The Electronic Bauhaus: Gestalt Technologies and the Electronic Challenge to Visual Art

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ABSTRACT

In linking the historical term 'Bauhaus' with the contemporary term 'electronics' and speaking of the 'Electronic Bauhaus', the author wishes to emphasize the continuity of the new and challenge it to discussion.

Walter Gropius's guiding conception of the Bauhaus as a pioneering school, founded on the idea that the urge to create is "an integral part of the substance of life in a civilized society", included the *grammar* of creation. Today immense efforts are still required to arrive at a grammar of creation pertinent to our own time, efforts that include knowledge of media technology.

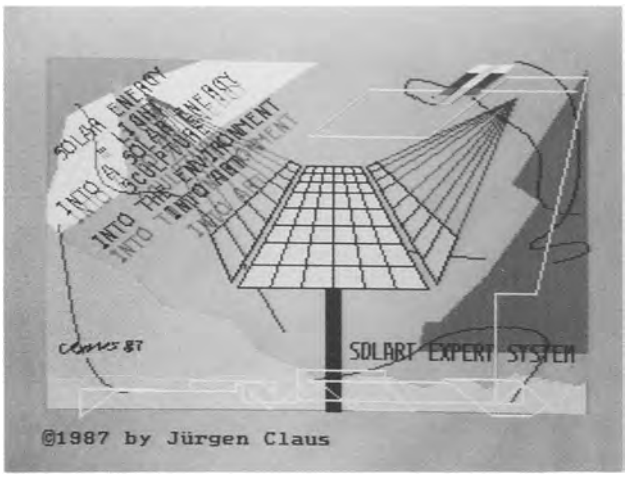
This paper focuses on three main topics: the ISDN for art: towards an architecture of communication; eco-technology: design with ecology; and the expert system artist: fifth-generation computer culture.

The historic Bauhaus belongs to the time of the Weimar Republic, from 1919 to 1933. It was in the 1920s that the school became, as Sibyl Moholy-Nagy points out, "the catalyst of the visual revolution for the 20. century": it provided a new vision for a new society that had to be shaped after the end of World War I [1]. Creation was, for Gropius, neither an intellectual nor a material concept, but an integral part of the life substance of civilized society. It brought together a consciously planned environment, a new scale of visual values, new forms of education and social changes. Technology in this context, at least from 1923 on (and certainly for Laszlo Moholy-Nagy and some others), emerged as the medium "by which a union was made possible between creative intuition and the severe discipline of design: *techne, logos*—the art of knowing how something is made, integrates ancient knowledge with the most futuristic research of the environment" [2].

We begin by taking the concept of an 'electronic Bauhaus' as our model, pointing out critical questions and suggesting the shape of some answers. These answers for the time being must remain provisional. And yet they provide the beginning of a new vision for a new society. It is essential to put art into the context of this new vision. And the challenge is that the participants of the cultural community must define it. To do this we must call upon three fundamental aspects of our artistic heritage: the traditions of art, the imaginary museum of Malraux and the energy phenomenon gleaned over the centuries that art is. However, not only must we familiarize ourselves again with our artistic heritage, we must also become aware of the foundations and standards of our own electronic age. This is an immense task for all of us, and we have not been trained for it. But it is only by using those standards that we can insert art into the living context of the communication society—art and what I call 'Gestalt technology' [3].

Gestalt technology combines *techne* and *logos* with the Gestalt that is created and perceived by humanity as a whole. The term *Gestalt* is a thoroughly German and untranslatable expression. It grew out of German poetry, philosophy and art, and I use the term precisely because of this tradition. Gestalt is related to *Gestaltung*, an emphatic reference to the never-definite, ever-emerging creation. In contrast to the machine-oriented approach of information technology, Gestalt technology embraces human perception and creation. (Art is perception and creation of Gestalt by Gestalt.) To clarify and elaborate on this theme, I focus on three topics: communication, design with ecology, and fifth-generation computer culture.

