Strategies of Interactivity

Abstract. The ideological and technological frames of reference for the changing paradigms of interactivity are presented in an overview. The topics range from the early days of media and modernism to a typology of interactive art in the 1980s and 1990s and include the mass media interactivity models of the last decade.

Reception as Participation—A Leitmotif of Modernism

In one of his apparently timeless sentences, Marcel Duchamp writes: »The personal ›art coefficient‹ is like an arithmetical relation between the unexpressed but intended and the unintentionally expressed.« [1] Accordingly, no work of art can communicate to the viewer exactly what the artist intends. To put it more candidly, one might say that the greater the misunderstanding, the higher the personal coefficient. Duchamp therefore establishes that in every aesthetic experience, the viewer is assigned a constitutive role and that he »thus adds his contribution to the creative act.« [2] On another occasion he even radicalizes his statement, claiming that »a work is made entirely by those who look at it or read it and who make it survive by their accolades or even their condemnation.« [3]

That the reception of a work of art requires the viewer's participation proves to be a leitmotif of Modernism that emerged as early as in Charles Baudelaire's writings. Faced with the images in his *Painter of Modern Life*, »the spectator becomes the translator, so to speak, of a translation....« [4] In his examination of Wagner he goes even further: »In music, as in painting, and even in the written word, which, nevertheless, is the most positive among the arts, there is always a gap (a lacuna), bridged by the imagination of the listener.« [5] Stéphane Mallarmé formulates the obvious conclusion in his concept of creative reading. As early as the end of the nineteenth century, he anticipated the idea of processual art with permutative, aleatory elements, which in the mid-twentieth century then became a platform of the avant-garde as an »open work of art.«

The attack on the ideal of everlasting, unchangeable beauty carried out under the colors of Modernism therefore had a centuries-old history before it was ultimately conferred with a new technological basis within the concept of interactive media

art. The reason for Baudelaire's rejection of photography also lies in the knowledge that the reception of a work of art always requires an element of participation in its constitution, because he understands photography as a purely technical reproduction of reality that allows no space for the imagination. What might the function of technical media be for the participation of the viewer?

Baudelaire fails to recognize that in their reproduction of reality, technical media produce a side-effect that can be regarded as analogous to Duchamp's »art coefficient.« Even if it is used in as flawless a way possible, any device constructed or operated by a human being to record or transmit images or sounds never registers only what his or her intention is directed toward at the moment of its use. Who is not familiar from one's own experience with the photograph that shows much more or something completely different than intended? Or the voices on the video that one did not really want to record? For the recipient of a technical media channel, this »excess« information allows an interpretation that may more or less deviate from the intention of the person who produced it. The side-effect heightens as the channels multiply. For the TV zapper or the Internet surfer, it becomes the actual »content« of his or her experience. [6] Putting it more concisely, one might assert that the »art coefficient,« which Duchamp describes as a psychical phenomenon, finds its equivalent in the technical principle of all media devices that are not—such as the drawing or writing hand—directly linked to the intention of those who use them. This effect, which becomes so noticeable with technical media that in the extreme case it ends up in noise, already begins with the pencil, which also reveals something about its material property that points beyond its purely instrumental character.

At the outset of the lecture in which Duchamp introduces his concept of the »art coefficient,« he describes the artist as a »medium« or a »mediumistic being.« [7] He is therefore applying the term as it was used in the nineteenth century to describe a person with paranormal or telepathic abilities, in much the same way it was taken up by the Surrealists. However, when Duchamp used the term in the United States in 1957, it had already taken on different connotations than those it bore in Paris of the 1920s.

Without wanting to accuse Duchamp of making reference to technical media, which

he certainly did not have in mind, it turns out, however, that even a text like *The Creative Act* is not quite as timeless as it at first seems to be. At the time, John Cage, who was a close friend of Duchamp, was already vigorously working on making the side-effects of technical media described above the theme of his music. The focus of his considerations was the very same problem regarding the intentionality of art that Duchamp examines with the »art coefficient.« Cage's approach is often understood as an attack on the Old European *Geniekult* (cult of the genius) surrounding the creative, yet he had no inhibitions about time and again drawing attention to the role Duchamp played in his own introduction of random processes into the »creative act.«

At the beginning of the 1950s, with his compositions for radio Cage achieved perhaps the first completely »open work of art« employing technical media—even before Umberto Eco coined the term in 1958. [8] In *Imaginary Landscape No. 4*, a piece composed in 1951 for twelve radios and twenty-four performers, Cage uses randomness in a twofold way: firstly, he determined the parameters of the score, which consists solely of instructions on how to operate the radios, using *the I Ching*, and secondly, the sounds coming from the received transmitters produce a relationship to the here and now of each performance that is just as random as it is coeval. Thus the side-effect of technical media mentioned above, which is to always transport more information than intended by their users, becomes the primary working means of an art that makes the participative and constitutive role of the recipient the principle of a new form of creativity and a new concept of an artistic work.

This digression to the history of Modernism elucidates the fact that the issue of viewer participation arises even before technical media are used in art. However, technology lends it a new dimension, as an interference occurs in media art between the two forms of the non-intentional emergence of information mentioned above. Here, the psychic role of the artist as a »medium« and the technical function of media devices join together. For about the last three decades, the ambivalent and everchanging meaning of the concept of interactivity, which constitutes the main theme of this essay, has been evolving in this intermediate area.

From Participation to Interaction

The above considerations with respect to the participation of the viewer, the listener or the reader start out from the assumption that modern art has changed the role of the recipient. They make reference to the aesthetic experience and assessment of art, but the material existence of the work of art remains unchanged. This is why the modern role of the recipient can also make reference to works from history. Duchamp cited the rediscovery of El Greco during the era of Expressionism as an example for contemporary art »making the picture« by changing the view of history.

Yet if the work of art itself is aimed at the active role of the recipient, the second step toward a new form of artistic production, which is decisive for the following, takes place, allowing interaction between the recipient and the work by intervening in its visual, acoustic or textual form. In the process, the work of art becomes a kind of collaborative process participated in by the artist and various recipients. The issue with respect to the intention of art thereby changes direction in that the viewer—literally, so to speak, along the lines of Duchamp's dictum—now makes the pictures. Interaction can take place in a large variety of ways, for example in the form of an object, within the context of a situation or by means of a technical medium. In the simplest case, recipients can modify an object that has been created by the artist, which occurred in 1960s' Kinetic Art. More complex structures of interaction develop through the combination of pieces of text or sounds, which in object-like form or as a score demand the recipient's active participation in order for the work to even be produced in the first place.

This transition from participation to interaction can be exemplified by John Cage as a precursor of the Happening. Cage's use of random factors makes every performance of a piece a debut that sounds different than any other previous performance. The performers and the audience therefore do not have any expectations directed toward a perfect reproduction; rather, they are open for a new experience. Since the end of the 1950s, John Cage's compositions have been giving performers more and more freedom. The graphic scores ultimately only specify the method and the material for a kind of »do-it-yourself« music, such as the sheets of transparent film in *Fontana Mix* (1958) and their multiple use for

different pieces. From here it is only a single step to Allan Kaprow's concept of the Happening. The Happenings are also based on scores with a frame of action; however, these now address all the participants, who are no longer separated from the audience but who create their own aesthetic experiences. Thus the completed work is replaced by an open field of action that is first engendered by the participants. These interact among themselves as well as with the specified frame of action, so that communication becomes the central factor of the aesthetic experience. This may even result in the complete removal of the boundary between author, participants, and the audience.

When interacting via a technical medium, various modes are possible, whose range from human-machine to human-medium-human communication constitutes the principle theme in the following. The role of media technology goes far beyond the previously examined side-effect of producing »excess« information, which enables a kind of »creative reading« beyond the producer's intention. When the two basic media-technological functions of »storing« and »transmitting« are implemented for an open work of art, they allow overlying production with reception, which—as in the case of the Happening—can remove the boundary between the author and the audience.

These different forms of interaction demonstrate the broad range of the meaning of this concept even in the area of art. However, the meanings in general language usage are even more diverse. Since the end of the 1980s, two usages have received more and more attention: on the one hand, the theory stemming from the social sciences of reciprocal actions by humans, and on the other hand, the technological category of human-machine communication, which is largely referred to as interactivity. [9] Because in a media society, people communicate with other people by means of machines, the overlapping of the two fields is evident. For this reason, in the following the concept of interactivity will stand for all forms of media-based communication and interaction that occur between human and machine as well as between humans.

Ideology or Technology—Brecht or Turing

In the current discussion on interactivity, the issues regarding the social ideology of

a media-based human-human relationship overlap those regarding the technological feasibility of the human-machine connection. The roots of these two fields of meaning go back to a period way before the emergence of today's concept of interactivity. They can be traced back to the 1930s and may be illustrated using two positions that could not be any more contradictory: Bertolt Brecht's and Alan Turing's. In 1932, Brecht called for the following: »Change this apparatus [the radio] over from distribution to communication.... By submitting ever persistent, incessant suggestions for the improved use of the apparatus for the general public, we have to rock the social foundations of this apparatus, to discredit its use for the benefit of a few.« [10] While Cage's composition only changes the reception form of the radio without intervening in the system of the mass medium, two decades prior to that, Brecht's approach goes all out and maps out an active role by the listeners as a political utopia that also includes the transmitter side of the medium. In 1929, with his radio play *Der Flug der Lindberghs* (The Flight of the Lindberghs) (Fig. 1) Brecht attempted to translate this idea into practice. But because German radio was unreceptive to the concept of listener participation, his idea was not realized in a radio broadcast but only demonstrated in a stage production by Brecht.

