EDMUND F. BYRNE

THE LABOR-SAVING DEVICE: EVIDENCE OF RESPONSIBILITY?*

It is unquestionably people who decide to develop and introduce new technologies. But technology advances so rapidly now that it is no longer apparent to the uninvolved observer that human beings are actually still in control of it. Technology, it is said, is on a "runaway" course; it is becoming "autonomous" of human agency. Taken literally, this characterization of technological change leaves no theoretical room for moral if even for legal responsibility. In the absence of any more subtle qualifications, it amounts to an instantiation of the sort of hard determinism that rules out the very possibility of free will.[1]

The case for technological determinism can, to be sure, be argued with a brief full of indications that technology is "out of control." Conceded. Moreover, indications that human beings are still in control can be denied theoretical import by asserting the "it's-only-a-matter-of-time" principle. Also conceded. Yet it remains the case that *some* human beings are clearly responsible agents of technological change. By this I mean that some human beings not only consciously seek the development of certain technologies but tolerate or even intend fully anticipated consequences of the introduction of that technology. I believe that this claim can be generalized so as to apply in some degree to any technological change. But here I shall build my case only on the subset of technologies developed and introduced as "labor-saving devices."

Assumed for purposes of this discussion is that workers are in fact displaced and are thereby harmed by the introduction of labor-saving devices. To be established is the claim that in each instance some human beings as agents consciously intend, at least indirectly, the harm that does result from the introduction of so characterized technologies. In support of this claim I propose to discredit each of four counter-arguments:

(1) Only good is intended by the introduction of a labor-saving device, as witness the support of workers as well as management.
(2) If workers are opposed to doing away with work, then it is demonstrably

Paul T. Durbin (ed.), Technology and Contemporary Life, 63–85.

false that some people intend the unemployment consequences of labor-saving devices. For, management surely has a long record of encouraging and stimulating hard work.

(3) Even if some people do intend to reduce the workforce by introducing a labor-saving device, they are not acting freely but only as they are compelled to do in response to competition.

(4) Even if some human beings do intend the unemployment consequences of labor-saving, this does not prove they are acting against the interests of workers. For, the long term result of this process will be a state of affairs in which people will no longer need to work.

Even if I am able to neutralize these objections, I will not, of course, have established any universal claim with regard to responsibility for technology. But the evidence I propose to introduce with regard to labor-saving devices might at least serve as an invitation to the opposition to assume the burden of proof.

I. LABOR-SAVING AS A EUPHEMISM

(1) Only good is intended by the introduction of a labor-saving device, as witness the support of workers as well as management.

Response: Appeal to worker support is misleading, because the notion of a labor-saving device is (a) ambiguous and (b) euphemistic.

Saving labor does not have the same meaning in everybody's vocabulary. In particular, it means something quite different to the managerial class than it does to the working class. To management saving labor means reducing production costs by lowering wages and/or benefits, shrinking working hours and/or the workforce itself, by automating or whatever. Working people, on the other hand (at least those who are not politically astute), typically associate saving labor not with any reduction in employment but with a reduction in the amount of *hard, debilitating work* that they must do to earn a living and/or carry out their domestic chores.

There is, then, both agreement and disagreement between management and workers with regard to the import of "labor saving." All agree that what should be saved, i.e., reduced or eliminated, is tedious debilitating work. Disagreement, and thus misunderstanding, has to do

with the relevance of such labor-saving to jobs. Workers generally favor reducing or eliminating not wages or jobs but only the demeaning aspects of work. Management, however, typically favors reducing or eliminating both the demeaning aspects of jobs and the holders of those jobs.

Evidence for this latter claim includes at least the following three observations. For one, elimination of unpleasant aspects of work is typically cited as a reason for adopting new technology.

Secondly, in the absence of new technology, management typically appeals to reasons for doing the work anyway. But to the extent that the work in question is unpleasant, the reasons cited need to overcome what is probably a natural aversion on the part of the workers. So most attempts to "sell" labor to workers depend upon some special gimmick.

Perhaps the most daring gimmick of all, utilized by Voltaire and by some German philosophers in the nineteenth century, is to declare flat out that labor is wholesome, meaningful, and fulfilling. Few defenders of labor have been quite so daring. Most have taken the softer approach of emphasizing the instrumental value of work as a means to some end. Work might be praised as the way to a better world, e.g., in the Marxist perspective. Work (associated particularly with labor) might also be recognized as painful but valuable for that very reason because of some indirect benefit that arises out of the pain. This approach has been widely utilized in the West, especially in the form of a "work ethic" that encourages people to work hard by appealing to their interest in being saved – not in this life, but in a promised life to come.

Thirdly, even jobs which are not inherently or even predominantly unpleasant are continually being eliminated when and as new technology becomes available. This in itself is a strong indication that the notion of a labor-saving device, as understood by management, is a euphemism. This, however, will become clearer from considerations below of the anti-labor bias of management.

II. MANAGERIAL SUPPORT OF HARD WORK: THE INTERIM RULE

(2) If workers are opposed to doing away with work, then it is demonstrably false that some people intend the unemployment consequences of labor-saving devices. For, management surely has a long record of encouraging and stimulating hard work.

Response: The appeal to hard work is only an interim device that, at least since the Industrial Revolution, is relied upon while awaiting a technological fix.

Work has long been a basic feature of social planning all across the ideological spectrum. For, in a world in which at least some human beings need to work in order that their kind can survive and occasionally even prosper, it is difficult for a social planner not to take work into account. But in taking work into account, two different but interconnected questions need to be addressed: (1) what work ought to be done; and (2) who (or what) ought to do it. The answer to the first question depends on goal-selection, for example, with regard to a desired level of need satisfaction and/or commitment to progress. The answer to the second at least presupposes a theory of distributive justice in society. More egalitarian ideals have been espoused in what I call the communitarian tradition.[2] But proponents of labor-saving devices are more likely to be associated with the authoritarian tradition.

