EXPANDED CINEMA
by Gene Youngblood

Introduction by R. Buckminster Fuller

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The question what is life, says Norman O. Brown, turns out to be the question what is sleep. We perceive that the sky exists only on earth. Evolution and human nature are mutually exclusive concepts. We're in transition from the Industrial Age to the Cybernetic Age, characterized by many as the post-Industrial Age. But I've found the term Paleocybernetic valuable as a conceptual tool with which to grasp the significance of our present environment: combining the primitive potential associated with Paleolithic and the transcendental integrities of "practical utopianism" associated with Cybernetic. So I call it the Paleocybernetic Age: an image of a hairy, buckskinned, barefooted atomic physicist with a brain full of mescaline and logarithms, working out the heuristics of computer-generated holograms or krypton laser interferometry. It's the dawn of man: for the first time in history we'll soon be free enough to discover who we are.

When we say expanded cinema we actually mean expanded consciousness. Expanded cinema does not mean computer films, video phosphors, atomic light, or spherical projections. Expanded cinema isn't a movie at all: like life it's a process of becoming, man's ongoing historical drive to manifest his consciousness outside of his mind, in front of his eyes. One no longer can specialize in a single discipline and hope truthfully to express a clear picture of its relationships in the environment. This is especially true in the case of the intermedia network of cinema and television, which now functions as nothing less than the nervous system of mankind.

At this point in the Paleocybernetic Age, the messages of society as expressed in the intermedia network have become almost totally irrelevant to the needs and actualities of the organism. The situation is equivalent to one's own nervous system transmitting erroneous information about the metabolic and homeostatic condition of one's own body. It is the primary purpose of this book to explore the new messages that exist in the cinema, and to examine some of the image-making technologies that promise to extend man's communicative capacities beyond his most extravagant visions.
We'll begin with a discussion of the individual's relationship to the contemporary cultural environment in a time of radical evolution, and the way in which an irresponsible attitude toward the intermedia network contributes to blind enculturation, confusion, and disharmony. In the section of Part One titled "Art, Entertainment, Entropy" I've applied cybernetics and communication theory to the role of commercial entertainment in our radically evolving environment. The prevailing messages of the so-called popular media have lost their relevance because a socioeconomic system that substitutes the profit motive for use value separates man from himself and art from life. When we're enslaved to any system, the creative impulse is dulled and the tendency to imitate increases. Thus arises the phenomenon of commercial entertainment distinct from art, a system of temporarily gratifying, without really fulfilling, the experiential needs of an aesthetically impoverished culture.

The mass public insists on entertainment over art in order to escape an unnatural way of life in which interior realities are not compatible with exterior realities. Freedom, says Brown, is fusion. Life becomes art when there's no difference between what we are and what we do. Art is a synergetic attempt at closing the gap between what *is* and what ought to be. Jacob Bronowski has suggested that we "ought to act in such a way that what is true can be verified to be so." This characterizes the substance of Part One, and is why I call it "The Audience and the Myth of Entertainment."

Before we can discuss that point at which the cinema requires some new technological extension we must first follow the history of conventional film language to its limits: this I have attempted to do in Part Two, "Synaesthetic Cinema: The End of Drama." The essence of this chapter is that technology is decentralizing and individualizing the communication channels of humanity; that personalized communication means the end of "official" communication structures such as the genre of drama, resulting in a new "major paradigm" of cinematic language that I call the synaesthetic mode. Following a detailed analysis of synaesthetic cinema there's a section titled "Image-Exchange and the Post-Mass-Audience Age." Here I've attempted to illuminate some of the social and psychological potentials inherent in the decentralization of global communications facilities. The conclusion is that the art and technology of expanded
cinema mean the beginning of creative living for all mankind and thus a solution to the so-called leisure problem.

In Part Three, "Toward Cosmic Consciousness," I discuss various new realities, primarily the result of scientific developments, which until recently the artist has not been able to engage in a meaningful fashion. This chapter also contains a discussion of the "new nostalgia," a post-Existential view of the human condition. Finally, I've contrasted two approaches to cinematic cosmic consciousness: Stanley Kubrick's 2001: A Space Odyssey, and the small personal films of the master, Jordan Belson.

Two of the most important technologies that will provide access to the new realities of the Paleocybernetic Age will be discussed in Part Four, "Cybernetic Cinema and Computer Films," and Part Five, "Television as a Creative Medium." I've attempted to cover these disciplines as comprehensively as possible, presenting the social, political, and psychological implications as well as their aesthetic and technical aspects. Thus the many interviews with artists and technologists are intended to counterbalance my subjective remarks and to provide a cross section of attitudes concerning the confluence of art and technology as it is today and as it will be tomorrow.

Part Six, "Intermedia," has more to do with attitude than technology. The intent here is to illuminate a universal trend toward the concept of artist as ecologist, art as environment rather than anti-environment, subsuming the eco-system of our planet itself into the art process. Finally with Part Seven, "Holographic Cinema," we arrive at the end that is also a beginning. I've tried to dispel many of the misconceptions regarding holographic movies, and to delineate some possibilities. With the perfection of holographic cinema within the next two decades, we'll arrive at that point in the evolution of intelligence when the concept of reality no longer will exist. Beyond that the cinema will be one with the life of the mind, and humanity's communications will become increasingly metaphysical.

Although I've been involved in film criticism since 1960, the major substance of this book is the result of articles published in different form in the Los Angeles Free Press from September, 1967, to December, 1969. That material was rewritten for this text, expanded
and clarified, in addition to the several hundred pages that appear here for the first time. We are transformed by time through living within it, so in a sense all of this book is "new" in my work.

