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## Cybernation: The silent conquest

Donald N. Michael

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# A R E P O R T

*to the*

*Center for the Study of Democratic Institutions*

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## Cybernation: The Silent Conquest

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by DONALD N. MICHAEL

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This **REPORT** is one of a number to be issued by the Center for the Study of Democratic Institutions about significant issues involved in the maintenance of a free society. The Center is now the main activity of the Fund for the Republic, Inc. Its studies are devoted to clarifying questions of freedom and justice, especially those constitutional questions raised by the emerging power of non-governmental institutions.

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# Cybernation: The Silent Conquest

by DONALD N. MICHAEL

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# Introduction

Both optimists and pessimists often claim that automation is simply the latest stage in the evolution of technological means for removing the burdens of work. The assertion is misleading. There is a very good possibility that automation is so different in degree as to be a profound difference in kind, and that it will pose unique problems for society, challenging our basic values and the ways in which we express and enforce them.\*

In order to understand what both the differences and the problems are and, even more, will be, we have to know something of the nature and use of automation and computers. There are two important classes of devices. One class, usually referred to when one speaks of "automation," is made up of devices that automatically perform sensing and motor tasks, replacing or improving on human capacities for performing these functions. The second class, usually referred to when one speaks of "computers," is composed of devices that perform, very rapidly, routine or complex logical and decision-making tasks, replacing or improving on human capacities for performing these functions.

Using these machines does not merely involve replacing men by having machines do tasks that men did before. It is, as John Diebold says, a way of "thinking as much as it is a way of doing. . . . It is no longer necessary to think in terms of individual machines, or even in terms of groups of machines; instead, for the first time, it is practical to look at an entire production or information-handling process as an integrated system and not as a series of individual steps."<sup>1</sup> For example, if the building trades were to be automated, it would not mean inventing machines to do the various tasks now done by men; rather, buildings would be redesigned so that they could be built by machines. One

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\*This paper makes the following assumptions in looking on the next twenty years or so: 1) international relations will derive from the same general conditions that pertain today; 2) the weapons systems industries will continue to support a major share of our economy; 3) major discoveries will be made and applied in other technologies, including psychology and medicine; 4) trends in megalopolis living and in population growth will continue; 5) no major shifts in underlying social attitudes and in public and private goals will take place.

Footnotes appear on pages 47 and 48.



might invent an automatic bricklayer, but it is more likely that housing would be designed so that bricks would not be laid. Automation of the electronics industry was not brought about through the invention of automatic means for wiring circuits but through the invention of essentially wireless—*i.e.*, printed—circuits (though today there are automatic circuit wirers as well).

The two classes of devices overlap. At one pole are the automatic producers of material objects and, at the other, the sophisticated analyzers and interpreters of complex data. In the middle zone are the mixed systems, in which computers control complicated processes, such as the operations of an oil refinery, on the basis of interpretations that they make of data automatically fed to them about the environment. Also in this middle zone are those routine, automatic, data-processing activities which provide men with the bases for controlling, or at least understanding, what is happening to a particular environment. Processing of social security data and making straightforward tabulations of census information are examples of these activities.\*

Cybernated systems perform with a precision and a rapidity unmatched in humans. They also perform in ways that would be impractical or impossible for humans to duplicate. They can be built to detect and correct errors in their own performance and to indicate to men which of their components are producing the error. They can make judgments on the basis of instructions programmed into them. They can remember and search their memories for appropriate data, which either has been programmed into them along with their instructions or has been acquired in the process of manipulating new data. Thus, they can learn on the basis of past experience with their environment. They can receive information in more codes and sensory modes than men can. They are beginning to perceive and to recognize.

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\*In order to eliminate the awkwardness of repeating the words "automation" and "computers" each time we wish to refer to both at the same time, and in order to avoid the semantic difficulties involved in using one term or the other to mean both ends of the continuum, we invent the term "cybernation" to refer to *both* automation and computers. The word is legitimate at least to the extent that it derives from "cybernetics," a term invented by Norbert Wiener to mean the processes of communication and control in man and machines. He derived it from the Greek word for "steersman." The theory and practice of cybernetics underlie all systematic design and application of automation and computers.

As a result of these characteristics, automation is being used to make and roll steel, mine coal, manufacture engine blocks, weave cloth, sort and grade everything from oranges to bank checks. More versatile automatic fabricators are becoming available, too:

*“U.S. Industries announced . . . that it had developed what was termed the first general-purpose automation machine available to manufacturers as standard ‘off-the-shelf’ hardware. . . . The new machine, called a TransfeRobot, sells for \$2,500. . . . The Westclox Company of La Salle, Ill., has been using a TransfeRobot to oil clock assemblies as they pass on a conveyor belt. The machine oils eight precision bearings simultaneously in a second. At the Underwood Corporation typewriter plant in Hartford, the robot picks up, transfers and places a small typewriter component into a close-fitting nest for an automatic machine operation. In an automobile plant, the device feeds partly fabricated parts of a steering assembly to a trimming press and controls the press. The device consists basically of an arm and actuator that can be fitted with many types of fingers and jaws. All are controlled by a self-contained electronic brain.”<sup>2</sup>*

At the other end of the continuum, computers are being used rather regularly to analyze market portfolios for brokers; compute the best combination of crops and livestock for given farm conditions; design and “fly” under typical and extreme conditions rockets and airplanes before they are built; design, in terms of costs and traffic-flow characteristics, the appropriate angles and grades for complex traffic interchanges; keep up-to-date inventory records and print new stock orders as automatically computed rates of sales and inventory status indicate. Computers have also been programmed to write mediocre TV dramas (by manipulating segments of the plot), write music, translate tolerably if not perfectly from one language to another, and simulate some logical brain processes (so that the machine goes about solving puzzles — and making mistakes in the process — in the ways people do). Also, computers are programmed to play elaborate “games” by themselves or in collaboration with human beings. Among other reasons, these games are played to understand and plan more efficiently for the conduct of wars and the procedures for industrial and business aggrandizement. Through such games, involving a vast number of variables, and contingencies

within which these variables act and interact, the best or most likely solutions to complex problems are obtained.

The utility and the applicability of computers are being continually enhanced. For example, after a few hours of training, non-specialists can operate the smaller computers without the aid of programmers simply by plugging in pre-recorded instruction tapes that tell the computer how to do specific tasks. Instruction-tape libraries can supply pre-programmed computer directions for everything from finding the cube root of a number to designing a bridge. When the machine is through with one task, its circuits can be easily cleared so that a new set of pre-programmed instructions can be plugged in by its businessman operator.

But the capabilities of computers already extend well beyond even these applications. Much successful work has been done on computers that can program themselves. For example, they are beginning to operate the way man appears to when he is exploring ways of solving a novel problem. That is, they apply and then modify, as appropriate, previous experiences with and methods of solution for what appear to be related problems. Some of the machines show originality and unpredictability. To take one example from a recent paper of Norbert Wiener:

*"The present level of these learning machines is that they play a fair amateur game at chess but that in checkers they can show a marked superiority to the player who has programmed them after from 10 to 20 playing hours of working and indoctrination. They thus most definitely escape from the completely effective control of the man who has made them. Rigid as the repertory of factors may be which they are in a position to take into consideration, they do unquestionably—and so say those who have played with them—show originality, not merely in their tactics, which may be quite unforeseen, but even in the detailed weighting of their strategy."*<sup>3</sup>

Another example of a machine the behavior of which is not completely controllable or predictable is the Perceptron, designed by Dr. Frank Rosenblatt. This machine can learn to recognize what it has seen before and to teach itself generalizations about what it recognizes. It can also learn to discriminate, and thereby to identify shapes similar to those it has seen before. Future versions will hear as well as see. It

is not possible to predict the degree and quality of recognition that the machine will display as it is learning. It is designed to learn and discriminate in the same way that it is believed man may learn and discriminate; it has its own pace and style of learning, of refining its discriminations, and of making mistakes in the process.

It is no fantasy, then, to be concerned with the implications of the thinking machines. There is every reason to believe that within the next two decades machines will be available outside the laboratory that will do a credible job of original thinking, certainly as good thinking as that expected of most middle-level people who are supposed to "use their minds." There is no basis for knowing where this process will stop, nor, as Wiener has pointed out, is there any comfort in the assertion that, since man built the machine, he will always be smarter or more capable than it is.

*"It may be seen that the result of a programming technique of [cybernation] is to remove from the mind of the designer and operator an effective understanding of many of the stages by which the machine comes to its conclusions and of what the real tactical intentions of many of its operations may be. This is highly relevant to the problem of our being able to foresee undesired consequences outside the frame of the strategy of the game while the machine is still in action and while intervention on our part may prevent the occurrence of these consequences. Here it is necessary to realize that human action is a feedback action. To avoid a disastrous consequence, it is not enough that some action on our part should be sufficient to change the course of the machine, because it is quite possible that we lack information on which to base consideration of such an action."*<sup>4</sup>

The capabilities and potentialities of these devices are unlimited. They contain extraordinary implications for the emancipation and enslavement of mankind.