Linked together as complementary themes of the authoritarian tradition are (a) the claims of an elite to exemption from some or all work and (b) some rationale to justify imposing the burdens of work on a subservient class or classes of people. The principal reason given for requiring work of others has always been that they will not otherwise qualify for social benefits. This reason has, in turn, been mystified with reminders that people are being punished for something or other and/or are on probation for a less demanding life ahead. Typical reasons given for excusing oneself from work that one requires of others is that one has more (socially) important things to do or, simply, that one is "the boss."

Authoritarian strategy with regard to the workforce has long been characterized by an interim rule and an ultimate rule. The interim rule is: do what you must to get productivity out of your workers. The ultimate rule is: whenever possible, replace people with machines. The history of the interim rule reveals the origins of labor-saving in anti-worker bias. The history of the replacement rule shows directly the culmination of anti-worker bias in worker-displacing technology and indirectly the conceptual inadequacy of the technological fix.

The German sociologist Max Weber identified the making of money as the single-minded, joyless, and ultimately irrational goal of the work ethic.[3] And as he described it, this ethic could be interiorized only by the

Whatever Benedict's intentions, in the course of time this early commitment to manual labor was reduced to mere symbolism as the monks left hard work to serfs and wage earners and engaged themselves only in more honorific and less tiring endeavors such as baking, gardening, and brewing.[6]

The holy elitism that characterized "reformed" Benedictinism is also found among the (clerical) intellectuals of the high Middle Ages who depended on institutionalized thinking to earn their living. Thomas Aquinas, a thirteenth century Italian monk with aristocratic origins, repeated Benedict's endorsement of both contemplation and action, but was willing to separate one from the other on the basis of one's position in society. He agreed with Aristotle that contemplation is the highest human endeavor, to which the chosen few might devote all their attention. And he also agreed with St. Paul's admonition, "If any man would not work, neither should he eat" – but only to the extent that such work is necessary. Where it was "necessary" was among the common people, who accordingly had a right as well as a duty to work. They were not to question or attempt to rise beyond their "natural" station in life; but in turn they were entitled to a "just price" (*justum pretium*) for their labor, i.e., just enough to provide a bare livelihood for one's self and one's family.[7]

This essentially authoritarian view of appropriate compensation for work did accommodate a paternalistic exception for the disabled. Anyone who was truly unable to work was recognized as having for that very reason a right to be cared for. But it was no more obvious in the Middle Ages than it is today just who is sufficiently disabled to merit care without working. At the time of Thomas Aquinas there was, to speak anachronistically, a sizeable surplus pool of labor. And as a result begging was an accepted means of gaining one's livelihood – one to which the formerly wealthy St. Francis of Assisi gave spiritual dignity by requiring his monks to rely upon it for their daily bread.

This comparatively idyllic policy with regard to the work obligation came to an end in the first half of the fourteenth century, for reasons that are still not clearly understood. But just as commerce was beginning to expand in various directions, Western Europe was decimated first by famine and then by the Black Death, which in 1347 swept across the continent from Constantinople and by 1349 had eliminated over a third of the population of England. The resulting sharp reduction in the labor supply led to the Statute of Laborers (1349), which accomodated

English landowners' need for agricultural workers by forbidding the able-bodied to beg, travel, or demand more than customary wages and requiring them to labor for their livelihood. Subject to the penalty of imprisonment, unskilled people who survived the plague were thus circumscribed:

> That every man and woman of our realm of England, of what condition he be, free or bond, able in body, and within the age of three-score years, not living in merchandize, nor exercising any craft, nor having of his own whereof he may live, nor his own land, about whose tillage he may occupy himself, and not serving another, if he in convenient service, his estate considered, be required to serve, he shall be bounden to serve him which so shall him require; and take only the wages, livery, meed, or salary, which were accustomed to be given in the places where he oweth to serve, the twentieth year of our reign of England, or five or six other common years next before.[8]

Or, as one modern commentator puts it, "The King and his lords saw begging, movement and vagrancy, and the labor shortage as essentially the same problem, to be dealt with in one law."[9] But the fabric of feudalism was coming undone, and the serfs' quest for freedom generated more and meaner laws. Persons without a letter authorizing travel were to be put in the stocks (12th Richard II, 1388). Yet after a century of thus battling against "idleness, mother and root of all vices," it was noted at the time of King Henry VIII that the number of vagabonds and beggars had actually increased. So provision was made for those truly in need (Statute of 1531); but able-bodied loafers were subject first to public whipping in the nude, then to whipping plus loss of part of one's right ear, then if still not willing to "put himself to labor like as a true man oweth to do," to "pains and execution of death" (Statute of 1536). During this same period of time most European countries empowered a new official, known in England as overseer of the poor, to put poor people to work and to imprison those who refused or performed unsatisfactorily (a somewhat primitive approach to vocational training). Meanwhile increasingly severe laws were being enacted to outlaw begging.[10]

It is in this context that Protestant reformers put forward their views about work. Martin Luther (1483–1546) still drew upon the just price theory to justify telling people to work at the trade or profession into which they were born. But he attributed equal value to any kind of work, active or contemplative, and stressed the religious dignity of one's work as a vocation or calling. Thus in his little book about vagabonds, *Liber Vagatorum*, he linked the Reformation to the growing movement against beggars by endorsing almsgiving only to duly certified indigents.