Fig. 1. Bertolt Brecht, *The Lindbergh Flight*, stage performance of the radio play with demonstration of the audience participation, Baden-Baden 1929

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.« [11]

Both of these theses stem from completely divergent discourses. On the basis of pure mathematics, Turing developed the scientific foundation for the feasibility of human-machine communication up to a level where it would be impossible to distinguish one from the other. Brecht transferred his theory of the theatre to media and acknowledges the social and political effects of human-human communication characterized by evermore perfect media machines. Yet despite these extremely different starting points, today, the extrapolations of these theses meet in the form of information sciences and cultural media theory—for instance in the discussion on the connection between the political and the technological function of the Internet. Against this background, in the following the concept of interactivity and its relevance in media art will be examined as a field of interference between ideology and technology.

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 agendas—in politics as much as in 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 ›programs instead of instruments‹ or ›software, not hardware.‹ This aesthetic stance made John Cage the precursor of the New Music and intermedia art of the 1960s. Bill Gates, in

contrast, realized the economic potential of this perception and in the course of the 1990s multimedia boom became the richest man on the planet. Both men no doubt attach 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, each time producing differing results through elements of chance and variation. [12] 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 social interaction among the group of musicians. This non-hierarchical form of creativity can be compared with the ›bottom-up‹ structure by which open-source software such as Linux is constantly enhanced by its users. In either case, it is possible to vary and reinterpret 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 the manner in which musical instruments are used in the most precise way possible.

As Cage saw it, the purpose of composition 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-honored, 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—the interference of musical production and reception became possible through the

information structures of such devices. Technology could not only replace human labor, but also open up a creative sphere. [13] 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. [14]

While the computer is indisputably replacing the piano as the most frequently used keyboard instrument in the home, liberation from the often tortuous obligation to practice 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 their conflicting models of interactivity ultimately 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 1960s to the 1990s. [15]

Shifting Paradigms of Interactivity from the 1960s to the 1990s

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 molded by Fluxus and Happening lie in the decision to replace an autonomous, finished work with an invitation to the audience to essentially self-determine how they experience the artwork and in doing so, lift the boundaries between artists and audience and those separating the genres. The suspension of the difference between production and reception in the arts has much in common with the demand made by political activists in the late-1960s for consumers to take over the means of production.

Despite the more than century-old history of active reception in the modern age, the classical, bourgeois concept of culture concedes a low ranking to the participation of viewer, reader or listener, demanding that paintings, books or concerts be enjoyed with a kindred understanding of an original work that has been

tampered with as little as possible. Forms of popular culture such as vaudeville, circus or, more recently, the techno DJ, on the other hand, enter into an intense exchange with the audience. The attempts to make interaction a means of avant-garde art in the 1960s 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 of art‹ mentioned above as well as the ›domination-free discourse‹ first expounded by 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. [16]

Models of open interaction similar to those in the arts were therefore developed and with a view to changing the role of the media. Drawing on Brecht, in 1970 Hans Magnus Enzensberger proffered the theory that the electronic technologies harbored the potential to emancipate by means of non-hierarchical communication. For the same reason, he saw the media, were they to be liberated from their perverted usage by the agents of capitalism, as potential stimulii to and instruments 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 quick-witted as football players, as surprising as guerrillas.« [17] 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 may personify a synthesis of these utopias; the origins of the hacker movement, however, are completely apolitical and provide a drastic example for technology as a weltanschauung. Its nucleus was formed around 1960 at MIT when the military lent the institute a computer free of charge that belonged to the first generation of computers with a screen. While programmers had previously had hardly any direct contact with the computer, developing their programs on paper and having operators feed the computers with punch cards, a group of student computer maniacs developed a »free wheeling, interactive, hands-on-über-alles style« in a direct dialogue with the machine, which today has long since come to be taken for granted, without the strictly hierarchical usage order for expensive running time. [18] The symbiotic relationship with the computer, which had virtually

become the sole purpose in life for this group of people who referred to themselves as hackers, anticipates what has in the meantime become the everyday proximity to the machine, turning the calculating machine into a kind of digital partner. The social consequences of this attitude are much more far-reaching than the rudimentary ideology, which the hacker historiographer Steven Levy summed up in the so-called hacker ethic, reveals. Here, Levy writes, among other things: »You can create art and beauty on a computer. Computers can change your life for the better.« [19]

In their detachment from the world and their complete immersion in computer programs, the pioneering hackers correspond with the ideal of art as an end in itself, as »art for the sake of art,« which the intermedia art movement of the 1960s renounced in order to propagate interaction between art and life. This is why without exception, the Fluxus and Happening as well as the political movements of the 1960s took a critical approach to technology. However, 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 1960s aimed to link the influence of art with that of the media. The social and cultural utopias supplied the objective of a hoped-for role of media in the future triggering a macro-change in society. This relation was turned on its head in the 1990s: media technology is now often seen as the leitmotif from which all social, cultural, and economic changes 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 telecommunications shares or cellphones and deploying the same heroic images of dancers, footballers or guerrillas. Since the 1980s, the original hacker ethic, which was committed purely to the thing itself, has likewise been marginalized by a partially criminal, partially commercial twilight zone.

The same is true of the concept of interactivity through interdisciplinarity, a cultural paradigm redefined in the 1990s 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, as propagated by intermedia art. 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. [20]

The 1990s attitude that grasps social and cultural transformation as an effect of the media, contrasting with the calls in the 1960s 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 as early as 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. [21] The contemporary scientific follow-ups are the media-theoretical approaches such as 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 devices, 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.« [22]

Measured against such a view, some of the interactive forms tried out and developed in 1990s media art may indeed seem naive and, above all, wholly dependent on technological specifications. Yet a look 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 prefabricated 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. [23] Ever since the Futurist movement, avant-garde art has envied technology for its influence 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 1990s can be truly understood only against the backdrop of the preceding developments, especially those in the 1960s.

Examples of Media-Assisted Interaction in Intermedia Art of the 1960s and 1970s

Compared with the visual arts, music requires considerably lower data volumes and storage capacity for its electronic processing. 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 first emerged in work with music. [24] 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 sounds made by the audience and coming from the 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, for instance in his composition for twelve radios of 1951, which allowed experiencing the mass-media variety of the broadcasting station as raw aesthetic material at the very moment the composition was being performed. TV zapping, another form of ›interactive‹ media perception likewise produced in real time by individual selection, namely by ›assembling‹ a new ›film‹ from the TV programs being broadcast at any given time, 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 1950s and day-to-day reception in the 1990s 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 1960s, 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 already indicated his crossover from New Music to the electronic image. The various »Participation TV« models presented there 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. [25] Since only one TV channel existed in Germany at the time 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/viewer hierarchy proved to be a transitory phase. Although these movements made a vital contribution toward changing the static concept of a work in the visual arts, they supplied 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 1960s progressed to become the Performance of the 1970s, audience interaction was either no longer desired or underwent severe ritualization and formalization. Bruce Nauman expressed this change unmistakably: »I mistrust audience participation.« [26] This attitude is evident in Nauman's closed-circuit installation *Live-Taped Video Corridor* from 1970, which by irritating viewers through their presence or absence in the video image, makes them more test objects than participants. [27] This is why Nauman can be regarded 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 or her to fall back on their own experience of body and image. Artists including Dan Graham, Peter Campus, and Peter Weibel used video technology in similar fashion in the 1970s in order to confront viewers with their own image by means of closed-circuit installations. 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 1960s, 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 from 1968 provides the antithesis to this 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. [28] This was an even more drastic conditioning of the viewer than in Nauman's *Corridor*, and again, doubt was cast on the boundary between public and private space. [29] 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 countermodel to onesided, 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 the social role of the media. 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 1968 movement.

Fiction and Function of Multimedia Technology and Cyberspace

Most of the examples presented so far involved interactive reapplications of media primarily serving the purposes of distribution and reproduction (video, film, TV, radio). The underlying artistic approaches deliberately worked against mass-media consumerism by modifying, to a more or less 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 computerbased multimedia technology, by contrast, the interaction of user and device is integrated into 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 computer-based simulation and communication. These spaces for a new experience, as virtual as

they are real, were becoming tangible in the late 1990s. That their roots stretch back to the 1960s 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 with respect to the potential social, aesthetic, and political implications.

Nearly all of the technical requirements for the current state of human-machine communication were created in the course of military developments. As has already been mentioned, until well into the 1960s, most computers were abstract computing machines used to process columns of figures and punched cards. With the introduction of the monitor, the first step was taken toward visual display. The first possibility of graphic interaction in real time had emerged in the 1950s with the linkage of a visual display unit and a light pen on the Whirlwind computer developed for air-defense purposes in view of the nuclear threat. [30] The dissemination of similar principles in the 1960s and 1970s 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 computergenerated 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 1960s 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 a Cold War anti-nuclear defense 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 ›bioadapter‹ drafted in the same year by the author Oswald Wiener in Vienna. [31] 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.« [32] 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.« [33] The consequences of one such scenario are depicted in the film *Matrix* from 1999.

