SOCIOLOGY

EDITED BY BARRY N. SCHWARTZ

HUMAN CONNECTION and the NEW MEDIA

Within the next few decades it will be "possible to receive a laser communication at a terminal within the home enabling the citizen to gather information from radio, teletype, microfilm, the telephone, televideo, libraries, satellites, and perhaps even interstellar communication," says Barry Schwartz, editor of this book. This is only one example of the pervasive effects that the new media will have on our society.

Will these unprecedented opportunities for wider communication allow our society to develop in a humanistic direction, or will the greater complexity of the communications network only serve to confuse us with a cacophony of sounds and an avalanche of information?

The essays in this volume examine what the new media are, what their potential is, and how they may open avenues for human connections. Evaluating the revolutionary aspects of the new media, such distinguished contributors as John Lilly, Peter Goldmark, Buckminster Fuller, Isaac Asimov describe the new media, including holography, lasers, video cables, and cassettes, and discuss their potential impact on human life. The contributors explain how the new media play a growing role in the accelerating rate of social change, and show that through positive use the new media can revitalize our communities and our democracy.

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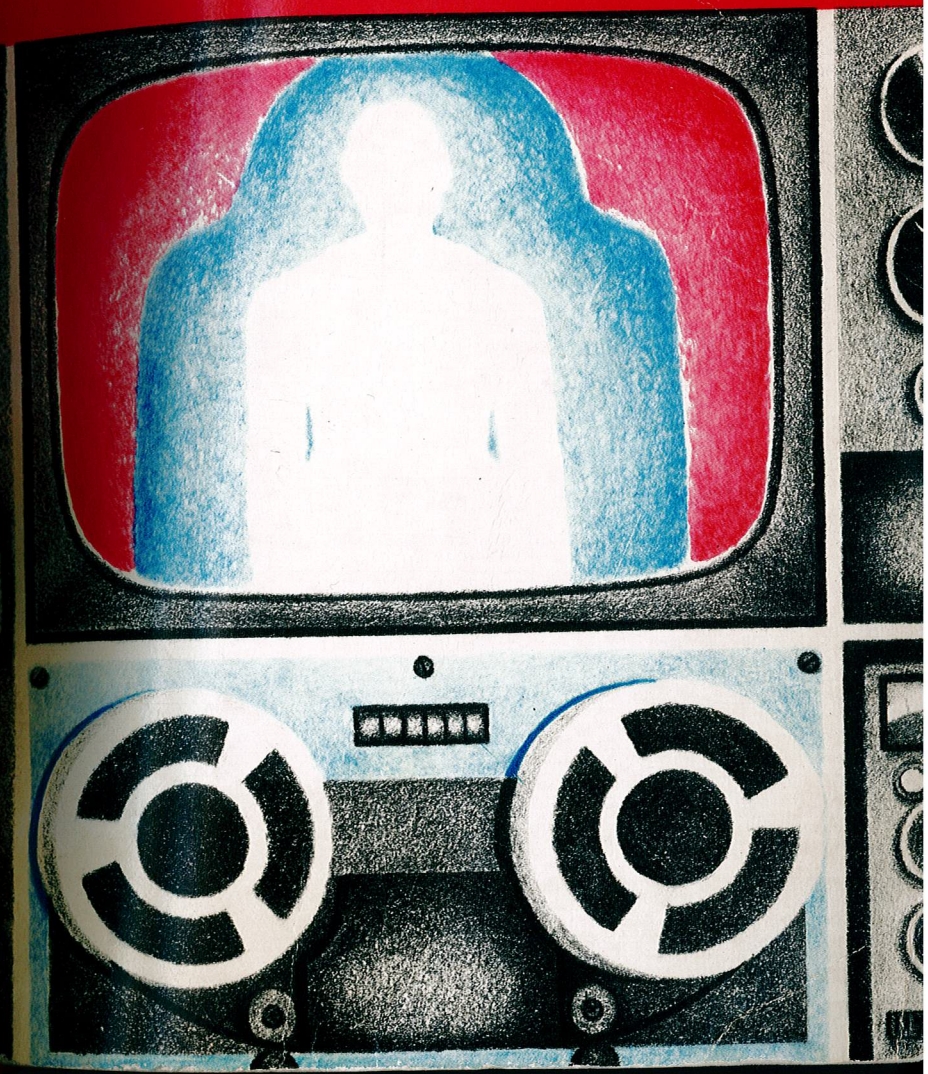

human connection and the new media

EDITED BY *Barry N. Schwartz*

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contents

This book is dedicated to
Professor Herman Krinsky,
who gave so generously to me
in my time of need

introduction
humanism and the new media

The technological pattern dominant in our time has generally spawned imitative processes throughout all disciplines. Artists, historians, critics, social philosophers and others have adopted a pseudo-scientific posture in their work which, in the extreme, is expressed as a formalism divorced from human values. The school administrator, whose function is to expedite and assist the learning process, now substitutes administration, with its rules, regulations, and bureaucratic mechanisms for the very educational experience which was once, but is no longer, primary. The art critic no longer explicates creative works, but now insists that art is a demonstration of his formalist biases. Industries which once directed their efforts toward servicing the needs of people now spend much of their operating budgets trying to convince people of needs they don't know they have.

Research and learning in most disciplines and activities is motivated by "correct" methods and not by a search for value. A glance at recent Ph.D. thesis titles is all that is needed to demonstrate to what extent specialists are the technicians of the technological order. Human inquiry now rests secure in the belief that the ways in which we work are more important than the purposes to which our efforts are directed.

During the past year I completed work on a book about the new humanism.[1] The same year I worked intimately with three

[1] Readers may wish to consult *THE NEW HUMANISM: Art in a Time of Change* (New York: Praeger Publishers, 1974).

others who were pioneering one of the new media, videotape. As we went along, we attempted to discern the general qualities and specific grammar of this new and decidedly crucial tool for communication. In many ways this volume represents a synthesis of these two seemingly different interests. However, the integration of the communication media with the developing humanist value system is vital to our future, and their combination is necessary if the new media are to serve to free us from the oppressions of our time.

As well as possessing certain characteristics common to all communication media, the new media do have inherent qualities and distinct impacts. The spatial, temporal and feedback properties of these media are capable of diverse uses, some very positive, and some that are highly manipulative. The integration of a humanist value system with the new media leads to an ethics, a code of media conduct, an awareness of those uses of the new media specifically designed to manipulate, distort, confuse and control. A media ethics would further set guidelines for the use of another's information and do much to create a climate of opinion, one that might become law, curtailing the most insidious uses of media. Unless we extend Humanistic ethics into the electronic environment we will have the right to speak, but not to program; the right to assembly, but not to connection; the right to due process but no way to influence the judgments of computers.

Values that emanate from words and not acts are doomed to stagnation. As ethical propositions, academic verbiage, moral persuasions, and philosophic leanings, verbalized values do little more than provide new course content in obsolete curricula or bolster sales of books young people are forced to read. But if values without application are futile, new information without new values is equally useless. The truth alone will not set us free. The new media will only be of enduring promise if their potential contribution to the humanizing and liberating movements of our time is realized. Thus the new media will come to be used for new purposes only when the new media and new values are indivisible. The new media and the new information they generate will change little if the prevailing value system remains intact.

For all the talk of information overload, we seem to be in a situation better described as value overload. If we change our

values, then our lives, we will find that we know too little, not too much. The existing value system, propped as it is on the commercial and exploitive drives to profit and control, nullifies the potential of all new developments. Marshall McLuhan not withstanding, new developments will be undermined if old values direct what we do with what we learn.

If social change is to accelerate at the same rate as technological change we need complete access to all information and to a communication system that is able to transmit both knowledge of events *and* our reaction to them. Unfortunately, in the world of the thinking, print still reigns supreme. Those who address themselves critically and creatively to the social patterns that affect them still do so after the fact. We have generated a situation in which the intelligentsia survives as a media-underprivileged group, while the average citizen, whose ability to read and utilize the print media itself is limited, remains a passive recipient of programmed learning.

Unlike print, which today maintains vast separations among people, the new media are holistic, which is to say that they bring together what societies and traditional media have kept apart. The new media have accurately been called the central nervous system of humanity, connecting human beings much the same way the individual's nervous system connects him to his body.

The new media, being holistic, tend to promote group processes and therefore lead us away from the fragmentations of unshakable individualism and collective mechanism. Their communal quality permits group processes within which there is enormous potential for individuality and unique expression. In some sense, the new media promote a vision of every man becoming the artist of his experience. This vision, of course, assumes that the tools will get into the hands of the people.

The existing mass media now promote passivity, and passivity deadens creativity. Many people, out of touch with their own creativity, expect technology to do what they have thus far failed to do for themselves. The new media are important—we cannot do without them—but they are not going to do something for us without us. If we are to get out of the contemporary crisis, we will need new tools; but new tools themselves will not get us out of our social,

cultural and spiritual dilemma. If the new media are harnessed by the existing value system, they will only help us to continue to do what we already do, only now more effectively.

The new media I have chosen for discussion affect our communication in at least two ways. Some are able to extend man's ability to communicate. Others are able to enlarge man's capacity for communication. Some, like holography, make it possible to communicate information that would have previously been inaccessible. Some, like videotape, make it possible to inform large numbers of people through intense learning experiences. Biofeedback, on the other hand, enables a person to communicate with his body in ways that give the mind and body more information about each other. To the general reader, ESP, telepathy, and even interstellar communication phenomena may seem removed from his communication experiences, but to dismiss them for this reason is foolish. Today they are viable communication media employed by growing numbers of people. To call a conception of communication potential "science fiction" is to pay it a compliment. Science fiction today usually deals with a probable future.

The new media *do have* enormous potential for democratizing the decision-making apparatuses of society. They are capable of instantly dispelling misconceptions which otherwise would mold our history. They are capable of leaving nothing to the imaginative powers of fear, distrust, and false conception. They render reality in greater focus and contribute to human understanding. They are communication media, and, as John Lilly suggests later in this book, the ability to communicate has a direct relationship to mental health, well-being, and humanness. Thus, while the world polarizes itself into noxious nationalisms and its points of view into many discrete and often violent factions, while inequity grows and awareness of it diminishes, the new media come to us as a real hope for the improvement of earth communication, the potential for nothing less than total community communication and the cessation of violence because awareness and understanding ultimately minimize conflict.

It will be possible within fifty years to receive a laser communication at a single terminal within the home enabling the citizen to gather information from radio, teletype, microfilm, telephone,

televideo, libraries, satellites, and perhaps even interstellar communication. This is no more fantastic than it was to imagine a hundred years ago that every citizen would have a wire that would connect him to every other citizen—the telephone. Such a vision would have seemed farfetched to men who were resigned to the present physical limitations of their ability to communicate.

However, as long as new technology is developed along the lines of our existing value orientations, the potential of the new media will scarcely be realized and the destructive implications of their features will be explored to the fullest. Guided by the prevailing values, values that have turned the twentieth century into a blood bath, men are very adept at finding the implications of technological control. But they are unable to direct their energies toward the alleviation of the dehumanizing facets of modern life.

What can be done? First, every sane and life-affirming individual must come to know about the new media. Today, ignorance is certainly not bliss: it is a state of alienation. Unfortunately, most information on the new media is either too technical to grasp—an outcome of that Tower of Babel called specialization—or it is enthusiastically mystified by those outside the power structure whose aspiration for community seems less vigorous than their wish for status and elitism. There is a real need for media information to be democratized and made accessible. And the individual must avail himself of openings in accessibility.

But knowledge itself does little to develop individual potency, nor does it create much of an impact on the environment. The informed individual must then become *involved* with the new media. It is here that social change is usually aborted. Sequestered from direct action within the teaching profession, the intelligentsia continually promotes the illusion that information exists only to be passed on. Being aware, however, involves a commitment to action. But professors are not generally doers, and those who act tend to have short academic lives.

The intelligentsia has been made comfortable. Fuller calls specialists the information gatherers for the Old Pirates (and the Old Pirates pay generously for services rendered). Very little that has resulted from recent decades of university life dispels the suggestion that intelligence *per se* is rewarded. In our time, too few

are prepared to forsake material rewards for the less tangible value of contribution, especially when contribution is so frequently punished.

Yet as many people as possible must become involved in the new media, and *children* particularly must be able to communicate with these media naturally. This will require the wisdom and commitment of their teachers. The first generation to be acculturated by broadcast television has, now that they are adults, demanded that there be a new television. Children sitting in classrooms today must become acquainted with other new media if they are to be more than passive recipients of programmed fare.

People are motivated to participate in social struggle by a deep-seated feeling of what it is they feel must be changed. A younger generation capable and comfortable with the new media will constitute the greatest force in democratizing and redirecting the uses of the new ways of communicating.

We are finally led to the politics of media; all those who would divorce research, involvement, and information from politics have already assumed their own lack of power. A dehumanized society is not neutral to the forces that would change it. Involvement with the new media will reveal certain imposed limitations. Most of the serious investigation into videotape, mind-expanding drugs, ESP, Kirillian photography, and acupuncture has been done against obstacles created by the institutions of government and industry. If this situation is beginning to change, it is only because men driven by the values of control and exploitation are interested in these phenomena for their use in furthering the effectiveness of existing behaviors.

At this very moment, important political decisions are being made which at a later time will be offered as the "traditional" ways society regulates the new media. It might well be that today's ignorance of media politics will limit the future options for human connection. If there are not sufficient numbers of alert, informed, and vocal media-watchers present now, today's decision will become tomorrow's law. The options of new media will be closed. The best and most obvious example demonstrating the need for sensitive media-watchers is the case of cable relay television. By the time the reader finishes this book he should be aware of the enormous potential of cable television. Cable will create great access to information; it will also greatly assist self-identity, democratic processes, educational environments, and community cohesion. The degree to which we are sensitive and responsive to the emerging regulations and uses of cable will do more to determine the ultimate significance of this communication system than the technological development of cable itself.

Unfortunately, many media-watchers today believe that the technology will transcend all attempts to contain it, that the positive qualities of the new media will be realized inevitably. They believe with Buckminster Fuller that as soon as we realize that there are enough resources to go around and that our present technology will enable us to do more with less—i.e., as soon as the new media create an ecological consciousness—we will set about ending war, preventing widescale poverty and disease, and providing a stable industrial base for countries now lacking one. Then we would see that such change would have been worth all the fortunes that had not been made, all the appliances and products we would not have had the opportunity to buy, and some of the short-term prosperity now associated with war, arms, and defense that would not have been enjoyed.

If the media-watcher believes that, despite regulation, obstacles, and present industrial interests, the media will prevail, he will certainly not be attentive to media politics. As well as media enthusiasts we need media-watchers to enforce media action programs based on human values that will reorder the present priorities. Much of the world today is geared to the maintenance of inequity and the withholding of surplus. Our present values have been based on absurd definitions of "progress," and are reinforced by a crass materialism of endless glut. The new media can either foster a new dynamic consumerism, an electronic package for the old values, or they can serve as a primary communication for the new values that are incarnate within the media themselves. Can there be a choice?

Unlike the prophets of the past who pictured apocalyptic nightmares as the result of divine retribution, our diviners are the ecologists, scientists, and poets who tell us we do not have an indefinite amount of time to continue our ecological self-destruction. Those who speak of the death of the air and ocean, mass famine, lead poisoning, nuclear holocaust, race wars, and of lemmings running to

the sea in mass suicide do not base their concerns on the fanciful vision of an angry god, but on statistics, intuitions, and scientific facts.

If there is an apocalyptic message that must be heard, if human society is, in fact, nearing the fail-safe point, it is clear that existing patterns of communication and the present media are sorely inadequate for the communication of *both* the present plight *and* the future alternatives, options and developments that might open a way beyond the present crisis. The new media discussed, evaluated, and *felt* in this book are the tools for the final analysis of an old world and the communication of the birth rites of a new one. Without access to and control over the role these media will play in our lives, we can have only a less hopeful vision of the future.

For some years now I have collected tropical fish. Only recently did I feel sufficiently competent to maintain a marine aquarium. The challenge of collecting salt-water life is infinitely greater than that for fresh water. Though many specialists believe that precise controls on temperature, pH, trace metals, copper, and nitrates are required for the fish, the well-being of the invisible bacteria is supremely important in the chemistry of the fish tank. If the bacteria die, the waste, measured by nitrate counts, will build up to lethal levels.

Last October the bacteria in my tank died. As I gazed into the fish tank, I saw healthy marine specimens happily swimming and enjoying their lives. I was completely unaware that as I looked into the tank all the healthy fish inside were, for practical purposes, already dead. That they died one month later was inevitable and predictable. Had I used a nitrate test to determine whether the conditions of the water had deteriorated, I might have saved the environment and those living things within it. Some argue today that our environment, the planet, is like my doomed home aquarium. Surely, many of our most reputable thinkers have made it patently clear that the conditions for our ultimate demise are advancing along chartable lines. But this feedback is filed under "long-term worries." There are no long-term worries. The new media promises to communicate the feedback telling us that existing values must be altered and to reveal some of the ways a new world conforming to new perceptions can be created.

The new media contain at least the following developments: satellite communication, color television, cable relay television, cassettes, videotape, videotape computer systems, videophones, electrostatic reproduction techniques, laser communication, electronic high-speed printing, electronic learning machines, printing by radio, time-sharing computers, generalized data banks, telepathy, various parapsychological phenomena, holography, biofeedback, and interstellar communication. These new forms of media are also capable of forming innumerably varied hybrid media with each other and with older media like printing, radar, X ray, teletype, and film. Some day in the not too distant future, communication may be comprised of a universal world grid of electricity and energy capable of transformation into countless forms and variations within forms. Thus, the earth itself may be encapsulated by an electric communication atmosphere that encircles it.

