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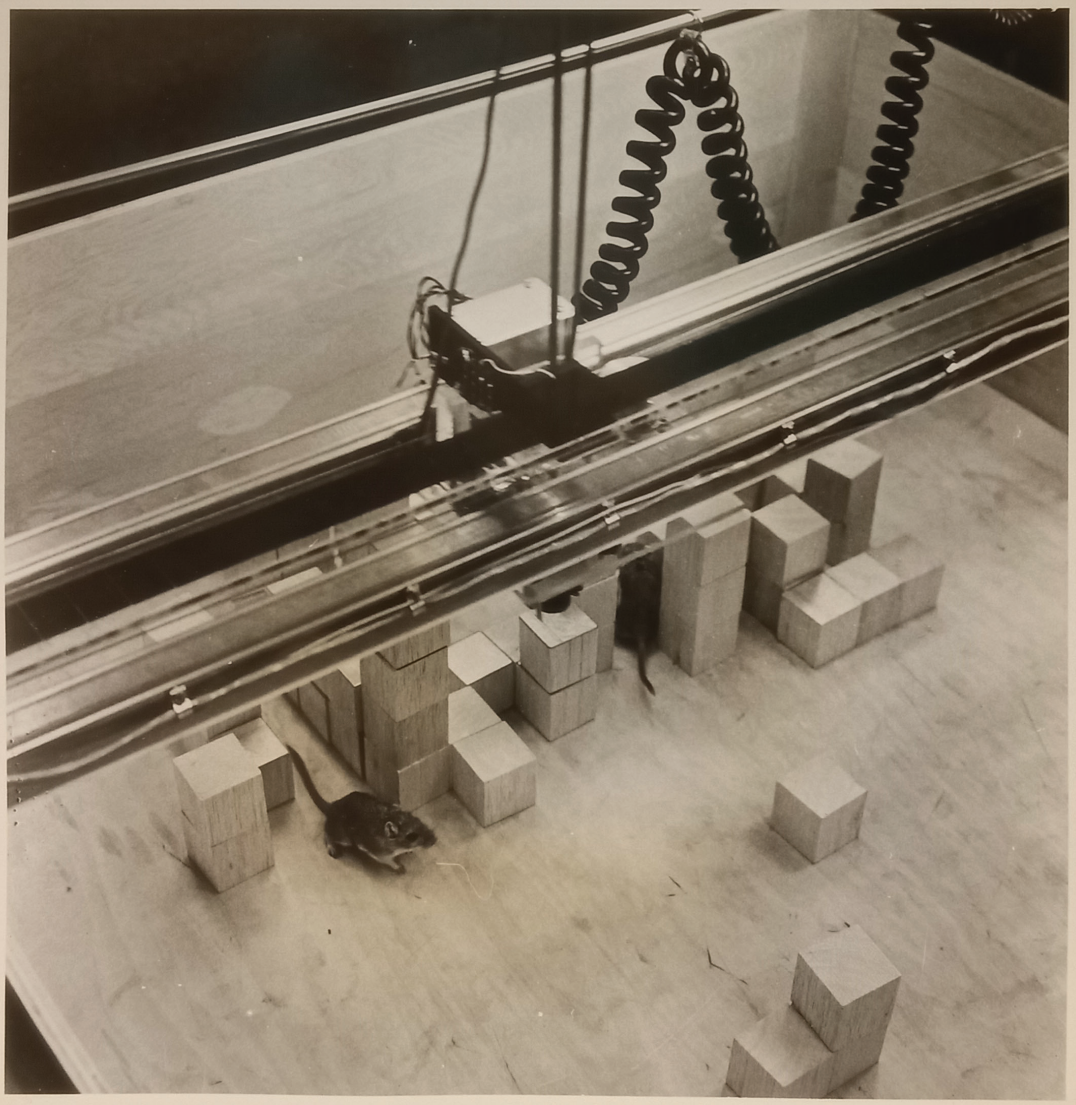

"SOFTWARE" "SEEK" By Nicholas Negroponte
and The Architecture Machine Group, M.I.T.

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	Avalanche	II.681

"SOFTWARE" Left: Paul Conly, Right: Allen Razdow with the TONUS ARP SYNTHESIZER

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	Avalanche	II.681

1) ASSUMERE VOLONTARIAMENTE UN QUADRO MENTALE. 2) SPOSTARSI VOLONTARIAMENTE DA UN ASPETTO DELLA SITUAZIONE ALL'ALTRO. 3) TENERE A MENTE SIMULTANEAMENTE VARI ASPETTI. 4) CAPIRE L'ESSENZIALE DI UN DATO COMPLETO NELLE SUE PARTI E ISOLARLE VOLONTARIAMENTE. 5) GENERALIZZARE; ASTRARRE PROPRIETA' COMUNI; PROGRAMMARE IN MODO IDEATIVO; ASSUMERE UN' ATTITUDINE NEI RIGUARDI DEL 'MERO POSSIBILE'. E PENSARE O AGIRE SIMBOLICAMENTE. 6) DISTACCARE LA PROPRIA IDENTITA' DAL MONDO ESTERNO.