The Lutheran Eberlein proposed in his utopian *Wolfaria* (1521) to abolish serfdom, execute all mendicant friars, strictly regulate all trades and professions to avoid production of luxuries, and set everyone, including the nobility, to work at the only really honest occupation: agriculture. Johann Andreae, a Lutheran priest, dreamed of a society called *Christianapolis* in which perfect officials would not tolerate begging and would give material assitance to the poor only after careful examination of their needs.[11]

John Calvin (1509–1564) pushed the significance of one's work even farther by tying it in some inscrutable way to one's eternal salvation. So casual work is for this purpose inadequate, and dislike of work raises serious doubts about one's being among the elect. Although committed to a rigorous doctrine of divine predestination according to which human choice is irrelevant to the final outcome, Calvin insisted that the faith by which one is saved is expressed in and through methodical, disciplined, rational, uniform and hence specialized work. Puritanism, which was an offshoot of Calvin's teachings, drew the logical conclusion that wealth-seeking is a fine way to assure one's salvation; and in this way, according to Max Weber, Calvin's austere theology provided the ideological underpinning for capitalism. According to another interpretation, however, what Calvin provided was a religious justification for the capitalist's hard-nosed approach to discipline on the assembly line.[12]

The latter interpretation is certainly borne out by the technocratic moralizing of Scottish engineer Andrew Ure. Ure, the Calvinist ideologue of the Industrial Revolution, explained the need for hard work by associating its pain with that of the crucifixion of Christ.[13] But Calvinism was not alone in its endorsement of work either during the mass production or the mechanization phase of the Industrial Revolution. Robert Burton, a British don with no known religious preference, dreamed in his *Anatomy of Melancholy* (1621) of a society in which there would be no "beggars, rogues, vagabonds, or idle persons at all, that cannot give an account of their lives how they maintain themselves" and in which all able-bodied poor would be "enforced to work."[14] Two centuries later, Joseph Proudhon developed an anarchist glorification of labor around the idea that the value of work is directly proportional to how hard it is.[15] Karl Marx, by comparison, was not nearly so enamored with work, as will be noted below. But Andre Gorz, a contemporary Marxist, has said that "after the communist revolution we will work more, not less."[16]

Of course, these and other encomia of work, whatever their ideological roots, share a common flaw: even if a society depends on the work of some, that work will not be held in esteem, either by the workers or by their beneficiaries, if something else, notably ownership, is considered more honorific.[17] But the point here is simply that a work ethic serves the purpose of encouraging productivity in the absence of suitable machines. This is evident, for example, from the various workforce development proposals put forward in England during the sixteenth and seventeenth centuries. Faced with numerous and potentially revolutionary poor people, literate members of the leisure class came up with all sorts of ideas about how best to put the poor to work without upsetting the rich. Typically conservative ideas for social experiments of every sort, on both the community and the national scale, aimed at doing away with vagabonds and beggars, turning them into totally responsive instruments which, properly organized, would turn a profit for the enterprising rich.[18] This organization of "manu-facture," which culminated in Ambrose Crowley's authoritarian Law Books for his ironworks, won the praise of eighteenth-century landowner Adam Smith, who has immortalized "mass production" of pins. But even as this "assemblying" of workers became common, the spectre of "labor-saving devices" loomed on the horizon.

Gabriel Plattes argued that such labor-saving devices should not be adopted until a labor shortage has first developed. But John Bellers, a wealthy Quaker professionally concerned with poor relief, took the view that prohibiting a labor-saving device by law is like requiring a laborer to work with one hand tied behind his back. In spite of some legal approaches of the sort favored by Plattes, it was Bellers's openness to technology that served as a model for the entrepreneurs to come.[19]

III. MANAGERIAL RESPONSIBILITY FOR "LABOR-SAVING": THE ULTIMATE RULE

(3) Even if some people do intend to reduce the workforce by introducing a labor-saving device, they are not acting freely but only as they are compelled to do in response to competition.

Response: (a) Labor-saving devices are not necessarily adopted in response to competition; and (b) even if concern about competition is a consideration, a labor-saving device may not be a suitable response.

Already in the Middle Ages people took delight in various devices that could do something ordinarily done by humans. But in the absence of motivators like profit and progress, such devices were perceived merely as objects of wonder. As capitalism gradually transformed social goals, people learned to think of such devices as sources not just of wonder but of lower-cost productivity by means of which they might gain an advantage over their competitors. As we shall see, this is not necessarily so. Besides, labor-saving has not been espoused solely to beat the competition. It has also been motivated by a desire to separate workers from their jobs – either directly, as a result of a deliberate anti-worker bias, or indirectly, as a result of a pro-technology bias the consequences of which for workers are not well anticipated. The indirect bias will be considered in connection with the fourth counter-argument. Here only the direct bias will be considered, before addressing the relevance of competition.

A. The Direct Anti-Worker Bias

Almost from the onset of the Industrial Revolution, with its characteristic centralization of workers in capitalist-controlled plants, forces were set in motion that made the idea of production without payrolls attractive to the entrepreneurial class. Skilled workers who had previously enjoyed relative autonomy in their work life chafed at the impoverishing terms offered to them by the factory owners. The response of the owners, as often as not, was to look for a technological substitute for such intractable employees.

Thus, for example, did a certain Mr. Roberts respond to British textile entrepreneurs by developing a spinning automaton known as "the Iron Man" to displace high-wage skilled spinners. More generally, according to Andrew Ure,

> Wherever a process requires peculiar dexterity and steadiness of hand, it is withdrawn as soon as possible from the *cunning* workman, who is prone to irregularities of many kinds, and it is placed in charge of a peculiar mechanism, so self-regulating, that a child may superintend it.

In this way, he notes, "when capital enlists science in her service, the refractory kind of labour will always be taught docility."[20]

A decision to replace skilled workers with some labor-saving device is seldom if ever going to be made, of course, just out of a desire for

docility of the sort articulated by Ure. In the first place, science is not always prepared to provide industry with a quick technological fix, nor is labor saving the only motive for introducing new technology. A substantial part of good management strategy in this regard is to determine what is most advantageous in light of all known variables. Having determined this insofar as possible, one might in a given situation choose not to introduce an available device – until, that is, there is a significant change in one of the variables.