Even if affirmative in tone, Wiener's well-nigh nihilistic skepticism 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.« [34] 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 lifting of boundaries of 1960s art. Toward the end of the same decade, this synthesis was promoted by the first Art & Technology events. [35] 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 1981 by science-fiction author William Gibson in his short story *Burning Chrome* and becomes common with his novel *Neuromancer* 1984. The emphatic, sometimes even ecstatic, books by scholars like Donna Haraway or popular authors such as Howard Rheingold were more conducive elements of 1990s cyber euphoria than the general public's hands-on experiences with technology of this kind. Yet this hype, for its part, stimulated technological developments and, above all, the need for them. 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 Virtual Reality 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 implementation. 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 removing boundaries was dependent on the device 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.[36] If artists are unaware of the inherent contradiction of using means developed for military purposes to advance their aesthetic aspirations towards lifting boundaries, then they are naive at best, opportunists at worst.[37]

Examples of Media-Assisted Forms of Interaction of the 1980s and 1990s

»Virtual Reality and Cyberspace are 1960s ideas, even if their technology was first implemented in the late 1980s,« asserts Peter Weibel. [38] Like Jeffrey Shaw and Valie Export, he counts among those artists whose work with different forms of interaction spans the divide between the approaches of the 1960s and 1990s. 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 1960s and the technological interactivity of three decades later. This might be partially explained by the fact that the notion of interactivity only reemerged in the 1990s as a result of technological development, after being almost entirely absent from the Conceptual and Minimal art dominant in the 1970s as well as from the postmodern retrospection of the 1980s.

Toward the end of the 1980s, 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 human 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 business enterprises. 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 1960s and 1970s now almost disappeared. Several typical models of human-machine interaction are briefly outlined below and placed in relation to parallel developments outside the field of art. [39]

i. Interaction with a video story through multiple options

Counting among the first successful examples of technology based interactivity, these works of the 1980s 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.

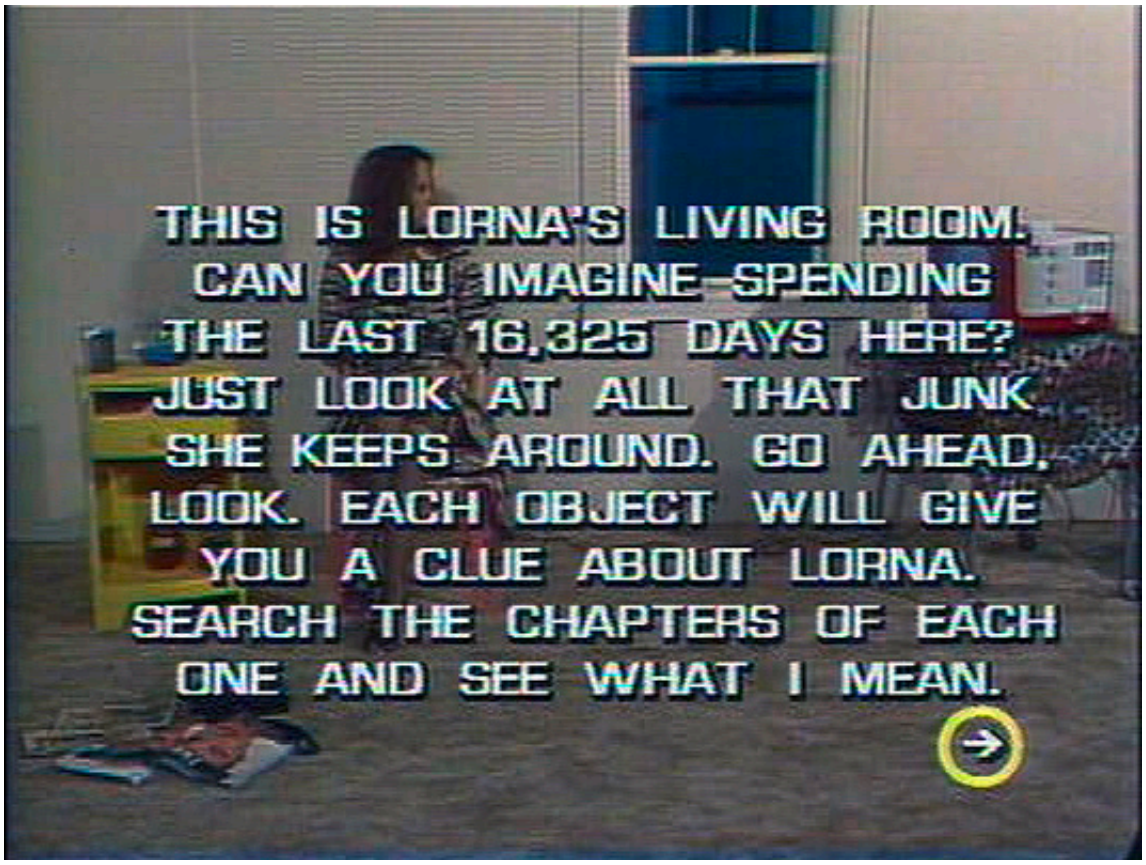

Fig. 2. Lynn Hershman, *Lorna*, (1983/84) interactive videodisk installation
left: the viewer controls Lorna's actions, the installation and Lorna's room in the video contain the same objects
right: the on-screen menu offers several options for Lorna's actions.

In her pioneering work *Lorna* (1983/84) (Fig. 2), Lynn Hershman places the viewer in the same space as the actress, whose fate he or she determines by way of a remote control. In her later installations, from a playfully feminist stance Hershman thematicizes 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). Grahame Weinbren's installations develop complex relations between several plot levels, pointing toward the interactive cinema of the future (*The Erl King*, 1986; *Sonata*, 1991/93). 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. Their labyrinth contains three interactive plots subject to interruption by questions, quiz assignments or scoreboard readings. 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 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 1990s, 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. [40] 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 interactive TV) might be taken as an indication that audiences prefer linear narration. [41] The dramatic structures of interactive narration likewise remain in the early stages. Zapping, which remains the most popular form of interaction with linear programs, 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 uses DVD technology to offer the viewer a choice between 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) and *The Virtual Museum* (1991) (Fig. 3). The viewer passes through an unchangeable data landscape, which is not unlike being on a tour around a town or through a museum. Decisive in Shaw's works is the quality of the interface that, moving away from the keyboard or mouse, places the viewer on a bicycle or into a 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 unfamiliar 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. 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 CDROMs 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 made 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. [42] These products slot into a tradition stretching back to the nineteenth-century panorama. [43] At the same time they make it clear that, ultimately, illusion and interaction are mutually exclusive.

Fig. 3. Jeffrey Shaw, *The Virtual Museum*, 1991, installation at Ars Electronica Linz

iii. Interaction between body and data world

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 headset 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 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 viewer. An eye tracker 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) permits direct, haptic access to a digital image. This work can also be viewed as the human-machine version of the human-human interface provided by Valie Export's *Tap and Touch Cinema*; again, the paradigm shift from the 1960s to the 1990s becomes evident. [44] Weibel carries forward this fusion of image and spectator in *The Curtain of Lascaux* (1993), embedding it in a philosophical concept taking in the history of human perception from prehistoric paintings through Plato's cave to Cyberspace. [45] A feedback between body and data takes place in Ulrike Gabriel's installation *Breath* (1992/93). 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 biofeedback between user and machine. Experiments with interactive choreography took the first step toward connecting human and technical action. *Electro Clips* (1994) by Christian Möller and Stephen Galloway as well as *Binary Ballistic Ballet* (1994) by Michael Saup and William Forsythe were both the products of collaboration between a media artist and a choreographer.

David Rokeby's sound installation *Very Nervous System*, whose reaction to body language he continued to develop between 1982 and 1995, is a pioneer work in the

area of body-computer interaction. There are different versions for different areas of implementation: it exists as an exhibition object for interaction with visitors and as an interactive instrument for performances with musicians and dancers. There is even a version for medical use that enables a completely paralyzed woman to communicate with the outside world by blinking her eyes. In this respect it is not only an installation, but above all a tool for multiple applications which its users furnish with content. The media-assisted body performances by Stelarc, who in countless selfexperiments since the end of the 1980s has temporarily integrated media technology into his body, are even more spectacular. External sensors, for example, control the movements of his arm, which can be animated alternatively by Internet users or by an echo in the transmission times in the Net (*Fractal Flesh* 1995, *Ping Body* 1996). McLuhan's dictum that media are »extensions of man« is taken so literally in this case that for its part, the body becomes an extension of media. Two diametrically opposed approaches: Stelarc works on incorporation of the machine in the body, and Rokeby works on the body-like reactivity of the machine. In doing so, both of them work continuously on new aspects of an almost alchemical, unfinishable opus of a lifetime in the undefined space between art, physiology, and software. This also applies to other pioneers of interactive art, such as Myron Kruger, who as early as 1974 began tinkering with perfecting his installation *Videoplace* in order to make the countless application modes for interaction between the body and the electronic image appear more and more human.

iv. A data system with momentum that is enhanced through interaction

Since Turing, the ability of machines to learn was always considered to be an essential condition of Artificial Intelligence. Even on the low-tech level, a number of models were created that assigned a ›work‹ a life of its own in interaction with the viewer. Peter Dittmer's installation *The Wet Nurse (Die Amme)* (1992–ongoing) (Fig. 4) is another live time development project. Based solely on language, this apparatus involves the user via the keyboard in a complex dialogue. If the computer becomes finally agitated, this results 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 back in 1992 for the user interaction. The sculptural appeal of the whole is as important and has since been significantly expanded and modified up to the last version of 2007 which filled a whole museum space. The basic set up is a clear demonstration of the 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 conversation based on written language, no such confusion is likely to occur with the milk served by the ›wet nurse.‹

Fig. 4. Peter Dittmer, *Die Amme (The wet nurse)* since 1992, installation at Minima Media Leipzig 1994

Daniela Plewe's installation *Muser's Service* (1994–95) 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. 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*, whose various modes range between ›cascades of doubts‹ and ›war of convictions.‹ 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 practicing 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.« [46]

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 pseudocaresses of their creators. Instead of the linkage of 'art and life' propagated in the 1960s, the concern is now to overlap technology with biology in order to simulate artificial life. Yet the entertainment aspect partially invalidates the intended character of scientific visualization.

