' [DPsNtN] = DISPLACED PERSONS say NOTHING to NOBODY' (1997-1999) [MKI], Christin Lahr conducted research in the LambdaMOO on the debates surrounding 'presence and absence, truth and falsity, gender, appearance, identity and location'. The findings are transferred to the art context by an installation in which only the static visitor can experience the overlaying of virtual and real space, making the encounter contemplative rather than interactive.

Physical interaction in simulated 3-D space can be combined with the information data downloaded from the Internet in elaborate installations of the type implemented by the 'Knowbotic Research' group ('Simulationsraum mobiler Datenklänge', 1993 [MKI]; 'Dialogue with the knowbotic south', 1994 [MKI]). The spectators enter not a pre-defined data space but a digital environment being continuously developed through several participants. It represents an attempt to find new forms of visualization for complex natural-scientific procedures such as those used in Antarctic research. By implementing the means of associative, spatial and physical experience, the artistic concern of the group is to make imaginable scientific and technological correlations that, due to their vast complexity, might seem to surpass the imaginative capacity. Since 1997, this field has been expanded to the analysis of urban structures. These images of 'computer-aided nature' produced at the crossover between art and scientific visualization are often seductively aesthetic, possibly even too beautiful to be true. <-

7. Interactivity and the Internet – the situation today

Although scientists around the world have been matter-of-coursely using the Internet for more than ten years now, the art world hit upon a new vision only with the hype that surrounded the Net boom. Artistic interest in the Internet from around 1994 onward was due mainly to the introduction of new software making the World-Wide Web multimedia-capable and opening it up for visuals and sound in addition to written communications. At the same time, interactive data carriers in the form of the CD-ROM and its successor the DVD appeared on the mass market. The faster transmission rates to be expected in the future, however, make it foreseeable that all fixed storage media will be replaced by Net distribution.

The most important effect of these new technologies is that interaction has now become an option for the mass media. Interactivity, the bright future of the media industry, is due to leave the laboratory. Restrictions on access to interactive hi-tech installations belong to the past: via telephone line or silver disk, the interactive data structures can be delivered to everybody's home. The viewer, relieved of the necessity to make romantic journeys in quest of the works, is becoming a data traveller who surfs through the Net with an elegance elevating the Californian beaches to the virtual plane.

The incisive shift of concepts is evident in the changing meaning of the central terms. 'Cyberspace' is no longer understood primarily as a projection of real space and the human body into the realm of data, but instead as a network of all

communications structures. 'Interactivity' is leaving behind man-machine interaction to again become interpersonal interaction whose structures are moulded by the supra-machine of the Internet with millions of connected computers and users.

A radical overabundance of communication has replaced the symbolic loneliness experienced by the viewer in the Cyberspace of the early '90s or on meeting his own video image in the closed-circuit installations of the '70s. As a point of convergence for all media and genres, the Internet appears to supply the technical means to fulfil the utopias of intermedia art. The idea of a 'Net' is older than the technical reality; already in the '60s, it was a central motif of alternative culture and aspirations to political and social influence. The ideals of that period are now being re-discovered in view of the new technologies. An 'open work' that is generated through the communication of participants and the 'domination-free' discourse of all Net users are basic forms of the Internet ideology and aesthetics of the early '90s. This attitude found a role model in projects like the '[Electronic Cafe](#)' of Kit Galloway and Sherrie Rabinowitz, which joined up various districts of Los Angeles in a multimedia network for the 1984 Olympic Games. Without offering any form of content, the makers were determined to show that merely the opening up of communication channels possesses an ethical and democratic dimension. [46] '[Electronic Cafe](#)' is thus the precursor of all Net utopias that cast a social model in a technological mould.