Fig. 1. Jürgen Claus, *SOLART Expert System*, videotex graphic, 1987. (Photo: H.-J. Hermann)



THE ISDN FOR ART: TOWARDS AN ARCHITECTURE OF COMMUNICATION

In evaluating our contemporary systems of networks and telecommunications we must consider their historical roots. In the 1880s Seurat, in his pointillist canvases, had discovered a visual code that might be called a precursor of the digital, pixel-oriented code [4]. The artist had become aware of the single elements of visual articulation—and their significance in establishing the proper meaning of image-communication. From the turn of the century on, art, in the process of becoming increasingly abstract, explored the fundamental meaning of signs, of symbols and of visual metaphors. The Bauhaus books *Point and Line to Plane* (1926) by Kandinsky and *from material to architecture* (1929) by Moholy-Nagy focused on the meaning of individual pri-

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mary visual elements and at the same time their interconnection, or, as we might say, networking. On another level, they focused on the carriers of visual form: the proper technologies and media of creation. In the beginning this revolved around photography, film, light sculptures, sound sculptures and similar media, and again their interrelation. Together these two levels, abstraction and carriers, established the early foundations of an *architecture of communication.*

A third concern of the Bauhaus artists has to do with the social implications of this new synthesis, a concern that has been largely neglected by art historians. In *Vision in Motion* (1947) Moholy-Nagy gives a perceptive insight into the failures of the technological revolution. Although the industrial revolution started with an enthusiastic emphasis on human values, its great metamorphosis as it ushered in the technological revolution served mainly the accumulation of profits, an asocial ethic based on goals of economic superiority rather than on the principles of justice.

> These ills, with their resultant monopolistic and fascist tendencies, finally led to repeated world wars which were cruel attempts to win capitalistic competition. . . . By concentrating insight, passion and stamina, we may recover the neglected fundamentals. . . . By integrating this newly gained knowledge with the existing social dynamics, we could direct our steps toward a harmony of individuals and social needs [5].

Moholy conceived of a "Parliament of social design", made up of culturally active agencies working to restore the basic unity of all human experiences. These form the nuclei of "new, collective forms of cultural and social life" whose goal is "the development of all creative capacities for individual and social fulfillment" [6]. It would be extremely shortsighted not to take into account these historical roots of artistic networking, telecommunication and what I call an 'ISDN' (Integrated Services Digital Network) for art. The Bauhaus aims lead, as we will see, to our present and future fight for a human-oriented approach in expert systems and artificial intelligence.

The architecture of communication found a new structure and quality with the binary digital code, the new primary element of production, storage and transmission. A new alphabet was invented, in which the same characters served for acoustic, verbal and visual communication. "Thinking in relations" (Gropius) was now, at the advent of the 'electronic Bauhaus', implicit in the inner code of the digital age. Because production, transmission and receiving were all based on a single code, it was natural for artists to adopt the code as well as electronic networks. This led to an intercommunication of culture, a culture intercom that was formulated and practiced from the early 1960s on by Stan VanDerBeek. At the time of the first satellite transmissions ("Telstar", 23 July 1962) he proposed Image Libraries as a means for a nonverbal international language. He believed that via satellites and equipped with a code that probes for the "emotional denominator", we could reach any age, any culture. "There are (in 1970) an estimated 700 million people in the world who are unlettered; we have no time to lose or miscalculate" [7]. When telecommunication began being used in the arts community in the second half of the 1970s, satellite technology was part of it. The virtual image of an object, the body or a landscape could be beamed instantaneously to any location on earth. This was realized during the *Satellite Project* in 1977 by Sherrie Rabinowitz and Kit Galloway, with the support of NASA, via U.S.-Canadian Hermes CTS satellite. Four dancers, two in California and two in Maryland, joined for a dance in virtual space. "We see communication and information systems as environments people live in", explains Rabinowitz. "So we look at the aesthetics of that environment, the shaping of the space." Gene Youngblood adds that Rabinowitz

> invokes architecture: information environments can be exalting and inspirational like cathedrals (computer networks) or squalid and dehumanizing like ghettos (the mass media). As buildings are said to be democratic or oppressive, so the architecture of electronic space determines possible relations among people, establishes the contours of desire [8].