I have not attempted to inform the reader of the most current and vital new developments in media. No book can do this. It takes about nine months from submission of manuscript to first printing, and that is too long to reasonably expect to have the last word on anything. Instead, I have distilled from the enormous bulk of writing on the new media strong statements that help acquaint the general reader with them—what their potential is, how they may open avenues for human connection, and what kinds of politics bear on a discussion of them.

PART ONE

the dialectics of media

Several years ago the playwright Eugene Ionesco wrote down his conviction that "the human condition determines the social condition, and not vice versa." The context for this remark is a discussion of the nature of evil. Is the flaw in the world we each experience accounted for by the imperfections in our social system, or is man's fundamental dissatisfaction with life determined by his relationship to life itself? These are questions of an "existential" nature, arising from an investigation of man's situation in the world.

Perhaps it is a sign of the continuing secularization of society that we do not ask such questions in the 1970s. Our social situation so determines our condition today that we are led to ask different questions, the most pressing of which can be articulated by paraphrasing and changing Ionesco's formulation: "the communications media determine the social condition, and not vice versa." This view, and its antithesis, is one major, perhaps *the* major intellectual debate within our time. Some argue that the new electronic environment will change society; others say that the new communications media will be hopelessly ensnarled by regulations and monopolies. The first view supposes that the ways a society communicates change

the society; the opposite position concludes that only a changed society will communicate in changed ways.

In fact, both views are correct: The new media *are* capable of changing societies *and* their potential is greatly undermined by the power structures that determine the uses to which the new media are put. However, the extreme positions should be studied, for they both illuminate the murky middle ground most of us have to live on. To this end I have assembled an artificial debate between Buckminster Fuller and Kingsley Widmer. Widmer, who is an outstanding social critic and too little appreciated by those who prefer their criticism in small doses, argues passionately that most of the electronic environment rhetoric is beside the point, that as long as the media are programmed by the present media decision-makers, *they* will do more of the same, only with less effort. Widmer's essay pulls no punches; he defines the state of the media without the illusion of panaceas. And yet, though Widmer appears to be right, he also seems uninvolved with the media itself. Widmer has a problem in levels of generalization. Usually his kind of analysis, a form of what Hemingway called "crap detecting," has an enduring value. But the new media are exceptional and unique and not just more efficient tools in the hands of the programmers. Sociopolitical analysis must be tempered by the fact that involvement with the media does lead to certain discoveries that are genuine, i.e., not known by conventional predication. Widmer's essay does much to elucidate facets of the media problem; but while it contains strong perceptions, it is not definitive.

One might say that Widmer is so acquainted with our present and past that he cannot accept the idea that our future might not derive from them. On the opposite pole is Buckminster Fuller, who believes that, in fact, the new media, and new technology generally, have made it possible to disengage ourselves from our present and invalidate our past.

Among other things, he is a man who has shown us that the closer we are to a subject the less we know about it, that the more detached our perspective, the greater the inclination of the mind (not the brain) to achieve metaphysical insights. He is, of course, an architect, designer, and scientist. But more significant, I suspect, for thousands of passionate admirers, is that he is a master storyteller of the new consciousness, a wizard who ferments analogy

and logic, and combines metaphors of man, nature, and universe into a more coherent and more human vision of planet earth.

Fuller is orbiting somewhere in intellectual space, radiating celestial comprehension from the special vantage point of genius, surveying the human condition with undisturbed ego. Possessing wit, brilliance, and a flexible intuition, he wishes earnestly, if somewhat naïvely, that we should all realize that we are not each other's enemy, that there is enough to go around in the world, that man's technology has opened the door to abundance and happiness, that our present ways of thinking work against our own well-being, and that once we have perceived this we should think differently.

Thus, Fuller, in his way, is a cosmological moralist. If men believed what Fuller believes and acted on what they believed, his analysis would be absolutely correct. A world of Buckminster Fuller's would be a world of sharing, of planning, of the greatest human needs receiving the greatest human attention. But it is, Kingsley Widmer would remind us, not Buckminster Fuller's world.

A moralist is one who argues a value system in the face of its denial. If Fuller is to be taken as a designer, then one would have to say that his design is inappropriate to the human species. Fuller's vision of the future is only one of many we might develop *if we believed* we could create our future. Most of mankind does not. The man who does not believe he can create his future is less inclined to try.

Fuller believes that we now have at our disposal the means to create worldwide abundance. He interprets the efforts to maintain divisions between the haves and the have-nots as a vestigial mentality, the legacy of an older time when the Darwinian and Malthusian views of scarcity may have been correct. But believing they are no longer correct, Fuller passionately argues that we must redirect our consciousness. To help show us that abundance is achievable, he has written numerous articles and books, invented the geodesic dome, and has begun to compile an inventory of the world's resources as well as the world game, which is designed to assist mankind in making the transition.

Though Fuller acknowledges the presence of men who do not believe we can have abundance, he does not adequately deal with

those who believe that we could have abundance but who still do not opt for it. This man of good (for Buckminster Fuller is a good man) has not yet come to terms with the question of evil. By assuming that destructive acts come from mentalities that believe war, exploitation, and the division between rich and poor are needed for survival, he also assumes that, once shown abundance is possible, men will cast off their competitive, destructive, greedy urges and choose to live in harmony. But did Iago worm his way into the psyche of Othello because he wanted Desdemona?

Unlike most of the intelligentsia, Fuller places his emphasis on mind, not brain. Fuller argues that unless we choose for the mind, and thereby discover its many powers, we will be obliterated. If we do choose for the mind, if we enable the metaphysical to overcome the physical, we will have utopia. The dilemma that Fuller both presents and is somewhat trapped by is that the human condition is not and has never been the exclusive outcome of what men have construed as reasonable. One cannot reasonably account for several thousand years of human dominance, hierarchy, and violence with the explanation that this is what earlier humans thought they needed to do. Fuller emerges as a true moralist when he argues that we *must* change our orientation, values, and consciousness if we are to escape oblivion.

At first the fact that Fuller writes much of his thoughts as poetry might seem unclear. However, if we think of him as a moralist who writes a poetry of immense beauty within the scope of his vision, we can better define how he serves us and the lasting impact of his contribution. For if he too easily dismisses the world that Widmer is mired in, he lingers in a vision of a new world, one which postulates a humanity far more in tune with universal harmony and far more equipped to live on the planet and in the cosmos than the men of limited vision who now direct the misuse of resources.

Those of us who share his vision, but do not believe that others will necessarily choose to do so, are inspired by his dream of human community and are aghast at the efforts of those around us who would perpetuate inequity. Fuller may be postpolitical, as so many of his youthful followers are, but the world itself seems quite willing to lose a few devotees from its ongoing program of

political perpetuity. If Fuller's vision does acquire the means to put values into action, then a very desperate struggle may ensue that will result in either utopia or oblivion.

Fuller believes that all men are capable of logic and reason, that if they could realize that inequity has no justification, they would forsake the politicians and seek to create a new world. Thus, from his point of view, the task before mankind is partly an educational one. Though the probabilities of finding enough teachers for this task are slight, and though infusing the educational system or an alternative one with freedom will be difficult, all great ideas, he believes, have transcended the obstacles to them.

One disagrees with Fuller without disagreeing. He is brilliant and right. But when one comes to put values in action, his usefulness diminishes. He has a truth, but not the way to the truth. Thus, he ends *Operating Manual for Spaceship Earth* with: "So, planners, architects, and engineers, take the initiative. Go to work, and above all co-operate and don't hold back on one another or try to gain at the expense of another."

Who is he talking to? Though I share his vision of that other world we have yet to create, the way to that world remains uncertain. Fuller designs out of the human condition the benign impact of absurdity itself. History is the outcome of human choice, and human choice may be capricious. Thus, his philosophy leads to utopia or oblivion, whereas history itself may offer a less dramatic continuum of diminished values and forsaken lives. I think we will not have utopia, but more cause for optimism; I think we will not have oblivion, but much more human decay. We will move toward a Renaissance in the twenty-first century or a Dark Ages. We will come to know better the vision of moralist Fuller, or the world so precisely mapped by Widmer; but in any case, we will be able to determine the outcome by the degree of importance we give to the new media, and by our commitment to ensuring that their value is maximized.

Chapter 1

utopia or oblivion

R. Buckminster Fuller

Astronauts, aviators, mariners, submariners, and people of all countries use and appreciate tiny transistors, because transistors do so much more, so much more reliably with so much less. So also do a myriad of invisible alloys, chemical and electromagnetic devices accomplish much more with less.

The development of these globally interacting, invisibly operating inventions was not organized as a benevolent world revolution by anyone. But their integrating and interacceleratingly regenerative more-with-lessing all together constitute a revolution which is found to be politically welcome the world around. Computers, TV's, and plastics, as superficial manifest of the invisible doings, are apparently wanted everywhere.

The centuries' long only subconscious more-with-lessing is only now entering human consciousness as constituting a unified world revolution—as inexorable and transcendental to man's will as is an earthquake. Some speak of the revolution as "the impact of technology on society," others as "automation." Everywhere people are aware of its portentousness. Few think of it correctly as "invisible more-with-lessing," the scientific description for which is "progres-

sive ephemeralization"—99% of humanity look upon it only as more-with-more and more again.

To turn the heretofore only subconsciously regenerative more-of-every-advantage with less-of-every-resource revolution to highest human benefit in the shortest time with the most pleasure and satisfaction and with the least effort, pain, or rupture for all has become the conscious focus of a world-around university students' coordinated research. Whether this particular initiative will persist and be successful is unpredictable. But its occurrence and circumstances provide a significant case history for it brings the generalized problem into sharp, wide-angle-lensed, maximum depth-of-field focus. As such it is probably the prototype exploration in how to make the world work satisfactorily for all.

Identified as the Design Science Decade, the world students' ten-year plan is divided into five evolutionary stages of two years each. Stage one was on exhibit in the Tuileries Gardens in Paris, France, for the first ten days of July, 1965 (under the auspices of the International Union of Architects' Eighth World Congress). It confronted the world with the basic facts which led the students to the research conclusion that human survival apparently depends upon an immediate, consciously coordinated, world-around, computerized research marshalling and inception of the theoretically required additional inventions and industrial network integrations for the swiftest attainment and maintenance of physical success of all humanity.

Fortunately, say the students, such invention initiative does not derive from political debate or bureaucratic licensing. The license comes only from the blue sky of the inventor's intellect. No one licensed the inventors of the airplane, telephone, electric light, and radio to go to work. It took only five men to invent these world-transforming developments. Herein lies the potentially swift effectiveness of the world student research revolution. . . .

The world students' design-science initiative has no precedent. All the conditions essential to its precipitation have never before coexisted. It is the constructive outgrowth of the world-around students' ever-more-logical dissatisfaction with the inadequacy of yesterday's theories and practices to cope with today's problems and potentials. Their highly intuitive and not always clearly conceived dissatisfaction is frequently articulated only in protests over local

regulations, or the right to be heard. Sometimes, in civil-rights movements, the students' spirit discloses superb courage and dedication to human justice. Sometimes—in wanton outbursts of indiscriminate disdain of the ineptness of all that is "old"—it may break windows and noses. Typical of the milder, organized protests was the recent University of California students' Berkeley rebellion.

The issues are often confused because of political tampering. It is easy for skilled operators of opposing world ideologies to surreptitiously exploit the universally persistent, intuitive discontent among their adversaries' youth by derring-do teasing in their respective directions.

Born utterly helpless, and gaining independent competence only slowly, youth's reflexes are preconditioned to expect some older authority to be responsible for its welfare. Youth assumes that the political authority is a public parent. When dissatisfied, youth protests to the authorities, assuming the authorities can, if they wish, make everything satisfactory. Often, the "authority" lacks such capability. The problems are usually beyond the scope of local authority. They demand world peace. The Mayor of Kankakee has no such capability.

The present university youth are World War II's babies, many born with their fathers away at war. Many were tended by group babysitters as their mothers worked in munitions factories. The present university students are also the first humans to be reared by the third parent—*television*—which has given them hourly news of world events. Unlike any previous generations, the students think "world." They will settle for nothing less than justice and physical advantage for all, everywhere around earth.

The third parent also taught them that no invention barriers are insurmountable to science and technology. They were born into a transoceanic, air-traveling world. The atom bomb is their birthmark. In their fourth year of life the giant transistorized computers began commercial operation. When the students were aged 9, men climbed to the peak of Mount Everest. When 10, they were immunized against polio. As they reached 12 years, the Russians' unmanned rocket Sputnik orbited the earth every hour and a half, and the first civilian nuclear reactor went into operation as an electric power-generating station. When the students were aged 13, the U.S. atomic-powered submarine *Nautilus* went from the Pacific

to the Atlantic submerged below the north polar ice. In their fourteenth year, the Russians' unmanned rocket photographed the far side of the moon and returned to earth. When they were 15, the U.S. bathyscaphe took man safely to photograph the bottom of the Pacific Ocean's deepest hole. In their sixteenth year, a Russian orbited earth in a rocket. As they reached 17, the DNA genetic code for the control of the design of all life was discovered.

The students know that man can do anything he wants. However, they see world officialdom investing the world's highest capabilities only in race suicide springboards. Finding their own political demonstrations for peace or their outright revolutions leading only toward further war, a few pioneers amongst the world students have joined up objectively with the heretofore only subjectively experienced do-more-with-less design-science revolution. The students are applying general systems theory to comprehend and to utilize the accelerating invention revolution as the swiftest and only fundamental means of attaining world peace with both physical success and moral justice for all. . . .

No exclusively political act of any political system can make the world's resources take care of more than 44% of humanity.

Despite the foregoing constant increase in human population and constant decrease of metals per person, between 1900 and 1965 the number of people attaining physical success as full-time participants in the highest standard of living progressively developed by world industrialization—a personal standard of living and health superior to that ever enjoyed by any pre-20th-century monarch—rose steadily from less than 1% to 40% of all living humanity.

The 40% of humanity surprisingly grown successful, despite constantly diminishing physical resources per capita, can only be explained by the doing-more-with-less invention revolution.

The success cannot be attributed to any political doctrine. It has flourished equally under opposing ideologies.

Take away the energy-distribution networks and the industrial machinery from America, Russia, and all the worlds' industrialized countries and within six months over two billion swiftly and painfully deteriorating people will starve to death.

Take away the politicians, all the ideologies and their professional protagonists from those same countries and leave them

their present energy networks, industrial machinery, routine production and distribution personnel and no more humans will starve nor be afflicted in health than at present.

Why has mankind failed to perceive, understand, and respond logically to the significance of this situation? The answer is complex. But it needs answering. That will take some paragraphs. If it is to be consciously solved by man it will have to be understood well enough to be properly stated. It is the students' working assumption that "a problem adequately stated is a problem well on its way to being solved."

The problem consists of such powerfully conditioned human reflexes as laissez-faire, induced by nature's "built-in," instinctive, "game-playing" drives which are subconsciously operative in all living creatures, by which—often in lieu of intellect, they only inadvertently and unintentionally provide vital support of one another—as for instance do all the mammals respire all the vegetation's vitally required carbon dioxide, while all vegetation respires all the mammals' vitally required oxygen; or as do the honey-hunting bees inadvertently fertilize the growth of flowers with their pollen-dusting tails. It is only by the integrated coordination of myriads upon myriads of unconsciously performed inadvertencies of such "game-playing" drives that nature is able to accomplish the comprehensive ecological and metabolic regeneration of life on earth. . . .

The public's vast ignorance of either the comprehensive or particular nature of original undertakings in technical development has been almost certified by national-defense secrecy. Ninety-nine percent of the original more-with-less invention revolution has been subsidized by the weapons programs of the major nations. Up to World War I all the drawings and calculations of all the world's navies' ships were methodically destroyed as soon as each ship was built, up to which moment they were the most carefully guarded of history's secrets.

During the first half century of the airplane, the major sovereign powers poured $2½ trillion directly and indirectly into aircraft development as the new supreme weapon. Now in one-third that time the world nations have again appropriated almost as

much capability wealth for the development of the atomic-headed rocketry and space race, for supreme control of the earth and its surrounding portion of the universe.

Most central to all the remote controlled more-with-lessing of moon-landed rockets and ocean bottom exploring are the swiftly multiplying transistorized electronic computers, one of which can now, in one minute, print-out the solution to a problem which a decade ago would have taken two years to accomplish by the combined efforts of all those educated on earth to calculate. Little wonder that 99% of humanity are left millenniums behind, innocently and innocuously preoccupied in playing yesterday's irrelevant game of "everyday" serious "business," "politics," and "education."

Twenty-five years after the original, secretly developed doing-only-more-killing-with-less-material-and-work-per-death as potentially realized in weapons and weapons-production technology—the, only inadvertently, *generalized do-more-with-less capabilities*—of the tools-to-make-tools, that finally make the special tools called "weapons"—99% of which tooling could also make peaceful products—are secondhanded into the domestic economics of world man to provide more life with less effort. But this ultimate life-support upgrading occurs only after the prime weapon contractors' respective weapons contracts expire and only as a result of the obsolescence of their respective weaponry end-products.