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.« [47] Following this line of thinking, Turing's question, »Can machines think?« would now have to read, »Can machines make art?«

v. Dialogue-based models

In these models the human-medium-human interaction is more important than humanmachine interaction. The simplest case are telecommunication pieces with live video or TV links between two exhibition venues (on different sides of the world or across the street). In the 1970s Douglas Davis began to use television for live art actions. Some of them allow a real dialogue (*Talk Out!*, 1972) others only

metaphorically, if not to say metaphysically, by 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) attract maximum audience participation today. While the telematic expansion of everyday situations such as sitting on a sofa or lying in bed is unlikely to rouse technological inhibitions, the dialogue mostly remains on the playful communicative level of ›hello there.‹ Agnes Hegedüs' installation *Between the Words* (1995) places directly opposite each other two partners in conversation separated only by a wall housing the interface in which virtual gestures are superimposed over real physical expressions. 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. [48] 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 dialoguebased approaches tend to exaggerate the symbolism of media connectivity. Douglas Davis, for instance, in 1975 described the feedback resulting 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.« [49] A fresh illustration of McLuhan's statement »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 viewer, 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, he or she occupies a specific position and is a part of the work's completion. They become ›exemplary viewers,‹ not just one viewer among many and no longer part of a group assembled in front of a work and walking around it at individual leisure.

In the hi-tech simulations of the 1990s, 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 1970s 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. [50] 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 pseudophysical 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—long queues are frequently a problem at popular shows in the 1990s. 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. [51] Loneliness, then, extends into the visual realm of the works. In none of the numerous virtual museums developed during the 1990s, will a visitor bump into other visitors. [52]

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, in the 1990s the price of the 3-D animation hard- and software generally surpasses by far the potential market value of the artwork generated with the aid of the same technology. The paradoxical relation of media and market is, that in the 1990s virtual-reality pieces cannot be sold because their technology is too expensive for the average collector or museum budget, whereas artists' videotapes in the 1980s and early 1990s were still too low-priced to be taken seriously as collectible art. Even more crucial is the fact that illustrations or documentations fail to produce essential aspects of the user interaction in hi-tech installations compared to traditional, static artworks. This is why books and press

reviews or even TV features can only convey a fraction of the whole. The most elaborate media inventions are precisely the ones which exceed the capacities of the mass media and are for this reason often 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 in the past people traveled for the sake of art. The stationary interactive installation has proved to be a dead end due to these distribution problems and the limitedness of its interaction potential. While the availability of high-tech equipment was a financial question in the 1990s, this is getting even more complex with the problems of maintenance and preservation of the hard- and software.

vii. Approaches toward collectivity in media space

Through the interconnection of several users as part of a collectively developed structure, the electronic realm can be transformed into a social and to some degree public domain. Complex communications structures 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) and the project with twenty-six authors initiated by Jean-François Lyotard on the occasion of his exhibition »Les Immateriaux« in 1985, or John Cage's *The First Meeting of the Satie Society* (1986) are initial efforts for a networked authorship among artists and writers. Hypertext concepts followed in Germany from 1988 onward by the project »PooLProcessing« of Heiko Idensen and Matthias Krohn. [53] The postmodern thesis of the »death of the author« thus finds its contemporary technological form, because already in Lyotard's project, it was possible to modify the texts written by the other participants in the collective. [54] An examination of the relation between ideology and technology is therefore also possible in the context of the postmodern discourse, in particular with respect to the concept of the rhizome, which Deleuze and Guattari coined for an interlinked text structure as early as 1976.

As a collective form of communication, networked writing has now become an everyday form of discourse on the Internet. In the 1990s 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 Internet way of life together

with chat rooms and mailing lists in the tradition of the once famous Californian »The Well.« [55] These playful communities were for a long time areas of noncompromised creativity and self expression, but did not surface in the context of media art. Exceptions are Evelyn Teutsch's »FOOGUE« (1996 onward) and the installation *[DPsNtN] = DISPLACED_PERSONS say NOTHING to NOBODY* (1997–99) by Christin Lahr. 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 overlayering of virtual and real space, making the encounter contemplative rather than interactive.

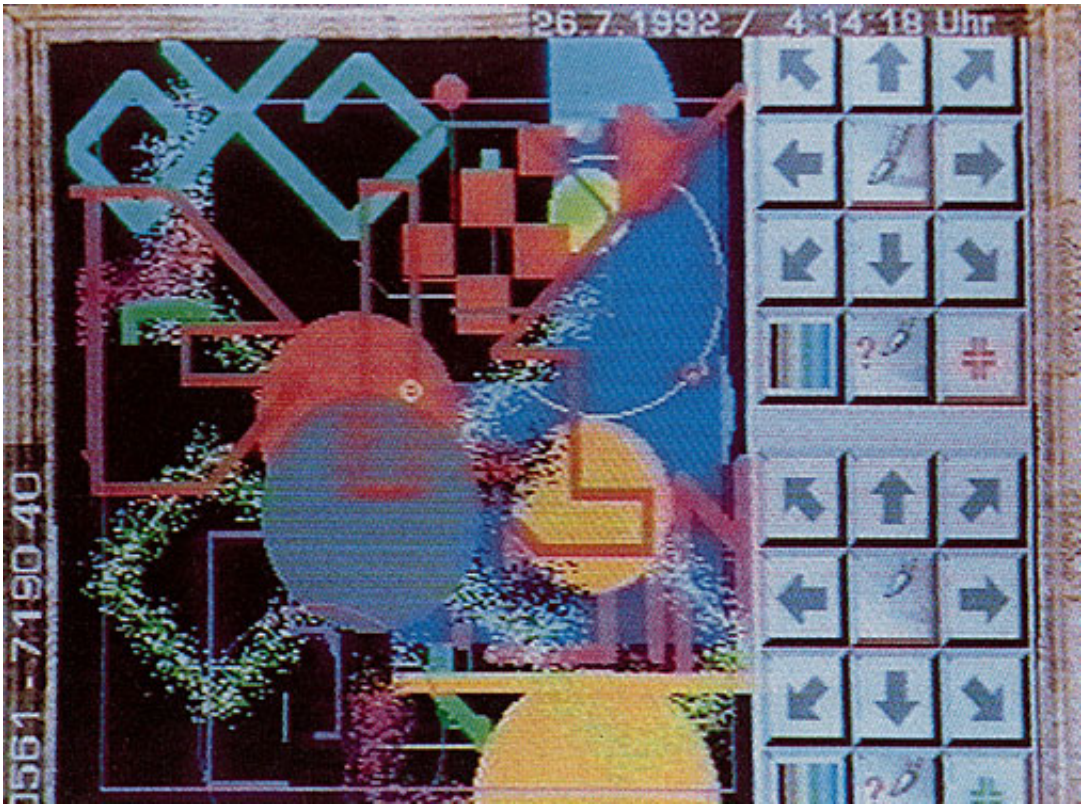

Fig. 5. Van Gogh TV, *Piazza Virtuale*, 1992, interactive TV broadcast for Documenta IX
left: viewer interaction by telephone and touchtone
right: interface for collective on-screen painting of the TV spectators

Even before the Internet boom, the project »Van Gogh TV« (Fig. 5) at the documenta 9 in 1992 created a computer-operated link between television and the telephone. This enabled viewers who had managed to acquire one of the few dial-in numbers to collectively make music, paint, or chat live on the television screen by means of an interface operated via the telephone keypad. However, despite—or even due to—the widespread acceptance by the public, the lack of a thematic parameter and the primitive interface caused the project to end in one hundred days of irrelevance. In retrospect, one could interpret »Van Gogh TV« in line with Benjamin—as a magnificently failed attempt to anticipate the effects of the World Wide Web using television and the telephone.

Physical interaction in simulated 3-D space can be combined with information data downloaded from the Internet in elaborate installations of the type implemented by the Knowbotic Research group (*Simulationsraum mobiler Datenklänge*, 1993;

Dialogue with the knowbotic south, 1994). The viewers do not enter not a predefined data space but a digital environment which is continuously developed through the participants. It represents an attempt to find new forms of visualization for complex 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 our 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.

Interactivity and the Internet [56]

Although scientists around the world have been using the Internet as a matter of course since the 1980s, the art world hit upon a new vision only with the hype that surrounded the Internet boom a decade later. 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 communication. At the same time, interactive data carriers in the form of the CD-ROM and later DVD-ROM appeared on the mass market. The most important effect of these new technologies is that interaction becomes an option for the mass media. Interactivity is due to leave the laboratory and announced as the bright future of the media industry. Restrictions on access to local interactive hi-tech installations belong to the past as the interactive data can be delivered to everybody's home. The viewer, relieved of the necessity to make extensive journeys in quest of the interactive art, is turned into a data traveler on the Net. The shift of concepts is evident in the changing meaning of the central terms. ›Cyberspace‹ is no longer understood primarily as a virtual extension of real space into an immersive data environment, but instead as a meta-network of communication structures. ›Interactivity‹ is leaving behind human-machine interaction to again become interpersonal interaction whose structures are molded by the supra-machine of the Internet.

An overabundance of connectivity has replaced the symbolic loneliness

experienced by the viewer in the Cyberspace of the early 1990s or on meeting his own video image in the 1970s closed-circuit installations. As a point of convergence for all media and genres, the Internet appears to supply the technical means to fulfill the utopias of intermedia art. The idea of a ›Net‹ is older than the technical reality; as early as in the 1960s, it was a central motif of alternative culture and aspirations to political and social influence. These ideals are being rediscovered in view of the new technologies in the first wave of Net utopias of the early 1990s. An ›open work‹ that is generated through the communication of participants and the ›domination-free‹ discourse of all Net users are basic forms of this Internet ideology and aesthetics. This attitude was anticipated 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. »Electronic Cafe« is thus the precursor of all Net utopias that cast a social model in a technological mold.