My indebtedness to the thoughts of R. Buckminster Fuller, John McHale, Norbert Wiener, and Marshall McLuhan is quite clear. What is not so clear is the influence of my friends Edwin Schlossberg, Ted Zatlyn, and Jon Dieges, all of whose perceptions of humanity as a whole system are unfettered by the constraints of yesterday's consciousness. There are portions of this text in which "by Gene Youngblood" should be taken to mean "by way of Youngblood, Schlossberg, and Zatlyn." Dieges' influence was less specific, more general. Charles Brouyette contributed much to the technical aspects of the chapter on television and I owe him thanks. In ways known to each of them I am gratefully indebted to Nancy Schiro, Ronald Nameth, Gerald O'Grady, Tom Ancell, John Margolies, Lawrence Lipton, Tony Cohan, and my parents Walter and Marie Youngblood who filled my childhood with the wonder of art. Finally, I wish to express my thanks to American Airlines for their generous assistance in the preparation of this book.

GENE YOUNGBLOOD

Los Angeles
January, 1970
"The computer is the LSD of the business world. It absolutely guarantees the elimination of all the business it is now being brought to serve."

MARSHALL McLuhan
The Technosphere: Man/Machine Symbiosis

If one were to propose a Bill of Rights for the year 2000 it would defend human liberty, not civil liberty. Guaranteed rights would include health, truth, reality, sexual fulfillment, study, travel, peace, intimacy, leisure, the right to be unique. Man is not "civilized" until he is whole. He is not whole until he's assured these rights. But I would add another: the right of every man to be protected from the consequences of his own ignorance. The computer provides this protection.

The computer does not make man obsolete. It makes him failsafe. The computer does not replace man. It liberates him from specialization. The transition from a culture that considers leisure a "problem" to a culture that demands leisure as a prerequisite of civilized behavior is a metamorphosis of the first magnitude. And it has begun. The computer is the arbiter of radical evolution: it changes the meaning of life. It makes us children. We must learn how to live all over again.

"Recently, as in his natural symbiotic relations with plants and animals, man's relation to cybernetic systems has been subtly changing toward a more closely-woven interdependency resembling his other ecological ties. This trend often is depicted as 'intelligent' machines dominating man; but the possibility is more clearly that of organic partnership."

1

In laboratories all over the world, biochemists are drawing ever closer to the secrets of the genetic code. Younger readers of this book may within their lifetimes, rub shoulders with pre-programmed humans. I do not say "synthetic" or "artificial." Fuller: "We speak erroneously of 'artificial' materials, 'synthetics' and so on. The basis for this erroneous terminology is the notion that nature has certain things which we call natural, and everything else is 'manmade,' ergo artificial. But what one learns in chemistry is that nature wrote all the rules of structuring; man does not invent chemical structuring rules; he only discovers the rules. All the chemist can do is to find out what

nature permits, and any substances that are thus developed or discovered are inherently natural.\textsuperscript{2}

John McHale: "We refuse to accept the reality of potentially limitless wealth inherent in our new symbiotic relation to automated technological processes. Scientific and technical development destroys all previous intrinsic value in physical resources or properties. From this point on, broadly speaking, all materials are inter-convertible. The only unique resource-input is human knowledge—the organized information which programs machine performance. The products are non-unique and expendable, as are the machines and materials. The only part of the whole process which is non-expendable and uniquely irreplaceable is man. Those social orientations which have had great survival value in the past now endanger survival in the present and cripple our approach to the future.\textsuperscript{3}

In 1963 two Soviet scientists amplified the bio-electrical muscle currents of a human body to operate exoskeletal servomechanisms attached to the limbs.\textsuperscript{4} For the first time, organic partnership was achieved to the direct physical advantage of man. The director of cardiovascular surgery at Maimonides Hospital asserted, also in 1963: "Surgery is essentially an engineering discipline the integration of electronic circuits into the human body as functioning and permanent parts is going to become very important within the next ten years.\textsuperscript{5} Since that remark we have witnessed a steady increase in the number of cyborgs walking among us. Scientists now speak of "moral spectrums for machines" based on the extent to which the machine "...helps or hinders human beings to realize their potentialities and thus to lead satisfactory lives.\textsuperscript{6}

The computer amplifies man's intelligence in about the same ratio that the telescope extends his vision. The man/computer symbiosis

\textsuperscript{2} Fuller, \textit{Ideas and Integrities} (Englewood Cliffs, NJ.: Prentice-Hall, 1963), pp. 75, 76.
\textsuperscript{3}McHale, "People Future," \textit{Architectural Design} (February, 1967), p. 94.
\textsuperscript{4} A. E. Kobvinsky and V. S. Gurfinkel, \textit{Time} (December, 1963).
\textsuperscript{5} A. Kantrowitz, \textit{Electronic Physiologic Aids} (New York: Maimonides Hospital, 1963).
182 Expanded Cinema

is developed to the point where the machine instructs its user and indicates possibilities for closer interaction. One needn't read the manual but may consult the machine directly with the order, "I want to do something, instruct me." It is not even necessary to be in the presence of the computer to do this. One can carry out one's work thousands of miles away, linked to the computer through remote viewing and operating consoles.
tion is a circle, a set of points. And as far as I'm concerned it's a wave form just as legitimate as the sine wave. So you could run this form back into the same particular operator and tell the computer to use this form—not the sine or cosine, but this form it has just described. The same recursive form applies to the other operations. For instance, you could take projections of projections, use an object as an element to shade a surface and so on.

Stan VanDerBeek: Mosaics of the Mind

"We're just fooling around on the outer edges of our own sensibilities. The new technologies will open higher levels of psychic communication and neurological referencing."

For the last five years Stan VanDerBeek has been working simultaneously with live-action and animated films, single and multiple-projection formats, intermedia events, video experiments, and computer graphics. Clearly a Renaissance Man, VanDerBeek has been a vital force in the convergence of art and technology, displaying a visionary's insight into the cultural and psychological implications of the Paleocytbernetic Age.