I introduced the model "ISDN for art" in 1984–1985 as a system for universal telecommunication for art and Gestalt technologies for the 1990s. The following year, I elaborated on some of its aspects in the *Terminal Art* exhibition for "ars electronica" in Linz, Austria [9]. I want to emphasize at this point that ISDN supports the coexistence of the different modes of communication such as speech, text, data and still pictures on one terminal with a standard 64 kilobits per sec. But with light as the medium, with optical waveguides as conductors, with chips performing the digitizing functions at a comparable speed, this will all change in the early 1990s [10]. Certain aspects of this emerging universal art network have been evident in the work of artists all over the world since the 1970s. One example is The Living Museum, which grew out of the Canadian ANNPAC organization and had its first colloquium in the summer of 1979. Using inexpensive computer terminals and one or more time-sharing computer data services, a number

Fig. 2. Jürgen Claus, *Solar Energy Sculpture* (model), 1987. (Photo: J. Claus)

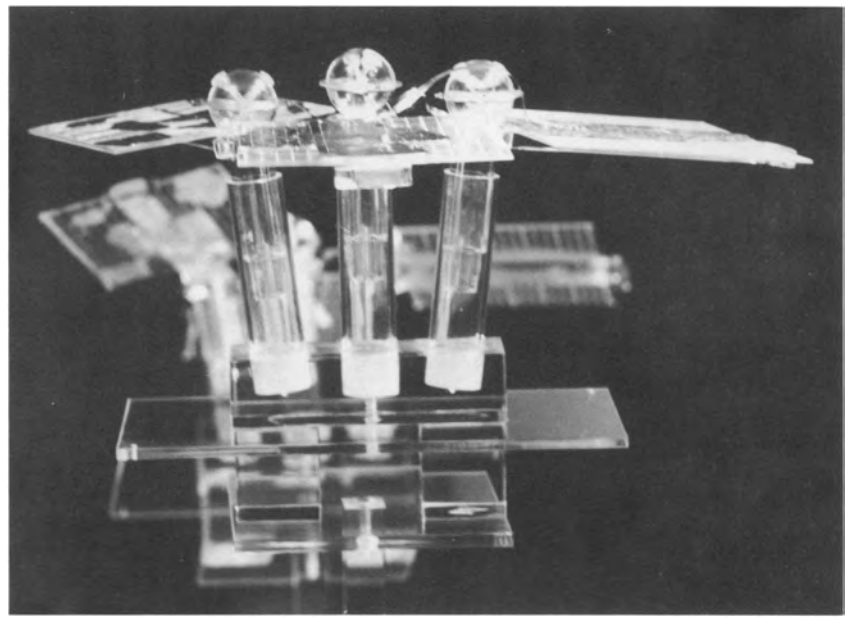

Fig. 3. Peter Vogel, *Musical-Cybernetical Environment*, Zagreb, 1977. (Photo: P. Vogel)

of artist-run organizations initiated an art-based, interactive data network [11]. Another example auguring an "ISDN for art" is the Videotex-Art-Network (V.A.N.). Headed by Manfred Eisenbeis, the group for media development/media research at the Academy of Design in Offenbach/Main has been concerned with videotex as a graphic system for some years. The V.A.N. project was the result: an international forum for the cultural and artistic utilization of the medium, facilitating the exchange of messages, images, text and notations between nations and continents via telephone [12].

The forthcoming "ISDN for art" is, on one hand, a data network, an image library, a research mailbox. On the other hand, it is a sort of echo chamber for associative thinking and creation—a fluid creativity. As Roy Ascott puts it, "Computer-mediated networks offer the possibility of a kind of planetary conviviality and creativity which no other means of communication has been able to achieve. One reason may be that networking puts you, in a sense, out of body, linking your mind into a kind of timeless sea" [13]. To summarize: It is important for the art community to develop pilot projects in the field of networking. Whether they are called Telematics, Telecommunications, The Living Museum, or "ISDN for art" is not important. What is important is that the art community itself articulates the foundations of visual image communication in the framework of information technology.