Joseph Kosuth - Software exhibition
"The 7th Investigation"
Banner in Turin, Italy to be duplicated in Chinese
for billboard on The Bowery, New York

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	Avalanche	II.681

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	Avalanche	II.681

"SOFTWARE"

Wiretap

Les Levine

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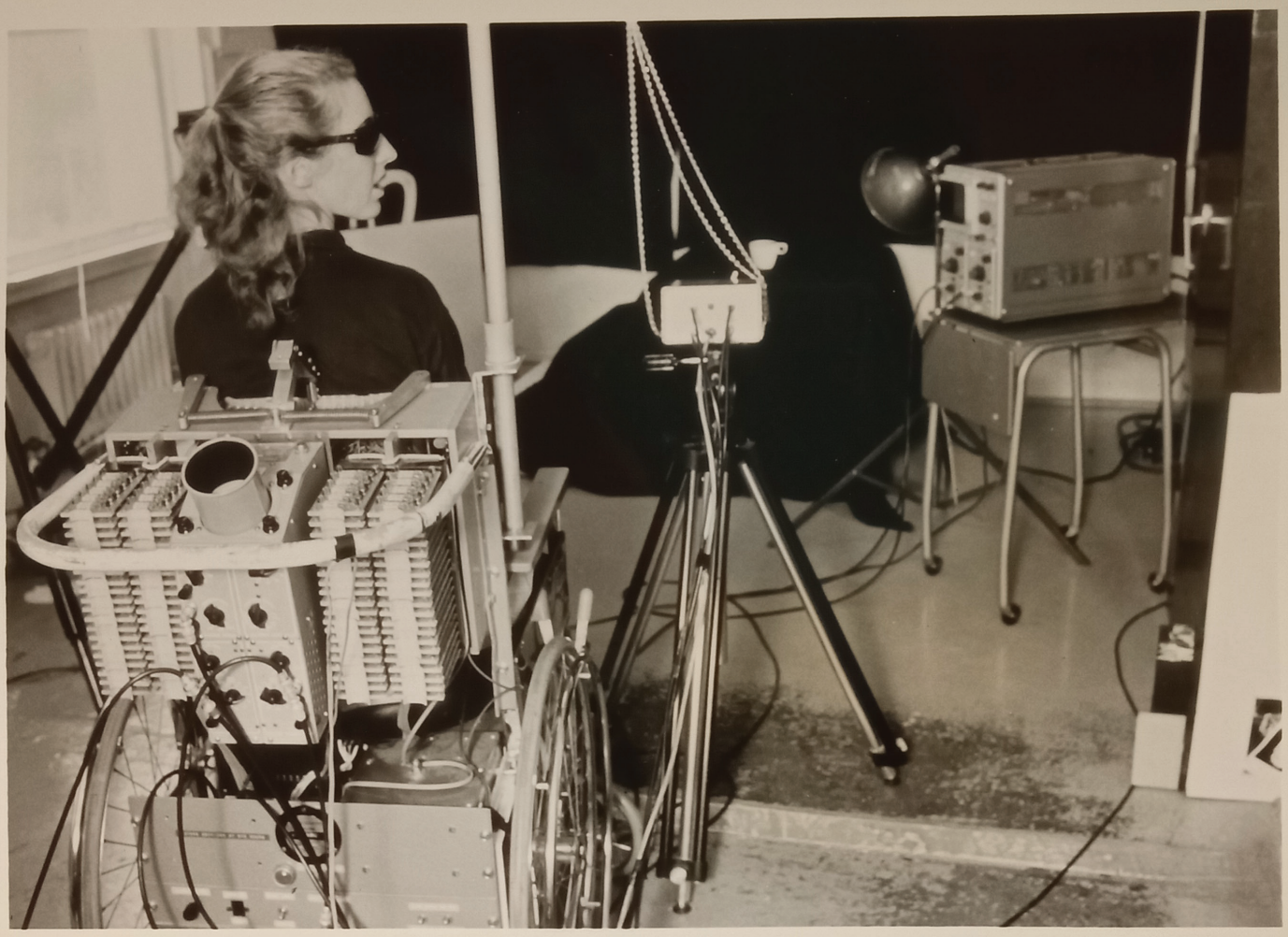
	Avalanche	II.681



The Vision Substitution System, developed by The Smith-Kettlewell Institute of Visual Sciences in the "Software" exhibition.

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	Avalanche	II.681

"Software"

SOLAR AUDIO WINDOW TRANSMISSION

Theodosius Victoria

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	Avalanche	II.681

SOME HIGHLIGHTS OF "SOFTWARE"
AN EXHIBITION SPONSORED BY AMERICAN MOTORS
AT THE JEWISH MUSEUM AND THE SMITHSONIAN INSTITUTION

1. The Catalogue
Written and edited by Judith Burnham
Designed by Robert Jakob

The catalogue has been designed as a self-organizing experience to work in conjunction with the computer description of the exhibition. It is a loose-leaf binder with a vinyl cover and will contain the basic descriptive material on the show. As a visitor walks through the exhibition and picks up his personalized computer print-outs on the various pieces, he can clip them into his catalogue. Thus everyone will have a different and tailor-made catalogue for the exhibition.

2. Title: Labyrinth
Artist: Art & Technology, Inc. of Boston

A visitor to "Software" will have the opportunity to interact, on a variety of levels, with a time-sharing computer system. The hardware consists of a DEC PDP-8 computer, nine terminals and other items such as teletype units, scopes, line printers and display screens.

Five different interactive programs will utilize the same time-sharing system, one by Hans Haacke (#3) and four by ATI, which follow:

a. HYPERTEXT CATALOGUE OF THE EXHIBITION
A revolutionary new computer editing system has been adapted for use in "Software" so that any visitor will be able to obtain a personalized catalogue of the exhibition.