VanDerBeek has produced approximately ten computer films in collaboration with Kenneth Knowlton of Bell Telephone Laboratories in New Jersey. They are descriptively titled Poem Fields, One through Eight, plus Collisdeoscope and a tenth film unfinished as of this writing. The term Poem Field indicates the visual effect of the mosaic picture system called Beflix (derived from "Bell Flicks") written by Knowlton. A high-level set of macro-instructions was first written in Fortran. The particular translation or definition of this language for each film is then determined by the subroutine system of mosaic composition called Beflix. A new set of Beflix punch cards is fed into the Fortran-primed computer (an IBM 7094 interfaced with an SC-4020 microfilm plotter) for each new movie desired.

Whereas most other digital computer films are characterized by linear trajectory figures moving dynamically in simulated three-dimensional space, the VanDerBeek-Knowlton Poem Fields are complex, syncretistic two-dimensional tapestries of geometrical configurations in mosaic patterns. "The mind is a computer," says
VanDerBeek, "not railroad tracks. Human intelligence functions on the order of a hundred-thousand decisions per second." It appears this brain capacity was a prime motive in the production of the *Poem Fields*, whose micro-patterns seem to permutate in a constant process of metamorphosis which could very likely include a hundred-thousand minuscule changes each second.

"The present state of design of graphics display systems," VanDerBeek explains, "is to integrate small points of light turned on or off at high speeds. A picture is 'resolved' from the mosaic points of light." The artist seems to feel that this process bears some physiognomic similarities to human perception. "The eye," he notes, "is a mosaic of rods and cones."
Variations of the Beflix technique of mosaic image-making, from computer films by Stan VanDerBeek and Kenneth C. Knowlton.
The early Poem Fields were investigations of calligraphic relationships between dogs and alphabetic characters integrated into fields of geometrical patterns constantly evolving into new forms. The most famous of these is Man and His World (1967), a title piece for an exhibit at Expo '67.

Variations on the mosaic field became more complex with successive experiments, until simulated three-dimensional depth was achieved in the form of infinitely-repeated modular units in perspective. It is immediately obvious that these films would be prohibitively tedious and time-consuming to do through conventional animation techniques. "Because of their high speeds of calculation and display," writes Knowlton, "the computer and automatic film recorder make feasible the production of some kinds of films that previously would have been far too expensive or difficult. In addition, the speed, ease, and economy of computer animation permit the moviemaker to take several tries at a scene—producing a whole family of film clips—from which he chooses the most appealing result, a luxury never before possible."

The more recent Beflix films have abandoned the original calligraphic patterns for highly complex Rorschach constellations of stunning beauty. They actually began with a film produced by two other scientists at Bell Telephone, B. Julesz and C. Bosche, for use in experiments with human vision and perception. This involved semirandom generation of graphic "noise," whose patterns were reflected several times to produce intricate mandala grids resembling Persian carpets and snowflake crystals.

"We're now working with variations on the Beflix system that involves secondary systems," VanDerBeek explained. "It goes through two levels: first Beflix, then computerizing and quantizing that level. It's something similar to what Ken Knowlton and Leon Harmon did with pictures-within-pictures. We're trying to do that cinematically."

The Poem Fields are filmed in black-and-white, with color added later through a special optical process that permits color gradations and increments almost as complex as the forms themselves.

film by running it through a three-gun, color film chain. The color is induced electronically through the video circuit and appears on tape. The same reproduction problem remains when a kinescope is made of this color tape, and the final color print must be augmented in optical printing. Videotronically-induced colors are desirable for their unique qualities of electron luminescence, which cannot be duplicated in chemical photography. Since synaesthetic videotapes are made with no intention of transferring them onto film, color reproduction is no problem. Tapes may be composed entirely through the film chain from looped film information, or composites of film, live action, slides, and other tapes. Color or black-and-white film stocks may be used since videotape color in a closed-circuit playback situation is always superior to the incident-reflected light of movie projection.

Videotronic Mixing, Switching, and Editing

The television switching/mixing console, described by Stan Van-DerBeek as "the world's most expensive optical bench," is an array of monitors and switching circuits by which different sources of video information are selected, mixed, and routed in various ways. Within its basic ingredient—alternating current—exists the potential for an art of image-synthesizing that could exceed the boldest dreams of the most inspired visionary. Yet, because the equipment was neither conceived nor constructed for aesthetic purposes this potential has remained tantalizingly inaccessible. Traditional use of the video system to imitate cinema is, in the words of one artist, "like hooking a horse to a rocket." Still most artists are quick to admit that even this limited potential of the television medium has not been fully explored.

Most video systems are capable of handling only three image sources at once. Although any number of sources may be available—most larger systems accommodate approximately twenty-four—the maximum capacity for viewing is any combination of any three of those sources. This is an absolutely arbitrary limitation based only on the intended commercial use of the equipment, for which three video sources are perfectly adequate. A few systems can accommodate four video sources at one time. Still fewer, called "routing switchers" or "delegation switchers," have five available
sources, each of whose five input terminals is fed by five more so that the image potential becomes any combination of any five-times-five video sources. This is a positive step in the direction of video synthesizing.

Compounding this image limitation is the cumbersome and unwieldy physical layout of the switching console itself. The primary reason is that video hardware has been design-oriented around the literary narrative mode of the cinema it imitates. It is built to accommodate a literary instructional form in which the elements are relatively simple and linear. In reality, the unique capabilities of video are perhaps even further from the narrative mode than cinema. No amount of written instruction could communicate the complexity of technical and intuitive maneuvers involved in the synaesthetic videographics we are about to discuss; and even if that were possible, no engineer could spend the time required to read and carry out those instructions: the program would never reach the air. Video hardware has been designed around a depersonalized instructional motive whereas it clearly should have been designed to accommodate personal aesthetic motives since all technology is moving inexorably in the direction of closer man/machine interaction and always has been.

