

Chapter 2

Revolutions

Two Revolutions

On the eve of the twenty-first century the only revolution spoken of in advanced capitalism is the information revolution. Few other ideas have proven so compelling for people attempting to comprehend incessant and accelerating technological change in their daily lives. Indeed, along with a number of synonymous or associated terms--`post-industrialism,' `super-industrialism,' `the technetronic society,' `the wired society,' `the control revolution,' `high technology society,' `the second industrial divide,' `post-Fordism,' `the globalisation of technology'--the phrase `information revolution' has come to profoundly define contemporary anxieties and hopes about the future. For, according to the theorists of this revolution, the technoscientific knowledge crystallised in computers, telecommunications, and biotechnologies is now unleashing an ongoing and irresistible transformation of civilisation, dramatic in its consequences, unavoidably traumatic in the short term, but opening onto horizons nothing short of utopian.

The development and content of the doctrine of information revolution have already been given extensive critical analysis.¹ But I want here to relate it to a different body of revolutionary theory--one whose star has fallen, even as that of the information revolution has risen: Marxism. Marxists have shared information revolutionaries' belief in the profound social consequences of technoscientific change. But they have differed from them in relating the dominative and liberatory potential of machines to the struggle between labour and capital, and to another kind of revolution--communist revolution. No propositions could today appear more fatally archaic. In the age of cyberspace, Lenin lies

in ruins. And many would say that the inverse trajectories of Marxism and the information revolution--one ascending as the other declines--are causally connected. Marxism, information revolutionaries claim, was unfit for the information age, doomed by allegiance to a labour theory of value in an era of intelligent machines; by a base/superstructure model of society blind to the significance of symbolic data; by a despotic statism that tried in vain to repress irresistibly proliferating channels of communications; and by a concept of revolution made obsolete by technological progress.

But if information revolutionaries have polemicised against Marxism, they have also themselves claimed many characteristically Marxist themes--notions of 'progress,' of 'materialism,' of 'liberation' and, of course, of 'revolution' itself. This common vocabulary in part goes back to the Enlightenment heritage that the insurrectionary Marx shared with technocratic utopians such as Babbage and Saint Simon, men whose schemes for a perfected industrialism overseen by scientific experts are the forerunners of information society theory.² But it also has a more recent basis. Some of today's most prominent information revolutionaries are themselves one-time Marxists, apostates who have drawn heavily on their former beliefs even while developing a new creed. This chapter therefore examines the information revolutionaries' hostile annexation of Marxism, showing how they turn Marx against Marx in pursuit of a technologically altered world where communism is neither possible nor necessary.

From the End of Ideology to Post-Industrialism

Although it is only recently that the idea of 'information revolution' has become widely current, it is the immediate descendant of a concept of the late 1960s--post-

industrial society. But to understand the relation of both these theories to Marxism it is necessary to look yet further back and glimpse behind the shoulder of post-industrialism the shape of a yet earlier concept--that of the "end of ideology."³

In the late 1950s and early 1960s a number of intellectuals, surveying the apparently calm and prosperous conditions of North American and European 'industrial' societies, suggested that these had reached a plateau of more or less permanent stabilisation. Post-war affluence, the institutionalisation of collective bargaining, and the welfare state had banished the class conflicts of an earlier era from the scene. Such societies presented the successful socio-economic model, toward which other experiments, including those in the 'underdeveloped' and 'socialist' world, would gradually converge. This was the condition of the "end of ideology"--which meant, in general, an end of alternatives to liberal capitalism, and, more specifically and pointedly, an end to Marxism as a revolutionary force. Amongst the most eloquent spokesmen for this thesis was one Daniel Bell, a rising young intellectual rapidly departing early Trotskyite flirtations on a rightward trajectory which would eventually deliver him as a founding figure of American neoconservatism.⁴

Few social theories have, however, had the misfortune to be as swiftly discredited as the "end of ideology" thesis. Within a matter of years the appearance of peaceful, passionless capitalist stability was spectacularly contradicted by the upsurge of domestic and international dissent in the late 1960s and early 1970s. Industrial society--the unsurpassable pinnacle of modernity, prosperity and technological advance--went into paroxysm, its military machine stalled in the jungles of Vietnam; its urban ghettos burning through successive summers; its huge automobile factories paralysed by labour conflict; its

university campuses in rebellion; its culture subverted by the music, drugs and politics of youth revolt; its domestic arrangements and relation to nature shaken by nascent feminist and ecological movements.

