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SUBJECT AND/OR REFERENCE Conference on Cybercultural Revolution DATE: 6/2/64

Enclosed is a copy of Mr. Seligman's speech of yesterday and a copy of the notes from which I spoke after his talk, as I mentioned in my memo of 6/20/64.

F. B. Wood

REPLY: _____ DATE: _____

THE COSTS OF AUTOMATION

Ben B. Seligman

Problems stemming from the introduction of cybernation are much too vast to be discussed adequately in a quarter of an hour. Nevertheless, I shall try, even if the results represent but a sketch of an outline for an adequate analysis. One can think of at least three broad rubrics: (1) irreversible structural changes in the work force; (2) the alterations enforced on business organization; (3) the rigidities that may be imposed on the social structure itself.

Let us proceed to the first, a problem area that the practitioners of conventional wisdom in economics insist is non-existent. But unlike the Emperor's clothes, the problem is quite real and there are enough displaced persons — displaced by cybernation or automation — now seeking other jobs who can testify eloquently to its reality. The U. S. Department of Labor has told us that 200,000 manufacturing jobs a year will be lost by 1972 because of the advanced technology brought on by the computer. From 1953 to 1959, within a short span of six years, 80 per cent of the decline in factory openings could be traced to automation. Moreover, this report, given originally to an Arden House conclave about a year ago, said nothing of those file clerks and accountants whose positions evaporate everytime a fresh piece of data processing equipment is installed in an office. Other observers are even gloomier — estimates ranging up to 40,000 lost jobs a week are attributed to the computer.

At this rate, simple arithmetic calculation tells us that there would be no work force by 1999. Of course, such an estimate fails to take into account whatever job creation might stem from the new industrial frontier or from increased demand. Hence, let me offer my own somewhat more conservative estimate of net job destruction. If one assumes frictional unemployment of 2 per cent, as used to be done (one wonders where and when the current 4 per cent figure got into the act) then with a work force of 72 million and total unemployment of over 4 million there would appear to be almost 2 3/4 million persons out of work for reasons other than ordinary economic adjustment. Such a presumption is sustained by the fact that unemployment increased 78 per cent in the 16 years between 1947 and 1963, as contrasted with a 20 per cent increase in the work force. One may hazard the guess that perhaps half the unemployment above frictional levels is structural. If this is the case, then almost 12,000 jobs a month have been destroyed: the figure, modest as it is, suggests the magnitude of automation net impact -- after all upgrading, new hires and rehires. In a decade, a million and a half jobs irrevocably lost. In terms of wages and investment that might have stemmed from such purchasing power the loss would appear to have been in the order of almost \$2 billion each year.

Now, sometimes we hear that cybernation creates new jobs. If it does, they are not very visible. True, there was a 4.3 million increase in the employed work force between

1957 and 1963. But this increase came mainly from federal, state and local governments: 65 per cent of the increase consisted of direct employment by these jurisdictions and of procurement programs on their behalf. Non-profit institutions accounted for 16 per cent; part-time jobs generated by private demand, 14 per cent; and full time jobs created by industry's own effort, 5 per cent. There is small consolation for the factory worker in the expansion of government employment, since he does not possess the transferable skills. Further, recent reports suggest some doubt about any continued increase in Federal jobs. A recent study of employment prospects, issued jointly by the Labor and Commerce Departments predicted a decline in employment in 18 major industries, mainly as a result of technology. And in 14 other industries -- including transport, electronics and trade -- only increased demand, it was said, would overcome the effects of spreading labor saving devices.

The fundamental economic relationships require that there be an increase in output as productivity increases, or else jobs go down the drain. There is no doubt that productivity, stemming from the new technology, has increased: from 1909 to 1947 the average annual rise in productivity was 2 per cent; from 1947 to 1960, about 3 per cent; and from 1960 to 1963, it was 3.6 per cent each year. With 60 million persons in private employment and a $3\frac{1}{2}$ per cent rise in productivity each year, there would have to be enough activity in the economy to create well over 2 million jobs just to keep

unemployment from rising, to say nothing of those just coming into the work force at the rate of 1.5 million each year. Now, while output has been rising, the pace has not been fast enough to overcome the enhances productivity stemming from automation and cybernation. It is all too easy to say "Let's produce more!" There is no way of encouraging greater output, at least in the private sector, when there is no greater market, and there is no greater market when jobs are lagging. One solution, which is indeed on the verge of adoption by default, is to recreate Disraeli's Two Nations and simply dump the dispossessed onto a social slag heap.

Much has been already written about what cybernated machines can do. They learn and "perceive": they analyze stock market conditions; establish rocket flight patterns before the shot is fired into space; write television scripts that compare favorable with what is now available; compose music; translate; and play games. They combine high technical competence with just enough of an I.Q. to keep them tractable. They do precisely the kind of work to which junior executives and semi-skilled employees are usually assigned.