A continuous explanation of the exhibition, much like a catalogue, will appear, paragraph by paragraph on a display screen. (As there are 9 display screens, 9 people can use this in different areas of the museum at any one time). A participant can read the explanation, and if it is sufficient, can press a button to receive a computer print-out of what he has read. If he wants further elaboration or explanation, he can stop the copy, type in a request for further details, and receive it in a print-out. If he is still curious, he can ask for an even more detailed statement.

For example, the explanation might start: "The exhibition you are attending is called "Software".[1] It was organized by Jack Burnham,[2] and made possible by a grant from American Motors."[3] At this point, the scientific visitor might want a further description of the word "software", the artistic type might want to know more about Jack Burnham, and the businessman might want to know why American Motors sponsored an art exhibition.

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	Avalanche	II.681

By typing in the number next to the term requiring further definition the visitor receives a more detailed explanation, which again contains footnotes. At any point one can elect to receive further information, or go back to the general introductory text. The result of all the information will appear as a computer print-out which the visitor can take home with him. As each person will undoubtedly ask for elucidation in different areas, each person's catalogue will be his individually and personally.

b. DIRECTLY INTERACTIVE CONVERSATIONAL PROGRAM

Oliver Selfridge, an expert in linguistic analysis, is working on a conversational program which will allow the visitor to interact directly with the computer. Information received from one visitor will be stored and used for the next visitor. For example, the sentence; "What do you think of the piece with the gerbils in it?", might appear on the display screen. The visitor might type in: "I don't see what it has to do with city planning as it says it does." The next person in line will then get the question: "In regard to the piece with the gerbils in it -- do you see what it has to do with city planning as it says it does?"

The computer will be programmed to differentiate, on a rather unsophisticated level, between questions, answers, ejaculations, adjective, noun and verb phrases. These will be rearranged in such a way as to allow visitors to give and receive information.

c. SPACE-LIGHT INTERACTION PIECE

A variation on the "space war" computer game can be played by four people at a time. Four lights, emanating from the ceiling, will be controlled by four levers on the floor. By manipulating the lever the player will be able to change the direction of this light, and by pushing a button will be able to send off little sparks of light from his main light source. If one of these "sparks" hits another player's light, it will go out. The player left with a light at the end of the game is the winner.

d. ARP-COMPUTER PIECE

Allen Razdow and Paul Conly of ATI have developed an electronic music synthesizer piece which is played by the computer and directed by four participants. Participants and audience are seated, each participant having a "sensor-box" on his chair. As the music plays the participants will be able to discover correspondence between the motion of their hands in the sensor boxes, and the melodic motion of one of the four synthesized voices.

3. Title: Visitor's Profile
Artist: Hans Haacke

Hans Haacke has developed a series of factual and controversial questions, the visitors' answers to which will be stored in the Labyrinth computer system. When the visitor approaches a teletype unit a question flashes on a visual display screen and he types the answer on the keyboard. All results will be correlated and registered immediately on a large display screen. Thus can be seen at any time a profile of "Software" visitor types. Correlations might be: of 12,000 visitors to "Software", there have been 6,000 Jews who smoke pot, or 7,000 college educated women against the war in Vietnam.

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	Avalanche	II.681

4. Title: Movie
Artist: Van Schley

While information on each visitor is being obtained for the computer system the visitor will be able to see three four minute color and sound films on the artists in "Software" talking about their work, and what "Software" means to them. The films will run on a continuous loop.

5. Title: Visual Substitution System
Artist: Smith-Kettlewell Institute of Visual Sciences

In this piece, the spectator will sit blindfolded in a specially contructed chair and "see" through the skin on his back. The system consists of a small television camera which transmits images to an electronic "commutator" which changes them into electrical impulses. These, in turn, go to a set of 400 plastic-tipped vibrators mounted in a 10 by 10 inch metal square on the back of a chair. The participant presses his back against the square of vibrators and receives a buzzing sensation at various points, corresponding to the configuration of the images transmitted by the camera.

In effect, the camera is a substitute for the lens of a blind person's eye and the skin of the back replaces the retina. Images, however, are not sent via the optic nerve to the brain's visual conters, but reach the brain through the sensory nerves of the skin. Even so, after about ten hours of practice, a blind subject forgets that images are being spelled out on his back and actually thinks of objects as being before him, as a normal-sighted person would. In other words, his brain learns to accept skin sensation as if it were visual information.

So far, the San Francisco investigators have trained several hundred subjects, most of whom are college students and have been blind since birth. By moving the cameras and changing the focus, a blind trainee can not only discern shapes but see them in perspective. He can tell when shapes are moving toward him or away from him by noting apparent changes in size. With enough practice, he can discriminate between shades of hair color, and using a zoom lens, read type.

6. Title: "Seek"
Artist: Nicholas Negroponte and the Architecture Machine Group

One concept which has intrigued the Architecture Machine Group is how a machine can solicit information from the real world on its own. This implies two more questions: "How can a machine interact with this world?" and "How can it learn (through playing) about this environment?" Since the present level of artificial intelligence is low and the present hardware is crude, they are dealing with models

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	Avalanche	II.681

of the real world rather than with the real world itself - all of which is transparent to SEEK.

What a spectator will see is a 7' x 5' free standing box containing gerbils (tiny animals) and 2,000 plastic cubes. A mechanical grappler zips around on sliding tracks above the gerbils, picks up blocks, and rearranges them, trying to wall the gerbils in. The grappler has its own little searchlight, pointing down. The grappler is controlled by a concealed Interdata mod 3 computer and teletype unit (for maintaining the system). The device has an emergency cut-off switch that turns off if it hits something furry, so there is no danger of harm to the animals.