Bell's "second coming" as a prophet of post-industrialism can be understood as a reaction to these events.⁵ Faced with the unexpected convulsions of 'industrial society,' many intellectuals sought explanations in the possibility that these tumults marked nothing less than the growing pains associated with the emergence of a radically new social order. Such notions were variously inflected, embracing both right and left variants. But the most influential version, the one from which a direct line to today's concept of the information revolution can be traced, arose amongst the think-tanks and sponsored research projects offering futurological guidance for US state policy and corporate strategy.

From this context emerged ideas such as that of the "technological society" fostered in Harvard's IBM-sponsored Program on Science and Technology (1971), the "knowledge society" predicted by management guru Peter Drucker (1968), the "technetronic era" described by soon-to-be US National Security advisor Zbigniew Brzezinski (1970), the "year 2000" scenarios elaborated by Herman Kahn and Anthony Wiener out of the RAND Corporation and the Hudson Institute (1967), and, most famously, the work of Bell, whose The Coming of Post-Industrial Society, published in 1973 but expressing ideas which its author had been developing since at least 1968, was to prove definitive of the entire genre.⁶

Taking the US as the exemplar of future global developments, Bell argued that out of the crises of his day was appearing a new type of "post-industrial" society, to be fully visible "in the next thirty to fifty years."⁷ The principal motor of this post-industrial

transition was the increasingly systematised relationship between scientific discovery and technological application, which was making theoretical knowledge society's central wealth producing resource. Around this central axis of change were grouped a set of loosely associated transformations: a shift from a goods producing to a service economy; a move in occupational distribution away from manual labour to the pre-eminence of professional and technical work; increasing capacities of assessment and forecasting; and a new "intellectual technology" of games-theory and systems-analysis, materially embedded in computer systems.⁸

The result would be a society "organised around knowledge for the purpose of social control and the directing of innovation and change."⁹ The most important agents in this post-industrial society would be scientists, engineers and administrators, a new "knowledge class" lodged primarily within government and academia, bearers of the rationalist skills and virtues required by increasing organisational and technological complexity.¹⁰ Bell argued that the endeavours of this new class could create an epoch of rationalised integration and prosperity-which, while not without its own problems, would finally escape from the material want, economic crisis and class conflict of the industrial era.

As he advanced this new position, Bell had firmly in mind the adversarial presence of Marx. For although the upheavals of the late 60s challenged socialist parties and governments as well as capitalist ones, they were undeniably shot through with the spirit of the very revolutionary tradition that the "end of ideology" thesis had pronounced defunct. Marx was present in the support for Vietnamese and Cuban guerrillas, in the theories of the New Left, and in the slogans of workers and students in Paris, Turin and Detroit. The

Coming of Post-Industrial Society in fact opens with the image of Marx in the British Museum hearing "in every faint sound of riot or each creaking downturn of the business cycle the rumblings of revolution and the abrupt transformation of society."¹¹ Saluting Marx's work, Bell situates his own efforts in the same tradition of "social forecasting"--and then launches into a sustained attack on Marxist claims that capitalist societies must violently succumb to their internal contradictions.¹²

This rebuttal proceeds not by a simple rejection of Marx, but by an ingenious recuperation.¹³ Bell proposes that there are actually two contradictory "schemas" in Marx's analysis of capitalism. The first, best-known, is the "revolutionary" prediction of sharpening class contradictions, market anarchy and deepening crisis contained in volume one of Capital. The second, Bell claims, is suggested in the later volumes, and envisages a quite different "rationalising" tendency, glimpsed by Marx but better understood by theorists such as Max Weber, a tendency apparent in the separation of professional management from capitalist ownership, the rise of a 'middle' class, the bureaucratisation of enterprise, and the spread of stockholding. This latter trend, Bell says, blurs and softens class conflict. The history of the twentieth century is the story of the cancellation of the former revolutionary prediction by the latter rationalising one---culminating in the advent of post-industrial society.

Knowledge, says Bell in one of his most widely repeated formulations, will replace both labour and capital as the main factor of production. Between the opposition of capitalist and worker emerges a new class--"a professional class, based on knowledge rather property."¹⁴ The rise of this new class follows a quasi-Marxian logic that relates the emergence of new historical subjects to new forces of production, but effectively negates

its revolutionary force.¹⁵ Capital will be transformed by technical and administrative experts, abandoning fixation with profit, becoming more socially responsible, and giving "moral issues" equal priority with balance sheets.¹⁶ Labour too will be transfigured. Technological development will raise living standards, automate manual toil and thereby liquidate Marx's subject of history--the immiserated industrial proletariat. "If there is an erosion of the working class in post-industrial society," Bell asks, posing the question all information society theorists will subsequently hurl at Marxism, "how can Marx's vision of social change be maintained?"¹⁷

Ultimately, in an ambivalence that persists throughout information society theory, Bell equivocates as to whether this regime of scientific expertise peacefully transcends capitalism or simply elevates it to a new level of stability and organisation.¹⁸ He toys with the idea that the "knowledge class" will become a new ruling class, only to regretfully retreat from this suggestion. But in any case its appearance is sufficient to nullify Marx's prediction of war between capital and labour, smoothing the sharp edges of bipolar class antagonism so as to make the idea of communist revolution a quaint anachronism.