The result of this traditional perversion of the medium is that any attempt at creativity becomes extremely complex and often flatly impossible. Even relatively simple effects used commonly in movies—such as dissolving from one matted title to another matted title—are not possible with normal switchers. The desired effect is a background scene over which title credits, either static or in motion, dissolve from one set of words into another set of words without changing the background. In video this requires a very elaborate device called a "double reentry switcher" with six rows of push buttons for each video source. Combinations of any of two or three-times-six buttons must be used in order to get the effect on the screen.

Assume that one wishes a video image in which colors are automatically reversed while blacks and whites remain the same; or reversing the blacks and whites while colors remain unchanged; draining a picture of all colors but one or two; enhancing only one or two colors so that they become vivid while other hues in the scene
remain stable; warbling a picture so that it looks like shimmering water; composite wipes, so that the edge of the wipe moving across the picture is not a hard edge but rather modulated by the audio or modulated by gray scales or colors; numerical camera controls that would cause one portion of a scene to grow larger or smaller according to the control setting. All of these things are possible in existing video technology, yet are not available to the artist in the form of a mixing/switching console. Moreover, they are potentially possible in a totally random and instantaneous fashion, whereas much labor and many hours are required to achieve the same effects in the cinema.

In addition, there is no reason that video switching must be push button controlled so that the operator of a common mastercontrol switcher must select combinations of approximately one hundred and twenty buttons. Effects could easily be tone or voice-actuated, or controlled by hand capacitors, photoelectric cells, or correspond-
ing pairs of voltages for transition effects. All of this could be realized in integrated circuitry, reducing the mammoth proportions of existing switchers by many times. Delegation or routing switchers could accomplish with twelve buttons what now requires more than a hundred.

The potentials of a video system are so vast that it becomes physically impossible for one person to have them accessible to him in a workable manner. This is where video-computer symbiosis becomes necessary. Virtually every possible alternative can be programmed into a computer, which then can employ them in a specific programmed order, or within random or semirandom parameters. Computer-controlled switchers can and will be designed that allow simultaneous processing of the video source by computer program, audio modulation, and manual override. In this way all desirable features of synergetic technology would be available: the randomness of a computer, which can be infinitely more "random" than any human; the video being semicontrolled by its own audio; and finally the artist manually overriding the whole system. Thus it would be possible to preset all conceivable combinations of alternatives for one video source, which could be actuated by one button or one audio tone. These capabilities not only exist within the scope of existing video technology, they are virtually inherent in the nature of the medium.

Until recently the one major advantage of cinema over video was sprocket holes and frames: that is, the ability to do stopframe animation. For many years the closest that video could come to this was the digital method of videotape editing such as the Ampex Editec system or the EECO system. These methods involved the digital timing of the videotape cue track in hours, minutes, seconds, and frames. Thus it was possible to pre-edit a videotape session by setting a dial, or to do post-editing and single-frame animation, though extremely time consuming and lacking precision. Remarks video artist Loren Sears:

One of the hardest things to do is stop the recorders and try to sync them up again. So the goal is to go from start to finish in planned lengths but still keeping the tape recorders running. So I tried doing some animation with an Editec system. You can animate by presetting anything from one to thirtysix frames,
and there's a manual override that keeps repeating the same frame as long as you hold it down. You lay down a cue track and set the machine going in an automatic mode. It has a seventeen-second cycle time in which it rolls to a stop, backs up and lays down a pulse where it's to pick up next time. It took about four hours to do twenty or thirty seconds of animation, whereas in film that's all instant with the single-frame button. This is exactly the reverse of other aspects of video versus-film, in which video is much more expedient. It's an extreme example, but it's something that film can do easily and there's no advantage of doing it in television; you waste time, and you can be more creative in film.

However, greater animation control and simplicity is now possible in video through computer-controlled color disk recording such as the Ampex HS-200 system. It provides all of the editing freedom that previously was possible only with film, plus the ability to pre-program the insertion of cuts, wipes, dissolves, and other effects exclusive to video—all instantaneously, with the push of a button. Digital identification and retrieval of any frame within four seconds allows skip-framing and stop-motion at normal, fast, and slow speeds in both forward and reverse modes. Apart from this positive note, I have stressed the limitations of the video system as an aesthetic medium because they need to be emphasized, and because the many positive aspects of videographic art will be quite clear in the pages that follow.
"The reason we're experimenting," explained Fred Barzyk, "is that a large portion of the public is really ahead of television. They can accept more images and ideas at once. They're watching underground films; they're commercial buffs who are fascinated by how many cuts there are in a Pepsi-Cola ad. These are the people who could easily be turned on to educational television if it had the proper ingredients." With young producer-directors like Barzyk taking an interest in television as an educational experience, the ingredients are certain to be there sooner or later.

It was at WGBH, for example, that the program "What's Happening Mr. Silver?" was originated. A regular experimental feature on pop culture, the program proved so successful that it was carried also by most other ETV stations except KQED in San Francisco, where it was found to be "technically innovative but slightly sick." In 1967 the program's host, David Silver, conducted his weekly show from a bed in the center of the studio floor, in which he reclined naked with an equally nude young lady.

We wanted to experiment with every possible aspect of the medium [Barzyk explained] and intimate behavior in the form of nudity became one factor. We tried to create new problems in the broadcast system so that we could break down the system as it existed. We adopted some of John Cage's theories: many times we'd have as many as thirty video sources available at once; there would be twenty people in the control room—whenever anyone got bored they'd just switch to something else without rhyme or reason.