Unbeknownst to SEEK, the little animals are bumping into blocks, disrupting constructions, and toppling towers. The result is a substantial mismatch between the three dimensional reality and the computed remembrances which reside in the memory of SEEK's computer. SEEK's role is to deal with these inconsistencies. In the process, SEEK exhibits inklings of a responsive behavior inasmuch as the actions of the gerbils are not predictable and the reactions of SEEK purposefully correct or amplify gerbil-provoked dislocations.

6. Title: The Conversationalist
Artist: David Antin

In his linguistics work with the Visual Arts Department of the University of California, David Antin became interested in experimenting as to how an arbitrary word can affect a conversation. A superficial example of this would be, if someone were to ask you a question about the weather, your reply would most probably contain the word "weather" in it.

In the exhibition a visitor will enter a room and see a printed invitation to sit down. When he does so, in the plexiglas, semi-soundproof booth, he activates a switch giving him full instructions for the piece. It will run something like this:

"You will hear a word or two or three words. If you would like to participate in this piece, after you have heard the word pick up the microphone and tell a story, preferably a true story using the word or words you have heard. If you feel like doing this, there is no need to hurry. You can think as long as you like before telling your story. When you are through telling your story, put back the microphone and you will have a chance to hear the work of which you have been a part, which will conclude with your own story. After you have heard your own story, please leave through the door marked exit. Naturally, if you don't want to play, you can leave by way of the exit without telling a story."

This spiel is being tested in practice and will be refined as necessary to correct ambiguities and avoid irritating the participants. The

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	Avalanche	II.681

precise tone of the invitation is crucial because it must set before the participant the feeling of being invited and avoid all the inherent fear of being deceived or coerced.

7. Title: Radio Free Poetry
Artist: Giorno Poetry Systems

For a $2 deposit visitors to "Software" will be able to pick up a transistor radio and hear continuous poetry being broadcast from within the museum. The programs will be 1½ hour tapes played on an automatic-reverse tape recorder. Each poet will be on for 15 minutes and there will be 6 different poets each day. The tapes will be changed daily. The poets include: Lennox Raphael, Allen Ginsberg, William Burroughs, John Sinclair, Diane Di Prima, Taylor Mead, John Giorno, Bobby Seale, Eldridge Cleaver, Frank O'Hara, Aram Saroyan, and Peter Schjeldahl. A program schedule will be given out with the transistors.

Under FCC Low Power Transmission Regulations, one may broadcast on AM radio without a license, if one transmits below 100-kw over any free space on the dial using an antenna of 12 feet.

Radio Free Poetry is part of a larger piece called GUERRILLA RADIO, in which people across the country are invited to set up their own radio stations. Through the underground newspapers, John Giorno has explained what equipment they need and how to go about it. He is trying to arrange for an exchange of tapes and information between the guerrilla stations.

8. Title: Air
Artist: Les Levine

Visitors will actually be able to see an artist at work in his own environment via 18 closed circuit television monitors. Switching mechanisms will pick up different areas of Les Levine's loft and switch close ups, medium range shots, and distance shots, from one monitor to the other.

9. Title: Solar Radios
Artist: Ted Victoria

Ten solar battery and radio units will be installed on the roof of the Jewish Museum. The units will be individually connected to the ten panes of glass (including the two doors) at the front of the museum, by means of contact sound reproducers. Each glass surface then will

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

9. Solar Radios (Continued)

give off sound with low volume information from the solar units above. The information will consist of: 1. Audio monitor on state and local police, emergency services and civil defense, 2. continuous weather bulletins for the immediate area, 3. C.B.S., N.B.C., and A.B.C. television audio, 4. international, national, and local news, 5. monitor of pilots, control towers and weather bulletins.

Participants will be expected to search out sounds along the front of the museum. The postion of the sun, along with weather conditions will determine which of the units will operate. Of course, the piece will not function at night or during inclement weather.

10. Title: Cremation Piece
Artist: John Baldessari

John Baldessari used to be a painter until recently when he stopped producing saleable objects. He is taking every painting he possesses to a crematorium in California for burning. The ashes will be deposited in a wall of the Jewish Museum, which will be covered by a plaque.

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	Avalanche	II.681

THE CRAFTING OF MEDIA

Theodor H. Nelson
May 24, 1970

The strange revolution of our information environment has only begun; yet is has begun in such an obscured and clouded form that the public sees only various meaningless disguises.

The all-purpose machine, as von Neumann called it, has been falsely promulgated to the public as the socalled computer, numerical, uncompromising, demanding and intractable. It has profited certain computer companies to make "computers" and their associated techniques incomprehensible and awesome; these same companies now seem unprepared for the widespread public revulsion to this image of the computer. It has profited computer companies to build ungainly and obscure systems for business purposes, badly related to what their business customers do; and to con the customer and his poor employees into believeing it has to be that way; this keeps the hapless customer on the hook indefinitely. These same companies now seem unprepared to have their all-wisdom questioned.

I would like to employ the word cybercrud to mean, in general, putting things over on people using computers.

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	Avalanche	II.681

Cybercrud is one of the most important specialties, if not the economic backbone, of the computer field. The promotion of false or clumsy approaches to a problem as "scientific," the frequent claim that "the computer has to have it that way" -- when a certain thing could be programmed very differently -- are cybercrud.