While different political ideologies, as with the different languages and customs as yet operative in yesterday's pirate-decreed and natural-barrier-divided lands, are useful in organizing mankind's employment of the ever-swiftly improving, multiplying, and integrating industrial-tool network of the invention revolution, by-producted from the weaponry-focused economies, it is becoming increasingly visible to ever more people that the industrial network will soon integrate society into a "one-town world" obliterating all national divisions of earth people, invented by the top pirates' competitive-ambition strategies.

It is also increasingly clear to even more people that the fundamental and highest priority responsibility for man's interim-survival success on this little sun-orbiting spaceship, *Earth,* does not fall directly within the problem-solving capabilities of political theory, nor with the results obtainable by politics' ultimately greatest lever

—war—hot, subversive, cool, or cold. *Either war is obsolete, or men are. . . .*

It comes to those who discover it, all round the world, as a dismaying shock to realize that continuation of the weapons race and of cold and hot warring is motivated only by intramural party fears of local political disasters. The world's political fate does not rest with leaders at the summit, expressing the will of world people, but with the local ambitions and fears of lower-echelon political machines, within the major weapons-possessing nations, whose vacillation is accompanied by an increasing spread of the atomic-weapons-possessing nations whose respective internal politics will forever frustrate disarmament by political initiative. All political machine professionals of all political states will always oppose loss of sovereignty for their own state. Solution of the impasse, if it comes at all, must clearly come from other than political initiative.

It is true, the world university students point out, that throughout all history up to now man has been faced with not enough to go around; not even for the survival of more than a small minority. It has always been—you or me. Swift you-or-me by the sword or gun has often been preferable to slow death by slum rot or slavery. The direct and conscious design-science revolution backed by the students can and may, by production of enough for all, accomplish elimination of the lethal you-or-me dictum and its political bias support.

Now, for the first time in history, employing its literary voices, world society can give design science its popularly mandated priority over political initiative with realistic hope as the impelling motivation. As 100% of humanity achieves, or nears, physical-survival success, past history's seemingly inexorable reason for war (not enough for both of us) will have been eliminated.

The students argue that if they can make man conscious of his design-revolution potential, and of the feasible and practical means of its accomplishment—the probability of pushing the annihilation button will be diminished from "critical" to "remote" status.

It seems apparent to students that—for whatever functional purposes man has been included in the design of the universe—nature has been, and continues to be, intent upon mankind's survival in his most physically successful and intellectually useful con-

dition, wherefore, in view of man's historically vast ignorance and fear, nature has employed those predominant "game-motivating" negatives to impel him unconscious, even as she impelled him through the womb, toward this moment of dawning awareness of realistic hope and birth of his responsibility and intellectual initiative. The inadvertent doing-more-with-less as a by-product of the weaponry race seems, retrospectively, to have been nature's trick for developing man's highest potential, while also saving him from his own shortsighted "game-playing" ignorance.

It is inconceivable that one man, one party, one nation, or even a world congress of all mankind's representatives meeting a century ago (1865)—when a million dollars was an almost incredible sum, could have had the vision, logic, and courage to elect to invest $5 trillion in the invention and development of the then uninvented and economically unanticipated telephone; electric light; radio; airplane; jet and rocket flight; nuclear reactor; flight into space; world-around television; elimination of both bacterial and virus diseases; discovery and isolation of 60 additional chemical elements and their electrons, and nuclear components; and the genetic code; together with the ten million additional, mutually interadvantaging technical inventions and discoveries which have occurred in the last century; plus development of industrial mass production and its progressive industrial-production-capacity-geared accrediting of the paper-financed mass-consumption industry; tripling of human longevity and the support of three times as many people on earth, half of them at standards of living better than any king has ever known. Those who suggest that it might all have developed peacefully and purposefully through a shift in political doctrine are as unrealistic as are those who now think that the old public laissez-faire and political-initiative-only patterns can continue without man's annihilating himself; as are those who cannot see that the world students have found a first tiny view of a realistically hopeful blue-sky future. . . .

Science and engineering say the design science's peaceful accomplishment of 100% industrialization and its comprehensively bounteous support of man is eminently feasible. It is feasible because the world's economy is now operating at the appalling low overall mechanical efficiency level at which only 4% of the energy consumed is realized as effective work. Reciprocating engines are 15%,

turbines 30%, jet engines 65% efficient. Efficiencies of 72% in atomic reactors—employing their by-product heat in desalination—and up to 80% in fuel cells are now everyday design realities. Increasing the overall mechanical efficiency of the world's prime movers and machinery to only 10% from the present 4% will result in 100% of mankind being benefited by higher living standards than the present highest.

In addition to the world students' reorientation of the public from prime dependence on politics to prime dependence upon design science, there are now in evidence several other hopeful and highly realistic trends toward elimination of the political impasse to be accomplished by accelerating the more-with-lessing to the advantage of all men. Completion of the ultrahigh-voltage world network integration of electrical-energy distribution, under the Bering Straits, which is now clearly possible well within the 20-year trend, will automatically increase the world energy efficiency to an overall of 20%. This energy-distributing network linking the day and night hemispheres of earth will reduce the local standby power losses by 25%. The staggering economical advantage accruing to both public and private sectors has thus far caused both to join unreservedly in its development. The decisions of both public and private sectors to subscribe to their mutual interoperation was never taken as a consequence of interpersuasion by one another or of victory of one over the other. The persuasion came exclusively from the unbiased calculations of computers. The machine showed both sides that they would each profit beyond previous dreams by "integration." The computers will play a swiftly increasing, dominant role in the decisions of men—leading him away from "policy" or political impasse and toward total physical success.

Because energy is wealth, the integrating world network means access of all humanity everywhere to the total operative commonwealth of earth.

Wealth cannot alter yesterday. It can only alter today and tomorrow.

Multiplication of wealth began when man stepped on the long end of a log lying across another log with its short end under another big log, and he saw the big log, which was too heavy for him to lift with his muscles, lifted easily by gravity pulling his minuscule weight against the high-advantage arm of the lever. When man

fastened a set of levers radially around the hub of a wheel and put the wheel under a waterfall and connected the wheel with a grinding mill, he learned to stand aside from the work and, gaining perspective, to use his brain to rearrange energy patterns to do more, and more fundamental, man-advantaging work.

Man found that the vast *associative* (gravity, matter) and *dissociative* (radiation) *energy patternings* of universe can be harnessed, shunted, and valved by man to impinge on levers and trains of gears ad infinitum.

Man is now learning through the repeated lessons of experimental science that wealth is explicitly the organized and operative tool and energy capability to sustain his forward metabolic regeneration; to protect him physically; to increase his knowledge and degrees of freedom while decreasing his interfrustrations. Wealth, he finds, is inherently regenerative. Experimentally demonstrated wealth is: energy compounded with intellect's knowhow.

Science's Law of Conservation of Energy states that "energy cannot be created or destroyed." The *first constituent* of wealth—energy—is therefore irreducible. Sciences states that the entire physical universe is ENERGY. $E = Mc^2$.

Every time man uses the second constituent of wealth—his knowhow—this intellectual resource automatically increases.

Energy cannot decrease. Knowhow can only increase.

It is therefore scientifically clear that wealth which combines energy and intellect can only increase, and that wealth can increase only with use and that wealth increases as fast as it is used. The faster-the-more! Those are the facts of science. Those are the facts of life.

The students know that they can generate more wealth through their cooperative initiative than in competition with each other. Cooperation generates commonwealth. They need not be concerned about "making a living" for themselves. By dedicating themselves to research in "how to make the world work for all in the shortest possible time" they will be realizing the only living now possible which is for all or none. . . .

Man's reflexes are conditioned to brush aside that statement on the grounds that "Utopia" has become synonymous with the "unrealistic" or "impossible." This is because the many past attempts to establish Utopias all failed. The fact is that all past attempts were unrealistic before they started. All the historical Utopian attempts occurred when it was assumed that Malthus was right and that there never would be enough physical resources for more than 1% of humans to live out their potential fourscore and ten years in comfort; nor for more than one ten-thousandth of 1% to live it out in precarious luxury as well as comfort; nor for any to live out their full span in health, safety, comfort, luxury, good conscience, and happiness. The latter would, of course, be the minimum requirements for everybody in the establishment of Utopia. That is why their attempts were "unrealistic" in the light of their working knowledge that those conditions could not then be met or even dreamed of.

It was said at that time that "man cannot lift himself up by his bootstraps." No one thought in the terms of doing-more-with-less. No Utopians thought of airplanes as a possible reality, not in terms of aircraft engines multiplying thousandfold in power while simultaneously reducing their engine and airframe weights per horsepower by 99%. No one thought of communications going from wire to wireless with enormous gains in distance accomplished per unit of invested materials, as well as a manifold reduction of weight and energy per each frequency-tuned message circuit; none thought of a 1/10-ton Telstar satellite outperforming 75,000 tons of transatlantic cable.

The great transformation of man's physical capabilities by scientific industrialization, which alone could provide the physical environment and harnessed energy adequate and essential to a Utopian level of metabolic-regeneration success for all humanity had neither occurred nor even been as yet scientifically conceived. As so far experienced, in their day, the would-be Utopians could reasonably think, for instance, of bigger, more fireproof, more bow-and-arrow-proof stone or brick walls instead of wood. They could think of common austerity. They could think of having more cows, or more acres, but experience, until then, gave them no thoughts of the doing-more-with-less science and technology revolution. Some cows gave more milk than others as some men were taller than others. There was good or bad luck. There was mystical blessedness or confoundment.

Not only did all the attempts to establish Utopias occur prematurely (in respect of technological capability to establish and

maintain any bacteria- and virus-immune, hungerless, travel anywhere Utopias), but all of the would-be Utopians disdained all the early manifestations of industrialization as "unnatural, stereotyped, and obnoxiously sterile." The would-be Utopians, therefore, attempted only metaphysical and ideological transformations of man's nature—unwitting any possible alternatives. It was then unthinkable that there might soon develop a full capability to satisfactorily transform the physical energy events and material structure of the environment—not by altering man, but by helping him to become literate and to use his innate cerebral capabilities, and thereby to at least achieve man's physical survival at a Utopianly successful level.

All the attempts to establish Utopias were not only premature and misconceived, but they were also exclusive. Small groups of humanity withdrew from and forsook the welfare of the balance of humanity. Utopia must be, inherently, for all or none. A minority's knowledge that the majority of humanity suffers and deteriorates while only the minority prospers would never permit a Utopian degree of contentment of the all-powerful subconscious reflexing of the human brain. In the far from Utopianly idealistic lives of history's "aristocratic" minorities, which were alone supportable by the known means and resource effectiveness of the preindustrial era, attempts were made by the successful minority to exclude thoughts of humanity's generally inexorable suffering by inventing "important" cultural preoccupations. However, dilettantism, sports, banquets, art patronage, flirtations, dueling, intrigue, and war failed to appease the subconscious reflexing of kings' and courtiers' brains. Their lopsided and twilighted conscience, therefore, imposed a code of affected blindness. This irrationality was propped up by an assumption of divine wisdom having placed a few in preposterous survival advantage over the many because of their superior wisdom, culture, and capability to fight for the less fortunate.

As a consequence, the poor illiterate masses built their churches and prayed that they and theirs be given strength to endure life, and that they be blessed—"blessed" means "wounded"—and possibly escape by death from unendurable life to a dreamed-of good life thereafter. All this is now changed, not because man has changed, but because man has found that he is endowed with a powerful brain which has found out what a few of the invisible principles operative in physical universe can do. But universe having

permitted him to discover his intellectual effectiveness as well as some of universe's riches, and thus to participate consciously as well as only subconsciously in universal evolution, will now require him to use his intellect directly and effectively. Success or failure is now all of humanity's responsibility.

The present top-priority world problem to be solved may be summarized as how to triple, swiftly, safely, and satisfyingly, the overall performances per kilos, kilowatts, and man-hours of the world's comprehensively invested resources of elements, energy, time, and intelligence. To do so will render those resources—which at the present uncoordinated, happenstance, design level can support only 44% of humanity—capable of supporting 100% of humanity's increasing population at higher standards of living than any human minority or single individual has ever known or dreamed of and will thus eliminate the cause of war and its weapons' frustrating diversion of productivity from the support of all mankind.

Because politicians will not dare to stop politicking, and because income-supported individuals will not risk loss of their incomes, and because the wage-earning world will not dare to drop its income-producing activity to promulgate the design-science achievement, it can only be undertaken by the more or less free-wheeling student world. If the student handling of its initiative is well done, then in the progressively accelerating emergencies of human society, the significance of the students' initiative will loom into increasing prominence as their design inventions are put to work, soon in sufficient degree to persuade the wage-earning adults to transfer their efforts to support the student initiative. If this occurs within the next decade, man may succeed in his continuance upon earth. Because of the students' intuition and youth, the chances are good!

. . . Let us, too, at least give ourselves a chance to vote to commit ourselves earnestly for the Design Science Decade approach to attaining Utopia. This moment of realization that it soon must be Utopia or Oblivion coincides exactly with the discovery by man that for the first time in history Utopia is, at least, physically possible of human attainment.

Chapter 2

sensibility under technocracy: reflections on the culture of processed communications

Kingsley Widmer

Writing in an earlier phase of the "communications explosion," in an era of the burgeoning of American newspapers, Henry David Thoreau defiantly asserted that he would have nothing to do with the weekly "news." Even in rural New England in the first half of the nineteenth century that sounded a bit odd, so Thoreau went on to explain that what passed for "news" rarely achieved that quality and, besides, was mostly irrelevant, redundant and distracting. That has been the usual view of the sage. Two millennia earlier, Chuang-Tzu suggested that the wise man might be awakened each morning by a crowing cock in the next village yet never bother to find out what was happening a cock's crow away. The Taoist and Transcendentalist taste in media, and such astute perceptions about what passes for news, may still be valid. But the claims to autonomy of Chuang-Tzu and Thoreau often can't be extended into our time. Contemporary Western man's media environment is ubiquitous, and the news and the crowing cocks will not keep their distance.

Their signs and sounds—imprinted, xeroxed, neoned, transistorized—pervade our villages and Waldens as well as our cities. Few can long escape the communications explosion and its shrapnel of labels, ads, directions, pop tunes and news. Shattered images and

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other fragments of processed ideology will surely riddle almost everyone's consciousness. We may choose not to communicate but we shall be communicated with, no matter what, short of complete catatonia. Our sensibilities have to be pocked warscapes of the media assault.

"News," rather more than ideas or art or enterainment, provides the mainline justifications for our technological media. The priority of the whole panoply of our amazing equipment, from ballpoint pocket pens to computerized television networks, rests, they say, on "informational utility." Obvious—or is it? News-information, as commonly defined, actually plays but a small part, providing less than thirty percent of most daily newspapers, less than ten percent of most daily broadcasting, and similarly small proportions in books and periodicals. We might, of course, metaphorically extend "news" to include commercials, top-forty pop records, sports, the standardized fantasies called media "entertainment," the pseudo-events of celebritydom and the pseudo-truths of officialdom. But by any reasonable calculus, most of this serves, at best, as organized misinformation, when it is not, under spurious claims of an impossible "objectivity," sheer indoctrination.

The pertinent understanding of contemporary media can hardly accept the "informational" camouflage. Cast a cold eye on the ways most people relate to the media "news." They seem to only half-listen to the hourly radio "news spot," disassociatedly scan the surreal jumble of newspaper pages, mesmerize themselves with the half-hour television news "program." As with the responses to most ads and entertainments, consciousness seems to be moving in some strange realm of epiphenomenalism based in a quite different reality. Taking in "the news" seems to be rather more ritualistic than informational.

News-as-ritual may be confirmed by the aesthetics of news presentation—the pretentious formats with the fracturing headlines, the shamanistic announcers, the portentous music and visuals, and the revealingly narcissistic emphasis. Not the world reported on but the *process* itself becomes the crucial experience. The processing-programming style consumes all, merging every reality into the arbitrarily delimited package, equalizing the sporting game and the genocidal war, a commercial quip and a social philosophy, the trivial and the tragic. Sometimes skillfully, of course—grandiloquent

packaging may be the ultimate American art. But "informing" can hardly describe its purposes or effects.

Look, too, at media news in terms of its least varying contents. Local weather reports, for example, come out as comic interludes on television, a mixture of weak joke and jargon and visual display—of little real concern to most urbanized viewers yet seemingly essential to the packaging. Similarly with "sports reports," specialized yet almost never analytic, at once arcane and simple-minded. That is just another definition of ritual style. Some recent studies suggest that many people follow the sports "scores" who do not otherwise relate to the athletic activity and who understand few of its nuances. One finds similar response in most mass religious practices. The ceremonial function appears equally strong in those most rococo sections of the "news service"—the decorum-rigid "press conference," the fatuously fractured and controlled "interview," and the other quaintly decorative "features." More generally, "content analysis" of media "news shows" reveals a tremendous redundancy combined with a low level of information, and even lower levels of analysis and interpretation. Rationality is not central to such experiences.

As I see them—and myself—the audience responds to media information in devotee fashion, piously and repetitively going through the normative reading, listening and viewing of the same events over and over again at the same times in the same ways. The media material, like the hormone-injected salt mush for animal forced-fattening, simultaneously feeds and increases the ritual hunger. Surely the media do impart some information and a certain, albeit often misleading, sense of the world, just as more ancient rituals impart some metaphysical dogma and certain, albeit often misleading, solace from the world. All such rituals serve to confirm accepted and official views of reality, re-sanctifying the sanctified. No doubt such ritualization seems essential in what many feel to be an acceleratingly complex and confusing world. Disorder requires more sanctioning and solacing description than does order, which is to say that it requires more misdescription. Thus the "informational utility" of our technological communications largely rests in rituals of misinformation. And thus it is not at all odd that media consumption tends to inverse relation to understanding. The audience responds obsessionally rather than critically, less learning

of and interpreting reality than exorcising and ceremonializing the threatening world.