Standard dogma in this regard among neoclassical economists was to the effect that a rise in the cost of labor will precede a decision to mechanize. Introduction of "the Iron Man" into the textile industry is an example. Others are provided by Karl Marx. He notes how manufacturers in England turned to mechanization only after the Factory Laws limited child labor to four-to-six hour shifts and children's parents refused to sell their "half-timers" for less than full-timers. He also points to the practice of producing machines in one country to be used in another country where high wages motivate such substitution, and indicates that this very practice so expands the labor pool in the country where the machines are introduced that other industries there are spared the need to mechanize. For, says Marx, the capitalist's "profit comes . . . not from a diminution of the labour employed but of the labour paid for."[21] Thus even where displacement of workers by machines is prohibitively expensive if not still technically infeasible, the very threat of doing so might be employed to dissuade workers from demanding higher compensation.[22]

The need to make a profit is unquestionably an important reason for a company to look for ways to cut costs; but labor-saving is only one of the ways to cut costs, other possible ways being through cheaper raw materials or cheaper service on corporate debt. Besides, there are factors other than profit or revenue maximization that management might consider to be of overriding importance. For example, it is reported that a landowner in India will resist profit maximization of his agricultural business if by increasing his tenants' share he risks having his tenants pay off their debts to him and get out from under his control.[23]

That control over the workforce can even take precedence over profit maximization is central to the Marxist analysis of mechanization under capitalism. In Harry Braverman's view, for example, control of the work process is the overarching reason for mechanization. The "deskilling" of

production that mechanization has effected is, according to Braverman, deliberate but not inevitable. In keeping with the Marxist class analysis of this process, he too speaks of capitalism striving for "domination of dead labor [machinery] over living labor [workers]," thereby attributing an anti-labor animus to the business decisions to mechanize and automate.[24] The evidence he is able to muster for this claim is largely circumstantial and anecdotal, for example, the fact that supervisor-operated numerical control (N/C) became the automation of choice rather than the equally efficient record-playback system (R/P) that leaves programming in the control of skilled machinists.[25] Historian David Noble has since elaborated upon this example in impressive fashion, but without finding a "smoking gun."[26] Other Braverman inspired studies of the labor process also lend support to the claim that skilled industrial workers are being systematically displaced by machinery.[27]

Whether and in what numbers workers affected by deskilling ever *rejoin the workforce is a subject of much debate.* What seems clearly beyond debate is that the immediate purpose of a labor-saving device is, as its very name indicates, to save labor, i.e., to save a company some of the costs associated with paying labor. This means that the process of introducing such a device is inherently even if not intentionally hostile to anyone whose labor is thereby going to be "saved." Marx and many who have followed him would go on to argue that there is a definite and deliberate anti-labor bias on the part of management that tilts cost-cutting decisions whenever possible in the direction of cutting payrolls.

A generalized claim to this effect is difficult if not impossible to prove. (Braverman says this is because the complexity of reasons why there has been a "transformation of the labor process" does not lend itself to a "unitary answer.")[28] But many on the side of management, especially industrial design engineers, have displayed just this sort of anti-labor bias. Ure, for example, put it thus:

> It is, in fact, the constant aim and tendency of every improvement in machinery to supersede human labor altogether, or to diminish its cost, by substituting the industry of women and children for that of men; or that of ordinary labourers for trained artisans.[29]

The century and a half since Ure has been characterized by a variety of strategies to hold down the cost of labor in manufacturing, including the total regimentation of company towns and Frederick Taylor's preference for "stupid" workers who can be counted on to be docile,

advancing to various managerial theories of "job enrichment" to pacify the ever more demanding workers of the twentieth century, and culminating in an all-out effort to design workers right out of production processes entirely.[30]

As this trend clearly indicates, technological unemployment is inevitable, to a degree still subject to debate. It is inevitable, however, not by virtue of any law of nature or because there are no alternatives with different consequences but because robots and other microelectronic devices are already perceived as cost effective in the long run and hence a necessary condition for staying competitive in the industries affected.[31] Thus is being carried out Ure's "automatic plan," which he defined as follows: "(S)killed labour gets progressively superseded, and will, eventually, be replaced by mere overlookers of machines."[32] And to this day engineers seem to believe that automation can be cost effective only by eliminating humans, because the greatest expense is incurred in trying to accommodate "man in the loop." Says Lawrence B. Evans, an MIT chemical engineer:

> The cost of complex electronic circuitry continues to decrease exponentially (by a factor of about 1/2 each year) due to large-scale integration (LSI) semiconductor technology. . . . The real cost of a system is in the hardware for communication between man and that system (displays, keys, typewriters) and this cost is a function of the way the system is packaged. Thus, automation functions and data processing become economic if they can be done blindly, without the need for human communication.[33]

Estimates vary as to just how much less expensive it may be to use robots in place of humans; but that there will be significant savings is widely assumed. As one writer puts it, a Japanese robot in automotive production can do at $5.50/hour what a UAW worker does for $18.10/hour (wages and fringe benefits).[34] An estimate of this sort is typically based on a comparison between costs incurred from labor and costs of procuring and maintaining a robot. Robot providers claim that robot costs will be recouped within a three-year payback period from savings in labor alone. Of course, assumptions with regard to the cost of money, the cost of installation, and the cost of power and maintenance of a robot need to be adjusted up to take inflation into account. But the initial cost of producing a robot may well drop from, say, $50,000 in 1980 to just $10,000 in 1990. So recent estimates are probably at least in the correct order of magnitude.