The opportunities for man's enhancement through the benefits of cybernation are generally more evident and more expected, especially in view of our proclivity to equate technological advances with progress and happiness. In the words of the National Association of Manufacturers:

*"For the expanding, dynamic economy of America, the sky is indeed the limit. Now more than ever we must have confidence in America's capacity to grow. Guided by electronics, powered by atomic energy, geared to the smooth, effortless workings of automation, the magic carpet of our free economy heads for distant and undreamed horizons. Just going along for the ride will be the biggest thrill on earth!"<sup>5</sup>*

But the somber and complex difficulties produced by cybernation, which already are beginning to plague some aspects of our society and economy, are only beginning to be recognized. Thus, although this paper will describe, first, the advantages of cybernation, which make its ever expanding application so compelling, it will, on the whole, emphasize the less obvious, sometimes acutely uncomfortable aspects of this development with which we must successfully contend if we are to enjoy the benefits of both cybernation and democracy.

## The Advantages of Cybernation

In recent years deteriorating sales prospects, rising production costs, increased foreign competition, and lower profits have led business management to turn to our national talent for technological invention as the most plausible means of reducing costs and increasing productivity, whether the product is an engine block or tables of sales figures. And the government, faced with the need to process and understand rapidly increasing masses of numerical facts about the state of the nation and the world, is already using 524 computers and is the major customer for more of them.

What are the advantages of cybernated systems that make government and private enterprise turn to them to solve problems?

In the first place, in a competitive society a successfully cybernated organization often has economic advantages over a competitor using people instead of machines. As *U.S. News and World Report* says:

*“In one line of business after another, the trend is the same. Companies are spending millions of dollars to mechanize their operations, boost output and cut costs. . . . Says an official of a big electrical company: ‘It is no longer a question of whether or not to automate, but rather it is how far to go and how fast to proceed. If you don’t, your competition will.’ ”*<sup>6</sup>

Not only must many organizations automate to compete, but the same principle probably holds for competing nations. We are by no means the only semi-cybernated society. Europe and Russia are well under way, and their machines and products compete with ours here and in the world market. The U.S.S.R. is making an all-out effort to cybernate as much of its planning-economic-industrial operation as it can.

In the second place, reducing the number of personnel in an organization reduces the magnitude of management’s human relations tasks, whether these be coping with over-long coffee breaks, union negotiations, human errors, or indifference.

In the third place, cybernation permits much greater rationalization of managerial activities. The computers can produce information about what is happening now, as well as continuously up-dated information about what will be the probable consequences of specific decisions based on present and extrapolated circumstances. The results are available in a multitude of detailed or simplified displays in the form of words, tables of figures, patterns of light, growth and decay curves, dial readings, etc. In many situations, built-in feedback monitors the developing situation and deals with routine changes, errors, and needs with little or no intervention by human beings. This frees management for attention to more basic duties. There is, for example,

*“. . . an automatic lathe . . . which gauges each part as it is produced and automatically resets the cutting tools to compensate for tool wear. In addition, when the cutting tools have been worn down to a certain predetermined limit, the machine automatically replaces them with sharp tools. The parts are automatically loaded onto the machine and are automatically unloaded as they are finished. These lathes can be*

*operated for 5 to 8 hours without attention, except for an occasional check to make sure that parts are being delivered to the loading mechanism.”<sup>7</sup>*

Another example, combining built-in feedback with a display capability, adds further illumination:

*“The Grayson-Robinson apparel chain, which has more than 100 stores throughout the country, receives print-punch tags daily from its stores and converts them to full-size punchcards. The complete merchandise and inventory control function is then handled on a computer. What styles are to be processed first are determined at the computer center. During any given week about 60 per cent of the sales data are received and summarized. On the following Monday morning the remaining 40 per cent of the sales data are received. The computer can then begin running style reports immediately after the tickets have been converted to cards. By this time the company can run up style reports by departments and price lines in order to obtain the necessary merchandising information. The entire reporting job is completed by Wednesday afternoon of each week, including reports on all inactive stockpiles.”<sup>8</sup>*

Freeing management from petty distractions in these ways permits more precise and better substantiated decisions, whether they have to do with business strategy, government economic policy, equipment system planning, or military strategy and tactics. Thus, management in business or government can have much better control both over the system as it operates and over the introduction of changes into future operations. Indeed, the changes themselves may be planned in conformity with, and guided by, a strategy that is derived from a computer analysis of the future environment.

In the fourth place, cybernation allows government and industry much greater freedom in locating their facilities efficiently in relation to the accessibility of raw products, markets, transportation, and needed (or cheaper) human and material resources. Distance is no longer a barrier to control and coordination. The computers that control automated processes need not be near the factories nor the data-processing computers near their sources of information or users if other considerations are more pressing. Widely dispersed installations can be coordinated

and controlled from still another place, and the dispersed units can interact with each other and affect one another's performance as easily, in many cases, as if they were all in the same place.

In the fifth place, some degree of cybernation is necessary to meet the needs of our larger population and to maintain or increase the rate of growth of the Gross National Product. An estimated 80,000,000 persons will be added to our population in the next twenty years. Beyond increases in productivity per man hour to be expected from the projected 20 per cent growth in the labor force during this same period, productive growth will have to be provided by machines.

If the criteria are control, understanding, and profits, there are strong reasons why government and business should want to, and indeed would have to, expand cybernation as rapidly as they can. The versatility of computers and automation is becoming better understood all the time by those who use them, even though, as with the human brain, most present users are far from applying their full potential. Cheap and general purpose computers or modular components applicable to many types of automatic production and decision-making are now being manufactured. In good part, they are cheap because they themselves are produced by automated methods. Techniques for gathering the field data that serve as the "inputs" to the machines are being refined and themselves automated or semi-automated. For example, a large shoe distributor is planning to attach a pre-punched IBM card to each shoe box. When a sale is made, the card is returned to a central facility to guide inventory adjustment, reordering, and sales recording and analysis. Techniques for quickly implementing the "outputs" from the machines are also being invented. Methods are being developed for systematically establishing the precise kind and degree of cybernation required in specific situations as well as the changes needed in the rest of the institution or organization using cybernation.

These are the advantages for management, for government, and for those parts of the work force whose status has been enhanced because of cybernation. But as cybernation advances, new and profound problems will arise for our society and its values. Cybernation presages changes in the social system so vast and so different from those with which we have traditionally wrestled that it will challenge to their roots



our current perceptions about the viability of our way of life. If our democratic system has a chance to survive at all, we shall need far more understanding of the consequences of cybernation. Even the job of simply preserving a *going* society will take a level of planning far exceeding any of our previous experiences with centralized control.

The balance of this paper will point out some of the implications of cybernation that we must recognize in our task of developing a society and institutions in which man may be allowed to reach his full capacities.

# The Problems of Cybernation

## UNEMPLOYMENT AND EMPLOYMENT

**BLUE-COLLAR ADULTS** *“In the highly automated chemical industry, the number of production jobs has fallen 3% since 1956 while output has soared 27%. Though steel capacity has increased 20% since 1955, the number of men needed to operate the industry’s plants—even at full capacity—has dropped 17,000. Auto employment slid from a peak of 746,000 in boom 1955 to 614,000 in November. . . . Since the meat industry’s 1956 employment peak, 28,000 workers have lost their jobs despite a production increase of 3%. Bakery jobs have been in a steady decline from 174,000 in 1954 to 163,000 last year. On the farm one man can grow enough to feed 24 people; back in 1949 he could feed only 15.”<sup>9</sup>*

Further insight into the problem of declining employment for the blue-collar worker comes from union statements to the effect that the number of these employees in manufacturing has been reduced by 1,500,000 in the last six years. As one example from the service industries, automatic elevators have already displaced 40,000 operators in New York.

Another disturbing aspect of the blue-collar displacement problem is its impact on employment opportunities for Negroes. There is already an increasingly lopsided Negro-to-white unemployment ratio as the dock, factory, and mine operations where Negroes have hitherto found their steadiest employment are cybernated. This, plus the handicaps of bias in hiring and lack of educational opportunity, leaves Negroes very few chances to gain new skills and new jobs. Continued widespread and disproportionate firings of Negroes, if accompanied by ineffectual re-employment methods, may well produce a situation that will increase disenchantment abroad and encourage discontent and violence here.

**SERVICE INDUSTRIES** It is commonly argued that, with the growth of population, there will always be more need for people in the service industries. The assumption is that these industries will be able to absorb the displaced, retrained blue-collar labor force; that automation will not seriously displace people who perform service functions; and that the demand for engineers and scientists will be so great as to provide employment for any number of the young people who graduate with engineering training. (Indeed, some of this demand is expected to arise from the needs of cybernetic systems themselves.)

It is all very well to speak glowingly of the coming growth in the service industries and the vast opportunities for well-paid jobs and job-upgrading that these activities will provide as blue-collar opportunities diminish. But is the future as bright and as simple as this speculation implies? In the first place, service activities will also tend to displace workers by becoming self-service, by becoming cybernated, and by being eliminated. Consider the following data: The U.S. Census Bureau was able to use fifty statisticians in 1960 to do the tabulations that required 4,100 in 1950. Even where people are not being fired, service industries can now carry on a vastly greater amount of business without hiring additional personnel; for example, a 50 per cent increase in the Bell System's volume of calls in the last ten years with only a 10 per cent increase in personnel.