ECOTECHNOLOGY: DESIGN WITH ECOLOGY

In the 1950s, dialectic relations between technology and energy forces of the widest spaces—heaven, sea, desert —started to develop on a new level. The age of the first satellites engendered a new awareness: the need for a new expression of our appreciation of nature.

For the 1986 "ars electronica" and within the *Terminal Art* exhibition my contribution focused on the topic of "Artificial Intelligence—Fluid Thinking": manipulative intelligence confronted with fluid intelligence. My metaphor for this was four glass containers filled with water dyed different shades of blue, a symbol of the fluid. The lesson of artificial intelligence is a despairing one—the confrontation with the natural—water, sand and light. This laboratory was entitled "Stake of Artificial Intelligence", an unfinished, even chaotic map between knowing and not-knowing. "The real is not rational, it is intelligent", said Michel Serres. Five years earlier, for the first SKY ART Conference at the Massachusetts Institute of Technology I contributed some thoughts about sky and ocean. They read, "Both the inner and the outer spaces of the earth are mirrors of our contemporary experience. They release us spiritually as well as physically. The inner and outer spaces have changed our visual con-

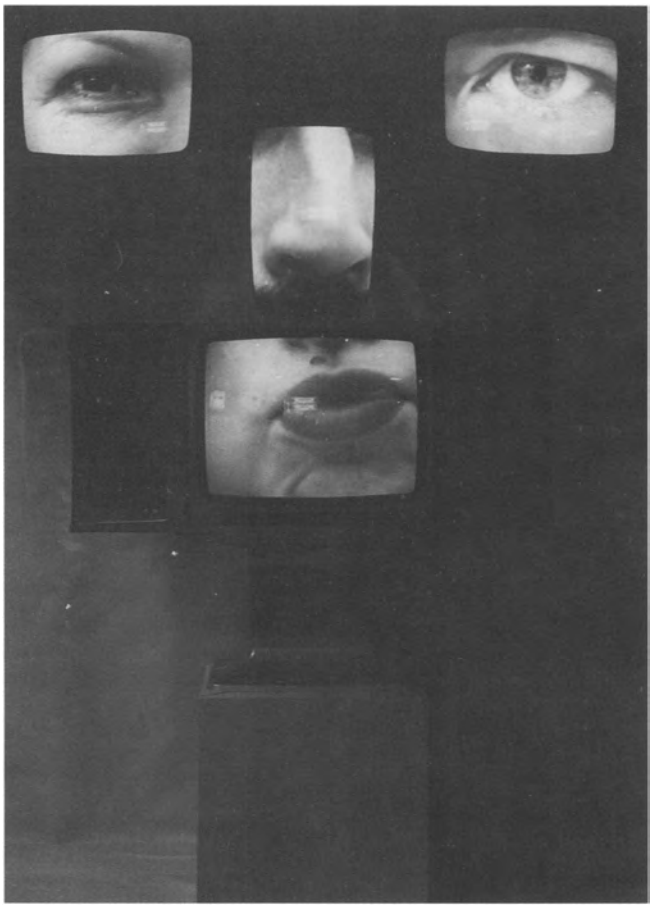

Fig. 4. Bernd Kracke, *Video Faces* (installation), 1982. (Photo: B. Kracke)

ception of this planet and the planet system as a whole" [14].

From the fourth and last SKY ART Conference in 1986 a manifesto emerged and was slow-scan-telecommunicated to artists at the University of São Paulo, Brazil. Written by sky artist Otto Piene, who inspired and shaped sky art, it reads like a manifesto for design with ecology: "Our reach into space constitutes an infinite extension of human life, imagination and creativity. The ascent into the sky is mirrored by the descent into inner space as it reflects the cosmos." And: "The artist as frontier poet with the artist's sensory instrumentarium goes into space to widen human perspective on the 'new world'—sky and space." This manifesto shows the expansion of the new vision for a new society.