The most successful projects in the grey zone between politics and culture are the ›digital‹ and ›international‹ cities created from 1994 onward, initially 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.« [57] The »global village« propagated by McLuhan in the 1960s was now scaled down to a regional electronic neighborhood but with a potential exchange between the interconnected digital municipalities. Many of these projects soon faced the question of whether they wanted to remain within the selfdetermined free space of alternative-artistic media work or, like the rest of this booming commercial environment, become professional service providers. This conflicting role led to the self-dissolution in 1997 of the prominent »Internationale Stadt Berlin,« while its digital counterpart in Bremen became an Internet service provider. [58] Such scenarios echo—but at a much faster pace—the way the video scene split up in the 1980s into those who did commercial work for TV and those who continued to produce art and had no further association with the TV networks.

A number of Internet projects can be related to the ›context art‹ of the 1990s, even if in the museum and gallery context it was never generally accepted that such a thing as ›Net art‹ even exists. The first such project was »The Thing,« founded in New York in 1991, which opened at least temporary nodes in Berlin, Frankfurt, Hamburg, Düsseldorf, Cologne, London, Stockholm, and Vienna. Wolfgang Staehle, the founder of what began as a purely text-oriented discussion forum with its own BBS network (Bulletin Board System) 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 concept of art.« [59] Can the problem of expanding the notion of art be solved using the appropriate medium? Or does this statement imply that artists too are now proclaiming the paradigm shift from the 1960s ideology to 1990s technology? To its users and creators, »The Thing« offered a preview of the time, when network communications have become a commodity and part of everyday live. Intended at first as a temporary project, it became a permanent structure that moved to the Internet and offered a discussion platform and provided web-space for artists projects. The internationality of the first years soon split up into more or less autonomous locations which led a live of there own during most of the 1990s – most of them disappearing from visibility as commercial providers offer the same services.

In the early 1990s, all arts-related Net projects were still determined to pursue the parallel goals of creating public access to the Internet 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. Since access to the Internet is supplied on a commercial basis, the demise of projects like »The Thing« or »Internationale Stadt« perhaps represents the commodification of the last twentiethcentury vision of combining technical and artistic progress. The historical relevance of these projects, as models for a general shift in the public access to and awareness of the Net, is not acknowledged in art history neither in media history. There is no institution that has per definition a responsibility for the documentation and preservation of this part of the history of digital culture. This is

why the initiative has been taken up by the Ludwig Boltzmann Institute Media. Art. Research for the exemplary republication and scholarly documentation of these early 1990s net-based artists' collaborations to prevent a total loss of this part of the cultural digital heritage. [60]

Certainly, art is a minor player on the sidelines of the 1990s Internet boom. 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 1970s, launched the project without any thought of the Internet as its medium, it became acutely relevant due to the Internet. Because 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 Internet statistics placed the project's Web site among the most frequently visited addresses, ranked closely after the Microsoft site.

Ingo Günther's »Refugee Republic« is another project that coincidentally meets with the emergence of the Internet as a conceptual model in the early 1990s. As a project aiming to make the twenty 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 (in 1993) as an Internet project, but the Net proved to be an appropriate medium. Günther does not base his work on the assumption that since we've got the Internet, artists are supposed to do something with it. Rather he starts to map out a new political function of the medium in relation to an international dispersed population, that has no central government. 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. [61]

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 just the opposite to those intended. Remembering the Internet community's organized mass e-mail protest in reaction to the first senders of spam mail in 1993, 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 commercial mass medium. Thanks to the multimedia capabilities of the Word Wide Web, communication and interaction is giving way to new models of broadcasting and consumerism. The Internet has since turned upside down the market for most cultural products – the most prominent example is the ongoing crisis of the music industry since Napster.

Ironically, the art market is the one place that has not been seriously affected by the Net economy. The ubiquity of the Net 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 and Rhizome in New York or the Public Netbase in Vienna, which encompassed the potential of both the art world and network communications. [62] That these projects have remained largely without impact inside the art world 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, Netbased 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. [63] It represents the pinnacle of a paradox that has accompanied media art from the beginning: mass media, and above all the Internet, dissolve all contextual relationships. In the twentieth 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. Netbased art in the 1990s thus faces the dilemma of addressing everybody through its medium, but nobody through its context.

The fast-developing Internet economy has passed by the field of art, which is possibly more immune to the dangers of commercialization than its exponents

might want it to be. The 1990s attempts at ›Net-art galleries‹ where based mostly on the model of conventional galleries and shared the fate of Gerry Schum's TV gallery, which was an abortive attempt in 1970 to transport the art context into a mass medium. [64] Further evidence is offered by the unsuccessful Internet auction of the New York »The Thing« Web site in 1999: bids only reached around five percent of the limit of $45,000.

Fig. 6. Blank / Jeron, *Dump Your Trash!*, 1998, diagram of the project

That slow access to the congested World Wide Web has brought the World Wide Wait instead of the promised land of freedom for modem-users in the 1990s is the topic of a project entitled »www.antworten.de« (1997) by Holger Friese and Max Kossatz. An Internet project such as »Dump Your Trash!« (1998) (Fig. 6) by Joachim Blank and Karlheinz Jeron is the symbolic gravestone marking the drowning, in an ocean of data trash, of faith in liberation through communications. 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 users may 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. [65] As formulated in art and also in theory, this Net critique has two targets: the false promises of the telecommunications industry and the lost utopias of the critics' own past. Geert Lovink, Joachim Blank and Karlheinz Jeron are Net pioneers of the early 1990s whose involvement in the digital cities movement proposed cultural and communicational alternatives to mainstream media.

At the end of the 1990s a critique of interactivity and its unresolved promises is common ground of media art and media theory. Under the motto "Interactivity is the biggest lie of all!" 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, on their CD-ROM *Blam!* 3. [66] A direct route leads from anti-interactivity to software subversion of the type awaiting unsuspecting viewers of the Jodi.org Web site. Confronted with constantly changing images of the final crash, the viewer is helpless until the realization dawns that these images simulate the non-simulatable end of all simulation machines.

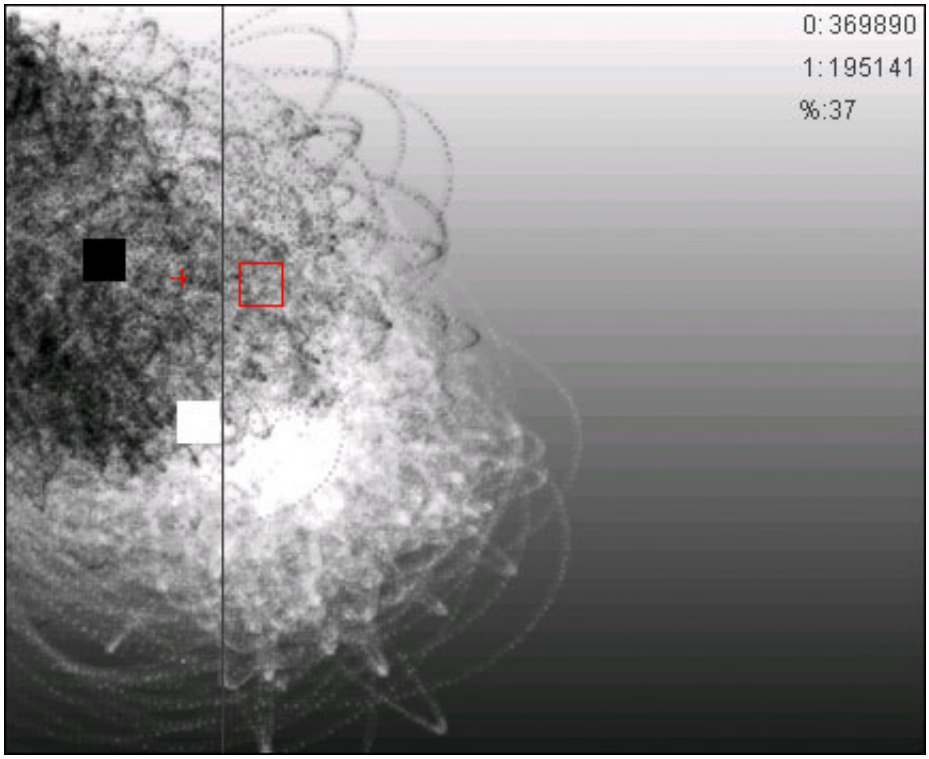

Fig. 7. Mark Napier, *Black and White* (CNN) 2002, application for *Carnivore* by RSG, reading each bit of cnn.com, 0 moves black horizontal, 1 moves white vertical, black and white attract each other

The subversive software *Carnivore* (Fig. 7) by the group RSG (Radical Software Group) goes even further. The project, which was launched in October 2001 three weeks after the 9/11 terrorist attacks, makes the complete surveillance of the Internet evident by allowing one to be able to read all data traffic in plain text after it has been installed on a local network. Using freeware, anyone can defy the FBI's elaborate spy program of the same name and in this way keep up with the anticipated heightened government surveillance in the wake of 9/11. The artistic side of *Carnivore* consists in its use as a basis for various forms of the alternative visualization of data streams in real time. These »diagnostic clients,» which were developed by several artists, allow transforming the consternation over being observed into an aesthetic contemplation of randomly determined structures. This conscious fatalism transformed into randomized aesthetics can be related all the way back to John Cage's pieces for radio from the early 1950s. RSG makes specific reference to the origins of the Ethernet in terms of radio technology, which is still evident in its designation.