Nor is this confined to the obvious public media. Our other controlling institutions, such as schools and universities and corporate bureaucracies, also ritually process us with their burgeoning "communications." Institutional programming now packages information and entertainment in a mystification of what is being done, and not done, creating a mythology of need and acceptance. At many levels, communication-rituals aim to control more remote abilities.

When electronic devotees attempt to identify teleculture's favored and distinctive forms, they usually put "news" first, then, variously, sports events or old movies or talk-shows. All but that last arrive as re-runs of other media. Only the talk-show seems to have achieved a distinctive popular form, and therefore we may take its characteristics as basic revelation of the medium. Even at its most ambitious, the talk-show presents less art than the artistic personality as its surrogate. The intellectual, in his or her rare appearances, becomes a spot performer between commercials. The popular adventurer or eccentric appears incongruously and stutteringly disconnected from their realities. The sexologist or demographer or mild dissenter (no others allowed) or other wiseman must operate as polite quipster to the dominant show-biz entertainers. Homogenized into a synthetically theatrical time and space, artist, intellectual, adventurer, expert and personality become props in a rigid and restrictive commercial-ceremonial package. All authentic persons thus become denatured and can only ritualistically parody themselves and their meanings. The undercutting commercialism, the mechanical timing (so experience rarely finds an organic length), the ornate arranging (so that artificiality overcomes any possible substance), the show-business professionalization (so that flashy grossness and ignorant narcissism tone all), the entertainment stylization (so that decorous amusement limits seriousness—in an hysterical refusal of all meaning, the maestros giggle constantly at nothing), this ritual processing is the art of it all, and just about all the art of it.

Is all this the result of bad people and bad purposes controlling the media? Certainly mass broadcasting and publishing are primarily devoted to exploitation and domination, and the hiero-

he media may be, as a group, shrewdly stupid and dully
ill, the technocommunications themselves must have more than an incremental role in this. Granted: business is still business; the absolutistic state operates in communications, too, on its own power imperatives; and the technocommunications are used by business, government, and other institutions, for their own social and ideological dominations. Technologists, as such, neither rule nor program our communications. Naivete about social controls and institutional imperatives makes most futurist writings on the media rather silly. Technological mystagogues, such as Buckminster Fuller and Marshall McLuhan, quite ignore the controlling functions of the media as well as their irrational roles in mythologizing reality and ritualizing responses. Unless radical social and cultural reorderings take place, we can expect future technocommunications to considerably serve the doctrines and dominations of the past.

Yet, as the communications theorists love to point out, technocommunications "enlarge exponentially." So does their "information." From an arithmetic base we get a geometric expansion. As with population, technocommunications "explode." Many things get blown up by the accelerating quantative change, art and humane discourse among them. The means will master the messages, the expansive communications will take over and determine much of what is to be communicated. Technocommunications develop by selectively serving social and ideological powers—the state, corporate orders, certain dubious "elites," and their pre-technological views—but the servants become so big the masters end in thrall to them.

In such technocracy, art tends to lose many of its past purposes—representation, the maintenance of craft, the creation of autonomous sensibility. Early modernist literary intellectuals and social theorists blamed "the decline in aesthetic and moral taste" on the media appealing to "uncultivated audiences," the newspapers and novels of the materialistic middle-class and, later, the semi-literate urban masses. A great tradition of anti-industrial and anti-bourgeoisie critics and artists developed theories of "mass culture" for a mass society. They gave us brilliant dystopian prophecies, as with those of Zamiatin in *We* (the forerunner of *Brave New World* and *1984*) in which an authoritarian "Benefactor" uses all the methods of technological communications, plus surgical "fanti-

sectomy" to remove the rebellious individual imagination, and thereby obtains a complete control of human sensibility in the ultimate religion of robotized power. It remains possible but perhaps more likely we face a broader technological-social control and its shorting-out of full human sensibility and responsiveness.

Uncontrollable by humane intelligence and responsive community, our self-aggrandizing technocommunications must lack most moral and aesthetic qualities. As the ancient philosophers would say, "it is not of their nature." So, too, with bureaucratic paper, that dark ex-forest hiding us from ourselves. It lacks most art and sensitivity, not to mention literacy and sense, and probably, in its quantity and function, cannot be otherwise. From sheer technique and mass, technocommunications may impose their own qualities, or lack of them. Some are good, in the senses of useful and convenient and pleasant. But the technical and quantative responses also bleed into other things. For instance, most scientific and humanistic scholars despairingly comment on the impossibility of "keeping up with the literature in the field." Whether one's concern be with genetic experiments, neolithic artifacts, explications of romantic poetry, applications of microwaves, or research on the mass media, the information on the subject seems unmanageable. Is this the result of "real" and "new" knowledge, or the residue of the communications processing? In the fields in which I can judge, the "knowledge explosion" is, like media "news," largely not new and, to echo Thoreau, seems irrelevant, redundant and distracting. A noted scientist tells me that "about eighty percent of the literature in my field is nonsense"; in my own fields I would have to propose a higher percentage and stronger language. Yet we seem, too, caught in its ritual compulsions.

The information explosion also encourages some new "laws" of information handling which apply to scholarship as well as to bureaucratic communications and the mass media. Much information must be treated as if it were not real, only self-serving. Indeed, when one scans through the latest pile of journals, or plows through yet another committee report, or watches an evening of TV, he may intentionally relate to the material for satiation of sensibility or ritual avoidance of something else, including the ironic pleasures of being inundated with nonsense. A second law might be that as information increases disproportionately so will pervasive fraud,

whether it be dubious statistics and declarations by institutions, the very widespread plagiarism in education, the dependence on phony official handouts in journalism, or fake aesthetic gestures. This results less from malicious motives than from the personal need to impersonally fill the communications channels with something, be it PR releases, purchased term papers, ersatz news or pseudo-art. Officials, students, reporters and artists unable to meet the massive demands of communications systems, few of which shut down when no one has anything to say, become ingenuous frauds.

Institutions and learning also respond with overload-display, such as endless unconsumable committee reports, or, say, the current style in biographies of literary and political figures, which swell to absurd proportions in a mania for trivial detailing. Relentless collection and reproduction of information conjoins with a decline in coherence, and becomes its substitute. The means of communication become self-demanding and saturation the major end. Nor do the "higher arts" show much more immunity than the lowered arts from the saturation of technique-induced and media-faddish disposable styles. The presses will roll, the programming will go on, the institutions will demand, and they will all be filled and re-filled. Our communications, too, abhor a vacuum, except perhaps that of the self which they encourage within us.

Non-technical selectivity, that of sense and feeling, seems inappropriate. The libraries of the universities and the paper and film depositories of the corporations and the state become unstylishly monumental, as do our other garbage dumps. In spite of various elaborate systems for miniaturizing, digesting, compacting and indexing, we cannot achieve adequate ways to refine and dispose of our communications refuse. As with FBI and credit files, much of the accumulated information remains "raw" and open to misuse. As with book publishing, ritual confirmation of role becomes a major function, authorship certifying academics and other bureaucratic specialists, artistic pretenders and other status aggrandizers. As with book reviewing, selection and judging come out quite sycophantic, incompetent and arbitrary. Publishing and broadcasting are about as intellectual and honest as real estate brokerage.

Often the stock answers to the "communications problem" are to increase the problem itself. Many "liberal" critics of mass

media news insist that we need more "news coverage," or even one or more new nation-wide systems of news broadcasting. Institutional reformers cry out for more committee studies and reports and public relations stuff. And sincere specialists everywhere self-interestedly demand more learned compilations and conference excretions and new subfields of research and grants and ego-reinforcing "communication." These pervasive responses must be part of a larger pathology. Just as our answer to nuclear war dangers has been to elaborate, produce and stockpile yet more nuclear weapons, so our answer to communications-information problems is to elaborate, produce and stockpile more of the same. Whether this logic inheres in technocratic order, or more deeply in the cast of mind and society which encourages that exponential processing, we see their fusion in a technocommunications religiosity.

Otherwise put, our poisoning by overdoses of incoherent information-communication is to be cured by homeopathically taking more of the same poison. Such magical treatment of sated sensibility runs through most futurist discussions of communications. "The knowledge factory of the future," the electronic mystics tell us, will be "a total information environment." By any available evidence and reasoning, mis-use, fraud, incoherence, satiation and ritual-control will also be massive characteristics of any further maximized communications systems.

Some futurists tell us that there will soon be a wonderful enlargement of television and its informing public services, with the current urban American access to about six channels to become, by way of cable TV, access to twenty to forty channels. By some weird extrapolation, multiplication of the same translates into diversity and freedom, and even increased art and enlightenment. The epitomization of this may be the McLuhanism of a few years ago in which by multiplying all the automobile models times all the optional accessories we arrive at the fantastic consumer options of 25 million transportation possibilities. Since the choices did not include significantly different power plants, or an inexpensively safe and well-crafted car, or comfortable and efficient public transportation, the millions of trivial variations merely confirmed the lack of significant choice which they helped to disguise. Parallel camouflaged standardization pervades publishing and broadcast-

ing though because, unlike automobiles, communications are not subject to minimums of internal combustion and gravity, their variety may be even less real.

There could of course be a small increase in mass media options for purposes of more sophisticated market exploitation and institutional control. In the mass media, in the developing home entertainment-information appliances, and in yet more unusual modes of further ritualizing play and thought, there may well be efforts to maximize special group appeals and profits rather than focusing on "One Maximum Audience." But given our social structure, any real increase in diversity and quality may only be slight. Radio stations devoted only to classical or rock music, magazines devoted only to popularized psychology or *au courant* art, may provide greater pleasures to their aficionados because of less distraction—a crucial longing of current overburdened audiences—and because of a distinctive vulgarization which highlights the identity of the special audience, thus giving further ritual appearance of personal definition and value. But the competitive conditioning of a still large and alienated audience promises no great increase in diversity or quality. More may usually be less when maximizing the inadequate for exploitative purposes. Put another way, the progress of technocommunications tends to be functional only, not intellectual or moral or aesthetic: ninety-nine ways of reproducing, redividing, redistributing the same material but not nine new ways of sensing, feeling and understanding the realities. Since our technocommunications have so far initiated little of significant aesthetic and intellectual quality, there is little reason to believe they ever will unless subject not to their own development but to radical changes in their social and cultural base.

Much of our current communications already produces excess, variously described as "the heavy communications overlay," "the information overload," "media saturation," "the knowledge explosion," "electronic enervation," "media shock," "stimuli redundancy," "technological burdening," or, in the superficially inflated metaphor of Alvin Toffler, "future shock." Some of the basic overload theories now current seem to derive from our knowledge of the effects of "sensory deprivation." The restricted laboratory animal or solitary invalid or prisoner suffers from a lack of stimuli and his symptoms of shock, anomie and apathy point to a physical as well as social

and psychic decline. Over-population, over-stimulation and over-communication produce strikingly similar effects to deprivation. Too much, like too little, leads to withering and withdrawal at all levels.

I emphasize the obvious: a "total information environment" or any other massive technocommunications system lacks human proportions. If not subject to the converging limitations of audience control, sensitively humane limits, and effective criticism, the communications will tend to impose their own processes and powers, violating the human sensibility historically oriented in previous communications. Part of this will be the impositions of the controllers of the communications, part will simply be the self-aggrandizing communications systems. Patently, the arbitrary and exploitative controls by our present bureaucratic-corporate marketplace do not, and cannot, provide sufficient limitation, criticism and participation. Technocommunications systems tend to take off on their own, overriding and overloading the audiences, partly because a humanly reduced and passive sensibility well fits the demands of a technocracy and its controllers.

In a complex order, withdrawal from a communications and information overload takes various and even perverse ways. Communications addiction appears to be a major current way of inadequate or exasperated response. Desensitized or otherwise disoriented from the overload, the sated TV watcher, the obsessional memo-writer, the sports glutton, the fanatic info-accumulator, the telephone-head, or other communications compulsive may increase the dosage in desperate hope that more stimuli will overcome the deadening from overload. But this can only succeed in the sense that the traditional drunkard's hair-of-the-dog-that-bit-him provides momentary recuperation.

Yet total withdrawal from communications intoxication does not seem a generally viable possibility. Furthermore, as Emile Durkheim correctly predicted, mass industrial society reaches a condition in which "collective sentiments are weakened." As a result of the widespread feelings of isolation and uncertainty, substitute relationships and identifications, such as those provided by the mass media and other communications networks, become necessary. American society has completed a generation in which both the mass media drastically expanded and class education became

mass education. But, as many studies indicate, the increase in education has not made major differences in media intellectual and aesthetic quality. The educated participate pretty much like everyone else in the ritual processing. I suggest they do so because there is no other church in town.

From media content, one suspects that a generation of development and education produced a slight increase in sophistication. From audience responses, one suspects that affluence-education produced a slight increase in resistance within the addictive processing, by way of cynicism about the information, contempt for aesthetic pretensions, and a defensively low-level of attention. Even to these hardly radical responses, the media counter with increased redundancy and ritualization, in an endless cycling of low-level dissatisfaction. So we achieve, for the media and more generally, the apathy called "tolerance" where anything goes, which means nothing goes with high verve or great intensity. A certain madness becomes normative, such as that of obscenely trumpeted pseudo-products, a decade-long televised brutal war, increased alienation from craft and intelligence, and much else. Dysfunction, in human terms, becomes functional in a disintegrating culture held together by shoddy but energetic technological systems.

Though compensatorily resisted, our communications overload must lead to exacerbation of the problems of society and sensibility. For instance, the administrative personality alienated from those he manipulates must maximize his "in-puts," such as multiplying his directives, though memos memorialize only the unmemorable and call forth a low level of response. Similarly with the "sensitivity sessions," new "internal information systems," and other social scientized, psychologized and technologized substitutes for common sentiments and authentic communications. Quite possibly, of course, true rather than ritualized communications would break up the bureaucracy since its authorities and products and purposes may be illegitimate and unjustifiable. But *pretenses* at communication will not re-legitimatize authorities and purposes, or liberate other vitalities. The radical problems remain under the ritual camouflage of communications and information systems. New techniques and technologies get pressed into play to answer the now self-evolving "communications problem," and the synthetic answer becomes the real difficulty. As with new superhighways to relieve

the overload of old superhighways, which were to relieve the overload of highways, which were to relieve the overload of roads and streets, the labyrinth may become an infinite regress. This is technocracy.

The condition can be seen as dubious long before the labyrinth of technocommunications. The sages, such as Thoreau and Chuang-Tzu, objected to too many communications partly because wisdom requires intellectual open spaces, a recuperative wilderness of immediacy and contemplation. But when we everywhere find communications pollution some essentials have been lost, including crucial kinds of attention (not the mere inattention so necessary to survive our communications), solitude (not the mere loneliness of urban paranoia), and tangible communion (not mere media images and identities). For sensibility deprived of its crucial resources and burdened with synthetic substitutes must suffer disorientation. Art in this context starts out systematically strained and submerged. Desperate to attract attention to itself amidst the communications pollution, the techniques of art will be over-charged, the forms over-strained, the styles over-loaded. Hard rock music became so loud that it literally deafened its players and listeners. Popular melodramas, such as the "western" and detective and spy fables, became fantastically decadent with heroes as weird cripples and psychopaths. The reversed eros and violence become extreme and gratuitous. In such mannerism, the props take over the action and moral implications become comically perverse. As with conducting a conversation next to a turbine at a constant half-shout, attention must be lost because of inability at nuance and persuasive variation and proportion. Such exacerbated artistry becomes self-defeating, and probably must self-destruct.

A "double-bind" aesthetic takes over. Physical violation fuses with moral blandness, and tends to be perceived as the same. Ornate hysteria becomes one with simplex palliatives. We simultaneously get pushed towards passionate responses and pulled back into passive packaging. Intense demands for our concern conjoin with massive indifferentism. Probing the states of mass art forces upon us paradoxical descriptions of technological sensibility and its violent apathy, its optimistic despair, and its most insistent condition of overloaded emptiness. The stage directions for the personae in a technocracy may repeat the paralytic circle that concludes both

acts of *Waiting for Godot:* " 'Yes, let's go.' *They do not move.*"

Probably we should resist the simple conclusion that our "communications explosion" serves as cause rather than also as an effect of the failure of real communication. Surely our technology provides what we need to carry out some deeper imperatives of our culture and society. The Protestant Work Ethic secularized into productions for production's sake, and our technocommunications come out of it. The bureaucratic rationalization of an over-enlarged and over-powered America required massive ritualization through the media. The circuits must proliferate, and in a style which makes the proliferation of circuits our ultimate purpose. I also suspect that our exaltation of technocommunications systems—hardly anyone else seems to be seriously against them—expresses a desperate religious surrogate, a sensate mirage substituting for a good society.

Certainly our technocommunications developed from and still serve institutional advantages and ideological dominations, but the processing, I have argued, tends to take off on its own. Not all effects seem bad; demagoguery, contrary to our earlier prophets of mass communications dangers, may have declined, along with other impassioned responses. Some commentators relate the undeniable loss of legitimacy of institutional hierarchies to the bypassing of them by the communications systems. No doubt there are other advantages to the sensibility disoriented by endless media distractions. True, technocommunications can also serve oppositions, on limited occasions, carrying rebellious messages. But most such must be small and bitter fruit, pulped into the ritualized overload and synthetic sensibility which itself becomes the ultimate mode of control.