Automation frequently permits the mass production of both cheap items and items of adequate to superior quality. It frequently uses methods of fabrication that make replacement of part or all of the item

more efficient or less bother than repairing it. As automation results in more leisure time, certainly some of this time will be used by more and more do-it-yourselfers to replace worn-out or faulty components in home appliances that are now repaired by paid service personnel. Nor is it clear that repairing computers will be big business. Computer design is in the direction of microminiaturized components: when there is a failure in the system, the malfunctioning part is simply unplugged or pulled out, much as a drawer from a bureau, and replaced by a new unit. Routine procedures determine which component is malfunctioning, so routine that the larger computers now indicate where their own troubles are, so routine that small computers could be built to troubleshoot others. This does not mean that clever maintenance and repair people will be completely unnecessary, but it does mean that a much more careful estimate is required of the probable need for these skills in home-repair work or in computer-repair work.

Drip-dry clothes, synthetic fabrics, plus self-service dry and wet cleaning facilities, probably will outmode this type of service activity.

Identification by fingerprints, instantly checked against an up-to-date nation-wide credit rating (performed by a central computer facility), could eliminate all service activities associated with processing based on identification (for example, bank tellers). A computer that can identify fingerprints does not yet exist, but there is no reason to believe it will not be invented in the next two decades.

If people cost more than machines — either in money or because of the managerial effort involved — there will be growing incentives to replace them in one way or another in most service activities where they perform routine, predefined tasks. It is possible, of course, that eventually people will not cost more than machines, because there may be so many of them competing for jobs, including a growing number of working women. But will service people be this cheap? As union strength is weakened or threatened through reductions in blue-collar membership, unions will try, as they have already begun to do, to organize the white-collar worker and other service personnel more completely in order to help them to protect their jobs from managements willing to hire those who, having no other work to turn to, would work for less money. Former blue-collar workers who, through retraining, will join the ranks

of the service group may help to produce an atmosphere conducive to such unionizing. But how many service organizations will accept the complications of union negotiations, strikes, personnel services, and higher wages in preference to investing in cybernation?

It is possible that as automation and computers are applied more widely an attitude of indifference to personalized service will gradually develop. People will not demand it and organizations will not provide it. The family doctor is disappearing; clerks of all sorts in stores of all sorts are disappearing as well. For example:

*“The R. H. Macy Co. is trying out its first electronic sales girl. This machine is smart enough to dispense 36 different items in 10 separate styles and sizes. It accepts one- and five-dollar bills in addition to coins and returns the correct change plus rejecting counterfeit currency.”<sup>10</sup>*

People either get used to this or, as in the case of the self-service supermarket, seem to prefer it.

It is already the rare sales clerk who knows the “real” differences between functionally similar items; indeed, in most stores, sales clerks as such are rare. Thus, the customer is almost forced to do much of his own selecting and to know at least as much about or to be at least as casual about the differences between competing items as the clerk. As automation increases, the utility of the sales clerk will further diminish. With some products, automation will permit extensive variation in design and utility. With others, especially if our society follows its present course, automation will encourage the endless proliferation of items only marginally different from one other. In either event there is no reason to believe that the clerk or salesman will become more knowledgeable about an even larger variety of competing items. Finally, it is obvious that the remaining tasks of the clerk, such as recording the sale and insuring that the item is paid for, can be cybernated without difficulty.

The greater the indifference to personalized service by both buyers and sellers, the greater the opportunity, of course, to remove human judgments from the system. Cybernation may well encourage acceptance of such depersonalization, and this, in turn, would encourage further reductions in opportunities for service jobs.

MIDDLE MANAGEMENT The blue-collar worker and the relatively menial service worker will not be the only employment victims of cybernation.

*“. . . Broadly, our prognostications are along the following lines:*

*“1) Information technology should move the boundary between planning and performance upward. Just as planning was taken from the hourly worker and given to the industrial engineer, we now expect it to be taken from a number of middle managers and given to as yet largely nonexistent specialists: ‘operation researchers,’ perhaps, or ‘organizational analysts.’ Jobs at today’s middle-management level will become highly structured. Much more of the work will be programmed, i.e., covered by sets of operating rules governing the day-to-day decisions that are made.*

*“2) Correlatively, we predict that large industrial organizations will re-centralize, that top managers will take on an ever larger proportion of the innovating, planning, and other ‘creative’ functions than they have now.*

*“3) A radical reorganization of middle-management levels should occur with certain classes of middle-management jobs moving downward in status and compensation (because they will require less autonomy and skill), while other classes move upward into the top-management group.*

*“4) We suggest, too, that the line separating the top from the middle of the organization will be drawn more clearly and impenetrably than ever, much like the line drawn in the last few decades between hourly workers and first-line supervisors.*

*“. . . Information technology promises to allow fewer people to do more work. The more it can reduce the number of middle managers, the more top managers will be willing to try it. . . . One can imagine major psychological problems arising from the depersonalization of relationships within management and the greater distance between people at different levels. . . . In particular, we may have to reappraise our traditional notions about the worth of the individual as opposed to the organization, and about the mobility rights of young men on the make. This kind of inquiry may be painfully difficult, but will be increasingly necessary.”<sup>11</sup>*

As cybernation moves into the areas now dominated by middle management in government and in business—and this move is already begin-

ning—growing numbers of middle managers will find themselves displaced. Perhaps the bulk of displaced members of the blue-collar and service work force might be trained “up” or “over” to other jobs with, generally speaking, little or no decline in status. But the middle manager presents a special and poignant problem. Where can he go? To firms that are not as yet assigning routine liaison, analysis, and minor executive tasks to machines? This may take care of some of the best of the displaced managers and junior executives, but if these firms are to have a future, the chances are that they will have to computerize eventually in order to compete. To the government? Again, some could join it, but the style and format of governmental operations may require readjustments that many junior executives would be unable to make. And, in any case, government too, as we have seen, is turning to computers, and it is entirely possible that much of the work of *its* middle management will also be absorbed by the computers. Up into top management? A few, of course, but necessarily only a few. Into the service end of the organization, such as sales? Some here, certainly, if they have the talent for such work. If computers and automation lead to an even greater efflorescence of marginally differentiated articles and services, there will be a correspondingly greater emphasis on sales in an effort to compete successfully. But can this be an outlet for a truly significant portion of the displaced? And at what salary? Overseas appointments in nations not yet using cybernation at the management level? Again, for a few, but only for those with the special ability to fit into a different culture at the corresponding level from which they came.

Middle management is the group in the society with the most intensive emotional drive for success and status. Their family and social life is molded by these needs, as the endless literature on life in suburbia and exurbia demonstrate. They stand to be deeply disturbed by the threat and fact of their replacement by machines. One wonders what the threat will do to the ambitions of those who will still be students and who, as followers of one of the pervasive American dreams, will have aspired to the role of middle manager “on the way up.”

With the demise or downgrading of this group, changes in consumption levels and patterns can also be expected. These people, although they are not the only consumers of products of the sort advertised in

*The New Yorker*, *Holiday*, and the like, are certainly among the largest of such consumers. They are the style-setters, the innovators, and the experimenters with new, quality products. With their loss of status and the loss of their buying power, one can imagine changes in advertising, or at least changes in the "taste" that this advertising tries to generate. It is possible that the new middle élite, the engineers, operations researchers, and systems analysts, will simply absorb the standards of the group they will have replaced. But they may be different enough in outlook and motives to have different styles in consumption.

OVERWORKED PROFESSIONALS There are service jobs, of course, that require judgments about people by people. (We are not including here the "personalized service" type of salesmanship.) The shortage of people with these talents is evidenced by the 60-hour and more work-weeks of many professionals. But these people are the products of special education, special motives, and special attitudes that are not shared to any great degree by those who turn to blue-collar or routine service tasks. Increasing the proportion of citizens with this sort of professional competence would require systematic changes in attitudes, motives, and levels of education, not to mention more teachers, a professional service already in short supply. Alterations of this magnitude cannot be carried out overnight or by casual advertising campaigns or minor government appropriations. It is doubtful indeed, in our present operating context, that they can be done fast enough to make a significant difference in the employment picture for professional services in the next decade or two. Values become imbedded early in life. They are subject to change, to be sure, but we are not, as a democratic society, adept at or inclined to change them deliberately and systematically.

Even if the teachers and the appropriate attitudes already existed, service needs at the professional level might not be great enough to absorb a large share of the potentially unemployed. Much of the work that now takes up the time of many professionals, such as doctors and lawyers, could be done by computers—just as much of the time of teachers is now taken up by teaching what could be done as well by machines.