The most successful projects in the grey zone between politics and culture are the 'digital' and 'international' cities created from 1994 onward, first in [Amsterdam](#) and then in many other European cities. One programmatic statement read: 'New interpersonal relationships are initiated by the International City and influence everyday life in the real city. In contrast to other media, new information will be created through social exchange.' [47] The 'global village' propagated by McLuhan in the '60s was now scaled-down to regional electronic neighbourhood but with a lively exchange between interconnected digital municipalities. Many of these projects soon faced the question of whether they wanted to remain within the self-determined free space of alternative-artistic media work or, like the rest of their booming commercial environment, become professional service providers. This conflicting role led to the self-dissolution in 1997 of the prominent 'Internationale Stadt Berlin' [MKI] while its digital counterpart in Bremen became an Internet service provider. [48] Such scenarios echo – at a much faster pace – the way in the '80s the video scene split up into those who did commercial work for TV and those who continued to produce art with no further relation to the TV networks.

A number of Net projects focus on the art context, even if it is not yet generally accepted that such a thing as 'Net art' exists. [49] The first such project was 'The Thing' [MKI], founded in New York in 1991, which opened at least temporary nodes in [Berlin](#), [Frankfurt](#), Hamburg, Düsseldorf, Cologne, London, Stockholm and [Vienna](#). [MKI] Wolfgang Staehle, the founder of what began as a purely text-oriented discussion forum with its own BBS network structure outside the Internet, cited big names: 'Beuys was concerned with social sculpture, with art production made collectively by a group or community. "The Thing" is a sculpture of that kind – it realizes Beuys' idea of direct democracy, of the political community as a social structure. At the same time, it represents an expansion of the notion of art.' [50] Can the problem of expanding the notion of art be solved with the appropriate medium, then, or does this statement imply that artists too are now proclaiming the paradigm shift from '60s ideology to '90s technology? The technologies have meanwhile overtaken and split up into more or less autonomous locations structures such as that of 'The Thing', a project inspired by the pioneering spirit of global networking. In this respect, too, the WWW ushered in the shift from communications serving the non-utilitarian purposes of theoretical discourse and insider gossip to usage which is semi-commercial.

In the early '90s, all arts-related Net projects were still determined to pursue the parallel goals of creating universal Net access and installing a new platform for discourse and dissemination whose content would develop along the lines of its members' activities. The Internet boom, however, soon rendered superfluous (or outmoded) this coupling of content to technology. Now that access to the Internet is supplied free-to-domicile on an industrial basis, the demise of projects like '[The Thing](#)' or 'Internationale Stadt' perhaps represents the victory of hard facts over the last 20th-century vision of combining technical and artistic progress.

Certainly, art is a minor player on the sidelines of the current boom in network communications. Artists, however, were anything but slow to grasp the central problems raised by the medium, as is demonstrated by '[The File Room](#)', a project initiated by Antoni Muntadas in 1994 and still in progress. Acting as an open archive of current and historical cases of censorship, it is continuously being expanded by a worldwide body of users. Although Muntadas, who began exploring the political function of mass media in the '70s, launched the project without any thought of the Internet as its medium, it became acutely relevant on account of the Net. Due to the repeated calls for Internet censorship and the 'Communications Decency Act' that narrowly failed to become law in the USA in 1996, '[The File Room](#)' directly synthesizes medium with message. Early Net statistics placed the project Website among the ten most frequently visited addresses, ranking directly after – remarkably – the Microsoft site.

Ingo Günther's '[Refugee Republic](#)' [MKI] is another project addressing the general function of the Internet. [MKI] As a project aiming to make the 20 million refugees worldwide a potent capital asset rather than an economic burden, it might

well appear to be a typical Net utopia. In fact, like 'The File Room' it was not conceived as a Net project (in 1993), but the Internet proved to be an appropriate medium. Günther does not base his work on the assumption of a status quo ('Now we've got the Internet, so what are artists supposed to do with it?'), but uses a concrete problem to map out a new function of the medium and, along with it, of part of society. In 1516, Thomas Moore had to use an undiscovered island state as the pretext for his 'Utopia', although he was attacking conditions in his own country. Günther's non-territorial state, by contrast, can exist only on the Internet, meaning it is a perfected utopia whose medium also designates the means of its realization – even if realization is not yet in sight. [51]