At some point, perhaps only recognizable in future perspective, the processing with technocommunications becomes sufficiently self-generating and self-serving so that freedom of communication doesn't even belong to those who own the communications. We may come under rule by our technology in the same sense that earlier cultures have been ruled by that which they worshipped. Of course technocracy is far from being, so far as we can see, complete, uniform, self-sufficient. Internal Ludditism and other ways of resistance continue, as do parts of traditional culture and counterculture, and may limit the communications mania. Possibly the pervasive boredom and disorientation will create a resentful rage

leading to apocalyptic tidings as the last message on the "news." Or the ritual processing and short-circuited sensibilities may merely decline into a full anemia of passion and purpose. Hence we may conclude with the rule of the sages: Too much of communications may finally be no communication at all. Perhaps we should add the Don Juan corollary: Just as the more one seduces the less one loves, so the more one is "informed" the less one knows. The seductions of maximized technocommunications and all their processing ways have become a religiosity which must be broken through. Otherwise the deadened sensibility and social catatonia of a technocracy may be the final news of the communications explosion.

PART TWO

the cybernetic consciousness

Science was born when philosophers deemphasized the conception of the nature of the universe in order to speculate and investigate "how" the universe behaved. To know "how," the scientist was eventually required to observe, test, hypothesize, and experiment. For the past two hundred years, perhaps longer, scientists have taken the study of the "how" to what some consider a dubious extreme. The degree of specialization today is a result of the view that depth tells us more than scope. Thus, within the macrocosmic endeavor of science, individuals have been increasingly encouraged to become microcosmic in their work.

Though Buckminster Fuller and Marshall McLuhan, among others, have called for "comprehensivist" or "generalist" students of the world, still more persuasively has the logic of science itself led us back to the "conception of the universe." The particular evolutionary development within science that brings us to a philosophic overview is cybernetics.

Throughout the history of science, individuals have made great discoveries about the universe itself which have had a great impact because of their implications for mankind. Though less appreciated

in their own time, many scientific ideas have evolved into still greater social or cultural systems of thought. Newton created a powerful physics in his time, but his lasting contribution to human history is his world view: the idea of enlightenment, and all of the cultural effects stimulated by his vision of the world as mechanistic order.

When Newton entitled his first book "Optics," not only did he wish to describe the universal behavior of light, but he wanted also to reinforce the assumptions of "enlightenment," the idea that the universe was ordered, that this order was knowable, and that once perceived, it would allow men to live more compatibly with natural law, and thereby achieve harmony. This is merely one obvious example of the fact that science itself is encased by the culture that encourages it. The scientific endeavor is influenced by what it seeks to find and by what the society wishes to know.

Science is encapsulated by society, and their relationship is reciprocal. The direction of science will be influenced by the social support it receives and by the assumptions the scientists themselves make, and society will be changed by the scientists' reconceptions of the nature of the universe. It is more than an irony that in the birth throes of the twentieth century, Einstein conceived his theory of relativity, a phrase that has little competition as the major characteristic of this century.

The relationship between society and science has tended to remain an unspoken truth, at least within the discipline of science itself. Now, with the evolution of cybernetics, this process has been scientifically articulated.

Cybernetics is a system of thought resulting from the investigation of information processes. Out of the efforts of some to understand the behavior of data-processing machines and computers, and from such narrow concerns as, for example, how much information can be accurately transmitted through a wire, a comprehensive overview has emerged which not only tells us about parts of the whole, but also shows us the whole itself. Some call this "systems thinking," but I would prefer to describe it as today's version of the historically repetitive attempt to integrate human knowledge with a holistic view of the universe. Cybernetics can be thought of as the rehumanizing of scientific information; a generalization of all data into a metaphysical model.

I have called cybernetics holistic, and it is. Its implications and insights are available to the research scientist, the communications specialist, the sociologist, the psychologist, the cultural historian, and the poet. It is a sophisticated system of thought that could not have arisen had it not been for the cultural influences of existentialism and relativity theory. One might even argue that cybernetics is existentialist science, for it enables us to describe the entire workings of a system without recourse to first causes, the workings of the divine, or to cosmological order. In other words, it is a comprehensive model that does not necessarily have to refute the principles of relativity. It is a view of meaning that does not require the universe to be meaningful.

That cybernetics comes to us at the latter part of the twentieth century could not be more timely. If there was ever an era that needed some comprehensive overview of the diversity of experience and the endless purview of information, it is the present.

The ways cybernetics came to be derived are easy to retrace. When dealing with the behavior of machines, one encounters the problem of machine-human and machine-machine communication. Obviously, a machine will be of value only if we can communicate with it and tell it what we wish it to do. Usually this communication occurs within the design of the machine itself. However, with computers, we have designed machines that are capable of many tasks, and it is our job to instruct the machine for each specific one. As well as humans communicating desired tasks to machines, it is also necessary for the machine to indicate to humans when it does not have sufficient information to complete the task, or when it simply does not understand what is required of it. Thus, there must be some kind of language to expedite human-machine cooperation. As men came to study this question and to explore this language, they arrived at some very important insights into the nature of communication itself. The specific processes will be described in the essays that follow.

It was soon recognized that the theory of communication, its epistemological insights, its definition and understanding of message, feedback, voice and input-output processes—all occurring within relative and variable rates of change—tell us a great deal about our world if we consider man a machine and human environments as systems. The information generated by a study of

human-machine and machine-machine communication became generalized into a broad field of study describing all communication processes.

If man can be metaphorically considered a machine, he can be redefined as an electro-chemical information system capable of various levels of multiple feedback. As the reader will see, this leads to holographic theories of the brain, psychic research, developments in neurobiology, studies of nonverbal communication, and a host of other related phenomena. If the human environment is considered as a system, a cybernetic investigation yields the connective-communicative aspects of the whole without expending energies in countless journeys into the parts.

Because new media are new communication systems, they will increase our cybernetic understanding and be better understood by a cybernetic analysis. The relationship is synergetic. The difficult cybernetics chapter appears first because an awareness of cybernetics is a necessary prelude to any further investigation of the media themselves. The parts should be discussed within the context of the whole. It is also necessary to consider John Lilly's clear articulation of the relationship between communication and mental health. Though some of the readings may be technical, the importance of their insights cannot be overestimated.

Chapter 3

mental health and communication

John Lilly

Communication, when it succeeds, is one of man's greatest assets, and when it fails is his worst enemy. Each of us tries and succeeds to a certain extent to communicate with others in his immediate surroundings every day, hours at a time. As we vary as individuals so we vary in our talents in communication with one another. Some persons are expert communicators; each of us recognizes the experts. Yet an expert is not a scientist, is not a psychologist, nor any specialist necessarily. Such an expert communicator can be anyone. How does such a person become an expert in communication? Basically this is a question of mental health. The best communicators are those who are the most mentally healthy, happy, natural, spontaneous, disciplined persons.

Among the human species are persons who have severe difficulties in communication with other human beings. During our growth from infancy each of us has had difficulties which grade all the way from those of the child who yet had no language for communication, through the various human achievement levels: grade school, high school, college, job, profession. As we become older our skills at communication tend to increase, with experience and with practice and with study. For each one of us this is the most important study that we have ever undertaken: how to communicate with our fellow man is a constant and recurring problem of consuming interest.

We want understanding, love, and respect; we receive them through communicating what is in our minds. We want to give understanding, love, and respect; we can give only through communication and only to those who can communicate in turn.

Our mental health is measured by how well we communicate with our fellow men and women. As Freud emphasized, the special communication called sexual activities gives one a rule of thumb of the success that a person has as a healthy human being. If one has exhilarating, stimulating, and fulfilling sexual experiences in the heterosexual sphere, he is mentally healthy. If one's work is successful, expanding, and happy, he is mentally healthy. In these two spheres (in the love life and in the work life) of a given individual are the major clues to a person's success as an individual. This is the outside view of one's personal accomplishments and personal behaviors.

However, the inside view (the almost secret view) of one's self that he protects from the outside society says similar things. If one, as it were, deep within his adult self knows that his sexual activities are satisfying, guilt-free, and give intense pleasure to his partner, he has a deep happiness on which he bases the rest of his life.

If one's work presents novelty, variety, and a sense of internal and external progress as judged by himself (and eventually by the others outside himself), he then adds to the happiness of his love life by the accomplishments in the external world.

Thus our problem in our own species is achieving a basic communication with our fellow men and fellow women, so deep that each of us and each of them can be satisfied in very basic ways. If our communication is blocked, the satisfactory performance of our love life and our work life is blocked. If we have an unconscious and a conscious desire to communicate with our fellow men we can succeed. However, we must know ourselves in order to communicate. We must know the kind of things that we project into other people "as if" they are communicating them to us but are really not so doing.

This phenomena of projection of ourselves (our thoughts and our expectations) into others is a very human problem. We miss our goals by assuming that others are what we want them to be or that they are saying or communicating by other means what we want them to communicate. This problem of projection blocks a large

fraction of true communication. How do we do this wishful, false realizing?

Our relatively large minds (brains) act as computers that can make models inside themselves of other human minds and their activities. Each of us knows that we construct models of other persons: one has a model of his wife in his head; she in turn has a model of her husband in hers. Each of us has a model of each child as it comes along; the models must grow with the child or there is communication trouble. The model of the wife must change in the husband as the wife changes and grows; the model of the husband in the wife must change as the real person changes. Otherwise there is a severe breakdown of communication.

One must change the models of one's parents and not project them into the model of one's wife or husband or children. The modeling that we did as children (of the adults in our surroundings) has the primitive features on which all the others eventually are built. However, unless built as growing, changing models, the childish models can be defective, can be incomplete, and eventually can be shown to be what they really are, "childish models," needing change and growth. Mentally healthy persons start with growing, changing models and see to it that growth continues.

Thus projection involves the use of inappropriate intransigent models of other human beings. If one has a realistic model of one's wife or husband (the model that corresponds more or less with the reality of that person), he or she then successfully communicates with the real person. He does not ask that particular real person to do impossible or contradictory things to satisfy his fantasies; he asks appropriate, realizable things to satisfy him.

Similarly, if one knows his own basic deep needs, he can communicate in terms of ethics, morals, manners, instincts, the acquisition of new knowledge, the nurturing and teaching of children, the building and maintenance of his own home, the encouragement of his friends, the performance of his work, the participation in the national and international life of his species. If one can realize that he is a unique individual, unrepeated since the beginning of his species, and can also confer this honor on each other human individual, he can then spend the time to learn his own internal language, and the internal language of each other individual, learn

how to translate each into the commonly shared language and thus succeed in communication.

The human species has found quite empirically that the best communication is by those who closely resemble one another and who are placed in long-term close contact with one another. Isolated communities develop and maintain singularities in the language used; they develop and maintain customs of dress, of ritual, of loving, and of working uniquely theirs. They can also develop what has been termed "fear of the stranger" or "xenophobia" in many instances. In other instances xenophobia fails to appear or somehow is worked through by the local community, and strangers are welcomed among them. The projection of one's fears outward onto the unknown or the unfamiliar, beyond one's own group, nation, or species, creates a dangerous communication paralysis.

In the modern world with the hydrogen bombs and threats of extinction, we must, finally, examine carefully our best means of communication with interpersonal man, of group to ever larger group. We must support research in these areas of communication. We must support research that shows promise of giving us new insight into interhuman communication. *For the mental health of each one of us, for the national and international peace of all of us, communication is a paramount and pressing issue.* We can no longer allow the "glass walls" that have risen between us (most dramatically in the mentally ill, and in the international cases) to exist, much less to influence our desires and our needs to communicate. This book demonstrates the relevance of the study of communication with the bottlenose dolphin to these extremely important future advances in human communication: through dolphins we will see ourselves as others see us. Through dolphin communication efforts we will help ourselves. . . .

The truly deep problems of the mentally ill are communication problems. A mentally ill person for some reason or another cannot and hence will not communicate adequately with other human beings. The reasons among the many unique ill individuals are myriad. The reasons are under intensive scrutiny in many areas of medical and mental health research.

Some of the genetic factors, the "inherited defects," are being turned up in the recent research on chromosomes in the human. For

example, several determinable physical signs of an altered inheritance have been found in the chromosomal studies. Some forms of mental illness depend upon such inherited, determinable defects. These defects are manifested by sometimes obvious anatomical changes in the appearance of the human being, sometimes in an obvious biochemical change (with the excretion of the urine of particular "abnormal" substances). Sometimes there are only peculiar behaviors, and, most relevant to our present discussion, only peculiar kinds of communication of types not normally encountered.

This group of patients are those with built-in "errors" of inheritance. These are the genetically determined and clinically detectable "errors." Such cases are relatively infrequent in occurrence.

Most of us who manage to survive all of the exigencies of conception, gestation, birth, and infancy are uniquely different, one from another. The evidence for this uniqueness is manifold. If one attempts to graft the skin of one person onto another person, the second person develops immunities against that grafted skin, and it eventually sloughs off. A careful examination of the mechanisms underlying the development of these immunities shows that each of us is so biochemically different that we reject the live tissues of another. These biochemical differences may extend into almost all aspects of our lives. Each of our neuronal patterns of activity is unique (EEGs, etc.). Perhaps each of us is so uniquely different that our thought processes, as well as our neuronal patterns of activity, are uniquely different. However, there seems to be at least potentially enough commonality of thinking and feeling to achieve communication and to maintain us as a species. We know that there is enough commonality of anatomy, at least of gross anatomy, to perpetuate the species. If there is not, that individual has no children. It is almost as if in the gross large picture we are forced by survival contingencies to look alike. As the picture becomes more and more microscopic, and we analyze closer and closer to the individual selves, the differences become obvious, inescapable, and determining.

The "general purpose" nature of large parts of our brains is the saving grace which allows one individual to communicate with another. The uniqueness built into the biochemistry generates a brain which in the patterns of activity and in microscopic and molecular detail is unique. As over the thousands of generations in

evolution the number of neurons has increased to the thirteen billions that we have, a common power or property has developed in most human brains. The important common power is the ability of this brain to assume the tasks of making models of creatures and persons in its surrounds. This is the fundamental property which allows communication to take place.

We can develop and share a language among uniquely different individuals because each of those individuals can take on enough of the commonality of language within his own brain to allow communication. But we must never forget that the thinking processes of the individual are still uniquely his or hers. Only certain aspects are common and shared. We may have the illusion of penetrating completely into the mental life of another human being through language, but this is impossible. Each of us is so uniquely different and so uniquely himself that we cannot yet so penetrate. It is a delusion to presume that one can. Laziness fosters this belief.

Chapter 4

cybernetics in history

Norbert Wiener

Since the end of World War II, I have been working on the many ramifications of the theory of messages. Besides the electrical engineering theory of the transmission of messages, there is a larger field which includes not only the study of language but the study of messages as a means of controlling machinery and society, the development of computing machines and other such automata, certain reflections upon psychology and the nervous system, and a tentative new theory of scientific method. This larger theory of messages is a probabilistic theory, an intrinsic part of the movement that owes its origin to Willard Gibbs. . . .

Until recently, there was no existing word for this complex of ideas, and in order to embrace the whole field by a single term, I felt constrained to invent one. Hence "Cybernetics," which I derived from the Greek word *kubernetes,* or "steersman," the same Greek word from which we eventually derive our word "governor." Incidentally, I found later that the word had already been used by Ampère with reference to political science, and had been introduced in another context by a Polish scientist, both uses dating from the earlier part of the nineteenth century.

I wrote a more or less technical book entitled *Cybernetics* which was published in 1948. In response to a certain demand for

me to make its ideas acceptable to the lay public, I published the first edition of *The Human Use of Human Beings* in 1950. Since then the subject has grown from a few ideas shared by Drs. Claude Shannon, Warren Weaver, and myself, into an established region of research. . . .

In giving the definition of Cybernetics in the original book, I classed communication and control together. Why did I do this? When I communicate with another person, I impart a message to him, and when he communicates back with me he returns a related message which contains information primarily accessible to him and not to me. When I control the actions of another person, I communicate a message to him, and although this message is in the imperative mood, the technique of communication does not differ from that of a message of fact. Furthermore, if my control is to be effective I must take cognizance of any messages from him which may indicate that the order is understood and has been obeyed.

It is [my] thesis . . . that society can only be understood through a study of the messages and the communication facilities which belong to it; and that in the future development of these messages and communication facilities, messages between man and machines, between machines and man, and between machine and machine, are destined to play an ever-increasing part.

When I give an order to a machine, the situation is not essentially different from that which arises when I give an order to a person. In other words, as far as my consciousness goes I am aware of the order that has gone out and of the signal of compliance that has come back. To me, personally, the fact that the signal in its intermediate stages has gone through a machine rather than through a person is irrelevant and does not in any case greatly change my relation to the signal. Thus the theory of control in engineering, whether human or animal or mechanical, is a chapter in the theory of messages.

Naturally there are detailed differences in messages and in problems of control, not only between a living organism and a machine, but within each narrower class of beings. It is the purpose of Cybernetics to develop a language and technique that will enable us indeed to attack the problem of control and communication in general, but also to find the proper repertory of ideas and

techniques to classify their particular manifestations under certain concepts.

The commands through which we exercise our control over our environment are a kind of information which we impart to it. Like any form of information, these commands are subject to disorganization in transit. They generally come through in less coherent fashion and certainly not more coherently than they were sent. In control and communication we are always fighting nature's tendency to degrade the organized and to destroy the meaningful; the tendency, as Gibbs has shown us, for entropy to increase.