The frightening consequences of high technology and the threat to our environment force me to raise the issues of ecotechnology, or design with ecology. Implicit is an intentional reference to the notion of "comprehensive design" (Buckminster Fuller), to design as "the conscious and intuitive effort to impose meaningful order" (Victor Papanek) [15]. Ecotechnology means the application of tools, materials, and technological processes in such a way as truly to harmonize them with nature: with the habitat of plant, animal and man; with the wider zones of our ecological home; indeed, with the entire globe and the cosmic space beyond. A good example of ecotechnology is photovoltaics, the use of sunlight as a source of energy. To use light as a creative medium came more naturally to earlier civilizations. But if we strip such conceptions of their mythical and religious content, we find them absolutely up-to-date. They portend the feasible, and perhaps the inevitable, solar age.

All energy events are closely related to each other because we do not have sources of energy, we have transformations of energy. In early Italian and Russian futurism, for instance, energy became the carrier in the continuum of space and time that entered pictorial art in the beginning of this century. Energy is probably the link between the spheres of natural and artistic phenomena. Heinz Mack, the former "Zero"-artist, notes, "The inner, cosmic constellation of our existence, of which the artistic existence appears to be a bright star, is at the same time an immense system of energies of inconceivable abundance. We are not lost within this cosmic supply of energies as long as our mental and spiritual energies remain active" [16].

THE EXPERT SYSTEM ARTIST: FIFTH-GENERATION COMPUTER CULTURE

In a recent paper about the interface with the machine, René Berger invited intellectuals to regain a spirit of initiative by intervening in the processes of daily decisions. "This would be the real innovation" [17]. It is in exactly this sense that I understand this last topic, and it is here that I want to define some opportunities for art and *Gestaltung* within the framework of expert systems and artificial intelligence (AI).

Basically, I am aiming at a new definition of the image that takes into consideration the rich tradition of art as well as today's complex cultural, social and art network. So far we have many experts on art, but there exist expert systems (XPS) founded on concepts of knowledge that no visual art expert can agree on. Sometimes I feel as if I am living in the legendary Jewish town of Chelm with its amiable fools. When the rabbi of Chelm visited the prison, he heard all but one of the inmates insisting on their innocence. When he returned to the village he held a council of the wise men and recommended that there be two prisons in Chelm, one for the guilty and another for the innocent. The Chelm of today's experts would also like two systems: one for the experts, and another for the expert system community.

To make our way through this jungle of definitions, let me first talk about the expert system artist. Figuratively, the system is a living, not a machine-oriented, one; the artist is an expert of sensuous perception, visual pattern creation and recognition; he gives Gestalt to the known and unknown, be it with or without electronic media, processes and results; he creates the visual, intelligible and intelligent coordinates with which we perceive *Wirklichkeit als Gestalt,* reality as Gestalt.

As opposed to the synthetic electronic image, the intelligent image created by the expert system artist promotes our perception and knowledge and articulates them. Only the genu-

ine intelligence of the artist-created image can be a product of the seen and the felt, with forms as well as colors, being objective and subjective at the same time. This intelligence is distinct from verbal, text-based knowledge. Yet if we acknowledge that this kind of knowledge includes that fundamental visual perception which the German language calls *Schauen* (the state of experience that precedes the recognition of visual pattern by 'looking at'), we must also admit that it is unlikely that we ever can store this knowledge. We can store and retrieve 'pattern', items that might be important to the data archives of art history. But that is not the point of intelligent art and the expert system artist [18].

In his contribution to the 1987 "ars electronica" symposium on the arts in the age of AI, Mihai Nadin wanted the intelligent machine to have ("contain") some sense of history and to display an awareness of it. The established AI techniques are actually, as he put it, "ill suited to handling such problems of the visual because, without exception, they are based on paradigms originating in language use and on logic along a synchronic axis. Consequently, we have to either establish new paradigms or to develop techniques which will also allow for the handling of qualitative properties of images and of dynamics (diachronic axis) implicit in an image" [19]. As an example, Nadin compared the CAD representation of a future product with the ability to identify the relevant elements of a problem (a computer graphics problem) to the designer's present task of generating solutions (which are issues of AI) using rules embodied in a program. What we call today an image machine can claim to have this kind of intelligence only if it takes into account human perception as well as the creation of Gestalt. As this is inseparably bound to more than just a machine approach, a basic notion of such an image machine must include the interaction of the human-oriented and the machine-oriented. This indeed is the new paradigm of the responsive environment where reality is not purely fabricated but where—once again according to René Berger —"the machine, the whole technology and therefore the computer join with us to elaborate a new vital environment".