B. Technology and Competition

The foregoing are clearly indications of free choice in the decision to adopt a labor-saving device. But, it may objected, they are not persuasive because they ignore the background conditions that mandate such a decision in the first place. These conditions, it is argued, involve competition among firms each of which seeks to control or at least to constrain others. It does not follow from this, however, that a labor-saving device is the appropriate response.

The labor-saving device has acquired a reputation for being able to deliver a technological fix to any business or industry that has what is considered to be an excessive payroll. This reputation, in turn, enhances significantly the success rate of suppliers who want to sell labor-saving devices to corporate buyers. What, if anything, the latter or anyone else stand to gain from any such purchase is, however, by no means obvious.

That society may wind up worse off because of corporate commitments to automation may be seen either on the level of the affected individuals or on the level of society taken collectively. It is beyond dispute that individual workers are harmed by automation and that society is seldom able to undo all the harm. And as for society, the automation decisions of corporations are not made with a view to benefitting society as a whole. With a view rather to making money for their investors, companies being tempted by automation take only their own ("internal") costs into account, not the overall ("external") costs, direct and indirect, that spill over onto society in the wake of major technological change. The overall costs, most of which the comparatively defenseless members of society are usually called on to bear, can be traced for the most part to the loss of jobs in a society that distributes benefits on the basis of one's employment.

What is especially deserving of our attention is the question of whether, or under what circumstances, technology in the guise of a labor-saving device is likely to benefit its corporate buyer. One might suppose in this regard that any corporation that could consistently answer these questions would know how to allocate R&D money for the purpose. But the matter is not that simple, in part because of uncertainty about the performance of the device and in part because of uncertainty about the performance of competitors who are also in a position to adopt a functionally comparable device.

Why there might be uncertainty about the performance of a device is

abundantly illustrated in the history of technology, for example, the development of machines to do calculations, from the counting board to the computer.[35] Inventors such as Leibniz, Pascal, and Babbage produced mechanical devices that could do calculations accurately, but not rapidly enough to make it economically attractive to substitute them for human clerks and accountants. Electricity introduced a new factor into the equation, but further development had to await improved designs as well as a situation of cost-discounting urgency. The Allies in World War II needed to expedite the development of trajectory charts for new types of shells, which were being introduced into the arsenal faster than human calculators could keep up. The needs of the war effort outweighed expenses as the ingenious ideas of Vannevar Bush and others were applied to produce the first workable computer. That it was able to perform its tasks as expected is, however, irrelevant to considerations of economy. There simply was no upper limit of expense beyond which R&D would not go under wartime conditions. This situation was not without precedent, of course, and it continues to this day – not with a view to winning a war, necessarily, only with a view to "defense."

Economically unjustified introduction of labor-saving devices does not occur with such indifference to cost in the private sector. But this does not preclude a corporate commitment to high-risk adventure, for reasons having to do with everything from the corporate image to the corporate will to dominate an industry. The former is often a shortcut to bankruptcy; the latter, a strategy best left to oligopolists. Thus, for example, might narrow-gauge cost considerations about the introduction of robots give way on occasion to a desire for product quality improvement, for example, in production of Chrysler's K-car at the Newark, Delaware, plant and of GM's Fleetwood in Detroit, where $8.5 million of robots save only $120,000/year. In such instances, a more affluent market is targeted, and cost is expected to be recouped through sales.[36]

It is in this context that one needs to consider neoclassical economic theories about motivation for technical change.[37] On the assumption that the entrepreneur rationally selects that mix of labor and capital that will maximize net revenue or profit, the orthodox position before World War II was that labor-saving innovations come about as a direct result of high-priced labor (and similarly with regard to the price of capital). The logic in that position is faulty, since total costs of production can be brought down by reducing the cost of either labor or capital. So there

would be no special reason to concentrate on reducing the cost of labor unless one has either easier access to labor-saving knowledge or, as in the case of Ure, an anti-labor(er) bias.

The orthodox position is even less persuasive if confronted with game theory considerations about the disparity between collective and individual benefits to be derived from a labor-saving innovation. If it be assumed that no entrepreneur knows what any other is going to do, each is caught in a Prisoners' Dilemma over how to avoid being the only one to bear the cost of introducing, or of not introducing, the labor-saving innovation. If, in addition, it be assumed that a search for cost-reducing innovations will be the same whether one focuses on saving labor or on saving capital, then in the absence of some special reason to favor labor saving, for example, a history of rising labor costs, the choice of direction might depend on nothing more than a flip of a coin.

Suppose, finally, that, an entrepreneur knows that one or more competing entrepreneurs might invest in a labor-saving device. *Alteris paribus*, it is still not necessarily the case that the entrepreneur armed with this information should invest in the same labor-saving device. For, if one's competitors do in fact "save labor" with their new device, the cost of labor in the industry will fall, and our non-innovating entrepreneur will be able to undercut the competition by virtue of both having avoided the cost of innovation and benefitting from the availability of cheaper labor. Since, however, the other entrepreneurs can be presumed to be making the same assessment, the entrepreneur must also contend with the possibility that none will innovate, in which case the cost of labor will continue to rise and the advantages of innovating unilaterally will increase. In short, introducing the labor-saving device would be the rational profit-maximization course of action only for the entrepreneur who does so unilaterally, not for those who "follow the crowd." (What better counter-argument to the old saw: Be not the first by whom the new is tried nor yet the last to cast the old aside?)

The resulting quandary about whether to invest or not in the labor-saving device has been described as a game of Chicken. It is such, however, only if (a) the innovation in question merely substitutes for rather than improves upon the product and/or its production and (b) no competitor does in fact make a move to introduce the innovation. Practice with regard to introducing innovations into traditionally labor-intensive industries in the 1980s satisfies, or at least is perceived as satisfying, both of these provisos. So in the real world that theoretical

quests for perfect rationality have so far failed to model, the game being played is not Chicken, but Corporate Survival; and the only thing certain is that the workforce will not be the winner.