That brings us back to the starting point of this text in two respects. Firstly, before any kind of interaction, participation is a basic principle of the modernist aesthetics —and in the RSG project it is being extended to otherwise invisible processes at the highest technical level possible. Secondly, the conflict between individual communication and mass communication reemerges, which has characterized all electronic media since the advent of the radio and ultimately to the Internet.

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 founds itself on this latter definition: they are what always prevents response, making all processes of exchange impossible (except in various forms of response simulation).« [67] 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), which consists solely of questions from the general public. Just as the new departure of the 1960s ended with Bruce Nauman's declaration of mistrust in participatory art forms, so the 1990s come to a close with a skeptical revision of a concept of interactivity molded by media technologies.

The term interpassivity, coined by Robert Pfaller, provides the theoretical background for this. [68] His skepticism with respect to the general euphoria surrounding interactivity goes back to phenomena such as the canned laughter heard on TV comedy shows, which is symptomatic for art that contemplates itself, so to speak, and thus anticipates viewer reaction. [69] Pfaller also sees this tendency toward »delegated amusement« in interactive art, which allows abstaining from forming an aesthetic opinion. Thus the concept of interpassivity constitutes the updated counterpart to the pseudoactivity of media consumers demonstrated as early as 1938 by Theodor Adorno in his examination of radio and record listeners. [70]

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 twelve radios and twenty-four 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 software, hardware and interface design?

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 the 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. [71] 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 in which 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 device and the android automatons that so impressed court audiences. 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, master builder of forts, and inventor of flying machines a symbol of a wholeness of cultural achievement, technical innovation, and scientific research that is forever lost.

Again: Is Interactivity an Ideology or a Technology?

Even with the aid of computers, the yearning for the resurgence of the Renaissance Man is doomed to remain unfulfilled in these times of an explosion in knowledge and communications. All the same networks are producing a convergence of

previously separated cultural, social and technological fields. The questions posed by Brecht and Turing regarding the social or technological significance of media-assisted interaction, which were still radically disparate in the 1930s, are now beginning to overlap. Due to the interweaving of human society and its digital back-up, it is becoming increasingly difficult to define the boundary between ideology and technology, and indeed technology forms a central part of ideology in the 1990s. [72]

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 massmedia consumer conditioning, as is shown in the symbolic deconstruction of radio and television by Cage, Paik, and Vostell, and also in 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 macrocultural inclination towards passive reception—provided these media can develop their inherent potential for interaction and communication. Therein lies the source of the proposition that the media have the 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 Brecht's radio theories of the 1930s, and Weibel's call in 1989 for a future dominated by interactive art. [73] The thesis of the liberating power of the media was likewise reflected in the ›Californian ideology‹ of the 1990s, as embodied by *Wired* magazine or the would-be alternative European projects such as the digital cities or »Nettime.« [74] 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, exhippies, and a small avant-garde in art and politics became the central message of the media industry leading directly into the bubble of the New Economy. Even quicker the new consumer-as-producer (prosumer) culture of the Web 2.0 has been turned around into a commercial data mining ground for the ever increasing exploitation of the attention economy. For the myspace und youtube generation the promise of the

user emancipation in network media is cannibalized by the self-consumerism following the slogan »broadcast yourself«. This is why, finally, the theory that mediaassisted interaction and communication would overcome the hegemony of the media industry has become more utopian than ever. Instead, the good old media skepticism of the high culture representatives is loosing ground as the conflict between ideology and technology is melting down. The on-line lifestyle of the young digerati has a pragmatic view of privacy and promotes the personal data profile as part of the public personae and as a personal commodity.

Ranging from Bertolt Brecht via Happening and Fluxus to the left-wing activism of the 1960s and 1970s, and, finally, the interactive art of the 1980s and 1990s, the experiments in the laboratory of the avant-garde have all produced the same findings. The influence of the mass 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.« [75] 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, then to have faith in the liberating potential of media amounts to much the same thing as giving an alcoholic the key to the alcohol cabinet. Indeed, in 1932 Brecht compared the radio listener's isolated passivity to that of the secret drinker, that most wretched of addicts. The interactivity euphoria of the early 1990s is coming to an end with the morning-after feeling of »electronic loneliness« which Agentur Bilwet summarizes in 1997 with the motto, »Change the world; stay at home.« [76] This is still a good motto ten years later in the Web 2.0 context, where social life is more and more virtualized.

»Where Do We Go from Here?«

The depression that followed the Internet euphoria in the late 1990s can be seen alongside the attempts by the mainstream mass media to adopt forms of interactivity developed in the Net culture and in media art. Already in these failed attempts around the year 2000, the ultimate goal of activating the audience through merging the Net and broadcast media was clearly discernible. [77] It is not

the emancipation of consumerism but a new edition of the economics of attention based in high-technology in which any activity by a viewer potentially becomes commercially measurable and exploitable. When AOL boss Steve Case says in 2000 that »more and more people want interactivity,« what he means is that in the future, viewers will »click on Britney Spear's dress during a TV show and K-Mart will deliver it to their front door.« [78] At the same time a group of researchers at MIT is developing a so-called hyper soap that will lead to the ultimate perfection of the old television principle of product placement. While the show is airing, viewers can click on any of the articles on the screen and receive information about the product or view one's ordering options. Imagine this: the car the leading man is driving, »Mercedes 300 SLK, $30,000—Link to the available models and a test-drive option.« The beer he drinks, »Tuborg, a six-pack for $3.99, delivery time 30 minutes for online orders.« The tissue he uses to dry his lover's tears, »Kleenex, $1.99, will be delivered with the beer.« Thus the entire story of a TV series takes place in a virtual department store in which the actors are living store-window mannequins. Identification with the star becomes a guaranteed commercializable factor. By buying his clothes, furniture, etc., one apparently becomes someone like him. Any further commercials would then be superfluous, even counterproductive. The interactive, netbased mass media would then achieve a total synthesis of economic and technological structure, against the divergence of which they have been fighting since the days of the radio using methods such as rating.

Ironically, the high-tech »hyper soap« exhibits marketing strategies comparable to low-tech reality TV [79]. Reality TV was likewise anticipated by avantgarde film in the style of Andy Warhol. In both cases, a principle developed within the context of media art is adopted by the mainstream media, but the original goal is turned into its opposite. To express it in Brecht's words: »Capitalism immediately and continuously transforms the poison with which it has been injected into a drug and it takes pleasure in it.« [80] Thus the artistic utopia of a participatory and later interactive art as the emancipation of the viewer from consumerism, which opposes the classic, closed concept of an artistic work that embodies an art in line with market conditions as a product, sees itself faced with the paradox that its concepts are to be converted into the engine for the total commercial penetration of everyday media consumption. This process may confirm the avant-garde status of media art.

However, since the collapse of the New Economy and the reemergence of Web 2.0 economy, the ideals of the ›heroic‹ period of interactive art sound like historical relics from the antiquity of the ›new media‹ age.

Today interactivity is no longer an experiment in the media lab or an experience in a media art exhibition but part of everyday life in digital culture. Does this mean, that some of the artistic and theoretic ideas behind it, have also left the field of high culture and have been embedded in a digital folklore which no longer cares about art with a capital A? Some anticipations of this idea can be traced back to Nicholas Negroponte's prophecy of a new electronic amateur »E-xpressionist« art from 1995 in his book »Being Digital«: »The Sunday painter is a symbol of a new era of opportunity and respect for creative avocations—lifelong making, doing, and expressing. … There will be a more common palette for love and duty, for selfexpression and group work. … Computer hackers young and old are an excellent example. … The behavior of their computer programs has a new kind of aesthetic. These hackers are the forerunners of the new e-xpressionists.« [81] The themes of media art festivals in 2000 also set the expectation for amateur Internet culture that, under the motto of »do it yourself,« closely scrutinizes or reprograms the industrially predefined standards of media technology, and, under the motto »take over,« dismisses or simply ignores the evaluation processes of the art business. [82] The pathetic proclamation of the »century of the consumer« in the ZKM exhibition »YOU_ser« of 2007 sounds like the final re-enactement of all the utopias that have been associated with interactivity and is again merging ideology and technology. After a long summary of the history of modernism as participatory user emancipation Peter Weibel's conclusions is: »The artist no longer has a monopoly on creativity. Users … become producers and program designers and thereby, competitors to television, radio, and newspapers, the historical media monopoly. Audience participation reshapes itself as consumers' emancipation. … The new installations presented in the exhibition transfer the potential for co-designing by the user that has been developed on the Internet into the context of art and allow the visitors to emancipate themselves. They can act as artists, curators, and producers. The exhibition visitors, as users, as emancipated consumers, are at the center of focus. YOU are the content of the exhibition! … Is this the new cultural space for the emancipated consumer, the visitor as user who will decide the culture

of the twentyfirst century, just as slaves, workers, and citizens as historical subjects have done in the past?« [83]

The unfulfilled utopia of an art that no longer calls itself art stems from the inheritance of early twentieth century avant-garde. The working class art of the early soviet union ended up in a totalitarian modernism and the ironic detachment of Marcel Duchamps ready-made became the model for a significant part of what we see in museums today. At the same time the media amateurs working with photography, radio, film and video have created autonomous communities of creativity, mostly outside the field of high-culture and at least in some parts independent from the media industry. Can the rhizomatic pluralism of the Internet culture rescue the ideological legacy of modernism from its totalitarian claim and thus make the question regarding art or non-art finally superfluous?