As a practitioner of media and environmental art, I see this possible interaction lying within the process of creating or, more precisely, 'cutting' preselected realities (film, video, sound, dance, space) into the digital processor, or simply allowing reality to interfere with interactive technologies in real time and in real life. Yet, neither reality itself nor the tools are deemed intelligent. It is the interference of a *human creator* that establishes the image as intelligent, because it is her/his knowledge that gives rise to the never-final, ever-changing Gestalt. Yes, this is common sense! Or at least it should be.

As I have said, I am weaving through the jungle of experts, expertise, and expert systems as constrained by an image based on fifth-generation computer culture—but a sixth-generation optical neural computer is already on the way [20].

Fig. 5. Exhibition sponsored by Siemens, *Youth and Chips*, Munich, 1985. (Photo: J. Claus)

A king, old and eccentric, called the chief rabbi and told him, "Before I die I want you to teach my pet monkey how to talk. And do it within one year, or your head will be chopped off!" "But your majesty", said the rabbi, "to do this I need more than a year—I need at least ten." "I'll allow you five and not a day more", said the king. The rabbi went home, related the king's demand to the people and all asked him what he would do. "Well", said he, "in five years, many things can happen. The king could die. Or, I could die. Or—maybe I can teach that monkey how to talk." This might well be the case as we move from expert graphic systems to the far more difficult intelligent image producer.

For the 1985 Third Annual Conference on "AI for Society" organized by the SEAKE Centre at Brighton Polytechnic, Graham J. Howard presented a paper on art and design towards AI; it was concerned with the nature of image understanding, image use and the social and political implications of images. Whereas expert graphic systems only will enhance the ability of the visual expert to manipulate visual elements within a configurational and sequential format, an intelligent image producer will have to be an intelligent image consumer as well. "It would have to be capable of understanding images in order to intelligently produce images. Image understanding", continued Howard, "would involve the location of the image in the context of knowledge and belief structures; it would require the specific elaboration of its context and at least some of its potential contexts" [21].

If fifth-generation knowledge information processing systems are specifically designed to handle symbols and not just numbers, and if the actual expert systems are made the pilot projects for them, then art and design may contribute their rich heritage in visual languages. But a greater opportunity lies ahead in the development of optical neural computers, where optical elements will be arranged in the same way as neurons are arranged in the brain, either electronically or with holograms.

The 'electronic Bauhaus' will participate in developing art-and-design-specific software. As with its famous predecessor, this should happen in the context of the tradition of our social and cultural demands, the Moholy-Nagy "Parliament of social de-

sign". It reinforces my own beliefs to know that I am standing on the shoulders of many practitioners of a new vision for a new society, some of them gathered around the Bauhaus, first in its German context and later, after emigration, in its American context. History here validates the practical experiment of today.

References and Notes

1. Sibyl Moholy-Nagy, *Laszlo Moholy-Nagy: Ein Totalexperiment* (Mainz, Berlin: Florian Kupferberg, 1972) p. 41. First published as *Moholy-Nagy. Experiment in Totality* (Cambridge, MA: MIT Press, 1969).

2. Moholy-Nagy [1] p. 13.

3. Jürgen Claus, "Gestalt-Technologie. Die Expansion der Medienkunst in den achtziger Jahren", *Kunst und Technologie* (Bonn: BMFT, 1984) pp. 9–13. English version: "Expansion of media art", in *ars electronica* (Linz: 1984) pp. 177–179. Gestalt technology has been incorrectly translated here as design technology. In a broader context, the idea of organic forms was especially well suited to Gestalt psychology, "whose cardinal precept was that perception of the whole preceded apprehension of the parts" (Phillip C. Ritterbush, *The Art of Organic Forms* [Washington, DC: Smithsonian, 1968] p. 87).