IV. THE EUDAEMONIC RATIONALE

(4) Even if some human beings do intend the unemployment consequences of labor-saving, this does not prove that they are acting against the interests of workers. For, the long term result of this process will be a state of affairs in which people will no longer need to work.

Response: The end envisioned is not easily extrapolated from available data; and, this notwithstanding, felicitous ends do not justify unjust means.

Working class endorsement of the saving of labor is not a spontaneous tropism on the part of those who live too close to labor. It has been instilled over the centuries by promises of a work-free utopia to come. Current versions of these hoary promises go beyond their classic predecessors by noting a need to re-educate people accustomed to labor for a life of leisure. There are basically just two versions of the utopian scenario. One recognizes a painful transition as we pass through the tunnel on our way to the light. The other, notably more pollyannaish, skips over interim *angst* to concentrate on the latter days.

The rationale here runs more or less as follows. For the first time in history technology has brought us to a point at which there are not and will never again be enough jobs to go around. So, whatever may have been society's need for workers in the past, that need is with us no longer. We have reached a point which has all along been proclaimed as a goal of technological innovation, namely, to eliminate the need for "labor" (meaning paid workers) by utilizing machines instead. Only so long as technology could not deliver on this promise, the obsolescence argument would continue, was there any need to instill in *humans* a sense of duty with regard to work. Now this need is passing from the scene, so society must transform its values and its objectives accordingly.

The pollyannaish proposal, presented as a prediction, is that society must begin to focus not on work, which is no longer an appropriate goal, but on leisure, which we shall have in the future whether we are ready

for it or not. In other words, work is less valuable now than it once was because it is less important to the satisfaction of human needs than it used to be. Robert Theobald, for example, envisions the emerging situation in this way:

> [In t]he new society we are entering . . . [m]any people will tend to work intensively for a period of time and then need to re-create and re-educate themselves. We shall extend rapidly the concept of sabbaticals in terms of the number of people involved, the number of occupations for which they are considered relevant, and the length of time for which people can free themselves up from responsibilities. Societies will be able to make free time available because of the impacts of computers and robots, which will limit the amount of human energy needed for industrial-era jobs.[38]

None of this, by the way, would have saddened Marx and his followers, provided only that control of the means of production be not in the hands of the capitalists but of the proletariat as represented by the State. Marx in his youth envisioned a future in which machines would be doing the work and the only question would be who was going to reap the benefits. He did not, to be sure, think of the road to such a state of affairs as one to be easily traversed. Respectfully rejecting the escapist proposals of the utopian socialists, both Marx and Engels sought to confront the new industrial reality head-on to salvage a future for the vast majority of human beings who make up the working class. On this view, labor, however valuable in the capitalist setting, has no intrinsic value. Machines are welcome as a means to the eventual liberation of human beings from dehumanizing drudgery. Lenin in the interim welcomed even Taylorism as an appropriate device for increasing productivity.[39] Workers are alienated from their work in the typical factory system, but this is due not to rationalization of work but to capitalist ownership. Scientific socialism promises the surmounting of alienation, first by assuring workers that collectively they own the means of production, and in time perhaps by freeing them of responsibility for production and handing this over to machines. Marxism, then, does not romanticize work but rather socializes the work ethic for the duration of our dependence on human labor for productivity.

In this regard, Harry Braverman acknowledges that no less a deskilling mechanization has taken place in Communist countries; but he excuses deskilling there because it is merely imitative of what capitalists did and expresses the hope that in these countries the dominance of machines over people is only transitional.[40] An even more utopian expression of hope in this regard is that of another neo-Marxist, Herbert

Marcuse, who welcomes automation in spite of the short-range concerns of workers. These concerns, says Marcuse, are legitimate in the absence of "compensating employment." But, he insists, over the mid-range of time such opposition to technical progress prevents "more efficient utilization of capital," "hampers intensified efforts to raise the productivity of labor," and leads to economic crisis and exacerbation of class conflicts. That is bad enough. What is worse is that opposition to automation stands in the way of eventual attainment of a liberating utopia based on technology. In Marcuse's words:

> Complete automation in the realm of necessity would open the dimension of free time as the one in which man's private *and* societal existence would constitute itself. This would be the historical transcendence toward a new civilization.[41]

Neo-Marxist Andre Gorz is also convinced that technology has prepared "paths to paradise." He is careful to point out, however, that these paths will be traversed toward "liberation from work" only "within a social environment which does not yet exist (at least not generally)."[42]

Whether or not the ultimate outcome of all of this will be anything like the downfall of capitalism that Marx predicted is a matter for specialists to debate. And as they do so they will want to bear in mind that the assumptions of classical economics, against the background of which Marx developed his alternative theory, are inadequate to represent the complexities of today's transnational marketplace of competing forces. What is important in the present context, somewhat more simply, is the impact that the delaboring of productivity will have on people regardless of the sociopolitical framework within which their onetime workplaces happen to have been located. On this issue divergent ideologies are of only secondary importance. More basic is the cross-cultural heritage of the human race with regard to the value and necessity of work, which finds its way into the views of writers of every persuasion.