The development of procedures for medical diagnosis by machine is proceeding well. A completely automatic analysis of data can produce

just as good a diagnosis of brain malfunction as that done by a highly trained doctor. Cybernated diagnosis will be used in conjunction with improved multi-purpose antibiotics and with microminiaturized, highly sensitive, and accurate telemetering equipment (which can be swallowed, imbedded in the body, or affixed to it) in order to detect, perhaps at a distance, significant symptoms.<sup>12</sup> All of these developments are likely to change the nature of a doctor's time-consuming tasks. In the field of law successful codification, so that searches and evaluations can be automatic, as well as changes in legal procedures, will probably make the lawyer's work substantially different from what it is today, at least in terms of how he allocates his time.

Computers probably will perform tasks like these because the shortage of professionals will be more acute at the time the computers acquire the necessary capabilities. By then, speeded-up data processing and interpretation will be necessary if professional services are to be rendered with any adequacy. Once the computers are in operation, the need for additional professional people may be only moderate, and those who are needed will have to be of very high calibre indeed. Probably only a small percentage of the population will have the natural endowments to meet such high requirements. A tour of the strongholds of science and engineering and conversations with productive scientists and engineers already lead to the conclusion that much of what now appears to be creative, barrier-breaking "research and development" is in fact routine work done by mediocre scientists and engineers. We lose sight of the fact that not everybody with dirty hands or a white coat is an Einstein or a Steinmetz. Many first-class scientists in universities will testify that one consequence of the increasingly large federal funds for research is that many more mediocre scientists doing mediocre work are being supported. No doubt for some time to come good use can be made by good professionals of battalions of mediocre professionals. But battalions are not armies. And sooner or later one general of science or engineering will be able to fight this war for knowledge more effectively with more push-buttons than with more intellectual foot-soldiers.

UNTRAINED ADOLESCENTS *"Altogether the United States will need 13,500,000 more jobs in the Sixties merely to keep abreast of the*



*expected growth in the labor force. This means an average of 25,000 new jobs each week, on top of those required to drain the reservoir of present unemployment and to replace jobs made superfluous by improved technology. In the last year, despite the slackness of employment opportunities, 2,500,000 more people came into the job scramble than left it through death, age, sickness or voluntary withdrawal. This was more than double the 835,000 average annual growth in the working population in the last ten years. By the end of this decade, 3,000,000 youngsters will be starting their quest for jobs each year, as against 2,000,000 now. This almost automatically guarantees trouble in getting the over-all unemployment rate down to 4 per cent because the proportion of idleness among teen-age workers is always far higher than it is among their elders.”<sup>13</sup>*

The Labor Department estimates that 26,000,000 adolescents will seek work in the Sixties. If present performance is any indicator, in the decade ahead 30 per cent of adolescents will continue to drop out before completing high school and many who could go to college won't. The unemployment rate for such drop-outs is about 30 per cent now. Robert E. Iffert, of the Department of Health, Education, and Welfare, concluded in a 1958 study that approximately one-fourth of the students who enter college leave after their freshman year never to return. Figures compiled since then lead him to conclude that there has been no significant change, in spite of the National Defense Education Act, which was supposed to help reduce this figure.<sup>14</sup>

If some figures recently given by James B. Conant turn out to be typical, at least one situation is much more serious than the average would imply. He found that in one of our largest cities, in an almost exclusively Negro slum of 125,000, 70 per cent of the boys and girls between 16 and 21 were out of school and unemployed. In another city, in an almost exclusively Negro slum, in the same age group, 48 per cent of the high school graduates were unemployed and 63 per cent of the high school drop-outs were unemployed.<sup>15</sup> These adolescents would in the normal course join the untrained or poorly trained work force, a work force that will be more and more the repository of untrainable or untrained people displaced from their jobs by cybernation. These adolescents will have the following choices: they can stay in school, for which

they are unsuited either by motivation or by intelligence; they can seek training that will raise them out of the untrained work force; they can compete in the growing manpower pool of those seeking relatively unskilled jobs; or they can loaf.

If they loaf, almost inevitably they are going to become delinquent. Thus, without adequate occupational outlets for these youths, cybernation may contribute substantially to further social disruption.

Threatened institutions often try forcibly to repress groups demanding changes in the *status quo*. Imagine the incentives to use force that would exist in a nation beset by national and international frustrations and bedeviled by anarchic unemployed-youth movements. Imagine, too, the incentives to use force in view of the reserves of volunteer "police" made up of adults who can vent their own unemployment-based hostility in a socially approved way by punishing or disciplining these "children."

A constructive alternative, of course, is to provide appropriate training for these young people in tasks that are not about to be automated. But this implies an elaborate, costly program of research and planning to recruit teachers, to apply advanced teaching machine methods as a supplement to teachers, and to stimulate presently unmotivated youngsters to learn. The program would also require intensive cooperation among business, labor, education, local social service agencies, and the government. And all this must begin *now* in order for it to be ready when it will be needed.

None of this is easily met. Persuading drop-outs to stay in school will not be easy. Teachers will not be easy to recruit unless they are well paid. There is already a shortage of teachers. And let no one suggest that an easy source of teachers would be displaced workers. There is no reason to believe that they have the verbal and social facility to teach, and most of them would have nothing to teach but skills that have become obsolete. Some, of course, might be taught to teach, though this would add obvious complications to the whole effort.

Knowing what to teach will depend on knowing what types of jobs are likely to exist when the student finishes his training. This will require knowledge about the trends and plans of local industry, if that is where the youths are to work (and if that is where industry plans to stay!), and of industries in other localities, if the youths are willing to move. Such

knowledge often does not exist in a rapidly changing world or, if it exists, may not be forthcoming from businesses more concerned with competition than with the frustrated "delinquents" of their community. As of now, in the words of Dr. Conant, "unemployment of youth is literally nobody's affair."

**SOME PROPOSED SOLUTIONS** Retraining is often proposed as if it were also the cure-all for coping with adults displaced by cybernation as well as young people. In some circumstances it has worked well for some people, especially with office personnel who have been displaced by data-processing computers and have learned other office jobs, including servicing the computers. But in other cases, especially with poorly educated blue-collar workers, retraining has not always been successful, nor have new jobs based on that retraining been available. Max Horton, Michigan's Director of Employment Security, says:

*"I suppose that is as good as any way for getting rid of the unemployed—just keeping them in retraining. But how retrainable are the mass of these unskilled and semi-skilled unemployed? Two-thirds of them have less than a high school education. Are they interested in retraining? But most important, is there a job waiting for them when they have been retrained?" The new California Smith-Collier Act retraining program drew only 100 applicants in six months.*"<sup>16</sup>

A. H. Raskin's survey of the situation leads him to conclude:

*"The upgrading task will be a difficult, and perhaps impossible, one for those whose education and general background do not fit them for skilled work. The outlook is especially bleak for miners, laborers and other unskilled workers over 40, who already make up such a big chunk of the hard core of joblessness."*<sup>17</sup>

Moreover, management has not always been willing to institute retraining programs. People are either fired outright in some cases or, more often, simply are not rehired after a layoff.

*"Labor and management have been slow to face the problem over the bargaining table. Harry Bridges' West Coast longshoremen's union recently agreed to give shippers a free hand to mechanize cargo han-*

*ding—in exchange for a guarantee of present jobs, plus early retirement and liberal death benefits. In Chicago this week, President Clark Kerr of the University of California, one of the top labor economists, will preside over a company-union committee meeting at Armour & Co. to draw up a plan for the rapidly automating meat industry. A similar committee is at work at Kaiser Steel Co. But many authorities think such efforts are far too few, that management must do more. E. C. Schulze, acting area director of Ohio's state employment service, says: 'I've yet to see an employer's group willing to take a look at this problem and seek solutions. They refuse to recognize their responsibility. They talk about long-term trends—but nobody talks about the immediate problem of jobless, needy people.'*"<sup>18</sup>

The problem of retraining blue-collar workers is formidable enough. But, in view of the coming role of cybernation in the service industries, the retraining problem for service personnel seems insuperable. No one has seriously proposed what service tasks this working group could be retrained *for*—to say nothing of training them for jobs that would pay high enough wages to make them good consumers of the cornucopia of products manufactured by automation.

Another proposal for coping with the unemployment-via-cybernation problem is shorter hours for the same pay. This approach is intended to maintain the ability of workers to consume the products of cybernation and, in the case of blue-collar workers, to maintain the strength of unions. This would retain the consumer purchasing capacity for  $x$  workers in those situations where the nature of the cybernation process is such that  $x$  men would do essentially the same work as  $x$  plus  $y$  men used to do. But when the task itself is eliminated or new tasks are developed that need different talents, shorter shifts clearly will not solve the problem. The latter conditions are the more likely ones as cybernation becomes more sophisticated.

Proponents of cybernation claim that it should reduce the price of products by removing much of the cost of labor and increasing consumer demand. Whether the price of beef, or milk, or rent will be reduced in phase with the displaced worker's lowered paycheck remains to be seen. So far this has not happened. Whether the price of TV sets, cars, refrigerators, etc. will be reduced substantially depends in part on how much

product cost goes into larger advertising budgets aimed at differentiating the product from the essentially same one produced last year or from the practically identical one produced on some other firm's automated production line.