4. "McLuhan and Harley W. Parker note in their extremely interesting 'Beyond the Vanishing Point' (1968) that 'Seurat, by divisionism, anticipates quadricolor reproduction and color TV', but this echoes Moholy's perception that 'Seurat, for example, with his pointillist art, intuitively anticipates the science of color photography'" (Richard Kostelanetz, "A Mine of Perceptions and Prophecies", in his *Moholy-Nagy* [New York: Praeger, 1970] p. 214).

5. Laszlo Moholy-Nagy, *Vision in Motion* (Chicago: Theobald, 1947) pp. 13–16.

6. Moholy-Nagy [5].

7. Stan VanDerBeek, in *Science & Technology in the Arts*, Stewart Kranz, ed. (New York: Van Nostrand Reinhold, 1974) p. 240.

8. Gene Youngblood, "Virtual Space. The electronic environments of mobile image", in *Computer Culture* (Linz: 1986) pp. 351–352.

9. Jürgen Claus, *ChippppKunst* (Berlin: Ullstein Materialien, 1985) p. 123, and "The electronic screen", in *ars electronica* (Linz: 1986) pp. 353–370.

10. An optical waveguide can have a transmission capacity of about 100 times that of a copper line. Compared with the 64 kilobits per sec. one would need 144 megabits per sec. to transmit moving color pictures. 64 kilobits per sec. = 65,536-bit storage capacity. It is built with 150,000 elements on a silicium crystal of 25 mm^2 chip space. Kilobits are a measure of how many electric pulses (bits) a computer 'reads'. One kilobit is 1,024 pulses. It would take about one kilobit to put this definition into the computer. One megabit is a million bits.

11. "The Living Museum", in *Spaces by artists*, Tanya Rosenberg, ed. (Toronto: ANNPAC, 1979) pp. 107–154.

12. *Programm Mosaik. Handbuch für die Gestaltung von Bildschirmtext*, Manfred Eisenbeis, ed. (Nuremberg: Verlag Müller, 1985); and Manfred Eisenbeis, "Videotex Art Network", in *ars electronica* (Linz: 1986) pp. 354–356.

13. Roy Ascott, "Art and Telematics", in *Art-Telecommunication*, Heidi Grundmann, ed. (Vienna, Vancouver: 1984) pp. 29–30.

14. "SKY ART Conference '81", M.I.T., Cambridge, MA, 1981, p. 50.

15. Victor Papanek, *Design for the Real World* (London: Thames and Hudson, 1984) p. 4.

16. Heinz Mack, "Kunst als Ausdruck von Energie" (Art as an expression of energy), a talk with the author in *kunstreport* (Berlin: 1, 1981) p. 11.

17. René Berger, "Changements technologiques et nouvelle dimension esthétique: l'interface avec la machine", working paper for the international seminar and workshop "Visual Arts and the New Media", Offenbach/Main, 1987.

18. Jürgen Claus, *Das Elektronische Bauhaus. Gestaltung mit Umwelt* (Zurich, Osnabrück: Edition Interfrom, 1987).

19. Mihai Nadin, "Image Machine and Artificial Intelligence", working paper for "ars electronica", 1987.

20. The first public conference about neural computers was held in San Diego, 21–24 June 1987. I want to quote here from "Optical Neural Computers" by Yaser S. Abu-Mostafa and Demetri Psaltis, both members of the faculty at Caltech, Pasadena, Calif. "Is there another technology from which computers could be built that does not suffer from this limitation in data communication? The operation of the eye's lens suggests one. The lens takes light from each of millions of points in the entrance pupil of the lens and redistributes it to millions of sensors in the retina. It is in this sense that the lens can be thought of as a highly capable interconnection device: light from every point in the image focused in the retina. Moreover, multiple beams of light can pass though lenses or prisms and still remain separate. Indeed, two beams of light, unlike a pair of current-carrying wires, can cross without affecting each other. It is the ability to establish an extensive communication network among processing elements that primarily distinguishes optical technology from semiconductor technology in its application to computation" (*Scientific American*, March 1987, pp. 66–73).

21. Graham J. Howard, "Art and Design: AI and its consequences", in *AI for Society*, K.S. Gill, ed. (Chichester: John Wiley & Sons, 1986) pp. 125–139.