Take, for example, Herbert Marcuse's guarded optimism about the benefits that labor-saving technology will bestow upon the working class. That Marcuse placed so much trust in the eventual blessings of technology for the working class reflects his interest in Marx's earlier writings.[43] But it does not reflect his interest in the writings of Freud. Although Freud seldom addressed the subject of work directly, one footnote in his *Civilization and Its Discontents* states explicitly what

elsewhere is only implicit. Work, he says here, is the best means of tying an individual to the community and, if it is work at a profession, is an excellent instrument of sublimation. But, he regrets,

> as a path to happiness, work is not highly prized by men. They do not strive after it as they do after other possibilities of satisfaction. The great majority of people only work under the stress of necessity, and this natural human aversion to work raises most difficult social problems.[44]

Thus is suggested the view that work, even if eventually unnecessary for economic productivity, is nonetheless an important vehicle of human creativity. This view underlies the concerns of Erich Fromm about the possible demise of work.[45] And a century earlier it underlay William Morris's aesthetic of work and Proudhon's glorification of work as having intrinsic dignity.[46] It was important to William Wordsworth and to John Ruskin as they watched cottage industries giving way to dehumanizing division of labor in factories. And in our own day it is finding expression in the works of novelist and poet Marge Piercy.

Emphasis on the human need for work is a key feature of E. F. Schumacher's insistence that we move toward "appropriate technology." As he once expressed his ideological assumption, at least for the poor man, "the chance to work is the greatest of all needs, and even poorly paid and relatively unproductive work is better than idleness."[47] Schumacher himself tried to incorporate this pro-work view into a kind of Buddhist economics that stresses the importance of work to the individual and to the community. But it would not be difficult for the authoritarian tradition to co-opt such humane theorizing for ends quite unrelated to anything that Schumacher wanted for the world. It was, after all, just this sort of co-opting that lay at the foundations of the modern factory system. The disciplined religious community that Saint Benedict developed in the sixth century became a thousand years later a model for organized "manufacture" which was well in place long before the appearance of mechanized assembly.

These worries aside, there is still good reason to support the claim that work, even laborious work, is a valuable instrument of human fulfillment. This admittedly has not been proved to be true universally and without qualification. And, like claims with regard to our reliance on gravity before humans experienced weightlessness, its truth may turn out to be of somewhat limited applicability. But just to the extent that it still obtains in the world as we know it, the delaboring of production

should not be endorsed without serious qualification. In particular, it should not be endorsed so long as work remains the principal means of support for oneself and for one's dependents while at the same time welfare rights are viewed not as the fruit of human progress but only as a recipe for sloth.[48]

This sort of cultural Catch-22 is not inherent in our genes. It is, if you will, the result of holding on to the interim rule even though the ultimate rule is now fully operative. Of far greater significance, however, is the fact that human beings – and, not infrequently, identifiable human beings – are responsible for the perpetuation of these rules. For, this constitutes a *prima facie* case of responsibility for the consequences of their application. A defense based on "business necessity" could no doubt be mounted. But, I submit, this defense can and should be overcome by showing that there are alternative social solutions.

Indiana University/Purdue University at Indianapolis

NOTES

[1] The hard determinism implicit in the view of Jacques Ellul is open to an unusually subtle qualification. Only his "sociological" works require a determinist conclusion; his theological works offer an escape in Christian activism. See my review in *Nature and System* **3** (September 1981): 184–188.

[2] The communitarian tradition, especially as exemplified in utopian literature, looks to reform and reconstitution of social organization as the proper remedy for work-related inequities. See Frank E. Manuel and Fritzie P. Manuel, *Utopian Thought in the Western World* (Cambridge, MA: Belknap/Harvard University Press, 1979).

[3] *The Protestant Ethic and the Spirit of Capitalism*, trans. Talcott Parsons (New York: Scribner's, 1958; German original, 1904–1905), p. 53.

[4] See Jacques LeGoff, *Time, Work, and Culture in the Middle Ages*, trans. A. Goldhammer (Chicago: University of Chicago Press, 1982); Alan Macfarlane, *The Origins of English Individualism* (New York: Cambridge University Press, 1978).

[5] The Rule of St. Benedict, in *Select Historical Documents of the Middle Ages*, trans. and ed., E. F. Henderson (London: G. Bell and Sons, 1925), pp. 274–275ff.

[6] LeGoff, *op. cit.*, p. 84; James W. Thompson, *The Economic and Social History of the Middle Ages (300–1300)* (New York: Century, 1928), pp. 607–618.

[7] Adriano Tilgher, *Work*, trans. D. C. Fisher (New York: Arno Press, 1977; original, 1930), pp. 39–42.

[8] 23 Edward III, Statute of Laborers, 1349, quoted by Karl de Schweinitz, *England's Road to Social Security, 1349 to 1947* (Philadelphia and London: University of Pennsylvania and Oxford University Presses, 1947), p. 6. See Henderson, *op. cit.*, pp. 165–168.

[9] De Schweinitz, *loc. cit.*

[10] De Schweinitz, *op. cit.*, pp. 20–38.