"The Medium Is the Medium" came out of this show in one sense, because after two years of "What's Happening Mr. Silver" we had so totally bombarded the engineering staff with experimentation. We took the attitude that the engineers would have to change their normal functions. In most of the television industry a video man is a video man, an audio man is an audio man, a cameraman is a cameraman; they never step over each other's bounds. We created a situation in which each one of them was asked constantly what he could do for the station. We told them they were artists. We said each week, "We don't know what we're going to do, here's our raw material, let's see what we can do with it." So out of this the audio man had his sources running, the cameraman had his sources running, and so on.
Initially there is a great deal of resistance from the engineering staff, as might be expected when you change someone's job conditions. We deprived them of their security. I mean, you know what a "good picture" is: flesh tones, lighting, so on. But we deprived them of that. We said on our shows it doesn't really matter. One engineer turned off his machine. He didn't think it was right. A year later he came up to me with three new ideas that we might be able to use. So the pressure is reversed to bring creativity out instead of repressing it; we have the most production-oriented engineers in the whole country, I'd say. In effect we tell them the station is experimenting and we ask them not to be engineers.

It was in this environment that the experimental program "The Medium Is the Medium" took form in the winter of 1968-69. The contributions of Allan Kaprow, Nam June Paik, and Aldo Tambellini are discussed elsewhere in this chapter; Otto Piene and James Seawright were also among the six artists who participated in the project.

**Otto Piene: Electronic Light Ballet**

Otto Piene's work with luminescence, pneumatics, and lighter-than-air environments is among the most elegant examples of aesthetic applications of technology. The artist's exquisitely delicate sense of proportion and balance, as demonstrated in his *Light Planets*, for example, is always stunning to behold. His synaesthetic videotape *Electronic Light Ballet* was no exception.

Typical of Piene's austere sensibility, only two image sources were used in this piece: a grid of colored dots that melted in rainbow colors across the screen; and a videotape of Piene's *Manned Helium Sculpture*, one of a series of experiments with lift and equilibrium that the artist conducted as a Fellow at M.I.T.'s Center for Advanced Visual Studies. The helium sculpture involved 800 feet of transparent polyethylene tubing in seven loops, inflated with approximately 4,000 cubic feet of helium, attached with ropes and parachute harness to a ninety-five-pound girl for a thirty-minute ascension into the air, controlled from the ground by ropes attached to the balloons and harness.

The ascension was staged at night in the parking lot of WGBH, which was illuminated by colored floodlights. Over this slow, buoyant, ethereal, surrealistic scene Piene superimposed a geometrical grid of regularly-spaced colored dots similar in effect to the multiple-bulb brilliance of his light sculptures. In exquisite counterpoint
Nam June Paik: Cathode Karma

"Cybernetics, the art of pure relations, has its origins in karma. The Buddhists say karma is sangsara, relationship is metempsychosis. Cybernated art is important, but art for cybernated life is more important, and the latter need not be cybernated."

"My experimental television is not always interesting," admits Nam June Paik, "but not always uninteresting: like nature, which is beautiful not because it changes beautifully, but simply because it changes." Paik is the embodiment of East and West, design scientist of the electron gun, pioneer ecologist of the videosphere. He is to television what John Whitney is to the computer; he does with TV sets what David Tudor does with pianos. "Television has been attacking us all our lives," he says, "now we can attack it back."

This Korean-born genius has been attacking it back longer than anyone, and in his own inimitable fashion. The bloody head of an ox was hung over the door to his first video exhibit in Wuppertal, Germany, in 1963, as a shock device "to get the audience into a oneness of consciousness so they could perceive more"—as in Zen, the master would strike the pupil. Although he never really harmed anyone, Paik was for several years a cultural terrorist, a kind of deus ex machina of the Orient, who left in his wake a series of demolished pianos, clipped neckties, bizarre junkyard robots, and scandalized audiences from Holland to Iceland. John Cage once remarked that "Paik's work, performances, and daily doings never cease by turn to amaze, delight, shock, and sometimes terrify me."

In recent years Paik has abandoned his mixed-media environmental Happenings to concentrate exclusively on television as an aesthetic and communicative instrument. Independently, in collaboration with scientists, and in a special research and development program with the State University of New York, he has explored nearly every facet of the medium, paving the way for a new generation of video artists. His work has followed four simultaneous directions: synaesthetic videotapes; videotronic distortions of the received signal; closed-circuit teledynamic environments; and sculptural pieces, usually of a satirical nature.

There are approximately four million individual phosphor trace-points on the face of a 21-inch television screen at any given
moment. Paik’s canvas is the electromagnetic field that controls the distribution of these trace-points in horizontal and vertical polar coordinates at 525 lines per second. By interfering, warping, and otherwise controlling the cathode’s magnetic field, he controls the four million glowing traces. "It creates the possibility of electron-drawing," he says. "It's better than drawing on a CRT with a light pen because it's multicolored and provides interaction with the air program." (See color plates.)

Although he is continually developing new parameters of control and interaction with television, most of Paik's basic techniques were developed in the period 1963-64 in collaboration with Hideo Uchida, president of Uchida Radio Research Institute in Tokyo, and with Shuya Abe, an electronics engineer who, according to Paik, "knows that science is more beauty than logic." Paik has outlined three general areas of variability with these techniques. ("Indeterminism and variability are underdeveloped parameters in the optical arts," he says, "though they have been the central problem in music for the last two decades. Conversely, the parameter of sex has been underdeveloped in music as opposed to literature and the visual arts.")

The first level of variability is the live transmission of the normal broadcast program, "which is the most variable optical and semantical event of our times... the beauty of distorted Nixon is different from the beauty of distorted football hero, or not always pretty but always stupid female announcer." Paik estimates that he can create at least five hundred different variations from one normal broadcast program.