But the computer is an all-purpose machine, and the computer display -- a screen programmed to present text and pictures somehow stored in the computer -- is a universal miraculous communication tool, as Ivan Sutherland showed in the early sixties with his sketchpad system. And computer prices, unlike other prices, go down relentlessly. Expensive as these devices may be today, within the decade small good ones will cost a few hundred, at most a few thousand dollars. As we learn to free ourselves from cybercrud, the question becomes not, "how do I relate to this sinister, demanding artifact?" but "what is the grooviest way to use this thing?" The human environment can now be wholly, wonderfully redesigned. What do we want? What do we want?? What do we want???

Until now, our media -- letters, books, television -- have been based on specific inventions and technical connec-

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	Avalanche	II.681

tions. But no longer are specific inventions of special importance: information may be commuted to any form, functioning networks may be built connecting any device to any other device; total trans-pluggability has come. (Imagine if you will a device with a red oval 2-inch TV screen, a set of chimes in the natural key of C, a smell generator capable of giving off most smells, and a foghorn. Should the F.C.C. authorize this combination as a broadcast medium?)

The design of media is thus in a sense a new art; before, we could tinker little with the package. I suggest the term "fantics" for the art and technology (in that order) of showing things; the crafting of media for human communication purposes is therefore its most important franchise, something like "city planning" in generality. Making things look good, feel right, and come across clearly should be a general objective.

We should distinguish between media and facilities. A facility is an available activity, or function, like a movie splicer or desk calculator. A medium is a set of presentation elements, and relations among them, that may be used by a person to create an object, environment or experience for someone else.

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Creating media that are organized, then, clear and easily related to the human mind, is our task. Creating media that are focussed, or gently converging, is the delicate part. Rather than present a user with ideas and activities stretching limitlessly in all directions, a presentational system should help organize his work and attention.

This is the age of option. For instance, we may have anything we want on display screens -- text or diagrams or both, moving or flickering or interacting or whatever. What do we want?

This is also the age of crunch. Ecstatic possibilities must survive various forbidding or shaping factors that might cut them down. In the design of media these include not merely economics and technicalities (such as transmission rates on phone lines), but social structure and motivation (what will the teacher put up with in the classroom? why don't students use the language laboratory?)

Hypertexts and hypergrams, then, are two new species of media for the computer age: personal, dynamic, and contradictory of the heavy-handed and stupid "computer" in the general stereotype. Hypertext, or writing that can branch or

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perform, is seen in the Software show's "Labyrinth" piece, wherein the visitor may browse through a maze of writings on the screen. "Hypergrams," branching or performing pictures, will be the pictorial equivalent. Designing the detailed activities of the presenting systems is an important task, demanding technical knowledge, love and appreciation for words and pictures, and a sense of alternatives and inspiration.

The new age will not be "scientific". The word "scientific" is obsolete,* like the adjectives "modern" and "streamlined." The technological imperative is a fake, computerization can take whatever form we wish it to; therefore we must learn about computers in order to wish better. As Burnham says at the end: "...Software makes none of the usual qualitative distinctions between the artistic and technical subcultures. At a time when esthetic insight must become a part of technological decision-making, would such divisions make sense?"

*Except where qualifying the activities and problems of scientists.

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

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	Avalanche	II.681

NOTES ON ART AND INFORMATION PROCESSING

It should be made clear that the Software exhibition does not represent a synthesis of art and advanced information processing technology. Rather in a limited sense it demonstrates the effects of contemporary control and communication techniques in the hands of artists. And more importantly it provides a number of possibilities for relating information technologies to personal experience. Software makes no distinctions between art and non-art; the need to make such decisions is left to each visitor. Hence the point of Software is to focus sensibilities on the fastest growing area in our culture: information processing systems and their devices.

In just the past few years, the movement away from art objects has been precipitated by concerns with natural and man-made systems, processes, ecological relationships, and the philosophical-linguistic involvement of Conceptual Art. All of these interests deal with art which is transactional; they are concerned with the underlying structures of communication instead of with abstract appearances. For this reason most of Software is aniconic; its images are usually secondary or instructional while its information often takes the form of printed materials. Also it is beginning to be apparent that information processing technology influences our notions about creativity, perception, and the limits of art. Thus it may not be, and probably is not, the province of computers and other telecommunication devices to produce art as we know it; but they will, in fact, be instrumental in redefining the entire area of esthetic

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	Avalanche	II.681

awareness.

Planning for the Software exhibition began early in 1969 when Karl Karz assembled a group of interested people, in art and the computer field, to review the feasibility of such an undertaking. The theme at that time was vaguely "cybernetic" or a sequal to the Museum of Modern Art's "The Machine as Seen at the End of the Mechanical Age" (1968). More than anything else, those early discussions were memorable for the communication obstacles between laymen and experts in their respective fields. As for the term cybernetic, somehow it meant little or nothing to the art representatives present -- except that it epitomized a very complicated and important field -- while it represented something already a little too general and passé for the computer specialists.

A touchstone which we all shared in those first months was Cybernetic Serendipity: The Computer and the Arts, a book-catalogue compiled and edited by Jasia Reichardt for her exhibition at the London Institute of Contemporary Art in 1968. In a most complete way, her exhibition attempted to document how computer and various cybernetic devices have been used creatively, both within and beyond the arts. Cybernetic Serendipity contained much basic information on the historical development of digital computers. It included scientific experiments and works by artists which utilized the principle of feedback in machines designed to respond to external and/or internal stimuli. Other exhibits featured printouts (visual diagrams) from computers as used in music analysis and music synthesis, computer graphics and movies, computer-designed choreography, and computer poems and text analyses. Since Cybernetic Serendipity was inmany ways a very comprehensive exhibition in the

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	Avalanche	II.681

form of a historical resumé, we felt that Software should not cover the same ground. Moreover, we wanted to use computers in a museum environment, a sizable technical feat which the earlier exhibition did not attempt.