»On the Internet, nobody knows that you're a dog,« announces the dog, in a cartoon from 1993, sitting at the keyboard of a computer talking to another dog. [84] Perhaps this is the updated version of Marcel Duchamp's closing statement in his 1961 lecture »Where do we go from here?«: »The great artist of tomorrow will go underground.« [85]

References

[1] Duchamp in his lecture »The Creative Act« from 1957. cf. Duchamp, M. (ed.) Museum Jean Tinguely, Basel, p. 43 (2002)
[2] Ibid
[3] Duchamp in a letter dated 1956. cf. Duchamp, M., Schriften, D. (eds.) Serge Stauffer, Zurich, p. 202 (1981)
[4] Baudelaire, C.: Critique d'art, Paris, p. 358 (1992)
[5] Baudelaire, C.: OEuvres complètes, Paris, vol. 2, p. 782 (1976)
[6] cf. Daniels, D.: Kunst als Sendung: Von der Telegrafie zum Internet, Munich, p. 168, 189 (2002)
[7] Duchamp, p. 239 (1981) (see note 3)
[8] Umberto Eco points out that the stimulus for his theses stems from New Music, without, however, mentioning John Cage. cf. Eco, U.: Das offene Kunstwerk, Frankfurt am Main, p. 23 (1977)

[9] The socioscientific concept of interaction can be traced back to the theory of symbolic interactionalism developed by George Herbert Mead in the 1920s. This theory examines the reciprocal conditionality of social action and communication. For a detailed conceptual history of interaction/interactivity see the essay by Katja Kwastek in this volume

[10] Brecht, B.: Der Rundfunk als Kommunikationsapparat. In: id., Werke, Berlin and Frankfurt am Main, vol. 21, p. 553, 557 (1992) Due, among other reasons, to Hans Magnus Enzensberger's renewed treatment of Brecht's theory of radio, which was noted by Marxist theorists like Todd Gitlin and artists like Douglas Davis, Brecht was similarly a point of reference for discourse on media and art in the United States in the 1960s and 1970s

[11] Turing, A.M.: Computing Machinery and Intelligence. Mind LIX 236, 433–460

[12] cf. Cage, J.: Composition as Process: Part II; Indeterminacy. In: Frieling, R., Daniels, D. (eds.) Media Art Action, Vienna and New York, pp. 27–33 (1997)

[13] Cage wrote in 1966: Are we an audience for computer art? The answer's not No; it's Yes. What we need is a computer that isn't labor-saving but which increases the work for us to do ... turns us (my idea) not ›on‹ but into artists. Cage, J.: A Year from Monday, London, p. 50 (1968)

[14] Gates as cited in Friedrich Kittler's lecture at the 1999 conference Wizards of Oz 1, Offene Quellen und freie Software, in Berlin

[15] Söke Dinkla writes on this subject: »The motto ›art and life‹ is transformed into ›art and technology‹.« She disregards, however, the associated shift in ideological paradigms that far surpasses the framework of art or technology. Equally, it is impossible to equate interaction based on a score written for a Happening or a Cage composition with interaction incorporated into a computer program without addressing the basic issue of human-machine interchangeability. Dinkla, S.: Pioniere Interaktiver Kunst von 1970 bis heute, Ostfildern, p. 41 (1997)

[16] Umberto Eco, For instance, in the final chapter of The Open Work (1962) examines the openness of a live TV broadcast as the mass-media counterpart to the open structures of the avant-garde. His hope with regard to the open structures: »These digressive annotations would then jolt the viewer out of the hypnotic spell woven by the plot, and, by distancing him from it, would force him to judge, or at least to question, the persuasiveness of what he sees on the screen.« Eco, U.: The Open Work, trans. A Cancogni, Cambridge, MA, p. 122 (1989)

[17] Enzensberger, H.M.: Constituents of a Theory of the Media (1970) In: Hanhardt, J. (ed.) Video Culture, Rochester, p. 97 (1986), Reprinted from The Consciousness Industry, trans. Stuart Hood, New York, pp. 95–128 (1974) cf. Jean Baudrillard's critique of this utopia, in which he objects to a view of the media merely »as the relay of an ideology« determined by the powers of capitalism, saying they must be grasped as »effectors of ideology.« Baudrillard, J. »Requiem for the Media« (1972), in Hanhardt 1986, op. cit., p. 128. Reprinted from For a Critique of the Political Economy of the Sign, trans. Charles Levin, St. Louis, pp. 164–184 (1981)
[18] cf. Levy, S.: Hackers: Heroes of the Computer Revolution, p. 52, New York (1994)
[19] Ibid., This ›hacker ethic‹ appears on the Web site of the Chaos Computer Club to this day, p. 39
[20] Here lies also the problem of the interference between scientific visualization and media art, as is investigated by groups like Knowbotic Research
[21] In Understanding Media, for instance, Marshall McLuhan describes television as an instrument of synaesthesia (1964)
[22] Kittler, F.: Fiktion und Simulation. In: Ars Electronica (ed.) Philosophien der neuen Technologie, Berlin, p. 57 (1989)
[23] Benjamin, W.: The Work of Art in the Age of Mechanical Reproduction (1935) In: id., Arendt, H. (ed.) Illuminations, New York, p. 251, note 30 (1969) Enzensberger carries on where Benjamin left off when he writes, in regard to the 1960s: »This is where the prognostic value of otherwise inessential productions, such as happenings, fluxus, and mixed-media shows, is to be found.« Enzensberger, p. 122 (1970) (see note 17)
[24] Umberto Eco, too, explicitly takes contemporary music as his point of departure and refers to Karlheinz Stockhausen, Luciano Berio, and Henri Pousseur, although John Cage is not mentioned. Eco (1962/1989) (see note 16)
[25] If an electronically modified TV set is fitted with a microphone, for instance, visitors can generate an oscillating pattern on the TV screen by making sounds and noises. cf. Frieling and Daniels 1997, p. 62 (see note 12)
[26] Naumann, B. (ed.): Joan Simmon, exh. cat. Walker Art Center, Minneapolis and Basel, p. 77 (1994)
[27] Upon entering this installation, the viewer sees him- or herself at the other end on one of the two video monitors, while the other monitor shows the empty corridor

in a previously recorded video without the viewer. Attempting to convince oneself of one's own presence in the image and/or space is utterly impossible, since as soon as one moves through the corridor to the video monitors, one moves away from the camera installed at the entrance and thus disappears from the video image
[28] Export, V. (ed.): Peter Assmann, exh. cat. Oö. Landesmuseum, Linz, p. 258 (1992)
[29] Valie Export's expanded-cinema project »Ping Pong, A Film to play with/a player's film« (1968) in which the viewer is asked to aim a ball, with the aid of a ping-pong paddle, at the black dots that emerge on, and disappear from, the film screen. This, according to Export, illustrated the »relation of domination between producer and consumer,« since even as a participant, the viewer remains wholly dependent on the specifications of the film
[30] For a more detailed description of the technological development, see for instance. Weibel, P.: Virtuelle Realität: Der Endo-Zugang zur Elektronik. In: Rötzer, F., Weibel, P. (eds.) Cyberspace: Zum medialen Gesamtkunstwerk, Munich, pp. 15–46 (1993), cf. the excerpt of the text in Rudolf Frieling and Dieter Daniels, Media Art Interaction: The 1980s and 1990s in Germany, ed. Goethe Institute, Munich, and ZKM Karlsruhe, Vienna and New York (2000), and the comprehensive study of interactive art by Dinkla, pp. 50–62 (1997) (see note 15)
[31] cf. Sutherland, I.: The Ultimate Display. In: Proceedings of IFIPS Congress 1965, New York, vol. 2, pp. 506–508 (1965), id. »Computer Inputs and Outputs,« Scientific American (September 1966). Rötzer and Weibel, p. 18, 25 (1993) (see note 30)
[32] Wiener, O.: Die Verbesserung von Mitteleuropa, Reinbek (1969/1985), p. CXXXIX. cf. translated excerpts In: Weibel, P. (ed.) The Vienna Group, Vienna and New York, pp. 666–698 (1997)
[33] Ibid., p. CLXXV
[34] Schoeffer, N.: Die Zukunft der Kunst—die Kunst der Zukunft. In: Schoeffer, N.: exh. cat. Städtische Kunsthalle, Düsseldorf (1968)
[35] cf. the »E. A. T.« (Experiments in Art and Technology) program at Los Angeles Country Museum from 1967 onward, and Cybernetic Serendipity: the computer and the arts. Reichardt, J. (ed.) exh. cat. Studio International, London, New York (1968)
[36] cf. Hartwagner, G., Iglhaut, S., Rötzer, F. (eds.): Künstliche Spiele, Munich (1993)