Even the political utopias from high-ranking sources that marked the beginning of the Net boom – for instance, the 'new, Athenian age of democracy' conjured up by Al Gore for Bill Clinton's information-superhighway election campaign in 1992 – have remained unfulfilled. Their influence, however, cannot be denied, even if the results were the opposite of those intended. Although the Net community's organized mass e-mail protest in reaction to the first senders of spam mail took place as recently as 1993, the recollection is like looking back on a distant, bygone Net era. Since the mid-1990s, the value-free vehicle of scientific discourse, chat rooms and newsgroups that was the Internet has been undergoing a transformation into a mass medium with tough commercial practices. Thanks to the multimedia capabilities of the WWW, communication and interaction is giving way to broadcasting and consuming necessitating increasing fusion with television and radio. The software and telecommunications multinationals are investing considerable amounts in the multimedia networks they view as the markets of the future. Bill Gates and competitors are busy trying to subjugate what remains of the anarchic Net structure to the hegemony of corporate business. Commercial Internet providers seem almost cynical when they send letters to artists rousing hopes of the long-awaited chance of world fame through home-page presentations of paintings or other output. It would be equally valid to assert that being listed in a telephone directory is the ideal start for an aspiring novelist.

Indubitably, the Internet could pose a greater challenge to the art system than any of the preceding electronic media. It represents not just a new form of production (as was the case with video and computer), but first and foremost a new method of distribution. Its ubiquity contradicts the socially and spatially defined context of art and the necessarily elitist discourse of those inside the art world. This led in the mid-1990s to the promising development of new structures like the Äda-Web in New York or the Public Netbase in Vienna that encompassed the potential of both the art world and network communications. [52] That so far these projects have remained largely without impact is due to the reciprocally exclusive discursive processes of the art and network cultures. Either side seems to have little real knowledge of the other, but the mutual reproaches sound alike: commercial dependency, pseudo-progressiveness, superficial openness, or blank arrogance. In consequence, Net art is merely the lowest common denominator in two discourses that fail to engage with each other, and as such a marginal category caught between two fringe groups. [53] Net art represents the pinnacle of a paradox that accompanied media art from the beginning on: mass media, and above all the Internet, dissolve all contextual relationships. In the 20th century, by contrast, the art of Modernism has become ever-more context-specific and, accordingly, ever-more context-dependent in regard to evaluation, even to perceptibility. Art on the Internet thus faces the dilemma of addressing everybody by its medium, but nobody by its context.

The fast-developing Net economy is making its mark in the field of art, although the latter is possibly more immune to the dangers of commercialization than its exponents might want it to be. Most attempts at 'Net-art galleries' are nothing more than virtual duplications based on the model of conventional galleries, and will presumably share the fate of Gerry Schum's 'TV gallery' [MKI], an abortive attempt in 1970 to transport the art context into a mass medium. [54] Further evidence is offered by the unsuccessful Internet auction of the New York 'The Thing' Website in 1999: bids only reached around five percent of the limit of \$ 45,000.

That general access to the congested WWW has brought the WorldWideWait instead of the promised land of freedom is the topic of a project entitled 'www.antworten.de' (1997) by Holger Friese and Max Kossatz [MKI]. An Internet project such as 'Dump Your Trash!' (1998) by Joachim Blank and Karlheinz Jeron [MKI] is the symbolic gravestone marking the drowning, in an ocean of data trash, of faith in liberation through communications. [MKI] On their server, named sero.org in tribute to the garbage recycling operation in the former GDR, Blank and Jeron also offer a 're-m@il' service for the public disposal of unanswered e-mails. In times when diligent users might easily find over 1,000 messages waiting when they return from a week's holiday, a service of this nature is a realistic satire on the self-blockage of the communications explosion. These concepts, which can comfortably be termed anti-interactive and anti-communicative, show the transition from Net utopia to Net critique. This shift is equally evident in the changing attitude emergent in the series of publications by Agentur Bilwet (Geert Lovink, Arjen Mulder and others) from 1991 to 1997, as well as in the debates conducted on the Nettime mailing list since 1995 [MKI]. [55] As formulated in art and theory, this Net critique has two targets: the false promises of the software industry, and the lost utopias of the critics' own past. Joachim Blank and Karlheinz Jeron are, like Geert Lovink, Net pioneers of the early '90s whose involvement in the digital-cities movement proposed cultural and communicational alternatives to the banality rife on the Net of today.