In the spring of last year we set about redefining the scope of the present exhibition as "The Second Age of Machines". One of the landmarks in the history of science occurred in 1947 when the M.I.T. mathematician Norbert Weiner along with his colleague Arture Rosenblueth of Harvard, coined the word Cybernetics. At a basic level, Cybernetics refers to "the set of problems centered about communication, control, and statistical mechanics, whether in the machine or in living tissue."[1] Weiner's subsequent research, along with that of many other scientists, led to a working concept that the behavior of all organisms, machines, and other physical systems is controlled by their communication structures both within themselves and with their environments. Research and development in the last twenty years has led to so many new ideas that the concept of cybernetics now represents a kind of historical snapshot, the germ of an insight expanded and modified far beyond its origins. In a sense, the original purpose of Cybernetics was to produce a unified theory of the control levels and types of messages used by men and machines in normal operation. Thus the history of computer technology may be interpreted as progress in making communication between men and machines more natural and complete. This remains a neutral or ideal definition however, because quite often in industry human beings have been adapted to inhuman machine schedules, rather than the other way around. What is less realized is that most businesses of any size have had to adapt themselves,

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	Avalanche	II.681

more or less traumatically, to radically different patterns of administration and organization as the result of information structures made possible by computer systems. So in part Software addresses itself to the personal and social sensibilities altered by this revolution. By and large these alterations have been internal, in the form of new procedures and ways of dealing with physical reality, rather than purely visual responses. With this in mind, over a year ago Les Levine suggested the name for the present exhibition.

Throughout the history of computer technology "software" has always meant changeable programs and procedures. Its genesis could be related to an idea held by the mathematician and computer scientist Marvin Minsky. He compares our intellectual conception of machines to the duality of the mind-body question which philosophers have pondered and debated for hundreds of years. All either idealistic or materialistic solutions to the problem contradict evidence which the body presents of its own functioning. But for practical purposes we have contented ourselves with the dualism that the body functions as one form of activity and the mind as another. Minsky states that "One area concerns mechanical, geometrical, and physical matters; the other deals with things like goals, meanings, and social interactions. When we see an object we account for its mechanical support in the first domain -- we ask who put it there and why in the second."[2]

Minsky concludes that we build machines in our own self-image -- although such a separation between body and mind may be no more than an illusion fostered by our lack of scientific knowledge about human biology and communication systems in general. While the integrationis

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

tendencies of systems design tend to play down such differences, in a very real way the division between software and hardware is one that tangibly relates to our own anthropomorphism. So in a sense this exhibition represents 'the state of art' as it is presently conceived. Yet it must be remembered that software originally referred to those aspects of a computer system most easily changed. This is no longer true since hardware can sometimes be replaced more quickly and cheaply than software. Here again distinctions begin to blur.

For computers, hardware components include processors, memories, display devices, communication equipment and other tangible computer subsystems. Software, or stored programs, has equal value, and perhaps with future refinement of computer systems it will be considered more important than hardware. The concept of software includes general and special purpose computer languages, programs such as instructional procedures, dictionaries, and so forth. In addition to stored information, software has come to mean for some engineers the process of systems-design itself; thus systems procedures, from flow diagramming to putting computer systems in working order, all fall under the heading of software. Thinking in systems terms, hardware and software interact, determining each other's structure for a given problem. Consequently the tendency is to think of both in unified terms.

Supplementing the above discription, Theodor H. Nelson, technical advisor for Software, provides these examples of software:

> Plans and procedures for action, as distinct from the equipment that carries the action out. Thus in a transportation system the hardware consists of cars, highways, traffic lights and policemen, while the software consists of rules, such as

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

drive on the right, stop on a red light, etc. Another example: subway cars and tracks are hardware, routes A, E. and BB are software. Finally: our bodies are hardware, our behavior software.

Software is the part of a system which is more easily changeable. In computer design we recognize no absolute distinction between machines and programs; often we have a choice of wiring a certain mode of behavior into equipment, which is faster but more expensive, or leaving the behavior to be done by a program, which is more flexible and cheaper. This choice, a matter of economics and engineering preference, is called the "hardware-software tradeoff", a renowned problem. The situation is now made more complicated by introduction of the term firmware, additional changeable programs which effectively rewire the hardware.

Software has a third meaning of sorts. In publishing, the terms "hardware" and "software" have for some reason been adopted as meaning objects (such as physical books) and content (what's printed in them). This is unfortunate, since in computer-based text systems we must distinguish between the hardware (computer and reading screen), software (computer and display program) and content (what is read).

The term software has also been expropriated as a fad by the commercial and advertising worlds to mean any kind of stimulus or environmental conditioning, possibly including the shaping of public opinion. It could be construed as information taken from the environment by a system, living or inorganic. We might even expand the notion of software to include any kind of data, but already this annihilates the traditional distinction between software (procedures) and data (information operated upon). Nevertheless, the exhibition contains all of these overtones and probably a few not mentioned.