An obvious solution to unemployment is a public works program. If our understanding of the direction of cybernation is correct, the government will probably be faced for the indefinite future with the need to support part of the population through public works. There is no dearth of public work to be done, and it is not impossible that so much would continue to be needed that an appropriately organized public works program could stimulate the economy to the point that a substantial portion of the work force could be re-absorbed into the private sector. That is, although the proportion of workers needed for any particular task will be reduced through the use of cybernation, the total number of tasks that need to be done could equal or exceed the absolute number of people available to do them. It is not known whether this situation would obtain for enough tasks in enough places so that the portion of the population working on public projects would be relatively small. However, if it should turn out that this felicitous state of affairs could be realized in principle, clearly it could only be realized and sustained if there were to be considerable and continuous centralized planning and control over financing, the choice of public projects, and the places where they were to be done. If, for whatever reasons, this situation could not be achieved, the public works payroll would remain very large indeed.

What would be the effects on the attitudes and aspirations of a society, and particularly of its leadership, when a significant part of it is overtly supported by governmental public works programs? ("Overtly" is used because much of the aerospace industry in particular and of the weapons systems industry in general is subsidized by the government right now: they literally live off cost plus fixed fee contracts, and there is no other comparable market for their products.) Whatever else the attitudes might be, they certainly would not be conducive to maintaining the spirit of a capitalistic economy. This shift in perspective may or may not be desirable, but those who think it would be undesirable should realize that

encouraging the extension of cybernation, in the interests of free enterprise and better profits, may be self-defeating.

The inherent flexibility of cybernated systems, which permits great latitude in their geographic location, is the inspiration for the proposal that if jobs are lost through cybernation, the unemployed could be moved to another area where jobs exist. It is said that a governmental agency similar to the Agricultural Resettlement Administration, which moved farmers from the Dust Bowl to cities, could be used. However, two important differences between that situation and this one would complicate this effort: the contemporary cause of the unemployment would not be the result of an act of God; and it is not immediately evident that these unemployed people could find jobs in other areas, which might be suffering from a similar plethora of useless workers.

Herbert Striner has suggested that a more extreme approach would be to export blue-collar and white-collar workers and their families to nations needing their talents. The problem of whether or how the salary differential might be made up is one of several difficulties with this proposal. Yet, if such emigration could be carried out, it might be a better solution than letting the workers atrophy here. The economic history of former colonial powers and their colonization techniques indicate that "dumping" of excess personnel into foreign lands would not be a radically new innovation.

Another possible long-run approach might be curtailment of the birth rate. In times of depression the rate falls off naturally—which may be the way the process would be accomplished here if enough people become unemployed or marginally employed (although the effects of the lowered birth rate would only follow after the economic and social changes had been made). Of course, the government could encourage birth control by reducing the income tax dependency deduction or by other tax means.

Finally, there is the proposal to reduce the working population by increasing the incentives for early retirement. Government could do this by reducing the retirement age for social security, and unions and management could use their collective ingenuity to provide special retirement incentives. Naturally, this would increase the already large percentage of retired elderly people. Along with the other familiar problems

associated with this group is the poignant one we shall face in more general form in the next section: how are all these people to be kept happily occupied in their leisure?

Whether any of these proposed solutions is adequate to the challenge of unemployment is not known to us or, we gather, to those who have proposed one solution or another. But even if, in principle, some combination of them would be adequate, in order to put them into effect a considerable change would be necessary in the attitudes and voting behavior of Congress and our tax-paying citizens. Preconceptions about the virtues and vices of work, inflation, the national debt, and government control run deep and shift slowly.

Not all of these dire threats would come to pass, of course, if cybernation reduced consumer buying power through unemployment and, thereby, the financial capability of industry and business to introduce or profit from cybernation. In this way we might all be saved from the adverse effects of unemployment from this source. But the economy would still be faced with those threats to its well-being which, as were pointed out earlier, make the need to cybernate so compelling.

Cybernation is by nature the sort of process that will be introduced selectively by organization, industry, and locality. The ill-effects will be felt at first only locally and, as a result, will not be recognized by those who introduce it—and perhaps not even by the government—as a *national* problem with many serious implications for the whole social system. Also, because one of the chief effects of cybernation on employment is not to hire rather than to fire, the economic-social consequences will be delayed and will at any time be exacerbated or ameliorated by other economic and social factors such as the condition of our foreign markets, which also are being changed and challenged by European and Russian cybernation. By the time the adverse effects of cybernation are sufficiently noticeable to be ascribed to cybernation, the equipment will be in and operating.

Once this happens, the costs of backtracking may be too great for private enterprise to sustain. For, in addition to the costs of removing the equipment, there will be the costs of building a pre-cybernation system of operations. But which firms will voluntarily undertake such a job if they are unsure whether their competitors are suffering the same setback—or

indeed if their competitors are going to decybernate at all? And, if not voluntarily, how would the government enforce, control, and pay for the change-over?

## ADDITIONAL LEISURE

It is generally recognized that sooner or later automation and computers will mean shorter working hours and greater leisure for most if not all of the American people. It is also generally, if vaguely, recognized that there probably are problems connected with the use of leisure that will take time to work out.

Two stages need to be distinguished: the state of leisure over the next decade or two, when our society will still be in transition to a way of life based on the widespread application of cybernation; and the relatively stable state some time in the future when supposedly everybody will have more leisure time than today and enough security to enjoy it. The transitional stage is our chief concern, for the end is far enough off to make more than some general speculations about it footless. At this later time people's behavior and attitudes will be conditioned as much by presently unforeseeable social and technological developments as by the character and impact of cybernation itself.

During the transition there will be four different "leisure" classes: 1) the unemployed, 2) the low-salaried employees working short hours, 3) the adequately paid to high-salaried group working short hours, and 4) those with no more leisure than they now have—which in the case of many professionals means very few hours of leisure indeed.

**LEISURE CLASS ONE** Today, most of the unemployed are from low educational backgrounds where leisure has always been simply a respite from labor. No particular aspirations to or positive attitudes about the creative use of leisure characterize this group. Since their main concern is finding work and security, what they do with their leisure is a gratuitous question; whatever they do, it will hardly contribute to someone else's profits.

It is worth speculating that one thing they might do is to participate in radical organizations through which they could vent their hostility over



being made insecure and useless. Another thing they could do, if so motivated and if the opportunity were available, would be to learn a skill not likely to be cybernated in the near future, although, as we have seen, the question arises of what this would be. Another thing would be to move to areas where there is still a demand for them. But breaking community ties is always difficult, especially during periods of threat when the familiar social group is the chief symbol of security. And who would pay for their move and who would guarantee a job when they got where they were going?<sup>19</sup>

As cybernation expands its domain, the unemployed "leisure" class will not consist only of blue-collar workers. The displaced service worker will also swell the ranks of the unemployed, as well as the relatively well-trained white-collar workers until they can find jobs or displace from jobs the less well-trained or less presentable, like the college graduate filling-station attendant of not so many years ago. It is doubtful that during their unemployed period these people will look upon that time as "leisure" time. For the poorly educated, watching television, gossiping, and puttering around the house will be low-cost time-fillers between unemployment checks; for the better educated, efforts at systematic self-improvement, perhaps, as well as reading, television, and gossip; for many, it will be time spent in making the agonizing shift in style of living required of the unemployed. These will be more or less individual tragedies representing at any given time a small portion of the work force of the nation, statistically speaking. They will be spread over the cities and suburbs of the nation, reflecting the consequences of actions taken by particular firms. If the spirit of the day grows more statistical than individualistic, as this paper suggests later that it well might, there is a real question of our capacity to make the necessary organized effort in order to anticipate and cope with these "individual" cases.

The free time of some men will be used to care for their children while their wives, in an effort to replace lost income, work at service jobs. But this arrangement is incompatible with our image of what properly constitutes man's role and man's work. The effects of this use of "leisure" on all family members will be corrosive rather than constructive and will contribute to disruption of the family circle. "Leisure" for this group of people may well acquire a connotation that will discourage for a long

time to come any real desire to achieve it or any effort to learn how to use it creatively.

One wonders, too, what women, with their growing tendency to work—to combat boredom as well as for money—will do as the barriers to work become higher, as menial white-collar jobs disappear under the impact of cybernation, and as the competition increases for the remaining jobs. If there are jobs, 6,000,000 more women are expected to be in the labor force in 1970 than were in it in 1960. Out of a total labor force of 87,000,000 at that time, 30,000,000 would be women. To the extent that women who want jobs to combat boredom will not be able to get them, there will be a growing leisure class that will be untrained for and does not want the added leisure. As for those women who have a source of adequate income but want jobs because they are bored, they will have less and less to do at home as automated procedures further routinize domestic chores.

LEISURE CLASS TWO A different kind of leisure problem will exist for the low-income group working shorter hours. This group will be composed of people with the attitudes and behavior traditionally associated with this class, as well as some others who will have drifted into the group as a result of having been displaced by cybernation. What evidence there is indicates that now and probably for years to come, when members of this group have leisure time as a result of fewer working hours, the tendency will be to take another job.<sup>20</sup> It is reasonable to believe that the general insecurity inevitably arising from changing work arrangements and the over-all threat of automation would encourage “moonlighting” rather than the use of free time for recreation. If these people cannot find second jobs, it is hard to imagine their doing anything different with their free time from what they do now, since they will not have the money, the motives, or the knowledge to search out different activities.