[11] J. C. Davis, *Utopia and the Ideal Society: A Study of English Utopian Writing 1516–1700* (Cambridge: Cambridge University Press, 1983, 1981), p. 72.
[12] Tilgher, *op. cit.*, pp. 59–60.
[13] Andrew Ure, *The Philosophy of Manufactures or an Exposition of the Scientific, Moral and Commercial Economy of the Factory System of Great Britain* (London: C. Knight, 1835), p. 423.
[14] Davis, *op. cit.*, p. 100.
[15] Manuel and Manuel, *op. cit.*, p. 771.
[16] 'The Tyranny of the Factory: Today and Tomorrow', in *The Division of Labor*, ed. Andre Gorz (Sussex, England: Harvester, 1976), p. 58. More recently, Gorz has bought into the dream of a technologically generated utopia. See below in connection with note 42.
[17] See Thorstein Veblen, *The Theory of the Leisure Class* (1899) (New York: Modern Library, 1934; original, 1899), pp. 92–95, 231.
[18] Davis, *op. cit.*, chap. 11, pp. 299–367.
[19] *Ibid.*, pp. 318, 345–346.
[20] Andrew Ure, *Philosophy of Manufactures* (3rd ed.; New York: Burt Franklin, 1969; this ed., originally, 1861), pp. 19, 366–368. See also pp. 16, 40–41, 331, 369–370.
[21] Karl Marx, *The Poverty of Philosophy* (1847), in Marx and Engels, *Collected Works* (London: Lawrence and Wishart, [nd], vol. 7, pp. 207, 393–394. See Jon Elster, *Explaining Technical Change* (Cambridge: Cambridge University Press, 1983), pp. 163–171.
[22] David Dickson, *The Politics of Alternative Technology* (New York: Universe, 1975), pp. 72–73, 181–182.
[23] A. Bhaduri, 'A Study in Agricultural Backwardness under Semi-Feudalism', *Economic Journal* **83** (1973): 120–137. See also S. Marglin, 'What Do Bosses Do?', in Gorz, ed., *op. cit.*
[24] Harry Braverman, *Labor and Monopoly Capital* (New York and London: Monthly Review Press, 1974), pp. 193–194, 199, 227–228. See also p. 188.
[25] *Ibid.*, pp. 196–206.
[26] David F. Noble, *Forces of Production: A Social History of Industrial Automation* (New York: Knopf, 1984). See also James Fallows, 'A Parable of Automation', *New York Review of Books* **31**, no. 14, September 27, 1984, pp. 11–17.
[27] See Andrew Zimbalist, ed., *Case Studies on the Labor Process* (New York and London: Monthly Review Press, 1979); Dan Clawson, *Bureaucracy and the Labor Process: The Transformation of U.S. Industry, 1860–1920* (New York and London: Monthly Review Press, 1980). Also instructive in this regard is the earlier work of George E. Barnett, *Chapters on Machinery and Labor* (Carbondale/Edwardsville: Southern Illinois University Press; London/Amsterdam: Feffer & Simons, 1969; original, 1926).
[28] *Ibid.*, p. 169.
[29] Ure, *op. cit.*, p. 23.
[30] See Edmund F. Byrne, 'Robots and the Future of Work', in H. Didsbury, ed., *The World of Work* (Bethesda, MD: World Future Society, 1983), pp. 30–38.
[31] Dickson, *op. cit.*, pp. 72–73, 181–182. Compare Ure's views on the need for machines to outdo foreign competition, *op. cit.*, pp. 31–32, 329.
[32] Ure, *op. cit.*, p. 20. See also pp. 1, 20–21, 23.
[33] 'Industrial Uses of the Microprocessor', in T. Forester, ed., *The Microelectronics*

Revolution (Oxford: Basil Blackwell, 1980), p. 144; originally published in *Science*, 18 March 1977.

[34] E. Janicki, 'Is There a Robot in Your Future?' *The Indianapolis Star Magazine*, November 22, 1981, p. 55.

[35] See Arthur W. Burks and Alice R. Burks, 'The ENIAC: First General-Purpose Electronic Computer', *Annals of the History of Computing* **3** (October 1981): 332–336, 386–388.

[36] *The Impacts of Robotics on the Workforce and Workplace* (Pittsburgh, PA: Carnegie-Mellon University, June 14, 1981), p. 52.

[37] The following analysis is derived from Elster, *op. cit.*, pp. 96–111.

[38] 'Toward Full Unemployment', in H. Didsbury, ed., *The World of Work* (Bethesda, MD: World Future Society, 1983), p. 54. For Frithjof Bergmann's view, see, for example, 'The Future of Work', *Praxis International* **3** (October 1983): 308–323.

[39] Dickson, *op. cit.*, pp. 55–56 and, in general, 41–62. See also Bernard Gendron, *Technology and the Human Condition* (New York: St. Martin's, 1977).

[40] Braverman, *op. cit.*, pp. 15–16, 22, 24.

[41] *One-Dimensional Man* (Boston: Beacon, 1966), pp. 35–37. See also pp. 44–45, 59, 231–232, 235. Marcuse bases his view on a passage from Marx's *Grundrisse der Kritik der politischen Oekonomie* in which Marx declares that labor time will eventually cease to be the measure of wealth.

[42] *Paths to Paradise: On the Liberation from Work*, trans. M. Imrie (London and Sydney: Pluto Press, 1985).

[43] Adam Schaff explains Marx's early dream of an "end of labor" as "youthful folly" categorically rejected in *Capital*. According to Schaff, "utopian prophecies" about what automation might accomplish "do not take us a single step further in the organization of our life today"; see *Marxism and the Human Individual*, trans. Olgierd Wojtasiewicz, ed. Robert S. Cohen (New York: McGraw-Hill, 1970), pp. 124–126, 134–135.

[44] *Civilization and Its Discontents*, trans. James Strachey (New York: Norton, 1962; original, 1930), p. 2, note. See Georges Friedmann, *The Anatomy of Work*, trans. Wyatt Rawson (New York: Free Press, 1964), p. 126; Philip Rieff, *Freud: The Mind of the Moralist* (3rd ed.; Chicago: University of Chicago Press, 1979), p. 245.

[45] *The Sane Society* (New York: Rinehart, 1955), pp. 288–289, quoted in Friedmann, *op. cit.*, pp. 45–55.

[46] Manuel and Manuel, *op. cit.*, pp. 745–747, 769. Note in particular the authors' comments about the nineteenth-century debate regarding the value of work, p. 745.

[47] 'Social and Economic Problems Calling for the Development of Intermediate Technology', mimeographed (undated), quoted in Dickson, *op. cit.*, p. 153.

[48] See David Macarov, *Work and Welfare: The Unholy Alliance* (Beverly Hills: Sage, 1980); Frances Fox Piven and Richard A. Cloward, *Regulating the Poor: The Functions of Public Welfare* (New York: Vintage, 1972).