The second level of variability involves the unique characteristics of circuitry in each individual television receiver. Paik has resurrected several dozen discarded sets from junkyards and brought them back to wilder life than ever before in their previous circuits. "I am proud to say that thirteen sets suffer thirteen different varieties of distortion," Paik once announced, and then added: "1957 model RCA sets are the best." By altering the circuitry of his receivers with resistors, interceptors, oscillators, grids, etc., Paik creates "prepared televisions" that are equivalent in concept to David Tudor's prepared pianos.
The third level of variability is the manipulation of these prepared TVs with wave-form generators, amplifiers, and tape recorders to produce various random, semirandom, or completely controlled effects, examples of which are: (a) the picture is changeable in three ways using hand switches: upside-down, right-left, positive-negative; (b) the picture can become smaller or larger in vertical or horizontal dimensions separately, according to the amplitude of the tape recorder; (c) the horizontal and vertical electron-beam deflection of normal TV is changed into a spiral deflection using a yoke oscillator amplifier, causing an average rectangular picture to become fanlike; (d) the picture can be "dissipated" by a strong demagnetizer whose location and rhythm contribute variety; (e) amplitude levels from radios or tape recorders can be made to intercept a relay signal at the grid of the output tube so that the picture is visible only when the amplitude changes; (f) asymmetrical sparks flash across the screen when a relay is intercepted at the AC 110-volt input and fed by a 25-watt amplifier without rectifier; (g) a 10-megohm resistor is placed at the vertical grid of the output tube and interacts with a sine wave to modulate the picture; (h) wave forms from a tape recorder are fed to the horizontal grid of the output tube, causing the horizontal lines to be warped according to the frequency and amplitude.

Once a set has been thus prepared, the simple flick of a switch results in breathtakingly beautiful imagery, from delicate Lissajous figures to spiraling phantasmagoric designs of surreal impact and dazzling brilliance. Tubular horizontal bands of color roll languidly toward the viewer like creening waves; flaccid faces melt, twitch, and curl, ears replacing eyes; globs of iridescent colors flutter out of place. When videotape playback systems are used as image sources instead of broadcast programs, the extent of control is multiplied and the visual results are astounding.

However, technical descriptions tend to underplay the sheer intuitive genius of Paik's video art. His techniques are hardly exclusive and are far from sophisticated (engineers say he does everything he shouldn't), and his cluttered loft on New York's Canal Street is scientifically unorthodox to say the least. Yet out of this tangle of wires and boxes comes some of the most exquisite kinaesthetic imagery in all of electronic art. "My experimental color television has instructional resource value," he suggests. "Kinder
Electromagnetic distortions of the video image by Nam June Paik. "Out of this tangle of wires and boxes comes some of the most exquisite kinaesthetic imagery in all of electronic art." Photos: Peter Moore.
garten and elementary school children should be exposed to electronic situations as early as possible. My experimental TV demonstrates various basic facts of physics and electronics empirically, such as amplitude modulation, radar, scanning, cathode rays, shadow mask tubes, oscillography, the ohm principle, overtone, magnetic character, etc. And it's a very pleasant way to learn these things."

Perhaps the most spectacular of Paik's videotape compositions was made early in 1969 for the PBL show "The Medium Is the Medium" at WGBH-TV in Boston, where later he became artist in residence. Paik brought a dozen of his prepared TVs into the studio; using three color cameras he mixed these images with two nude dancers, tape delays, and positive-negative image reversals. The nude slow-motion dancers in multiple levels of delayed action suddenly burst into dazzling silver sparks against emerald gaseous clouds; rainbow-hued Lissajous figures revolved placidly over a close-up of two lovers kissing in negative colors; images of Richard Nixon and other personalities in warped perspectives alternated with equally warped hippies. All this was set against a recording of the Moonlight Sonata, interrupted periodically by a laconic Paik who yawned, announced that life was boring, and instructed the viewer to close his eyes just as some fabulous visual miracle was about to burst across the screen.

Later in 1969, Paik produced an impressive teledynamic environment called Participation TV. The first version was shown in an exhibit called "Television as a Creative Medium" at the Howard Wise Gallery in New York City; it was then modified into Participation TV No. 2 for the "Cybernetic Serendipity" exhibit in Washington, D.C. The principle of the piece involves three television cameras whose signals are displayed on one screen by the red, green, and blue cathode guns respectively; the tube shows three different images in three different colors at once. Color brightness is controlled by amplitudes from three tape recorders at reverse phase. Thus the viewer sees himself three times in three colors on the same screen, often appearing to float in air or to dissolve in shimmering water as multicolored feedback echoes shatter into infinity. This was repeated on three and four different TV sets arranged around the environment.
"Television has not yet left the breast": Nam June Paik with Charlotte Moorman in TV Bra for Living Sculpture. Howard Wise Gallery, New York, 1969. Images are modulated by musical tones played on the cello. Photo: Peter Moore.
"The real issue implied in art and technology," he has said, "is not to make another scientific toy, but how to humanize the technology and the electronic medium. I suggest Silent TV Station, which transmits only beautiful 'mood art' in the sense of mood music. What I'm aiming at with my Lissajous figures and other distortions is a television equivalent of Vivaldi, or electronic Compoz. Lumia art will then become a permanent asset in the collections of millions of people. The Silent TV Station will simply be there, not intruding on other activities, and will be looked at exactly like a landscape or a beautiful bathing nude of Renoir. Normal TV bores you and makes you nervous; this soothes you. It's like a tranquilizer. Maybe you could call it video-soma."

Paik's exquisite sense of satirical irony comes through most effectively in his video sculpture pieces. In TV Bra for Living Sculpture, Paik covered cellist Charlotte Moorman's bare breasts with two tiny three-inch TV sets whose images were modulated by the notes played on her cello. "Another attempt to humanize technology," Paik explained. For an exhibit titled "The Machine at the End of the Machine Age" at the Museum of Modern Art, Paik contributed a chair with a built-in TV set in place of the seat: one was able to sit on the program of one's choice. For an exhibit at New York's Bonino Gallery he constructed a video crucifix of glaring and ominous proportions; and in the privacy of his studio loft there sits a box containing a TV set that peeps through the vaginal opening of a photographed vulva. "Art," he says, "is all activities, desires, phenomena, that one cannot explain."

Aldo Tambellini: Black TV

"Our creative involvement with television must begin now so that the electronic energy of communication can give birth to new visions: we will face the realities which astronauts and scientists know to be part of life."