If the shorter hours are of the order of four eight-hours days, potentially serious social problems will arise. For example, a father will be working fewer hours than his children do in school. What he will do “around the house” and what adjustments he, his wife, and children will have to make to each other will certainly add very real difficulties to the already inadequate, ambiguous, and frustrating personal relationships that typify much of middle-class family life.

LEISURE CLASS THREE Workers with good or adequate income employed for shorter hours are the group usually thought of when one talks about the positive opportunities for using extra leisure in a cybernated world. Its members for the most part will be the professional, semi-professional, or skilled workers who will contribute enough in their social role to command a good salary but who will not be so rare as to be needed for 40 hours a week. These people already value learning and learning to learn. Given knowledge about, money for, and access to new leisure-time activities, they are likely to make use of them. They could help to do various desirable social service tasks in the community, tasks for which there is not enough money to attract paid personnel of high enough quality. They could help to teach, and, by virtue of their own intimate experiences with cybernation, they would be able to pass on the attitudes and knowledge that will be needed to live effectively in a cybernated world. It is likely, too, that this group will be the chief repository of creative, skilled manual talents. In a nation living off mass-produced, automatically produced products, there may be a real if limited demand for hand-made articles. (We may become again in part a nation of small shopkeepers and craftsmen.) In general, this group of people will probably produce and consume most of its own leisure-time activities.

LEISURE CLASS FOUR The fourth group consists of those who probably will have little or no more leisure time than they now have except to the extent permitted by additions to their ranks and by the services of cybernation. But extrapolations for the foreseeable future indicate insufficient increases in the class of presently overworked professionals and executives. Computers should be able to remove many of the more tedious aspects of their work in another few years, but for some time to come these people will continue to be overburdened. Some of this relatively small proportion of the population may manage to get down to a 40-hour week, and these lucky few should find no difficulty in using their leisure as productively and creatively as those in the third group.

Thus, during the transition period, it is the second group, the low-salaried workers who cannot or will not find another job, that presents the true leisure problem, as distinct from the unemployment problem. Here is

where the multiple problems connected with private and public make-play efforts may prove very difficult indeed. We have some knowledge about relatively low-income workers who become voluntarily interested in adult education and adult play sessions, but we have had no real experience with the problems of how to stimulate the interests and change the attitudes of a large population that is forced to work shorter hours but is used to equating work and security, that will be bombarded with an advertising *geist* praising consumption and glamorous leisure, that will be bounded closely on one side by the unemployed and on the other by a relatively well-to-do community to which it cannot hope to aspire. Boredom may drive these people to seek new leisure-time activities if they are provided and do not cost much. But boredom combined with other factors may also make for frustration and aggression and all the social and political problems these qualities imply.

## DECISIONS AND PUBLIC OPINION

**PRIVILEGED INFORMATION** The government must turn to computers to handle many of its major problems simply because the data involved are so massive and the factors so complex that only machines can handle the material fast enough to allow timely action based on understanding of the facts. In the nature of the situation, the decisions made by the government with the help of computers would be based in good part on computers that have been programmed with more or less confidential information—and privileged access to information, at the time it is needed, is a sufficient if not always necessary condition for attaining and maintaining power. There may not be any easy way to insure that decisions based on computers could not become a threat to democratic government.

Most of the necessary inputs for the government's computer systems are available only to the government, because it is the only institution with sufficiently extensive facilities for massive surveys (whether they be photographic, observational, paper and pencil, or electronic in nature). Also, the costs of these facilities and their computer installations are so great that buying and maintaining such a system is sensible only if one has the decision-making needs of a government and the data required to

feed the machines. Other organizations, with other purposes, would not need this kind of installation. These machines can provide more potent information than merely rapidly produced summaries and tabulations of data. They can quickly provide information on relationships among data, which may be appreciated as significant only by those already having privileged information based on a simpler level of analysis or on other non-quantified intelligence to which the user is privy.<sup>21</sup> Computers can also provide information in the form of extrapolations of the consequences of specific strategies and the probabilities that these consequences will arise. This information can be based on exceedingly complex contingencies. The utility and applicability of these extrapolations will be fully understandable only to those knowing the particular assumptions that went into the programming of the machines.

THE INEVITABILITY OF IGNORANCE It may be impossible to allow much of the government, to say nothing of the public, access to the kind of information we have been discussing here. But let us assume that somehow the operation of the government has been reorganized so that procedures are enforced to permit competing political parties and other private organizations to have access to the government's raw data, to have parallel systems for the processing of data as well as to have access to the government's computer programs. Even then, most people will be incapable of judging the validity of one contending computer program compared to another, or whether the policies based on them are appropriate.

This condition exists today about military postures. These are derived in good part from computer analyses and computer-based games that produce probabilities based on programmed assumptions about weapon systems and our and the enemy's behavior. Here the intellectual ineffectualness of the layman is obscured by the secrecy that keeps him from finding out what he probably would not be able to understand anyway. If this sounds condescending, it only needs to be pointed out that there are large areas of misunderstanding and misinterpretation among the military too. At any given time, some of these people do not fully appreciate the relationships between the programs used in the computers and the real world in which the consequences are supposed to follow. As it is now, the average intelligent man has little basis for judging the differing

opinions of economists about the state of the economy or even about the reasons for a past state. He also has little basis for appraising the conflicting opinions among scientists and engineers about the costs and results of complex scientific developments such as man in space. In both examples, computers play important roles in the esoteric arguments involved.

Thus, even if people may have more leisure time to attend more closely to politics, they may not have the ability to contribute to the formulation of policy. Some observers feel that the middle class does not now take a strong interest in voting and is alienated in its responsibility for the conduct of government. Leisure may not change this trend, especially when government becomes in large part the complex computer operation that it must necessarily become.

Significant public opinion may come from only a relatively small portion of the public: a) those who are able to follow the battles of the computers and to understand the implications of their programs; and b) those who are concerned with government policy but who are outside of or unfamiliar with the computer environment.

For this segment of the voting population, differences over decisions that are made or should be made might become more intense and more irreconcilable. Already there is a difference of opinion among intelligent men about the problem of the proper roles in American foreign policy of military weapons, arms control, and various levels of disarmament. One side accuses its opponents of naïveté or ignorance about the "facts" (computer-based), and the other side objects to the immorality or political insensibilities of its opponents. Many aspects of the problem involve incommensurables; most are too complex to stand simplification in order to appeal to the larger public or to an unsophisticated Congressman. Yet the arguments *are* simplified for these purposes and the result is fantastic confusion. The ensuing frustration leads to further efforts to make the case black or white and to further efforts by one contingent to provide ever more impressive computer-based analyses and by the other side to demonstrate that they are beside the point.

This is only one example of the problems that will arise from the existence of sophisticated computers. Will the problems create greater chasms between the sophisticated voter and the general public, and within the sophisticated voting group itself?

PERSONNEL AND PERSONALITIES As for the selection of the men who are to plan or make policy, a computerized government will require different training from that which executive personnel in most governmental agencies has today. Certainly, without such training (and perhaps with it) there is bound to be a deepening of the split between politics and facts. For example, it is evident that the attitudes of many Congressmen toward space activities are motivated more by politics and conventional interpretations of reality than by engineering facts or the realities of international relations.

The same schisms will be compounded as computers are used more and more to plan programs in the Department of Health, Education, and Welfare, urban development, communications, transportation, foreign aid, and the analysis of intelligence data of all sorts.

In business and industry the shift has already begun toward recruiting top management from the cadre of engineering and laboratory administration, for these are the people who understand the possibilities of and are sympathetic to computer-based thinking. In government the trend has not been as clear-cut, but it is noteworthy that the scientist, as high-level adviser, is a recent innovation and one clearly here to stay. Sometimes unhappily and sometimes enthusiastically, the scientist, scientist-administrator, and engineer acknowledge that their role of adviser is frequently confused with that of policy-maker. As people with this training come more to influence policy and those chosen to make it, changes in the character and attitudes of the men responsible for the conduct of government will inevitably occur.

For reasons of personality as well as professional perspective, many operations researchers and systems analysts have great difficulty in coping with the more ambiguous and less "logical" aspects of society.<sup>22</sup> Their temperaments, training, and sympathies may not incline them to indulge the slow, ponderous, illogical, and emotional tendencies of democratic processes. Or they may ignore the extra-logical nature of man. Emphasis on "logic," in association with the other factors we have mentioned, may encourage a trend toward the recruitment of authoritarian personalities. There is no necessary correlation between the desire to apply scientific logic to problems and the desire to apply democratic principles to daily, or even to professional scientific, life.