No slur is intended here, for in addition to the ordinary worker it is the middle manager, the backbone of the average corporation, who will be most affected by automation. He has a bleak future indeed, when computers relay information to each other, do all the scheduling, and control manufacturing from inception to the point at which the product is packaged and rolled onto a boxcar. It is rather the industrial archon who ultimately wins out, for with the

elimination of both plant and office staff, this man at the very top gains even tighter control over the decision-making process. The sort of organizational looseness that prevailed prior to the advent of the computer is eliminated, and corporate structure becomes more formal, more "integrated", since with the computer there must be greater "cooperation". The number of links in the chain of command is reduced drastically; vice-presidents are soon out of a job. No less an authority than Herbert A. Simon of Carnegie Tech has said that by 1985 machines can dispense with all middle echelons in business. Production planning is handed over to the digital demon, while both the middle manager and the displaced worker drive taxicabs. The sociologist may very well ask, whither the American dream of status and success?

Quite often, the computer engineer tries to build his own empire within the corporation. Fresh to the ways of business life, he unabashedly plays havoc with established relations. He and his programmer cohorts, cutting across all divisions, often ignore and undermine the authority of department heads and vice-presidents. Sometimes the new elite does lose out: it has not been unknown for a computer installation to be yanked as a result of corporate internecine warfare.

Usually though, archon and engineers are in complete accord. With the computer creating certain expectations the firm must operate through a series of highly rigid sequences. Flexibility has been dispensed with, for the whole plant is now a single technical structure in which total performance must be

"optimized." The engineer examines each step in the process solely in terms of efficiency - industrial logic of the most unremitting kind takes primacy of place. Under cybernation, the engineer or mathematician is the skilled man in the plant, while workers, those who remain and those who do not, are expected to adjust with equanimity to a situation for which they have had no responsibility. In fact, the engineer's attitude quite often is tough and hard, too much so for the ordinary men: what the worker doesn't know, says he, won't hurt him. The scientists appreciate only "facts": the human problems of an industrial system frequently have little meaning for them. Unlike the organization men of the 50's, they are usually "inner directed," disturbers of the corporate peace, freebooters in pursuit of the idols of efficiency. Since the latter is measured by high profit and low cost, such scientific ruthlessness meets the approval of the archon. The latter may not know what the scientist is doing: top management merely voices a faith based on payoff. Thus the programmer, who often assumes the aspect of a medieval alchemist, runs his own show, designing projects, cutting corporate red tape with abandon, and advising the industrial relations department that labor displacement is "none of your business." At best, the engineer can parrot some devotee of the conventional economic wisdom by repeating that automation creates new demand and new jobs, upgrades the worker and inspires everyone with its challenge. There must be a certain glory in the marvels of automation: but the men who once worked in the chemical plants, oil refineries,

and steel mills are now out of sight and out of mind.

Perhaps the most serious social cost stems from distortions of our value systems imposed by cybernation, for the philosophic preconceptions in computer technology are thoroughly mechanistic. There is a presumption that all behavior is thoroughly objective and that reality can be compressed into mathematical equations. Once this is done, prediction comes easily and so does control of the human being and his society. Certitude, such as was never known before, can be provided, particularly with a high speed digital machine. Man has no soul, says the psychologist, and his emotions and irrationality are mere outputs emanating from a "black box" whose electronic characteristics will soon be revealed. Introspection is utterly useless, for behavior can be explained in the relatively simpler terms of stimulus and response. The actions of intelligent human beings can be understood as a product of complicated but finite and determinate "laws". It is this philosophic outlook that underpins rote memory experiments, the generation of visual displays on the computer, studies in mechanical perception and artificial concept formation. It is confidently argued that all this will eventually demonstrate how images are transformed into ideas and action by the brain.

An astounding intellectual arrogance infuses the thinking of these specialists. One went so far as to assert that there was too much irrational reverence for human intelligence and that in fact there was nothing special about

either intelligence or creativity. Intelligence as ordinarily conceived was deemed to be but "an aesthetic question, or one of a sense of dignity", not a technical matter. It is really a complex of performances which we may respect but not necessarily comprehend. Consequently, it would be just as easy for these creators of androids to simulate large scale organizations as to replicate the behavior of individuals. Artificial social structures and processes are made to develop according to certain rules as the game of philosopher king continues unabated.

Thus, it is presumed that the machine will itself generate the "time stream of a decision-making process." However, the patent difficulty is the supposed creditability that it lends to whatever theory the computer operator happens to have in mind. Now, in the social sciences particularly, there are no theories that are absolute: it is always a case of "perhaps". Worse yet, computer experts seldom take the trouble to check their computations against ordinary observation and expect the common man to accept what they say virtually on faith simply because complicated equations have been stuffed through a computer. In a sense, mechanical or electronic craftsmanship has been substituted for meaning, and, as Robert Solo remarked, formalism has replaced human thought. It is seldom asked why the choice of the computer is necessarily superior to that of judgement rooted in experience. But, it is insisted that the imitation is better than the real thing, and reality is created out of the illusions engendered by the machine.

What is so disturbing about these efforts to cybernetate existence is the creation of conditions which facilitate the manipulation of people. It is assumed that once an equation has been formulated, all pertinent factors have been encompassed. As Jacques Barzun has said, the individual is to be given a number, stripped of differences and turned into a manufactured object for analysis and abstraction. The sentient man is replaced by the Compleat Robot, for to many scientists man's hope and fate are irrelevant. Complex social and psychological situations are cast into a framework suitable for the computer, ignoring the intricacies and subtleties of human response. Such activities can be rooted only in a callousness and sense of expediency that readily sustains a mass society in which individual uniqueness cannot survive.

6/20/64