Used in an art format, any notion of software leads one to

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The Museum of Modern Art Archives, NY	Collection: Avalanche	Series.Folder: II.681

reconsider the historical idea of art. Normally the context of art is a painting, sculpture, or perhaps a gallery environment. Contexts lend meaning to art works or art ideas: they "frame" the work, so to speak. All works of art function as signs; that is they signify in some form or other the fact that they are operative within the art context. However it is clear that the material presences of frames or even gallery spaces are no longer necessary for placing signs in an art context. For the sophisticated viewer, contexts are defined and carried over from previous art experiences. Thus many of the exhibits in Software deal with conceptual and processural relationships which on the surface seem to be totally devoid of the usual art contexts.

One of the purposes of Software is to destroy the normal perceptual experiences and habits which viewers bring to an art exhibition. In some cases this is done by deliberately separating or isolating communication structures from their usual surroundings. In daily life we receive thousands of "messages" or information, most of them unconscious, upon which we act. The same is true of behavior in an art gallery. Artists' messages are frequently ignored by a non-participant or someone without the needed training to respond to certain cues. In this sense the idea of Software detracts from the notion of art as a system of tangible aspects and predigested signs. Rather Software is about experiencing art without the mental cues of art history. Instead it is saying: "sense what happens to you when you perceive something new or interact with something or someone in a strange situation". For this reason Software regards the perceived existence of the art object as a fraction of the entire communication structure surrounding any art.

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

Introspection rather than inspection is the point of the show.

The machines in Software should not be regarded as art objects; instead they are merely transducers, that is means of relaying information which may or may not have relevance to the art context. Visitors to Software should have the opportunity to interact to varying degrees with the equipment and systems at hand. In all cases such "interaction" falls short of the level of richness found in ordinary human conversation. But another goal of Software is to make it clear that art participation is a form of intermittent dialogue. We are trying to make that sense of dialogue a conscious event.

A few years ago one of the inventors of the first conversational computer programs, Joseph Weizenbaum of M.I.T., observed that machines carry on brilliant dialogues with articulate human beings and very uninspired conversations, using the same program, with dull people. Any "art" that transpires -- if such a term is needed -- is the direct result of interaction between the computer's software and the "program" (behavioral idiosyncrasies) of a human being. In a similar sense, the printed materials which convey many of the conceptual works in the exhibition are not art in themselves; rather their concepts and processes, as perceived, are the art. Such a view of reality insists that nothing has art as an innate quality, but that the art context of an object or environment is always provisional and always open to challenge.

Such a philosophy of insubstantiality appears to be a form of scientific Neo-Platonism -- that is knowledge free of the effects of direct sensory affirmation. The objective of Software, however,

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

is to stress the fact that information is simply a measure of response between sender and receiver; the ability to change someone's mind about some things is the measure of data's worth as information. (Note: In the computer field information is a commodity, something which has monetary value for a client. In the mathematical-philosophical realm of information theory, information is seen as a process between entities, one with no objective value for anyone.) All information becomes obsolete unless it remains in a meaningful context to us. The objective of art history and most retrospective disciplines is to counteract the natural effects of time on information by turning the past into a form of information which remains relevant in the future. If this seems exaggerated, consider the fate of many objects once removed from their elevated contexts in tourist guides and art histories. History is a conservative force which preserves by providing a mythical ambiance for objects and buildings that formerly would have been discarded.

In a very real sense the structure of a computerized society comes in direct conflict with the Art Ideal. As Warren Brody and Nilo Lindgren have written, using computers in a society dominated by traditional knowledge structures is an invitation to chaos. The writers observe that information is always defined by a point of view, whether a favored theory, an avialable technology, or a social condition. But in a world rapidly being forced to separate information from habitual procedures, "It is not even possible to guage how deeply our classical concepts are rooted, until after we have adopted the evolutionary viewpoint that regards information as continuously being evolved from the unknown, metabolized into meaning, and finally reconstructed into noise....Man survives as

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

a creature who continually changes and evolves, a creature who feeds on novelty, who reorganizes himself as he reorganizes his physical world and maintains stability by this process of change."[3] It might be observed that presently in the United States a group of museums are creating the most elaborate index of known art works ever assembled -- all to be filed in computer programs for the future use of all museums and scholars. It almost seems as though we are exchanging one mythic structure for another, i.e., art history becomes a kind of comprehensive electronic memory, one given to the same modes of mythic organization that pervaded tribal life in the past.

As a popular interpreter of technology Marshall McLuhan has commented on the same evolutionary values. In The Gutenberg Galaxy McLuhan defines machines of the nineteenth century, the effects of mass-production, and the technology of the printed book as "homogeneous segmentation", or the proliferation of experience through duplication. This, according to McLuhan, is "the method of the fixed or specialist point of view that insists on repetition as the criterion of truth and practicality."[4] For example, it is safe to say that the popularity and efficacy of modern art is to a large degree the result of good, cheap color reproductions produced by the millions. The magic of personal creativity in the Machine Age was, and to some degree still is, the recreation of the individual's gesture through the anonymous, all-pervasive means of the mass media. So, increasingly the importance of the work of art is seemingly in direct proportion to the number of times it is reproduced for popular consumption. Literacy, in McLuhan's judgement, produces a closed circuit of values, one that makes

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

the distinction between art and non-art not only possible but necessary. In mythic terms, works of art are singular or unique; but paradoxically we reinforce this uniqueness through mass production of the art object's image. The non-literate tradition produced myths and tales which could be told over and over again in an infinite number of ways; with the coming of the book, their counterpart was the idea of the masterpiece. But again our concept of perpetuating important information may be changing; in McLuhan's words: "Today our science and method strive not towards a point of view but to discover how not to have a point of view, the method not of closure and perspective but of an open 'field' and the suspended judgement. Such is now the only viable method under electric conditions of simultaneous information movement and total human interdependence."[5]