MASS VS. THE INDIVIDUAL    The psychological influence of computers is overwhelming: they symbolize and reenforce the potency of America's belief in the utility of science and technology. There is a sense of security in nicely worked-up curves and complex displays of information which are the products of almost unimaginably intricate and elegant machinery. In general, the influence of computers will continue to be enhanced if those who use them attend chiefly to those components of reality which can be put into a computer and processed by it, and the important values will become those which are compatible with this approach to analyzing and manipulating the world. For example, the influence of computers has already been sufficiently strong to seduce military planners and civil defense planners *away* from those aspects of their problems which are not now subject to data processing. Most of the planning for survival following nuclear attack has to do with those parts of the situation which can be studied by computers. Crucial aspects of psychological and social reorganization have been pushed into the background simply because they cannot be handled statistically with convenience or with the demonstrated "expertness" of the specialist in computers. Thus, the nature of the post-attack situation is argued learnedly but spuriously by those who have the attention of leadership, an attention stimulated by the glamor of computers, the prestige of their scientist-keepers, and the comfort of their "hard facts."

Computers are especially useful for dealing with social situations that pertain to people in the mass, such as traffic control, financial transactions, mass-demand consumer goods, allocation of resources, etc. They are so useful in these areas that they undoubtedly will help to seduce planners into inventing a society with goals that can be dealt with in the mass rather than in terms of the individual. In fact, the whole trend toward cybernation can be seen as an effort to remove the variabilities in man's on-the-job behavior and off-the-job needs which, because of their non-statistical nature, complicate production and consumption. Thus, somewhere along the line, the idea of the individual may be completely swallowed up in statistics. The planner and those he plans for may become divorced from one another, and the alienation of the individual from his government and individual from individual within government may grow ever greater.

Computers will inevitably be used to plan employment for those dis-



placed by cybernation. This may lead to a more rationalized society than could otherwise be invented, with a more adequate allocation of jobs. But one wonders whether it will not also lead, on a national scale, to an attitude in the planner of relative indifference to the individual, an indifference similar to that shown by many managers of large self-service institutions who find an occasional complaint too much trouble to cope with individually because the influence of the individual on the operation of the system is too negligible to warrant attention.

What will be the consequences for our relations with underdeveloped nations of a government that sees the world through computers? With our general public alienated from its own productive and governmental processes and our leadership seemingly successful through its use of computer-based planning and control, our government may well become more and more incapable of recognizing the differences between the needs, aspirations, and customs of these nations and those of our own country. In these nations, productive and governmental processes will still be very human activities, with all the non-statistical variabilities that implies. Our decision to race the U.S.S.R. to the moon is an initial indication of our incapacity as an advanced technological nation to appreciate what our acts look like to other nations with different attitudes.

On the other hand, the emphasis on human behavior as a statistical reality may encourage revisions in the temporal scale of government planning and programs. Time is a statistical property in cybernated systems: it takes time for variables to average out, to rise or fall in their effects, and the time period usually is not a fiscal year or some small multiple thereof. Thus, perhaps we can hope for more sensible long-range planning in government as a result of the computer's need for long time periods in which to make its statistical models work out. If this should come about, of course, it will require vast changes in the conduct of government and in the devices that government, and especially the Congress, uses for controlling its activities. It may also result in extending the present trend of turning over governmental policy-planning and, in effect, policy-making responsibilities to private organizations and their human and machine computers such as RAND. For unless the rules for Congressional elections are also changed, some of the responsibility that Congressmen now take for programs, when they vote relatively short-term appropria-

tions, will no doubt be transferred to the machines that invented the plans if Congressmen should be faced with passing on appropriations and programs that would extend far beyond the time of their incumbencies.

DECISIONS FOR BUSINESS The implications of the concentration of decision-making within business firms as a result of cybernation are not as clear-cut as the effects for government. In principle, both big and small business will be able to know much more about the nature of their markets and of their organizational operations through cybernation. Whether or not this will help both big and small proportionately is far from clear. Big business will undoubtedly have better facilities for information and decisions, but small business may be able to get what it needs by buying it from service organizations that will come into existence for this purpose. Big organizations will be able to afford high-priced personnel for doing the thinking beyond that done by the machines. If quality of thinking is always related to price, the big organizations will be able to put their small competitors out of business. But the big organizations, precisely because of their size, may have relatively little maneuverability, and some of the best minds may find the little organizations a more exciting game. Whether the little organizations could stay afloat is moot, but one can anticipate some exciting entrepreneurial maneuvers among the small firms while they last.

One thing is clear: among the small organizations, and probably among the big ones too, we can expect disastrous mistakes as a result of poor machine programming or inaccurate interpretations of the directives of the machines. These will be greatest during the early period when it will be faddish to plan via machine and when few organizations will have the brainpower and organization to do so intelligently. Thus, added to the unemployment ranks in the decade or so ahead will be those who have been put out of jobs because their firms have misused computers.

# The Control of Cybernation

## TIME AND PLANNING

Time is crucial in any plan to cope with cybernation. Ways of ameliorating its adverse effects require thinking farther ahead than we ever do. In a society in the process of becoming cybernated, education and training for work as well as education and training for leisure must begin early in life. Shifts in behavior, attitudes, and aspirations take a long time to mature. It will be extraordinarily difficult to produce appropriate "culture-bearers," both parents and teachers, in sufficient numbers, distribution, and quality in the relatively brief time available. It is hard to see, for example, how Congress, composed in good part of older men acting from traditional perspectives and operating by seniority, could recognize soon enough and then legislate well enough to produce the fundamental shifts needed to meet the complexities of cybernation. It is hard to see how our style of pragmatic making-do and frantic crash programs can radically change in the next few years. This is especially hard to visualize when the whole cybernation situation is such that we find it impossible to determine the consequences of cybernation even in the medium long run. The differences expressed in the public statements of business and labor demonstrate that any reconciliation of interests will be a very long-range effort indeed. "Drastic" actions to forestall or eliminate the ill-effects of cybernation will not be taken in time unless we change our operating style drastically.

## EDUCATION: OCCUPATIONS AND ATTITUDES

Among the many factors contributing to the stability of a social system are two intimately intertwined ones: the types of tasks that are performed; and the nature of the relationship between the attitudes of the members

of the society toward these tasks and their opinions about the proper goals of the individual members of the society and the right ways of reaching them.

The long-range stability of the social system depends on a population of young people properly educated to enter the adult world of tasks and attitudes. Once, the pace of change was slow enough to permit a comfortable margin of compatibility between the adult world and the one children were trained to expect. This compatibility no longer exists. Now we have to ask: What should be the education of a population more and more enveloped in cybernation? What are the appropriate attitudes toward and training for participation in government, the use of leisure, standards of consumption, particular occupations?

Education must cope with the transitional period when the disruption among different socio-economic and occupational groups will be the greatest; and the later, relatively stable period, if it ever comes to exist, when most people would have adequate income and shorter working hours. The problem involves looking ahead five, ten, twenty years to see what are likely to be the occupational and social needs and attitudes of those future periods; planning the intellectual and social education of each age group in the numbers needed; motivating young people to seek certain types of jobs and to adopt the desirable and necessary attitudes; providing enough suitable teachers; being able to alter all of these as the actualities in society and technology indicate; and directing the pattern of cybernation so that it fits with the expected kinds and distribution of abilities and attitudes produced by home and school.

To what extent education and technology can be coordinated is not at all clear, if only because we do not know, even for today's world, the criteria for judging the consonance or dissonance in our educational, attitudinal, and occupational systems. We think that parts of the social system are badly out of phase with other parts and that, as a whole, the system is progressively less capable of coping with the problems it produces. But there is little consensus on the "causes" and even less on what can be done about them. All we have at present is the hope that most people can be educated for significant participation in such a world as we have foreseen here — we have no evidence that it can be done.

If we do not find the answers to these questions soon, we will have a population in the next ten to twenty years more and more out of touch with national and international realities, ever more the victims of insecurity on the one hand and ennui on the other, and more and more mismatched to the occupational needs of the day. If we fail to find the answers, we can bumble along, very probably heading into disaster, or we can restrict the extension of cybernation, permitting it only where necessary for the national interest. But judging the national interest and distinguishing it from private interests would confront us with most of the problems that have been outlined in this paper.

Perhaps time has already run out. Even if our style somehow should shift to long-range planning, it would not eliminate the inadequate training and inadequate values of much of our present adolescent and pre-adolescent population, as well as of those adults who will be displaced or remain unhired as a result of cybernation in the next decade. Only a partial solution exists in this case: Begin now a program of economic and social first aid for these people.

## **A MORATORIUM ON CYBERNATION?**

Can we control the effects of cybernation by making it illegal or unprofitable to develop cybernation technology? No, not without virtually stopping the development of almost all of new technology and a good part of the general development of scientific knowledge. The accumulation of knowledge in many areas of science depends on computers. To refine computers and make them more versatile requires research in almost every scientific area. It also requires the development of a technology, usually automated, to produce the articles needed to build new computers. As long as we choose to compete with other parts of the world, we shall have to develop new products and new means for producing them better. Cybernation is the only way to do it on a significant scale. As long as we choose to live in a world guided by science and its technology we have no choice but to encourage the development of cybernation. If we insist on this framework, the answers to coping with its effects must be found elsewhere than in a moratorium on its development.