. . . Man is immersed in a world which he perceives through his sense organs. Information that he receives is co-ordinated through his brain and nervous system until, after the proper process of storage, collation, and selection, it emerges through effector organs, generally his muscles. These in turn act on the external world, and also react on the central nervous system through receptor organs such as the end organs of kinaesthesia; and the information received by the kinaesthetic organs is combined with his already accumulated store of information to influence future action.

Information is a name for the content of what is exchanged with the outer world as we adjust to it, and make our adjustment felt upon it. The process of receiving and of using information is the process of our adjusting to the contingencies of the outer environment, and of our living effectively within that environment. The needs and the complexity of modern life make greater demands on this process of information than ever before, and our press, our museums, our scientific laboratories, our universities, our libraries and textbooks, are obliged to meet the needs of this process or fail in their purpose. To live effectively is to live with adequate information. Thus, communication and control belong to the essence of man's inner life, even as they belong to his life in society. . . .

The machine which acts on the external world by means of messages is . . . familiar. The automatic photoelectric door opener is known to every person who has passed through the Pennsylvania Station in New York, and is used in many other buildings as well. When a message consisting of the interception of a beam of light is sent to the apparatus, this message actuates the door, and opens it so that the passenger may go through.

The steps between the actuation of a machine of this type by sense organs and its performance of a task may be as simple as in the case of the electric door; or it may be in fact of any desired degree of complexity within the limits of our engineering techniques. A complex action is one in which the data introduced, which we call the *input,* to obtain an effect on the outer world, which we call the *output,* may involve a large number of combinations. These are combinations both of the data put in at the moment and of the records taken from the past stored data which we call the *memory.* These are recorded in the machine. The most complicated machines yet made which transform input data into output data are the high-speed electrical computing machines. . . . The determination of the mode of conduct of these machines is given through a special sort of input, which frequently consists of punched cards or tapes or of magnetized wires, and which determines the way in which the machine is going to act in one operation, as distinct from the way in which it might have acted in another. Because of the frequent use of punched or magnetic tape in the control, the data which are fed in, and which indicate the mode of operation of one of these machines for combining information, are called the *taping.*

. . . Man and the animal have a kinaesthetic sense, by which they keep a record of the position and tensions of their muscles. For any machine subject to a varied external environment to act effectively it is necessary that information concerning the results of its own action be furnished to it as part of the information on which it must continue to act. For example, if we are running an elevator, it is not enough to open the outside door because the orders we have given should make the elevator be at that door at the time we open it. It is important that the release for opening the door be dependent on the fact that the elevator is actually at the door; otherwise something might have detained it, and the passenger might step into the empty shaft. This control of a machine on the basis of its *actual* performance rather than its *expected* performance is known as *feedback,* and involves sensory members which are actuated by motor members and perform the function of *tell-tales* or *monitors*—that is, of elements which indicate a performance. It is the function of these mechanisms to control the mechanical tendency toward disorganization; in other words, to produce a

temporary and local reversal of the normal direction of entropy.

I have just mentioned the elevator as an example of feedback. There are other cases where the importance of feedback is even more apparent. For example, a gun-pointer takes information from his instruments of observation, and conveys it to the gun, so that the latter will point in such a direction that the missile will pass through the moving target at a certain time. Now, the gun itself must be used under all conditions of weather. In some of these the grease is warm, and the gun swings easily and rapidly. Under other conditions the grease is frozen or mixed with sand, and the gun is slow to answer the orders given to it. If these orders are reinforced by an extra push given when the gun fails to respond easily to the orders and lags behind them, then the error of the gunpointer will be decreased. To obtain a performance as uniform as possible, it is customary to put into the gun a control feedback element which reads the lag of the gun behind the position it should have according to the orders given it, and which uses this difference to give the gun an extra push.

It is true that precautions must be taken so that the push is not too hard, for if it is, the gun will swing past its proper position, and will have to be pulled back in a series of oscillations, which may well become wider and wider, and lead to a disastrous instability. If the feedback system is itself controlled—if, in other words, its own entropic tendencies are checked by still other controlling mechanisms—and kept within limits sufficiently stringent, this will not occur, and the existence of the feedback will increase the stability of performance of the gun. In other words, the performance will become less dependent on the frictional load; or what is the same thing, on the drag created by the stiffness of the grease.

Something very similar to this occurs in human action. If I pick up my cigar, I do not will to move any specific muscles. Indeed in many cases, I do not know what those muscles are. What I do is to turn into action a certain feedback mechanism; namely, a reflex in which the amount by which I have yet failed to pick up the cigar is turned into a new and increased order to the lagging muscles, whichever they may be. In this way, a fairly uniform voluntary command will enable the same task to be performed from widely varying initial positions, and irrespective of the decrease of contraction due to fatigue of the muscles. Similarly, when I drive a car, I do not follow out a series of commands dependent simply

on a mental image of the road and the task I am doing. If I find the car swerving too much to the right, that causes me to pull it to the left. This depends on the actual performance of the car, and not simply on the road; and it allows me to drive with nearly equal efficiency a light Austin or a heavy truck, without having formed separate habits for the driving of the two. . . .

It is my thesis that the physical functioning of the living individual and the operation of some of the newer communication machines are precisely parallel in their analogous attempts to control entropy through feedback. Both of them have sensory receptors as one stage in their cycle of operation: that is, in both of them there exists a special apparatus for collecting information from the outer world at low energy levels, and for making it available in the operation of the individual or of the machine. In both cases these external messages are not taken *neat,* but through the internal transforming powers of the apparatus, whether it be alive or dead. The information is then turned into a new form available for the further stages of performance. In both the animal and the machine this performance is made to be effective on the outer world. In both of them, their *performed* action on the outer world, and not merely their *intended* action, is reported back to the central regulatory apparatus. This complex of behavior is ignored by the average man, and in particular does not play the role that it should in our habitual analysis of society; for just as individual physical responses may be seen from this point of view, so may the organic responses of society itself. I do not mean that the sociologist is unaware of the existence and complex nature of communications in society, but until recently he has tended to overlook the extent to which they are the cement which binds its fabric together.

We have seen in this [discussion] the fundamental unity of a complex of ideas which until recently had not been sufficiently associated with one another, namely, the contingent view of physics that Gibbs introduced as a modification of the traditional, Newtonian conventions, the Augustinian attitude toward order and conduct which is demanded by this view, and the theory of the message among men, machines, and in society as a sequence of events in time which, though it itself has a certain contingency, strives to hold back nature's tendency toward disorder by adjusting its parts to various purposive ends.

Chapter 5

language and communication

Jagjit Singh

Although cybernetics has now become a miscellany of loosely related activities, we shall use the term here to denote an interdisciplinary inquiry into the nature and physical basis of human intelligence, with the object of reproducing it synthetically. Since human intelligence shows itself in the complexity of man's total conduct, such an introspective probe must naturally begin with the construction of mechanisms that will exhibit comparable complexity of behavior. But to construct the latter we must somehow specify in language the complexity we wish to embody in the machine. Consequently, the complexity of the system we attempt to define will inevitably be limited by our power of processing the information communicated in the language we use. Unfortunately, our information-absorbing powers, when we employ the language of our daily discourse, are notoriously limited. The only way of overcoming this handicap is to make machines that understand languages—machine codes—with far greater capacity to gobble and digest coded information fed into them than our own. . . . Several machine languages or codes of sufficient sophistication have recently been devised to permit description of highly complicated systems. There is thus a close but reciprocal tie-up between the complexity of a system and the language used to specify complexity for communicating it to the processing machine. Language and communication on

"Language and Communication." From *Great Ideas in Information Theory, Language, and Cybernetics,* by Jagjit Singh (New York: Dover Publications, Inc., 1966). Reprinted by permission of the publisher.

the one hand and complexity of artificial intelligent systems on the other are, therefore, closely related. Advances in one—say, the power of language—enable the specification of more complex systems; whereas the construction of more complex systems that such specification allows leads to the invention of more powerful languages or machine codes. Thanks to parallel advances in machine codes and in the design of machines able to manipulate the information they embody, it has recently been possible to devise highly complex communication machines and control systems capable of imitating human behavior to some extent. Such, for example, are the machines which communicate with one another by means of a code or language very much as human beings do. There are others which store data put into them and thus exhibit what we call memory. This process has been extended to confer on these machines even the power to learn, although the technique of building and employing such machines . . . is still very rudimentary and imperfect. However, despite their imperfections, the study of all these kinds of machines has inevitably led to a new understanding of the mechanism of language, communication, memory, and learning in human beings.

The new understanding fostered by cybernetics is not only leading to the creation of improved technical devices (enabling a computer or even a summit leader to speak to its/his counterpart across the continent at the flick of a few switches) but is providing a basis for the design of what Hans Freudenthal calls "Lincos," a new language for cosmic intercourse. Beginning with a Lincos broadcast of such universal truths as "twice two makes four," it may be possible to develop sufficient vocabulary to converse even on God, love, Universal Mind and the like with celestial beings in other planetary worlds of the Milky Way and beyond.

The ability of cybernetics to take in its stride such a wide diversity of activities as the design of robots to guide satellites in their courses, pursue missiles, run refineries, or monitor telephone exchanges, on the one hand, and that of ersatz brains, intelligence amplifiers, and Lincos, on the other, stems from a basic unity pervading both types of control and communication mechanisms—the naturally occurring type found in animals as well as the artificially contrived one in manmade automata. It shows itself most strikingly in the rudimentary imitations of life embodied in the remarkable

toys of electrophysiologists like Ross Ashby and Grey Walter. Ashby's creature, appropriately christened *machina spora,* for example, behaves as a "fireside cat or dog which only stirs when disturbed, and then methodically finds a comfortable position and goes to sleep again." [1] Actually it is merely a rig of electronic circuits similar to the reflex arcs within the spinal cord of an animal. Grey Walter's wandering tortoise, *machina speculatrix,* on the other hand,

> is never still except when "feeding"—that is, when the batteries are being recharged. Like the restless creatures in a drop of pond water it bustles around in a series of swooping curves so that in an hour it will investigate several hundred square feet of ground. In its exploration of any ordinary room it inevitably encounters many obstacles; but apart from stairs and rugs, there are few situations from which it cannot extricate itself.[2]

What the Ashby-Walter pieces of complicated electrical circuitry attempt to do is to simulate the mental activity of the brain, that is, its thinking process, in a rudimentary manner by substituting wire in place of nerve fiber, hardware in place of flesh, and electromagnetic wave in place of the mysterious pulse in the living nerve fiber. Although the purposive lifelike behavior of such simulacra and other servo systems devised for the automatic control of machinery and plant by no means warrants the assumption that the animal nervous systems function in the same way, their study is nevertheless an essential preliminary to our understanding of animal brains as well as of human behavior patterns such as speech and other habits. This is why cybernetics is now a confluence of many streams of knowledge—neurophysiology, biochemistry, computers, information theory, automation, mathematical logic, probability, linguistics, and psychology, to name only a few. This is also why it is likely to have even more momentous consequences for the future of mankind than the discovery of atomic energy, unless we happen to abuse the latter by blowing ourselves up in a fit of suicidal stupidity.

Indeed, cybernetics has already sparked what has been aptly called the *second* industrial revolution. In the first industrial revolu-

[1] *The Living Brain,* by W. Grey Walter, Penguin Books, Inc., 1961, p. 111.
[2] *Ibid.,* p. 114.

tion first steam-driven machines and then the internal combustion engine took over the physical work that man or his beasts of burden used to do. But man still had to perform all important control functions to guide the engines he set to work. In the second industrial revolution even such guidance has now begun to devolve in increasing measure on other machines. If the first revolution was the outcome of the efforts of a long succession of *application-oriented* engineers like Porta, Newcomen, Watt, and Boulton, the second sprouted from the labors of pure mathematicians like Leibnitz, Pascal, Babbage, and Boole. Charles Babbage made elaborate blueprints of automatic computers, showing a perspicacity and vision not unlike Leonardo's in foreseeing the day of airplanes. Both were far ahead of the technology of their times. Whereas the realization of Leonardo's dream had to wait for the invention of the internal combustion engine, that of Babbage had to wait for the emergence of electronics with its gift of electronic relays, vacuum tubes, magnetic tapes, and transistors. Once the new electronic tools to implement Babbage's ideas came to hand, it did not take long to automatize computation. Surprising as it may seem, automatization of computation immediately paved the way for automatizing industrial operations. The movement began with the chemical industry and soon spread to the telephone system and automobile production during the 1920's. It now bids fair to encompass all the remaining areas.

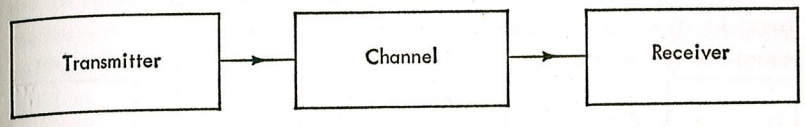
The reason electronics was able to advance automation so speedily is that for many years it was devoted almost entirely to the communication or transmission of information from one place to another. Besides wire and radio communication, it included sound recording, hearing aids, television, and other information-handling systems. In each of these applications the principal objective of the various pieces of equipment is to reproduce the input signal with as high fidelity as possible at the output device. From mere hi-fi transmission of information to its "processing" is but a step. Nevertheless, it was a major advance in that the electronic relays, vacuum tubes, transistors, and other similar control and communication devices which facilitate the processing of information are to the power machines they control what brain is to brawn. The control systems operate with low expenditure of energy and their mechanical

efficiency is of no consequence, because their basic function is not to transform energy but to *process* information. The inputs of such systems are often the electronic counterparts of such animal sense organs as eyes and ears—thermostats, photoelectric cells, microphones, or stain gauges. The outputs are the analogues of an animal's muscles or communicating organs—loudspeakers, electric typewriters, and electric motors. Internally, the information being processed takes the form of the passage of electrical signals from one part of the system to another. It therefore follows that the functioning of the control devices depends primarily on proper flow or processing of information communicated by one part of the automatized system to another.

Control and communications systems attempt to do this in one of two ways or both. *Either* they merely transmit information with the least possible distortion, as in teletype, telephony, radio, and television, or they "process" the flow of such information from one part to another of an integrated whole in order to carry through a closely knit sequence of operations, whether industrial or computational, without human intervention at any intermediate stage. What then is this "information" with whose "flow" and "processing" the science of cybernetics and communication engineering are chiefly concerned?

In ordinary speech we use the word "information" as a synonym for news, knowledge, intelligence, report, and so on. It is an amalgam of so many vague and imprecise meanings that a scientist has to purify from the blend of its diverse connotations the one he requires for his purpose, very much as a chemist purifies a substance in order to study its behavior. In the communication engineer's purification of the term the stress is on the quantitative aspect of the *flow* in a *network* of an *intangible* attribute called *information*. It is measured (in a manner to be defined more precisely later) by its "news" value, that is, the extent of surprise it causes to the recipient. To understand the rationale underlying the surprise-value theory of information measure, consider a typical communications network. No matter whether it is a network of telegraph and telephone lines or of radio and television channels or even a mere living-room conversation, any such network will consist of at least three main parts:

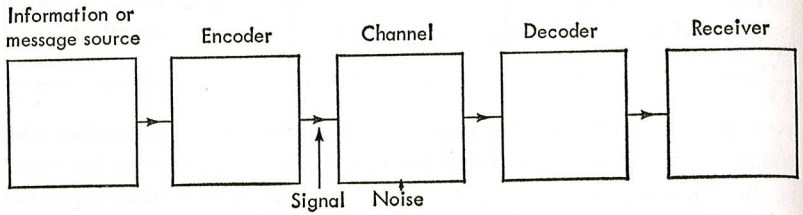
(i) Transmitter or source.
(ii) Receiver.
(iii) Channel which conveys the communiqué from the transmitter to the receiver.



For example, in the case of a living-room conversation, the speaker is the source or transmitter, the air which carries his voice is the channel, and the listener is the receiver. Practical cases are generally much more elaborate, consisting of a number of sources and receivers in a complex network. The problems of transmission of information in such complex networks are somewhat analogous to those of electric transmission in a power grid using several interconnected generating stations to supply a number of towns. In both cases one seeks optimal schemes of distribution of the commodity flowing in the network on the basis of an appropriate criterion of efficiency of transmission. When the communiqué is tangible and therefore readily measurable, as in the case of an electric grid or a manufacturing belt, the problems encountered in the study of the communications system are of the types somewhat familiar to engineers and operational analysts. Such, for instance, is the case with an electric power network, where the criterion of efficiency is obviously the minimization of the heat loss *during* transmission. One way of accomplishing this (apart from using low-resistance transmission wires) is to increase the voltage at the input terminals of the line by installing a step-up voltage transformer and reducing the voltage to the prescribed level at the output terminals by another step-down transformer.