Intermedia artist and filmmaker Aldo Tambellini has worked creatively with television in many ways for several years. He has produced synaesthetic videotapes, videographic films, and closed-circuit teledynamic environments. All of his work, in whatever medium, is concerned with the theme of "black," both as idea and
One could equate it, because of its flexibility, with looking at a person sitting in a chair: he looks as he always looks except that his behavior changes your image of him. Television has this quality: it always somehow looks the same, but it's always doing something different."

Frank Gillette, Ira Schneider: *Wipe Cycle*

Unlike Levine's work, the effect of *Wipe Cycle*, by the young New York artists Frank Gillette and Ira Schneider, was to integrate the viewer and his local environment into the larger macrosystem of information transmission. *Wipe Cycle* was first exhibited at the Howard Wise Gallery in New York in 1969. It consisted of nine monitors whose displays were controlled by synchronized cycle patterns of live and delayed feedback, broadcast television, and taped programming shot by Gillette and Schneider with portable.

equipment. These were displayed through alternations of four pre programmed pulse signals every two, four, eight, and sixteen seconds. Separately, each of the cycles acted as a layer of video information, while all four levels in concert determined the overall composition of the work at any given moment.

"The most important function of *Wipe Cycle*," Schneider explained, "was to integrate the audience into the information. It was a live feedback system which enabled the viewer standing within its environment to see himself not only now in time and space, but also eight seconds ago and sixteen seconds ago. In addition he saw standard broadcast images alternating with his own delayed/live image. And also two collage-type programmed tapes, ranging from a
shot of the earth, to outer space, to cows grazing, and a 'skin flick' bathtub scene."

"It was an attempt," Gillette added, "to demonstrate that you're as much a piece of information as tomorrow morning's headlines— as a viewer you take a satellite relationship to the information. And the satellite which is you is incorporated into the thing which is being sent back to the satellite. In other words, rearranging one's experience of information reception. Thus in *Wipe Cycle* several levels of time and space were synthesized into one audiovisual experience on many simultaneous frequencies of perception. What is, what has been, and what could be, were merged into one engrossing teledynamic continuum and the process of communication was brought into focus.

Allan Kaprow: *Hello*

The elements of randomness and chance, which Allan Kaprow has explored so successfully in his Happenings and environmental events, were brought into play in a television experiment conducted by Kaprow with the unique facilities of WGBH-TV in Boston for "The Medium Is the Medium." The station has direct closed-circuit inputs from a number of locations in the Boston-Cambridge area: a line to M.I.T., another to a hospital, another to an educational videotape library, and a fourth to Boston Airport. These were interconnected with five TV cameras and twenty-seven monitors that Kaprow utilized as a sort of sociological conduit, demonstrating the possibilities of creativity in the act of videotronic communication, including obstacles to communication.

Groups of people were dispatched to the various locations with instructions as to what they would say on camera, such as "Hello, I see you," when acknowledging their own image or that of a friend. Kaprow functioned as "director" in the studio control room, ordering channels opened and closed randomly. If someone at the airport were talking to someone at M.I.T., the picture might suddenly switch and one would be talking to doctors at the hospital. Thus not only the process of communication was involved, but the elements of choice and decision-making as well. Kaprow has suggested a global form of

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8 From an interview with Frank Gillette and Ira Schneider by Jud Yalkut in "Film," *East Village Other*, August 6, 1969.
Hello, interconnecting continents, languages, and cultures in one huge sociological mix. The information transmitted in Hello, he emphasized, was not a newscast or lecture but the most important message of all: "Oneself in connection with someone else."
Technotanarchy: The Open Empire

"In another moment Alice was through the glass and had jumped lightly down into the looking-glass room. The very first thing she did was to look whether there was a fire in the fireplace, and she was quite pleased to find that there was a real one, blazing away as brightly as the one she had left behind. 'So I shall be as warm here as I was in the old room,' thought Alice, 'warmer in fact, because there'll be no one to scold me away from the fire.'"

LEWIS CARROLL

John Cage tells the story of an international conference of philosophers in Hawaii on the subject of Reality. For three days Daisetz Suzuki said nothing. Finally the chairman turned to him and asked, "Dr. Suzuki, would you say this table around which we are sitting is real?" Suzuki raised his head and said yes. The chairman asked in what sense Suzuki thought the table was real. Suzuki said, "In every sense." The wise thinker is a true realist; he might well have been talking about the future of cinema.

I've attempted to bring the past, present, and future of the movies together in one image so that a vast metamorphosis might be revealed. One can no longer speak of art without speaking of science and technology. It is no longer possible to discuss physical phenomena without also embracing metaphysical realities. The communications of humanity obviously are trending toward that future point at which virtually all information will be spontaneously available and copyable at the individual level; beyond that a vast transformation must occur. Today when one speaks of cinema one implies a metamorphosis in human perception.

This transformation is being realized on the personal level as well as on the global front of the industrial equation itself, where it can be realized only through the synergetic efforts of all men applying all

3 Cage, op. cit., p. 35.
disciplines. While personal films, videotapes, and light shows will continue to expand human communication on one level, organizations such as PULSA at Yale University, and the various national chapters of Experiments in Art and Technology (E.A.T.) are suffusing art, science, and the eco-system of earth itself at that point where all converge within the purview of modern technology.

Not only do computer, video, and laser technologies promise to transform our notion of reality on a conceptual level, they also reveal paradoxes in the physical world that transcend and remake our perception of that phenomenon as well. A glimpse of the future of expanded cinema might be found in such recent phenomena as the spherical mirror developed by the Los Angeles chapter of E.A.T. for the Pepsi-Cola Pavilion at Expo '70 in Osaka. Although it developed from the synergetic technologies of computer science and polyvinyl-chloride (PVC) plastics, it is triumphantly nontechnical as an experience. It's just a mirror—a mirror that is nearly two-thirds of a sphere made of 13,000 square feet of airinflated mirrorized mylar one-thousandth of an inch thick. It is ninety feet in diameter and fifty-five feet high, and weighs approximately 250 pounds.