[37] One rare example of congruence of technology and content was one of the first computercontrolled interactive visual artworks, namely the program Random War by Charles Csuri, which on the basis of a randomly generated constellation simulates the progress of a battle between two groups of soldiers. Reichardt, p. 81 (1968) (see note 35)
[38] Rötzer and Weibel, p. 27 (1993) (see note 30)
[39] Most of the examples only briefly mentioned here are documented on, http://www. mediaartnet.org
[40] A linkage of popular culture and interactivity was introduced very early by the Austrian group Station Rose
[41] Even before interactivity boomed in the 1990s, Ann-Sargeant Wooster wrote the following in the commendable article »Reach out and touch someone—The Romance of Interactivity«: »Most uses of interactivity will probably be confined to mass-market populist entertainment ... and rigidly controlled by media merchants.« In: Hall, D., Fifer, S.J. (eds.) Illuminating Video, New York, p. 302 (1990); See also on this subject Regina Cornwell, »Interactive Art: Touching the ›Body in the Mind‹,« Discourse 14.2, p. 209 (Spring 1992)
[42] From 1993 onward, Jeffrey Shaw collaborated with engineers and computer scientists at the Kernforschungszentrum in Karlsruhe on developing the project »EVE—extended virtual environment,« which corresponds to a viewer-interactive panorama. In 1997, Shaw and the Frauenhofer Institut, Stuttgart, jointly carried out the »confFIGURING the CAVE« project in a »Cave Automatic Virtual Environment« (a 3-D simulation developed for research purposes and able to be physically entered)
[43] Oliver Grau investigated this development in the Deutsche Forschungsgesellschaft research project »Kunstgeschichte und Medientheorien der Virtuellen Realität« conducted at the Kunsthistorisches Seminar, Humboldt University, Berlin, http://www.virtualart.at
[44] Peter Weibel participated as a ›crowd-warmer‹ in Valie Export's action
[45] cf. Weibel, P.: Der Vorhang von Lascaux. In: First Europeans: frühe Kulturen—moderne Visionen, exh. cat. Orangerie Charlottenburg, Berlin, p. 78 (1993)
[46] Plewe in an e-mail to the author
[47] Kriesche, R.: Artificial Intelligence in the Arts, Graz, p. 13 (1985); see text in Frieling and Daniels 2000 (see note 30)

[48] Stenslie, S.: Cyber SM, and Kirk Woolford, »A touch at the end of the century,« both in Lab 1: Das Magazin der Kunsthochschule für Medien, Cologne, pp. 40–43, 72–75 (1994)
[49] Douglas Davis, interviewed by David Ross. In: Schneider, I., Korot, B.: KorotVideo Art, An Anthology, New York and London, p. 33 (1976)
[50] Krauss, R.: Video: The Aesthetics of Narcissism (October 1, 1976)
[51] Shaw, J.: Reisen in der virtuellen Realität: Gespräch mit Florian Rötzer. Kunstforum 117, 295 (1992)
[52] Such virtual museums are only beginning to become potential sites of communication in the late 1990s thanks to the incipient synthesis of 3-D graphics and the Internet. cf. Grassmuck, V.: Das lebende Museum im Netz. In: Schade, S., Tholen, G.C. (eds.), Konfigurationen zwischen Kunst und Medien, Munich, pp. 231–251 (1999)
[53] cf. Roy Ascott's theses on art and telematics, which although written as early as 1983,were comprehensive and concrete. Grundmann, H. (ed.) Art Telecommunication, Vienna and Vancouver, pp. 25–59 (1984)
[54] Lyotard, J.-F. (ed.): Les Immatériaux, vol. 1, Epreuves d'écriture, vol. 2, Album: Inventaire, exh. cat. Centre Georges Pompidou, Paris (1985)
[55] cf. Turkle, S.: Live on the Screen, New York (1995)
[56] The last part of the essay refers only to art works before 2003, when it was first published in German
[57] Manifesto on Web site of the »Internationale Stadt Berlin« (1994) (offline)
[58] cf. Kerscher, G., Blank, J.: »brave new city,« Kritische Berichte 1, pp. 10–16 (1998); special issue on Net Art
[59] Staehle in Vera Graf, »Kunst im Informationszeitalter,« Süddeutsche Zeitung, p. 11(March 22, 1994)
[60] http://www.netzpioniere.at
[61] cf. Daniels, D.: Utopia—What For? In: Rennert, S., von Wiese, S. (ed.) Ingo Günther: Republik.com, exh. cat. Kunstmuseum Düsseldorf, Ostfildern, pp. 48–61 (1998)
[62] Äda-Web and Public Netbase both went online at the start of 1995 and in a collaboration with artists produced WWW-specific works that were then embedded in a theoretical context. After its sponsor, a telecommunications company, withdrew its support, Äda Web ceased operations in 1998 and was sold to the Walker Art

Center as an archive offering access via the Internet. Public Netbase was forced to stop its activity in 2006 due to lack of funding and will be documented as part of the netzpioniere.at project by the Ludwig Boltzmann Institute Media. Art. Research
[63] cf. on this subject the debate, telling for the misconceptions on either side, conducted on Net art between Isabelle Graw and Tilman Baumgärtel: Graw, I.: »Man sieht, was man sieht: Anmerkungen zur Netzkunst,« Texte zur Kunst 32, 18–31 (1998), Tilman Baumgärtel, »Das Imperium schlägt zurück!,« Telepolis (on-line journal) (January 20, 1999)
[64] While Olia Lialina's Net-art gallery Art Teleportacia in Moscow has received plentiful press coverage, it has so far sold only one work of art (by the gallery owner). The online version of the New York Times did at least find worth a notice the purchase of the project, http://www.antworten.de by Holger Friese and Max Kossatz by the private collectors Hannelore and Hans-Dieter Huber
[65] Agentur Bilwet has published the following books: Bewegingsleer, 1990 (engl. Cracking the Movement: squatting beyond the media, 1994); Media-Archif, 1992 (engl. The Media Archive, 1997); Der Datendandy, 1994; Elektronische Einsamkeit, 1997; also Geert Lovink, My First Recession, 2003; nettime, Netzkritik, Bosma, J., et al. (eds.) (1997); Read Me! filtered by nettime: ASCII culture and the revenge of knowledge, New York (1999)
[66] cf. Römer, S.: Interaktivität ist die größte Lüge. Texte zur Kunst 32, 70–73 (1998)
[67] Baudrillard in Hanhardt, p. 129 (1986) (see note 17)
[68] Pfaller, R. (ed.): Interpassivität: Studien über delegiertes Geniessen, Vienna and New York (2000)
[69] Valie Export's first interactive video installation Autohypnose, likewise shows the conditioning of the viewer by means of a systematic behavioral program and his or her being rewarded with applause from the videotape (1973)
[70] Whenever they attempt to break away from the passive status of compulsory consumers and ›activate‹ themselves, they succumb to pseudoactivity.... Their ecstasy is without content. That it happens, that the music is listened to, this replaces the content itself. Theodor Adorno, On the Fetish-Character in Music and the Regression of Listening. In: Arato, A., Gebhardt, E. (eds.) The Essential Frankfurt School Reader, New York, pp. 270–299, p. 292 (1987)
[71] cf. on this subject Armin Medosch in the on-line journal Telepolis (June 1, 1999)

[72] cf. also Jean Baudrillard, in whose view the media produce an ideology as opposed to merely being the means of the latter (see note 17)
[73] Peter Weibel in 1989 expressed the view that modern art as a whole was undergoing a development towards the ›inter‹ principle, and announced his own program of concentrating »on the actual, utopian social possibilities ... offered by technology, such as participation in and interaction with the artwork as a model for emancipationist communicational forms.« Peter Weibel, »Momente der Interaktivität,« In: Kunstforum 103, p. 87 (1989)
[74] cf. on this subject: Richard Barbrook and Andy Cameron, Californian Ideology, first published in 1995, The authors call for a specifically European position in which, in opposition to the US enthusiasm for technology, the »hi-tech artisans« re-connect with the theory and practice of the visual arts, http://www.hrc.wmin.ac.uk/theory-californianideology.html (accessed November 10, 2007)
[75] Brecht, p. 556 (1992) (see note 10)
[76] Bilwet, A.: Elektronische Einsamkeit, Cologne, p. 11 (1997)
[77] In November 2000, the major German TV broadcasting stations RTL and ZDF launched Internet series that attempt to translate the tried-and-true television format of the soap opera into an interactive, Internet-based form. RTL's Internet soap opera Zwischen den Stunden comes from the producers of the TV series Gute Zeiten schlechte Zeiten and is shown at designated »airtimes.« With etagezwo, ZDF developed a more intricate Internetspecific presentation, but the viewing audience is also unable to influence the plot. ARTE, a joint Franco-German cultural TV channel, even offered an interactive novel, where the audience was supposed to write the complex plot for actors provided by the TV station. Although each of the stations takes great pains to win over the target group of young, future-oriented audience, none of the projects are successful, and all of them are eventually discontinued
[78] Steve Case and AOL manager Myer Berlow, cited in Christian Tenbrock, »Online sucht Inhalt,« Die Zeit, p. 32 (September 14, 2000)
[79] Product placement in reality TV also leads to a duplication of the medium in reality instead of to a depiction of reality in the medium. The media theoretician Douglas Rushkoff speaks of an »ossification of the interactive capabilities« of the Internet due to marketing strategies. Rushkoff, D.: Virtuelles Marketing. In: Maresch,

R., Rötzer, F. (eds.) Cyberhypes, Frankfurt am Main, p. 103 (2001)
[80] Brecht, p. 516 (1992) (see note 10)
[81] Negroponte, N.: Being Digital, New York, p. 221 (1995)
[82] In 2001, the theme of the Transmediale Berlin was »do it yourself,« and the theme of the Ars Electronica Linz was »take over«
[83] Weibel, P.: http://www.zkm.de/you (accessed November 10, 2007)
[84] Cartoon by Peter Steiner, The New Yorker, vol. 69 (LXIX) (20), p. 61 (July 5, 1993), The cartoon did not receive much attention at the time, but in 2000 it is the most reproduced cartoon ever from the New Yorker. The sentence ... has slipped into the public consciousness, leaving its source behind ... and the saying has become practically an industry of its own. Fleishman, G.: Cartoon Captures Spirit of the Internet, The New York Times (December 14, 2000)
[85] Duchamp, p. 242 (1981) (see note 3)

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