When, however, the flow in the network is an intangible like "information," as in the problem of the communications engineer concerned with sending messages by telegraph, telephone, radio, or otherwise, the criterion of efficiency naturally is the transmission of messages with minimum distortion at maximum speed and minimum cost. It happens that just as we may use a transformer to improve the efficiency of an electrical transmission system so also we

may use what is called an encoder to improve the efficiency of a communication channel. The reason is that an encoded message is less liable to distortion by channel noise. Any communications system then may be symbolically represented as follows:



The information or message source selects a desired message out of a set of possible messages, just as a telegraphist selects one from a tray of messages awaiting transmission. The selected message may consist of written or spoken words or of pictures, music, and the like. The encoder codes the message or transforms it into the signal, which is actually sent over the communication channel from the encoder to the decoder. In the case of telephony, the channel is a wire, which carries the signal, a varying electrical current, produced by the encoder or the apparatus that transforms the sound pressure of source voice into the varying electrical current. In telegraphy the encoder codes the written words of the message into sequences of interrupted currents of varying lengths (dots, dashes, and spaces). In oral speech the information source is the brain, the encoder the voice mechanism that produces the varying sound pressure (the signal) which is transmitted through the air, the channel. In radio the channel is simply space and the signal the transmitted electromagnetic wave. Likewise, at the receiver's terminal a decoder is employed to transform the encoded message into the original form acceptable to the receiver. In other words, while the encoder transforms the intangible input commodity called "information" into a new form, the decoder performs the reverse operation to recover the encoded commodity in its pristine purity. In actual practice, however, there is no such pure recovery. One has always to contend with the vitiations of noise which in physical systems inevitably prevent perfect communication. These unwanted additions to the signal may be distortions of sound as in telephony, static as in radio, distortions in shape or shading of pictures as in television, or errors in transmission as in telegraphy. In all such communications systems the fundamental problem is to devise an appropriate measure of the "information" that they handle or process so as to use it to improve their "efficiency" in diverse ways such as enhancing the capacity of the channel to carry information to its optimal level and/or minimizing the adverse effects of noise vitiating its transmission.

Chapter 6

video tape and the communications revolution

Barry Schwartz

In a recent letter from the Editor-in-Chief of *Arts in Society,* Edward L. Kamarck, I was asked to write an article of a broadly speculative nature on the following:

- Possible insights for the arts coming out of the rapidly growing communications theory
- Futurist thinking and planning as they relate to the arts, arts development and culture
- The range of possibilities (and hazards) for the arts opened up by the new media, resources, materials and techniques
- The cultural problems, impacts and opportunities—both likely and already manifest—posed by the new technologies of communication
- The definition of a more responsible social role for communications in our culture and a contingent consideration of the necessary social changes.

Mr. Kamarck's letter communicates as much about print as through it. At first, I was hesitant to quote from it; I may be violating a print ethic. Print is a communication medium with implied degrees of privacy. It is personal, and has a varying impact depending on how it is used and with whom. Thus print supports hierarchies of in-

"Video Tape and the Communications Revolution" (revised), by Barry Schwartz. Published originally as "The Communications Revolution: Lower Rates for Long Distance Telephone Calls, or the Transformation of Society." From *Arts in Society*, vol. 9, no. 2 (Summer–Fall 1972). Reprinted by permission of the author and publisher.

formation as well as secrecy, fragmentation and concepts of communication propriety. Print begins in isolation and only reaches an audience of more than one by an expenditure of energy. The decoding of print requires that the reader too must exist in isolation. When he reads, he can do little more. He must stop experience in order to participate in a communication process.

These qualities do not characterize the new communications media. It is nearly impossible to communicate with the new media in privacy. The new media are electric; it takes energy to restrict the flow of information. The new media communicate publicly; there are no more secrets; no more private discussions.

Print is essentially a cognitive experience. Print encourages the invention of categories and then requires that they be legitimized. The history of theological writing is one excellent example of how much energy can be spent trying to validate print categories. Print is concerned largely with ideas and analysis. If I am to write this article on communications, I must *think about and analyze* the problems that have been posed. I must use cognitive units to give order by their meanings to a world that, if unordered, appears as frightening, chaotic and inexplicable. If I chose to use one of the new media—video, for example—I would comply with Mr. Kamarck's request by *doing,* not by thinking. My response would be an action through the media; I would respond rather than work out an appropriate response. It is one of the more revolutionary features of the new media that *communication is simultaneous with experience.* The communication process is not a reflection of experience but a part of it. Thus, the outstanding feature of new media is their capacity to provide feedback. If the new media are to affect the arts, it will be in the direction of leading artistic experience back into real time, not delayed-response time; the artist will be encouraged to unify life experience and artistic experience into the same space in real time. Artists will become highly sophisticated forms of human feedback in real-time situations.

Today's world can not be ordered effectively by print or by the still-frame aesthetic of photography, painting and image making. The world is surrounded by an envelope of electronically communicated information. Print is encapsulated by the electronic environment. Print may in fact confuse us because it leads us to the erroneous assumption that our description of an experience re-

sembles the experience, that the phrasing of a problem is a perimeter containing the problem. Print, however, does poorly as a container for contemporary experience. What is needed is the dynamic frame of the newer communications media.

Print allows no feedback. If Mr. Kamarck and I were able to communicate telepathically we could discuss his letter and my response to it before he would sit down to write me. The letter itself would be merely a record of what was communicated, not a medium through which we communicate. The new media are not telepathic (not yet), but insofar as they do permit the process I have described, we may think of the new media as slow-motion telepathy. By slow motion, I may mean only microseconds from coded communication to decoded message to feedback. Like telepathy, the new media are electric.

Each moment we are inundated with electric information via television, radio, teletype, record players, tape machines, computers and satellite communications. In this environment young people are first acculturated into the society electronically. All learn a visual-electronic literacy long before they learn print. A child who stutters when reading aloud may be indefatigable and fluent on the telephone. The inevitable outcome of exposure to the new media is that society is relinquishing the view that print has a more valuable function than reportage of sporting events or the instructions to the toaster. Despite the efforts of the print nostalgia cult called college, slowly but irreversibly the importance of print is subsiding.

For most people, print is after the fact. They are becoming accustomed to media that communicate in real time. Of course, real time, all the time, is very taxing. Survival may come to be more dependent on the durability of the nervous system than on the cognitive muscularity of the brain. Some analysts of the electronic environment (energy trippers) proclaim that modern man is a crude form of electric man, whose advanced nervous system presumably places him higher on the evolutionary track.

Electricity holds no allegiances to custom, national boundaries, geography, or roadblocks. An electric perception is *de facto* an ecological one. The launching of satellites and the pictures they electronically communicate constitute feedback to the earth that it is a planet. Countries, states, institutions are aggregates of matter;

they hold bodies. In the electric environment, we are told we are no longer convinced of the need for separation and fragmentation. Electricity brings us together. In the electric current, we find a holistic view of man in the world. We will seek communality rather than egoistic death-wish power drives.

In the electronic environment reality is only one's accumulated information. For twenty-five years, this country has created myths of China. Our great men of state have characterized her as "the yellow peril," and her people as "yellow dwarfs with pen knives." But in the electronic environment, there are no men of state; only men of media. The first few seconds of live video coverage via satellite of Nixon's visit to China destroyed twenty-five years of illusions for many people. All at once China was no more threatening than Dodge City or the Twilight Zone; no further away than our chief celebrity, the man usually televised from the White House, the only man in America who can preempt the regular programming at will.

According to a *Newsweek* poll, the average American household watches more than six hours of television a day. There are more television sets in homes than telephones, bathtubs or refrigerators. In 1948, 200,000 American homes had television, and there were fifteen broadcasting stations. Today, 95 percent of homes have television—14 million of them in color—and there are 520 broadcasting stations. In America in 1973, there are few things more *essential* than television.

Broadcast information is our environment. Unfortunately the use of the media is predicated on commercial-exploitative values rather than on cultural or educational ones. Recently advertising studios have begun to run programs which they have packaged to show between their commercials. These programs are primarily geared toward developing and advancing consumerism, toward creating a passive, anxiety-ridden populace, ever ready to buy the latest innovation on the American dream. Television, we are reminded, is a mass medium, and mass media cater to what those with broadcast power euphemistically call the "common denominator."

Now hold on to your antennas. This situation is about to be altered dramatically. Enter video. Broadcast television is a one-way communication directing an audience toward programming with which they have no relationship. Now with a hand-held camera,

a playback-record deck and a monitor or an RF unit (which plays back through your regular TV set), you are able to create your own programming. You are your own commercials.

The ability to make your own "software" coincides with the maturation of the first generation to grow up electrically. This generation has watched television all its life. It is not surprising to find that as adults, they insist that there be a new television, one that is relevant to the lives of the viewers, not to the profits of the broadcasters. This generation is committed to the box, the video medium, and watching television. It was inevitable that they would demand and utilize a technology that would remake their experience into a more meaningful one.

A lot of people are now creating their own video. But how do they communicate this information? The crudest method available involves the swapping of tapes. I mail you my software; you mail me yours. Effective? Yes. Satisfactory? No. Some have turned to theater events using multiple television screens and a comfortably darkened room. But this too has its limitations.

The efforts of software creators would be of minor interest were it not for the two most important developments in media: cable television and video cassettes. Here is the media revolution. A Community Antenna or Cable Television System (CATV) consists of a super antenna, a "head" which processes signals and a coaxial cable which, like the telephone cable, connects to home reception units. Subscribers pay as little as $5.00 a month for their hook-up. Present capacity is from twelve to twenty television channels through each cable, though in time, the contemplated forty-two channel hook-up projected for San Jose, California, will not be unusual. Cable now connects to 4.5 million American homes. By 1980, it is estimated that 40 percent of all American homes will be connected to cable.

Cable is radically different from broadcast TV. For one thing, the program does not travel over the airwaves, which are considered public space. Though the program is televised, the process is most analogous to telephone conversation, which suggests that an enormous variety of contents is possible within the system. The private cable owner, like Bell Tell, is in the position of renting a service for the transmission of messages without control over their content.

The possibility exists for what Paul Ryan has called "cybernetic guerilla warfare." Every receiver of cable becomes a potential program originator. The implication is, and the reality may soon become, that every community will control its information. It means that the cable subscriber will have available to him a wide variety of alternatives to the one-dimensional broadcast television. It means potentially that the entire information envelope surrounding the earth will be accessible to every single human being. It means the optimum communication system: high variety of programming, low cost, built-in feedback. Finally, the introduction of video cassettes will do much to insure that not even cable regulation and government restriction will stifle the communications explosion.

Obviously, the effect of video on the arts will be dramatic. Throughout the process of technocratization, artists have chosen between two options: the first offered artists the possibility of paralleling or complementing science and the seemingly bold forces of technology, thereby playing a supportive role to the historical pattern and affirming the commitments of society. We have called this option modernism. It is a form of technological portraiture. The second option is the human resistance to the blind technocratization of the natural and human environments. This option has been characterized by Marcuse as the "Great Refusal."

Modernism anticipates an avant-garde defined by its ability to innovate, discover and change at a rate comparable with technological development; the second option pictures an avant-garde based on the artist's ability to provide a counter-cultural force—an opposition to the acculturating forces that are part of the technocratization movement. The new media will be embraced by artists of both persuasions. The media will be used to further incorporate the arts into the frozen structures of American life, as demonstrations of a modernist aesthetic, *and* the media will promote very effective counter-cultural creations. . . .

How will the new media affect art? The modernist will take to video. In fact, many of the important video developments in the past few years have been due to the discoveries of artists working with the media. The video synthesizer, Eric Siegal's colorizer, and many sophisticated techniques for use and production of ½" videotape are attributable to the contribution of the artist. Since video is

audio and visual, comprised of light and sound, artists will explore its compositional potential. To use what may prove to be a poor analogy, many artists are now painting with energy.

Video is not film. Still, used as film, it makes possible major cinematic productions because of its greater editing flexibility and erasable tape. The ability to see what you have shot without waiting three weeks for film development, and the ability to make changes, edit and mix seconds after the initial impressions are made, makes possible greater flexibility in the filmmaker's craft. But, in the end, video is electric, not chemical. It introduces feedback as an artistic variable. Feedback not only makes it possible for a viewer to experience an event or interaction, but also makes it possible for the viewer to experience his reaction to the event or interaction. And then to experience his reaction to his reaction to the event. Built into this system is the idea that the artistic event is a process, not a product. The artist's involvement with his audience is multidimensional. Because video greatly accelerates human time, the intensity of the experience is very great.

Video will further encourage the present shift in the arts generally to dynamic events. The new media, particularly video, use a dynamic reference. If you give a porta-pak (portable video set-up) to a novice, encourage him to shoot some tape, and then sit down and look at it, you will soon be able to demonstrate one of the most important aspects of video use. As the tape is playing back, you arbitrarily select a frame and hold it on "still." In any tape, there are dozens of still shots that are masterpieces of still-frame photography. The camera man did not try for them; it was just that by shooting reality itself within a dynamic frame, a number of excellent still-frames are recorded on the tape. If the novice using video for the first time can achieve photographic excellence, then the criteria for excellence in video must be based on a dynamic and not a still-frame aesthetic.

The neophyte video user often thinks that making video is merely a matter of acquiring a portable television unit, and entering into a world of potential software. In one sense this is correct: it is that spontaneity, that feeling of "just go and shoot it," that sense of freedom to travel, move and shoot that makes the creation of software the easeful, playful excitement that video is. Unfortunately, the neophyte *is* a neophyte because he regards his equipment as only tools and his software as finished product.

As the neophyte begins to use his camera, he may soon discover that it has many of the same properties as an eyeball. It is more than a mechanical way of recording what the eye sees; instead, it *is* an electronic eye. Not only is it capable of selecting information from the environment, but it is able to change what it sees by virtue of the electric life within it. Thus, when the camera is aimed at the monitor that shows what the camera is shooting, the video user discovers either a demonstration of infinity (the monitor showing the monitor showing the monitor . . . to infinity) or a dance of electricity seen as a wave, seen as mandala patterns, seen as electronic feedback.

The regular video camera has its limitations, generally those associated with lighting. Some video users use quartz lamps to light their subjects. Unfortunately, by adjusting to the needs of their camera, they create a studio situation which allows little interaction and spontaneity; instead it intensifies self-consciousness by requiring *people* to be *subjects*. A tivicon tube modification on the camera is one way around this. This tube intensifies light—it turns lit matches into fireballs and dark rooms into comfortable shooting situations. It is handy, visually very exciting and necessary.

The novice will also tend to regard his software as final product. Actually, any software shot becomes material for a much smaller, edited version. The edit not only records the desirable sequences of the original, but can also be used to change order, create unlikely juxtapositions, altogether refashion the original material and compress real time (the time of the interaction short) into video time (the edited tape which is shorter), which makes for much better video viewing. It is part of the video aesthetic that tape *moves,* that it has a dynamic changing quality. Unlike film, where sequences that are too long may be too long by minutes, with video, seconds count. Thirty seconds in video is a long time.

The novice may also require a structure to his work before he even begins. Rigid concepts, plot lines, shooting scripts are anathema to the experienced video user. With a general idea and the elimination of unwanted variables, the video user is apt to "let it happen," to allow spontaneity of events, assuming that if he shoots it all, he

will be able to edit out those parts that he thinks unnecessary or unworthy of his final tape.

Obviously editing video is as important as shooting it. Further, with several cameras and decks on hand, one can get into a more sophisticated editing. Each time a new piece of equipment is introduced (and this must be thought of as the artist's tools) the video user finds his range of possibilities extended. With the introduction of specialized equipment like a special effects generator, which can be rented or purchased, two tapes can be overlapped or juxtaposed or used on a split screen. And here we have a new area of creative contribution—mixing. Obviously two tapes can be mixed in almost infinite ways, and the person mixing decidedly influences the nature of the final product. If the video user wishes to become still more sophisticated in his technique, he can modify the S.E.G. and make it possible to bring still more inputs into the mixing board. And if he wants to throw all caution to the winds, he can even separate and mix sound tracks.

Though a very talented video user can shoot, edit and mix his own tapes, it should be obvious by now that video does not lend itself to solos. I believe that the video media is inherently a group process. Still more fundamental is that video is inherently a process-oriented media. Though the video user creates products when it is desired to do so, or required of him, the real experience of video is in the making, the learning, the doing. It is in this sense one speaks of the media as an art form.

Group processes, as you may already know, are only as successful as the group members' ability to achieve harmony. Much of the initial work of a video team is spent learning how to learn from each other; this often occurs long before they have begun to learn what the media has to teach them. Such group efforts are fraught with numerous tensions and frustrations, but the achievement of a video team that works well together is consistently joyful. Under such circumstances, the shooting of tape, the editing, the fancy work of image juxtaposing, mixing, deciding what to include and what to reject and the realization of all of this in a final tape a number of people have made and take pride in, are the pleasures that make video a rewarding experience.

A group process, an understanding of the many parts that go into the video process, individual excellence and group synchronism are important points to consider. A group effort in video will appeal to those who are aware that equipment is costly but vital to the extension of the powers of the video user. A group will tend to have more equipment than an individual. But it should also appeal to those who are aware that video is the communication of information—on all levels—and that how well one communicates to a large audience in part results from how well one learns to communicate to a smaller one—those you work with.

Video teams are forming all over the place. In trips to Minneapolis, Los Angeles and San Francisco, I found one or more video groups shooting tape, relating to the experiences of their community, particularly involved in dissemination of information on cable and loving every minute of it. In some cases, I saw a few portable units, lighting and the use of tape recorders for doubling on audio tracks; in other places I saw sophisticated equipment and a major emphasis on editing. But however it was done, there was the spark of enthusiasm and energy of the video user.

My remarks should not be taken to be critical of the single individual who buys a portable unit and begins shooting those tapes that seem important enough to be shot. I am only suggesting what those who have lived with video a while know—that with video it is hard to shoot the world outside without involving it and yourself in it. Fortunately, with group video processes there is almost no loss of autonomy, and there is a great gain in community.