On the CD-ROM 'Blam! 3', Keith Seward and Eric Swenson condense the mixture of hard pornography, radical politics, advertising and propaganda that characterizes the Net and, above all, the discussion surrounding it, under the motto

'Interactivity is the biggest lie of all!'. [56] A direct route leads from anti-interactivity to software subversion of the type awaiting unsuspecting viewers of the Jodi.org Website or CD-ROM. Confronted with constantly changing images of the final crash, the viewer is helpless until the realization dawns that these images simulate the non-simulable end of all simulation machines. As early as 1972, Jean Baudrillard had refuted Enzenberger's theories regarding the emancipating, democratic function of the media: 'Now, the totality of the existing architecture of the media finds itself on this latter definition: they are what always prevents response, making all processes of exchange impossible (except in various forms of response simulation)'. [57] According to Jochen Gerz, it was the questions as opposed to the answers that were crucial for the political upheaval of 1968. The impossibility of providing answers in the media is shown by his Internet project 'The Berkeley Oracle' (1997-99) [MKI], which consists solely of questions from the general public. [MKI] Just as the new departure of the '60s ended with Bruce Nauman's declaration of mistrust in participatory art-forms, so the '90s come to a close with a sceptical revision of a concept of interactivity moulded by media technologies.

The merging of Internet and broadcasting aspired to by industry strategy also has gratifying offshoots in the arts field. Examples include the live Webcasts in the 'crosscultural' sphere of media initiatives, art concepts and pop and techno that amounted to an underground re-invention of the good old principles of broadcasting. Further evidence of the vanishing boundaries between Net and broadcasting structures is Achim Wollscheid's 'Imaginary Soundscapes' (a radio project since 1999). Several co-players are able to control via the Internet a sound memory unit with collective input capacity, and this programming capacity may eventually be extended to listeners. The resultant compositions go out live on air after the close of the regular daytime schedule of a Frankfurt-based radio station. [MKI]

Is it possible, at this point, to bring to full circle the ideal of aesthetic sensitization extending into interaction with the media as demonstrated in 1951 by John Cage's 'Imaginary Landscape No. 4' for 12 radios and 24 performers? Are artists merely the 'exemplary listeners' who allow us to recognize the media-induced change of world view through a process of selection and bundling – or have precisely the new technologies restored to art the opportunity and the claim to intervene in the dynamics of the development of a media society? Conversely: how 'resistant' will the notion of art prove to be against the mediatization of all areas of life? Or, specifically in relation to the subject of this essay: does it still make sense to ponder upon the significance of interactivity from the perspective of art, or would it suffice to point out developments in the fields of soft- and hardware along with the constantly rising numbers of people who have Internet access?

The fact that in 1999 the jury of the Prix Ars Electronica chose to award the main prize in the '.net' category to the operating system Linux may have something to do with the difference between open and closed systems described above in relation to John Cage and Bill Gates. However, the underlying implication that programming is the actual art and what artists make of it will always remain secondary matches up with Friedrich Kittler's suggestion that only our ignorance makes us confuse the products of media with art. The emphatic confirmation of this theory by an art jury can be criticized, from the perspective of art, as superfluous affirmation of media art's unquestioning faith in technology and the final truncation of all links to the art context. [58] From a cultural-historical stance, on the other hand, this decision can also be seen as indicating the unquenchable yearning to return to an age when art and technology were not separated. A festival such as 'Ars electronica' would then be the rightful successor to the 'Ars inveniendi' of the Baroque age, whose attractions included military art, water art and firework displays along with the first mechanical computing apparatus and the android automatons that so impressed court audiences. Present-day technological interactivity contains in equal parts a mixture of undisguised military interests along with elements of science and art and post-feudal entertainment. The countless projects falling somewhere between art and media and boasting the name Leonardo in their title suggests the same need to make the painter, anatomist, fort-builder and inventor of flying machines a symbol of a wholeness of cultural achievement, technical innovation and scientific research that is, indeed, forever lost<-.