Software is McLuhan's idea of the present environment which cannot be art because it is not yet behind us. For many visitors there will be no "art" in the conceptual displays, television monitors, computer-based readers, and time-sharing terminals of the exhibition -- mainly because few art authorities have ever been convinced that these could contain an art experience. These activities, however, possess the sensory consistency of the oral tradition in pre-literate society. Where modifications and differences lie is still uncertain, but McLuhan has this to say about their effect upon experienced reality: "Thus the technique of suspended judgement, the great discovery of the twentieth century in art and physics alike, is a recoil and transformation of the impersonal assembly-line of nineteenth century art and science. And to speak of the stream of consciousness as unlike the rational world is merely to insist upon visual sequence as

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

the rational norm, handing art over to the unconscious quite gratuitously. For what is meant by the irrational and the non-logical in much modern discussion is merely the rediscovery of the ordinary transactions between self and the world, or between subject and object. Such transactions had seemed to end with the effects of phonetic literacy in the Greek world."[6]

Yet the ultimate achievement of McLuhan's visions are still very distant. In many cases the information processing technologies have only aggravated the suppressed anxieties behind Machine Age politics and economics. As demonstrated in Nelson's essay on "cybercrud", we seem to be the victims of a perpetual consumer's fraud, no matter how promising the hardware and software. In terms of the humanistic orientation of the art world, no group of artists involved with computers and electronics is going to win the "good guys" award. Yet at some point an attempt has to be made to put the issues of esthetic communication into a different frame of reference. In the thinking of most computer scientists, twenty years ago computer usage belonged to a tiny, highly skilled, mathematical elite -- a pristhood; ten years later laymen who bothered to master cumbersome computer languages could use them; and today, as evidenced by this exhibition, people with no special training have access to computers. Thus in usage there has been a steady trend towards democratization.

Yet this is a peculiar age where we begin to read <u>esthetics</u> into budgets, planning procedures, and priorities -- and not so much into finished products. And most important, how do electronic information processing systems affect the psychological outlook

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

of the average human being? The possible goals and uses of super-human intelligent computer programs -- if and when they become a reality -- are still very unclear even at the highest levels. The automation or semi-automation of work tasks does not insure that they are any less boring than before; much depends upon the job and the planning that goes into them. Computer programming can be the most varied and creative activity that one can do on salary, allowing the most initiative and variety of personal means of expression. However, in some business contexts a certain kind of low-level programming (also called "coding") is employed; much worse, keypunching is certainly intolerable. Thus personal contact with such machines ranges from the most rewarding to the most boring and regimented experiences possible. On another level, computerized data files on individuals continue to be one of the most serious threats to human rights, and one against which there are few real protections. And in a survey on the effects of computer data banks by Jerry Rosenberg[7] he finds it significant that the most negative attitudes are shared by people whose work exposes them to computerized data-gathering.

As our information storage problems expand in magnitude (along with our statistics and resource management problems in ecology) we are forced to confront the computer as the only practical solution. Such contingent situations produce a very real paradox: it appears that we cannot survive without technologies potentially just as dangerous as the problems they are designed to solve. It is almost a truism that scientific technique has never been as value-free or objective in its benefits as we have been led to believe. We might ask ourselves if future generations of information systems

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

will be used with any more sensitivity than radio and television have been up to now. It seems apparent that once esthetics is removed from the tidy confines of the Art World, it becomes infused with ethical, political, and biological implications.

Needless to say, many of the finest works in the Software exhibition are in no way connected with machines. In a sense they represent the "programs" of artists who have chosen not to make paintings or sculptures, but to express an idea or art proposition. The human mind can and does become equally involved with any of these works. After experiencing examples of Conceptual Art, it becomes apparent that machines can only handle the ideas given to them by other human beings. What machines do is to telescope and edit experiences in a way that printed materials cannot.

Software is not technological art; rather it defines technology as a pervasive environment altering our consciousness vastly more than art. Since people will continue to make poems and paintings without computers, Software focuses on modes of creativity and creative assistance which are more or less unique to the electronic technologies. Remembering the Latin derivation of art, the term ars in the Middle Ages was less theoretical than scientia: it dealt with the manual skills related to a craft or technique. But present distinctions between the fine, applied, and scientific arts have grown out of all proportion to the original schism precipitated by the Industrial Revolution. Thus Software makes none of the usual qualitative distinctions between the artistic and technical subcultures. At a time when esthetic insight must become a part of technological decision-making, does such a division still make sense?

Jack Burnham

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The Museum of Modern Art Archives, NY	Collection:	Series.Folder:
	Avalanche	II.681

FOOTNOTES

1. Weiner, Norbert (1948) Cybernetics: Or Control and Communication in the Animal and the Machine (The M.I.T. Press: Cambridge, Massachusetts, 2nd edition, 1961) p. 11
2. Minsky, Marvin (April 1969) "I think, Therefore I am" in Psychology Today p. 31
3. Brody, Warren and Lindgren, Nilo (September 1967) "Human Enhancement Through Evolutionary Technology" in IEEE Spectrum p. 91
4. McLuhan, Marshall (1962) The Gutenberg Galaxy (Signet Books: New York, 1st edition, 1969) p. 327
5. Ibid.
6. McLuhan, p. 329
7. Rosenberg, Jerry M. (1969) The Death of Privacy (Random House: New York) p. 139