Culturally, video completes the transition from painting to conceptual art; theater to participatory theater events; sculpture to earth works. Art and life are increasingly inseparable, and video is the most appropriate media for their joining. Under the influence of video, the arts will be encouraged to give up their elitism and learn a vocabulary that speaks to an ever-widening audience. The artist will be required to learn how to participate in dialogue. Since the gap between life experience and artistic experience is closing, the artist has both the potential for influencing mass perception and a greater danger of becoming a commodity in the entertainment business.

As a counter-cultural force, the artist can choose to fill the media with social change software, or can choose to dismantle or render ineffective (symbolically or otherwise) the existing media

structures. The artist can upset structures by a political documentary (a small taste of this can be gleaned from the developments that followed Geraldo Rivera's recent exposé of Willowbrook) to the creation of experiences that provide the electronic turn-on for new life styles and life-affirming activities. Further, the artist can join with the community in the creation of an information system designed to assist self-expression, identity, control of resources and new mechanisms for democracy at the community level. The implications for educational reform as a result of artistic input with new media are enormous.

The artist can choose to become more sophisticated in the role Herbert Read assigns to him: *ein Ruttler,* an upsetter of the established order.[1] These kinds of artists will short-circuit establishment electronics. The technodadaists will be twenty-first century Robin Hoods, taking from the communications systems rich and distributing to the information poor. Right now, for example, there is a new breed of technodadaists, generally known as phone phreaks, who engage in the process of phone tripping. With "blue box" in hand, they instantaneously take control of the entire telephone system. For no other purpose than to demonstrate the single man's mastery of the electronic maze, the phone phreaks seize control of cable, satellite, and millions of telephone lines to set up their mobile underground communications network. For the Telephone Company to weed them out, they would have to spend one billion over the next twenty years in the development of a "fool" proof system. Some phone phreaks are now getting into computer raiding; they are tapping into computers with their own programs, using them for purposes other than those for which they were intended. There are even rumors that if enough phone phreaks worked together, they could bring Ma Bell to a standstill. . . .[2]

Any discussion of the new communications technology and its impact on the arts must take into account the equally probable use of the media to extend the present consolidation and control of the arts. Across the country we see the continuing institutionalization of the arts and the centralization of patronage. With the integration of the arts into the mainstream of American life, with the

[1]Herbert Read, *Art and Alienation.* Horizon Press, 1967, p. 24.

[2] Ron Rosenblum, "Secrets of the Little Blue Box," in *Esquire Magazine,* October 1971, pp. 117–25, 222–26.

"professionalizing" of the artist, the soft underbelly of culture has been exposed. The artist is made respectable, and in the process the arts are fully devitalized. The new media will have two dramatic impacts on arts management. They will enable management to be more efficient. They will bring thousands of diverse creative activities under an electronic umbrella and further serve to castrate artistic activity. Finally, Prufrock will be able to be a highly regarded painter. And the arts will be brought closer to the popular arts by a form of techno-translation, which will cause original art activity and creation to be translated through media into devitalized carcasses for a mass audience that will eventually come to believe that the arts are no more important than the rest of the meaningless fare.

Many who bask in the cybernetic sunshine believe that the new communications technology will heal us. They are convinced that the new technology of communications is larger and more influential than those who control it; that the integrative, synergetic powers of the new media will survive the attempts of corporation heads and politicians to keep information access from the people. It is a widely held belief among techno-freaks and media heads that the electric environment is inherently positive. The individual who sees the communications technology as a tool available for use but not, assuredly, a panacea or the demonstration of fascism is considered unhip to both the techno-freaks and the Luddites.

In an age of disbelief, when nothing is to be trusted, and all enthusiasms are cons, it takes a lot to get people excited. At a time when everything is revolutionary; when World War II films of Japanese-American conflicts are played on Sony televisions in Denver, Colorado, sponsored by Datsun Cars; and when twenty years of negative China images can be reversed in one week, people no longer believe. But the young and the youthful want to believe. They want to find a way out of this madness. They want to have a vision of social change, a better world, humanity, sanity and justice. Unfortunately partial victories, tentative optimism, self-motivated enthusiasms are insufficient to break the despair that comes with impotency. They need a hype, and they, in turn, feel compelled to hype the good.

A hype is when something of substantial value is fantasized to many times its actual worth. Perhaps good ideas must be presented

as the greatest ones so that they can be heard over the clamor of commercial noises. Unfortunately, those who hype are only creating situations where, in the end, the thing hyped will disappoint them, be less than a miracle, become subject to corruption, and they will then become dejected, more depressed, less able to believe in the powers of any new vision to remain free of contamination by the world they wish would die.

The flower children generation was hyped. An important youth development became "The Greening of America." The psychedelic experience was hyped; important and satisfying experiences with a few specific drugs became a vision of God, the way to the truth, the death of the ego. The Eastern religion trip is hyped; the significant and enduring wisdom of the East is turned into service to Krishna, urban yogas, and the achievement of nirvanas. We are always hyping ourselves. Each new hype comes on like it is the transforming force of the world, the dramatic departure from the past, the healing mechanism for the whole society. We become enamored, then true believers and then, with our disillusionment comes the resentment at having been betrayed. We even hype people. Marshall McLuhan is ex-hype; Buckminster Fuller is present hype; John Lilly is future hype.

While our less sophisticated fellow creatures consume new products, our intelligentsia consumes new fascinations, new ideas, new heroes, like they were so much hair dressing. The intellectual's goldmine serves as a contemporary symbol of insincerity. Believing ourselves unable to make anything happen, we sit around fantasizing the importance of what is happening without us.

My purpose in elaborating on the hype is that this article on the communications revolution must conclude by extracting the substance of communications theory from its hype. If we are to profit at all from the new communications, we must—absolutely must—reject the hype so that we can fully utilize the substance. If we continue to hype ourselves, we will toss the potential benefit of these media back to the institutions. For the hype discounts the political nature of the environment and the problematic outcome of any new tool which can be used for better control or liberation. If we discount the dirty little secret of politics, we will wind up not with Childhood's End but with Hogan's Heroes.

Unfortunately many are turning the media into a cultism.

Unable to say that here is something that is really important, something that counts, they require it to be salvation, a new vision, a panacea for a new age and a new man. Unfortunately the religious trip confuses more than it clarifies; the new media are already becoming surrounded by a vocabulary and a linguistic DMZ created by communications "experts" though incomprehensible to others. As well as jargon and evangelistic rhetoric, the new media people can be characterized by a form of intolerance called the "more electric than thou" syndrome. The vision of young men and women armed with porta-paks, standing up to America with their software, their blue boxes, or their spacy games may be exciting to some; but if we are to believe that the new media will make a difference, it will only be because the kind of long-term strategy, careful planning and post-crunch survival tactics are now being worked out.

Chapter 7

the anatomy of cable television

Barry Schwartz and Jay-Garfield Watkins

Throughout its twenty-four-year history, cable television has developed and prospered on a grass-roots level. The use of this technology which began not as a product, but as a service, has partly been determined by the needs of the people the owners of the system wish to serve. Therefore, any discussion of cable television must take into consideration not only its technological potential, but also the unprecedented alignment of citizen groups who serve the cable as an instrument for social change, and as a means of revitalizing communication among human beings.

As well as citizen groups, product-oriented industries such as the telephone utilities, television broadcasters, and manufacturers of electronic technology see the cable as an extension of themselves. The financial and scientific interests of these industries dictate a system which supports more advanced products and therefore more commercially desirable versions of their existing technology.

These two disparate interest groups direct our attention to both man's new awareness of the importance of communication tools and the incorporation of old values in the use of new media. The past, present, and future of the development of cable television then is a paradgim of man evolving while under the influence of his existing environment.

Cable television began as a device to carry program reception to rural and isolated areas that lay outside the reception range of television stations. At a certain point within the signal range of these stations, system builders erected tall antennas that caught and amplified over-the-air signals and transported them by coaxial cable to individual homes in communities with little or no reception. Each home which received community antenna television (CATV) was connected by a feeder line to the cable for a small installation charge and thereafter paid a small monthly service rate. In many cases, homes in isolated areas that were connected to the cable got clearer reception than homes in the vicinity of the station, and they were often able to get a wider selection of channels. The next development was a logical one—to install the cables in metropolitan areas. Clearer color pictures was the advantage here, as well as the reception of additional channels.

But the possibilities of the cable were not limited to transporting broadcast signals. Inherent in the construction of the coaxial cable itself is its ability to carry many channels, far more than there are over-the-air stations to fill them. To attract more customers, the cable companies first began utilizing these additional channels for weather reports, stock market quotations, and shots of AP and UPI tickertapes. Later, when owners began to originate live local programs, again to attract subscribers, socially concerned organizations, as well as the communications industries, saw the implications of the device. An all-inclusive system, cable could not only carry network programming, but produce and transmit more diverse software of its own at very little expense. Assured of monthly subscription fees from customers, cable companies, unlike over-the-air stations, did not have to depend upon advertisers who require large audiences to sell products. The flexibility of the cable allows it to tap the content of one system and then compete with it. Obviously, this duality of service raises legal questions. Broadcasters insist CATV companies should pay copyright fees for transmitting their programs as compensation for the loss of over-the-air audiences.

At the same time that they have struggled against cable television, broadcasters, telephone companies, and other media industries have been quickly buying up old cable systems and installing new ones. The threat of competition and the large profits of even

the smallest cable companies are not the sole reasons for their interest. Broadcast television transmits over-the-air in what is called the electromagnetic spectrum. This spectrum, of which television uses nearly 60 percent, has become increasingly crowded with signals of the same frequency range from other media. These frequencies are known commonly as VHF or the very high frequency waves. Two-way radio systems for taxis and delivery trucks, AM and FM radio stations, walkie-talkies, air lines, and police departments use VHF. Land vehicles are and will be demanding more space in this spectrum for their radio units. The communication satellites are expected to take an even greater share of the range in the future. For the four major television networks and their outlets to claim so much of this valuable territory has become a major issue and has created yet another problem that lies within a complicated political framework.

The Federal Communications Commission is the agency that oversees the rights to ownership of the vast communication networks in the United States. The FCC, a small governmental agency whose tasks have outgrown its resources in staff, financing, and policy, lacks an overall plan for the coordination of old and new technologies, and often is the target of attack. Headed by a small group of commissioners, it bends in contradictory directions to pressures from social organizations and interested parties in each of the competing communications industries. For example, the commission may be quite lenient with a cable television company owned by an electronic corporation that is part of the telephone complex and unyielding with a small, independently owned system.

Many communication experts see the inevitability of an entire nation being wired and the eventual conversion of all television systems from over-the-air to over-the-cable transmission. They envision an interconnecting system in which the cables would have common carrier status, as the nation's telephone lines now have. Cables would be treated as public utilities, and their owners would have no control over the content of channels. Any organization, commercial or otherwise, at standard rates, would have access to the service. However, competition among the different factions, enormous investments in older technologies, and conflicts of interest among policy-makers will no doubt long delay, and may abort, the introduction of a uniform cable system.

Already in the major metropolitan areas, CATV has run up against powerful obstacles adeptly erected by established television stations. Cable companies are even having difficulties obtaining permission from telephone authorities to string their cables on existing telephone poles.

If the potential of CATV was limited to clearer images of the same television fare we have received for the past twenty-five years, we might well leave the cable controversy to the engineers and politicians. However, more and more people are becoming aware that they have an intrinsic right to determine with whom and what they will communicate. When Alexander Graham Bell demonstrated the telephone at the Philadelphia Centennial Exposition in 1876, no one saw any need for it. At first a novelty, the telephone quickly became a necessary instrument by which man gained access to man on a *common* basis. With the introduction of radio, film, and television, communication became the interaction between the active communicators (broadcasters) who *imparted* information and entertainment to a passive mass of listener-viewers. These media, "luxuries" at their inception, created the "public" and focused attention on the public's unmanageable shadow, the society.

For two decades, commercial broadcast television has educated the nation to many of its problems and created many more. By abstracting from social situations, "managing" injustices and popularizing bad taste, it has caused the nation to suffer from a collective impotency. Until recently there has been little opportunity for the American public as groups or individuals to alter this image of themselves, except via more delayed methods such as print, mass demonstrations, and face-to-face or voice-to-voice confrontation. Community antenna television, however, offers an opportunity for the people to create their own images.

The key issue at stake for those who wish to see at least a part of the CATV system used for community purposes is public access. Three years ago, civil liberty groups formed a lobby and petitioned the FCC to open up a portion of the cable channels for public use. As a result of their efforts, the FCC recently ruled that all cable television companies in the top 100 markets had to free at least one channel for community use on a nondiscriminatory basis. In several cities such as New York, Minneapolis, and Los

Angeles, two or more channels are now open to the public. The civil liberties organizations won a decisive victory for the communities. Although at present twenty percent of American homes are hooked up to cable systems, there is every indication that by 1980 at least one-half the nation will be wired.

In an excerpt from an unpublished novel, *The Biggest, Freest TV in Town* by Pete Seeger, a character states, "The purpose of life is to live, not watch others live." America has spent twenty-five years of passive nation-watching, so much so that the communities and even the cities have become invisible to the people who reside in them. Many of these communities are not even aware of the problems that afflict them until they face a major crisis. Societal wrongs are considered national rather than community questions.

Public access groups, who see CATV as a means of local expression, organization, and communication, are springing up throughout the country. These nonprofit organizations are forming for two reasons: They protect the citizen's rights in CATV, and now they are beginning to work as facilitators and catalysts, encouraging every segment of the community to participate in confronting its problems. They are offering brief training workshops in video tape equipment and program production to groups and individuals who request it and educating minorities and the poor generally to the value of the video tape process. They believe that once the members of a community learn to participate with the medium, they will no longer be able to think of themselves as static and incapable of action. When a community or group gets feedback on itself, it changes. "Nothing ever happens in my town," is a lament that will be muffled out in dialogues between groups previously unaware of each other's existence.

Thus far, there has been no discrimination in the public's access to CATV. Observing a few regulations, such as those against the use of profanity, incitements to violence, and libelous statements on private persons, any private group or citizen may request and receive free channel time on a first-come, first-served basis. The group pays only for the tape and production costs involved in the making of their software. As this process continues and communities push for more free channels, the awe with which the individual

usually confronts his communication tools—and technology in general—may give way to respect for his *own* ability to communicate with greater force.

The one drawback to present and future CATV systems for community use goes back to its noncommon carrier status. Installation charges and monthly service rates will make the poorer communities the last to receive cable television. Neighborhood outlets are the solution here, where people may gather in storefronts and meeting halls not only to watch themselves, but to use the media experience as a start to organizing positive problem-solving.

There is also much discussion of the potential of CATV to serve a specialized audience. Broadcast television programs the common denominator for a mass audience. People located outside metropolitan areas who are interested in viewing concerts, dance, serious drama, and poetry readings could now have this kind of programming on local channels set aside for the purpose. Through a combination of over-the-air signals and interconnecting cables, it will be entirely possible for someone on a farm outside Topeka, Kansas, to experience live an opening night performance of an off-Broadway play in New York City.

Entire channels devoted to instruction are now a reality in some cable areas, and there is talk of extending the service to specialized professional education. Physicians may be able to receive the latest medical developments, chemists can watch new experiments being performed, and the scholar will have first-hand exposure to lectures, discussions, and demonstrations on a variety of disciplines from experts he would never be able to encounter in person.

The survival of cable television as a medium for social change in the community is dependent upon the organization of concerned citizens to counter the private interest pressures of the various communication industries. When the average citizen has the opportunity to communicate via a medium that previously excluded him and focus attention on the problems of *human* communication, he will also be able to shake the valueless foundations on which much of the present-day technological systems sit.

CATV is certainly not the answer to all of man's problems. It does not even answer the question: What will be our prime

technology of communication in the future? Scientists are suggesting that direct satellite-to-home telecasting will make CATV obsolete even before the nation is completely wired. But those who recognize the potential of two-way cable systems, which enable the subscriber to be a program originator, argue that no other medium offers such dramatic feedback properties. Futurists are predicting that the unexplored laser beam is the secret to inexpensive and abundant communication technology. It is very likely, however, that satellites will be used mostly for national distribution of programs, and that a "wired nation" is not only feasible, but essential for the immediate future. What is important here is that all interests are taken into account and that a national policy is established with regard to CATV and other systems.

With better cables, in which a hundred or more channels can be compressed, the future of communications in the United States sounds like a technocrat's dream. The home, we are told, will contain a complete communications center. Return bands on the cable will supplement the present one-way system so that an individual may impart information in a variety of forms as well as receive it. Already the Bell Telephone Company has developed the videophone, which allows callers to see as well as hear each other.

Some people feel the consequences of an extensive communications system are dangerous. Having the "world" at his fingertips could eventually cut the individual off from direct personal contact with others. They see man becoming connected to a system that requires constant response to machines. Another widespread concern is the invasion of privacy. Two-way communication systems could become an effective method of police surveillance in the home and therefore destroy individual freedom. In the wrong hands, personal data collected by computer banks could very well make privacy impossible.

Yet, those who are now organizing on the grass-roots level to promote individual and group use of TV technology see cable television as the beginning of a new human communication and of greater human involvement. Taking advantage of the simplified technology he now has, the individual may begin learning not only his responsibility to society, but gain awareness of the significance of his existence. Statements such as "Who am I to say," "What does

it matter," and "Who cares what I do" will diminish in frequency as he begins to see and hear the results of his own inputs and feedback to social problems. If he starts now, the individual can be on his way to self-identity within the community.