## CONTROL: PUBLIC OR PRIVATE?

There has always been tension between big industry, with its concern for profit and market control, and government, with its concern for the national interest. The tension has increased as big business has become so large as to be quasi-governmental in its influence and as government has had to turn to and even subsidize parts of business in order to meet parts of the national interest within a free-enterprise framework. Under these circumstances we can expect strong differences between government and business as to when and where it is socially legitimate to introduce automation.

Sufficient governmental control over who can cybernate, when, and where would not come easily. In the first place, decisions about control would have to be based on the intentions of local business and industry as well as on the national picture. For example, the effects on Congressional seating of shifts in populations as a result of cybernation-based industrial relocation would presumably enter the calculations. Longer-run consequences would have to be balanced against short-run profits or social dislocations. Implications for our military posture and for international trade would be significant. Moreover, it would be difficult for the government to make a case for control of private organizations on the basis of ambiguous estimates of the effects of automation on hiring policy. In any particular case, it becomes clear only well after the fact of cybernation whether increases or changes in production resulted in a corresponding increase in man-hours of work sufficient to compensate the economy for the jobs lost or the people unhired.

Finally, it must be kept in mind that the power of some of the largest unions is seriously threatened by automation. In a relatively short time they may not have the leverage they now have. Thus, a crucial counterbalance to the pressures from business may be absent when it is most needed. It is possible that the crisis that will arouse the government to exert control will not be evident until the blue-collar work force has been so eroded as to have weakened the unions irreparably.

Yet some sort of control is going to be necessary. There are, of course, the federal regulatory agencies. However, they have never been distinguished for applying their powers with the vigor sometimes allowed

by their mandates, and there is no reason to suppose that their traditional weaknesses would suddenly disappear and that an agency created to cope with cybernation would be effective. Nor is there any reason to believe that an agency with the very wide-ranging powers that it would need would be approved before the crisis that it was supposed to avert was upon us.

In theory, control could be exercised by private enterprise. But in the unlikely case that competitors could see their mutual interests clearly enough to join forces, the very act of cooperative control would be incompatible with our anti-trust laws. Whether the government or some alter-government comprised of business, labor, and industry were to do the controlling, either group would have to undertake a degree of national planning and control thoroughly incompatible with the way in which we look upon the management of our economic and social system today.

## After the Take-Over

In twenty years, other things being equal, most of the routine blue-collar and white-collar tasks that can be done by cybernation will be. Our schools will probably be turning out a larger proportion of the population better educated than they are today, but most of our citizens will be unable to understand the cybernated world in which they live. Perhaps they will understand the rudiments of calculus, biology, nuclear physics, and the humanities. But the research realm of scientists, the problems of government, and the interplay between them will be beyond the ken even of our college graduates. Besides, most people will have had to recognize that, when it comes to logic, the machines by and large can think better than they, for in that time reasonably good thinking computers should be operating on a large scale.

There will be a small, almost separate, society of people in rapport with the advanced computers. These cyberneticians will have established

a relationship with their machines that cannot be shared with the average man any more than the average man today can understand the problems of molecular biology, nuclear physics, or neuropsychiatry. Indeed, many scholars will not have the capacity to share their knowledge or feeling about this new man-machine relationship. Those with the talent for the work probably will have to develop it from childhood and will be trained as intensively as the classical ballerina.

Some of the remaining population will be productively engaged in human-to-human or human-to-machine activities requiring judgment and a high level of intelligence and training. But the rest, whose innate intelligence or training is not of the highest, what will they do? We can foresee a nation with a large portion of its people doing, directly or indirectly, the endless public tasks that the welfare state needs and that the government will not allow to be cybernated because of the serious unemployment that would result. These people will work short hours, with much time for the pursuit of leisure activities.

Even with a college education, what will they do all their long lives, day after day, four-day week-end after week-end, vacation after vacation, in a more and more crowded world? (There is a population explosion to face in another ten to thirty years.) What will they believe in and aspire to as they work their shorter hours and, on the outside, pursue their "self-fulfilling" activities, whatever they may be? No one has ever seriously envisioned what characteristics these activities might have in order to be able to engross most men and women most of their adult lives. What will be the relationship of these people to government, to the "upper intellectuals," to the rest of the world, to themselves?

Obviously, attitudes toward work, play, and social responsibility will have changed greatly. Somehow we shall have had to cope emotionally with the vast gap in living standards that will then typify the difference between us and the have-not nations. We shall presumably have found some way to give meaning to the consumption of mass leisure. It would seem that a life oriented to private recreation might carry with it an attitude of relative indifference to public responsibility. This indifference, plus the centralization of authority, would seem to imply a governing élite and a popular acceptance of such an élite.

If this world is to exist as a coherent society, it will have to have its



own "logic," so that it will make sense to its inhabitants. Today, for most of our population, our society makes sense, even though some other eyes hardly see us as logical in the formal sense of the word and the eyes of some of our own people look on us as a more or less pointless society. We make and solve our problems chiefly by other than mathematical-logical standards, and so must the cybernated generations. What these standards might be, we do not know. But if they are inadequate, the frustration and pointlessness that they produce may well evoke, in turn, a war of desperation—ostensibly against some external enemy but, in fact, a war to make the world safe for human beings by destroying most of society's sophisticated technological base. One thing is clear: if the new "logic" is to resolve the problems raised here, it will have to generate beliefs, behavior, and goals far different from those which we have held until now and which are driving us more and more inexorably into a contradictory world run by (and for?) ever more intelligent, ever more versatile slaves.

## FOOTNOTES

1. John Diebold, *Automation: Its Impact on Business and Labor*, National Planning Association, Planning Pamphlet No. 106, Washington, D. C., May, 1959, p. 3.
2. "Multi-Purpose Automation Unit is Sold 'Off the Shelf,'" *New York Times*, June 23, 1961, p. 44.
3. Norbert Wiener, "Some Moral and Technical Consequences of Automation," *Science*, Vol. 131, No. 3410, May 6, 1960, p. 1356.
4. *Ibid*, p. 1357.
5. *Calling All Jobs*, National Association of Manufacturers, New York, October, 1957, p. 21.
6. "When Machines Have Jobs—and Workers Do Not," *U.S. News and World Report*, Vol. 50, No. 6, February 6, 1961, p. 76.
7. From statement by Walter Reuther before the Subcommittee on Economic Stabilization of the Joint Committee on the Economic Report, U. S. Congress; *Automation and Technological Change*, 84th Congress, First Session, USGPO, 1955, p. 99.
8. From statement of James A. Suffridge, President, Retail Clerks International Association before the Subcommittee on Automation and Energy Resources of the Joint Economic Committee, U. S. Congress; *New Views on Automation*, 86th Congress, Second Session, USGPO, 1960, p. 591.
9. "The Automation Jobless . . . Not Fired, Just Not Hired," *Time*, Vol. 77, No. 9, February 24, 1961, p. 69.
10. From statement by Howard Coughlin, President, Office Employees International Union, AFL-CIO, before the Subcommittee on Automation and Energy Resources of the Joint Economic Committee, U. S. Congress; *New Views on Automation*, 86th Congress, Second Session, USGPO, 1960, p. 513.
11. Harold J. Leavitt and Thomas L. Whisler, "Management in the 1980's," *Harvard Business Review*, Nov.-Dec. 1958, pp. 41-8.
12. See, for example, Howard Rusk, "New Tools in Medicine," *New York Times*, July 23, 1961.
13. A. H. Raskin, "Hard-Core Unemployment a Rising National Problem," *New York Times*, April 6, 1961, p. 18.

14. In conversation with Mr. Iffert. See also Robert E. Iffert, *Retention and Withdrawal of College Students*, Bulletin No. 1, Department of Health, Education, and Welfare, 1958.
15. James B. Conant, "Social Dynamite in Our Large Cities," *Vital Speeches*, #18, July 1, 1961, p. 554 ff.
16. "The Automation Jobless . . . Not Fired, Just Not Hired," *Time*, Vol. 77, No. 9, February 24, 1961, p. 69.
17. A. H. Raskin, "Fears About Automation Overshadowing Its Boons," *New York Times*, April 7, 1961, p. 16.
18. "The Automation Jobless . . . Not Fired, Just Not Hired," *Time*, Vol. 77, No. 9, February 24, 1961, p. 69.
19. Perhaps an indication of things to come is to be found in the recent Federal Court ruling that employees have an "earned and vested right" of seniority and that this cannot be "denied unilaterally" or affected by a change in the location of their employer. "Court Bars Firing in Plant Move," *Washington Post*, July 7, 1961.
20. Harvey Swados, "Less Work—Less Leisure," *Mass Leisure*, ed. Eric Larrabee and Rolf Meyersohn, The Free Press, Glencoe, Ill., 1958, p. 353.
21. Lawrence E. Davies, "Data Retriever to Help the CIA. Finds One Page in Millions in Only a Few Seconds," *New York Times*, July 12, 1961.
22. Donald N. Michael, "Some Factors Tending to Limit the Utility of the Social Scientist in Military Systems Analysis," *Operations Research*, Vol. 5, No. 1, February, 1957, pp. 90-96.

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