8. Again: is interactivity an ideology or a technology?

Even with the aid of computers, the yearning for the Renaissance Man is doomed to remain unfulfilled in these times of an explosion in knowledge and communications. All the same, computers and networking are producing a convergence of previously separated fields. The questions posed by Brecht and Turing regarding the social or technological significance of media-assisted interaction, which were radically disparate in the 1930s still, are now beginning to overlap. Due to the interweaving of human society and its digital back-up, it is becoming increasingly difficult to tell whether we are communicating with machines instead of people, or with people by means of machines, or talking to people about machines, or to machines about people. This entails a blurring of the boundary between ideology and technology, and technology is indeed a central part of ideology in the '90s. [59]

The possibility of a future convergence of ideology and technology was present throughout the development of media-assisted interactivity and the surrounding debates. Even before any media artworks had been produced, the participatory forms introduced by Happening and Fluxus were attempting to remove the boundary between producer and recipient. These movements were also a reaction against mass-media consumer conditioning, as is shown by the deployment of radio and television by Cage, Paik and Vostell, and also in the drift of Expanded Cinema. With its equally aesthetic, social and political

foundation, this ideology results in the belief that by means of the media it will be possible to disrupt the macro-cultural inclination towards passive reception – provided these media do not succumb to the distribution requirements of finance and industry but can develop their inherent potential for interaction and communication. There lies the source of the proposition that the media have power to emancipate, a thesis put forward in identical form in such disparate contexts as Enzenberger's criticism of the left's inadequate media skills, written in 1970 with a nod to the Brecht's radio theories of the '30s, and Weibel's call, in 1989, for a future dominated by interactive art. [60] The thesis of the liberating power of the media was likewise reflected in the ' Californian ideology' of the '90s, as embodied by ' Wired' magazine or the would-be alternative European projects such as the digital cities or ' Nettime'. [61] Bill Clinton's superhighway electoral campaign in 1992, however, already heralded a radical turnabout. In a record period of time, the idea of free network communications hatched somewhere between hackers, ex-hippies, and a small avant-garde in art and politics, became the central message of the media industry. This is why, finally, people forgot what media-assisted interaction and communication was supposed to overcome: nothing other than the hegemony of the media industry as the cause of cultural consumerism.

Ranging from Bertolt Brecht via Happening and Fluxus to the left-wing activism of the '60s and '70s and, finally, the interactive art of the '80s and '90s, the experiments in the laboratory of the avant-garde have all produced the same findings. The influence of the media cannot be changed permanently or on a large scale. The posited liberating potential of media can be put into effect only in closely demarcated, culturally screened-off niches but – even in the allegedly post-capitalist era – will not survive against market forces. That was why Brecht deemed another usage of radio would be ' impossible to implement in this social order, feasible in another.' [62] Now that the issue of Capitalism vs. Communism has been decided, however, we know there will be no other social order. If consumerism is an inevitable effect of all mass media, and attains ultimate fulfilment only in the pseudo-participatory receptive forms of zapping and surfing, then to have faith in the liberating potential of media amounts to much the same thing as giving an alcoholic the key to the drinks cabinet. Indeed, Brecht in 1932 compared the radio listener's isolated passivity to that of the secret drinker, that most wretched of addicts. The interactivity euphoria of the early '90s is coming to an end with the morning-after feeling of ' electronic loneliness' Agentur Bilwet summarizes with the motto, ' Change the world, and stay at home'. [63]<-

Translation by Tom Morrison