There have been other mirrorized mylar (or PVC) spherical tensile structures, notably the Pageos and Echo satellites. But they weren't constructed as mirrors per se and, of course, one could not enter them. Thus once again, as in the case of City-Scape, we see that humanity's most ambitious venture into the frontiers of reality—the space program—contributes to the expansion of the world of art: both are efforts to comprehend larger spectra of experience.

Essentially a full-scale model of the pavilion mirror that later was constructed in Japan, E.A.T.'s sensuous, transcendentally surrealist mirror-womb was revealed to the world in September, 1969, in a cavernous blimp hangar in Santa Ana, California. There, sustained in 210-degrees of space and anchored by 60,000 pounds of water in two circular tubes at its base, was a gateway to an open empire of experiential design information available to the artist. An astonishing phenomenon occurs inside this boundless space that is but one of many revelations to come in the Cybernetic Age: one is able to view actual holographic images of oneself floating in threedimensional space in real time as one moves about the environment.
Because the mirror is spherical no lenses or pinhole light sources are necessary: the omni-directionally-reflecting light waves intersect at an equidistant focal point, creating real images without laser light or hardware of any kind. Interfaced with perpetual fog banks and krypton laser rainbow light showers at the World Exposition, the mirror indeed "exposed" a world of expanded cinema in its widest and most profound significance.

The accelerating transformations of radical evolution often generate illusions of impending disaster: hence the overriding sense of paranoia that seems to cloud the new consciousness as we thrust toward the future. Yet surely some revelation is at hand. In 1920 W. B. Yeats (in his poem "The Second Coming") saw that things were falling apart: "The falcon cannot hear the falconer; /... the centre
cannot hold; / Mere anarchy is loosed upon the world,... / And what rough beast, its hour come round at last / Slouches towards Bethlehem to be born?"

Yeats didn't know what was coming, and thus like all of us he feared it. But in assigning Bethlehem as its birthplace he suggested that we were to be visited by a savior, however fearsome. That savior is technanarchy and he is born out of the industry of man's ignorance, in spite of our petty copulations, in contradistinction to our minor misbehaviors. The term anarchy is defined as "a political theory... advocating a society based on voluntary cooperation and free association of individuals and groups... a utopian society having no government and made up of individuals who enjoy complete freedom." The biologist John Bleibtreu is an anarchist, then, when he speaks of “a new sustaining myth which corresponds to reality... this new mythology which is being derived from the most painstaking research into other animals, their sensations and behavior, is an attempt to reestablish our losses—to place ourselves anew within an order of things, because faith in an order is a requirement of life."[4] Yesterday, man needed officialdom in order to survive. But technology has reversed the process: survival today depends on the emergence of a natural order. Thus we see that anarchy and order are one, because history is demonstrating that officialdom is no order at all.

Technology is the only thing that keeps man human. We are free in direct relation to the effective deployment of our technology. We are slaves in direct relation to the effectiveness of our political leadership. (Herbert Read: "Effective leadership is fascism.") The world is populated by three-and-a-half-billion human slaves, forced by the masters of politics continually to prove our right to live. The old consciousness perpetuates myths in order to preserve the union; it reforms man to suit the system. The new consciousness reforms the system to suit man. Water takes the shape of its container. We have no basis for postulating a "human nature" until there's no difference between the individual and the system. We cannot ask man to respect his environment until this difference is erased. This is anarchy: seeking a natural order. It is technanarchy because it will be realized only through the instrumented and documented intellect that we call technology.

"As they are extended into mythologies, metaphysical systems allow mankind the means to abide with mystery. Without a mythology we must deny mystery, and with this denial we can live only at great cost to ourselves. It seems that we are in the process of creating a mythology out of the raw materials of science in much the same way that the Greeks and Jews created their mythologies out of the raw materials of history."

The limits of our language mean the limits of our world. A new meaning is equivalent to a new word. A new word is the beginning of a new language. A new language is the seed of a new world. We are making a new world by making new language. We make new language to express our inarticulate conscious. Our intuitions have flown beyond the limits of our language. The poet purifies the language in order to merge sense and symbol. We are a generation of poets. We've abandoned the official world for the real world. Technology has liberated us from the need of officialdom. Unlike our fathers we trust our senses as a standard for knowing how to act. There is only one real world: that of the individual. There are as many different worlds as there are men. Only through technology is the individual free enough to know himself and thus to know his own reality. The process of art is the process of learning how to think. When man is free from the needs of marginal survival, he will remember what he was thinking before he had to prove his right to live. Ramakrishna said that given a choice between going to heaven or hearing a lecture on heaven, people would choose the lecture. That is no longer true. Through the art and technology of expanded cinema we shall create heaven right here on earth.

5 Ibid., p. xi.
At the cross-over between performative arts and film, expanded cinema emerged in the mid-60s and is now considered to have influenced many aspects of contemporary media installations and performances. American artist pioneers explored its means in regards to politics and collective participation as well as radical subjective experimentation. Expanded cinema is used to describe a film, video, multi-media performance or an immersive environment that pushes the boundaries of cinema and rejects the traditional one-way relationship between the audience and the screen. The term was coined in the mid-1960s by the US filmmaker Stan Van Der Beek, when artists and filmmakers started to challenge the conventions of spectatorship, creating more participatory roles for the viewer. Expanded Cinema. by Gene Youngblood. Introduction by R. Buckminster Fuller. Expanded Cinema. Charles Csuri: Hummingbird Demonstration of RCA's liquid crystal display John Whitney working with his mechanical analogue computer Detail shots of mechanical analogue computer John Whitney: Catalogue Dr. Jack Citron of IBM Los Angeles James Whitney: Lapis James Whitney: Lapis John Whitney, Jr.