The post-industrial prophecy thus projects into an imminent future the very conditions of stabilisation which the "end of ideology" thesis had mistakenly declared already achieved. As Krishan Kumar has pointed out, Bell and his colleagues, faced by the revelation that contemporary society was not in fact fully pacified, responded by proposing an extra stage to the march of progress.¹⁹ With the suitable application of expertise and technology, the lingering problems would be cleared up once and for all around the year 2000.

Often, Bell speaks of this outcome with oracular certainty. Yet this tone is at odds with another more urgent and combative element in his writings--condemnation, polemic, warning. Rational progress--embodied in the technocratic state and its knowledge elite--is under siege by the irrational protest by the New Left, student revolt, affirmative action groups, and an "adversary culture."²⁰ Only if the pilotage of society is entrusted to the cadres of technical experts, scientists, engineers and administrators will chaos be avoided, and the dawning era safely ushered in. No mere extrapolation from predetermined trends, but a determined assertion of what those trends will be, post-industrial futurology foresees the future it intends to make.

From Post-industrialism to the Information Society

In the late 1960s and early 70s such post-industrial theory enjoyed wide popularity amongst academics, government experts and corporate managers. Nowhere was it more avidly received than in Japan. There, translated texts by North American futurists were reworked by authors such as Tadeo Umesao, Kenichi Kohyama, Yujiro Hayashi, and Yoneji Masuda to produce the concepts of johoka shakai or joho shakai --'informational society' or 'information society'.²¹ According to Tessa Morris-Suzuki's study of Japanese information society theory, joho shakai gave particular emphasis to computers' potential for changing industrial production methods by introducing unprecedeted levels of automation and of integration between office, factory and consumer.²² At the same time, the content of production was envisaged as becoming more 'information intensive,' in the sense that

innovation, planning, design and marketing would represent an integral and increasing share in the value of goods and services.

In the work of futurists such as Masuda these transformations were linked to an idealistic vision of an emergent society in which increased availability of information and free time resulted in declining materialism, improved self-actualisation, voluntary civic participation, enhanced global and ecological consciousness, and, ultimately a revival of spirituality--in short "computopia."²³ But this concept of extensive computerisation also entered the domain of public policy, sponsored by the powerful Ministry of International Trade and Industry, as a hard-headed development strategy aimed at overcoming shortages in labour and natural resources, securing international markets and remedying the widespread social disaffection of the 1960s. The creation of an "information society" became a centrepiece of Japanese economic planning.

In North America and Europe, interest in these ideas was accelerated by economic recession, whose first tremors had appeared in the late 60s. Bell and his colleagues had assumed an uninterrupted continuation of post-war rates of economic growth. But by the mid-1970s this prediction was abruptly confounded as social disorder was met by austerity, recession and economic crisis. However, as the West's leaders searched for solutions to social economic malaise, their eyes turned to the 'Japanese miracle'--only to discover joho shakai as a strategy for computerisation, robotisation, workplace reorganisation and systematic 'softening' of the economy. Under this guise, post-industrialism earned a new lease of life. In 1978, a conference of Japanese and US communications scholars resulted in the publication of the first North American book to use the term "information society" in its title.²⁴

At the same time, related ideas were independently gaining currency on both sides of the Atlantic. In 1977, the US Government's Office of Telecommunication published Marc Porat's influential study of the "information economy" which suggested that an increasing portion of GNP depended on "information activity" and a growing proportion of jobs on "information work."²⁵ In Europe, a broadly similar effect was produced by the publication in 1978 of a French governmental report on computerisation, L'Informatisation de la Societie, by Simon Nora and Alain Minc.²⁶ This argued that the convergence of computers and telecommunications--which they termed "telematics"--would alter "the entire nervous system of social organisation."²⁷ In the light of this transformation, national well-being depended on the fostering of domestically based high-technology industries, and the computerisation of the operations of government.

Thus by the late 1970s, the 'information revolution' was emerging as a central category in government and corporate planning. In 1979 Bell recast his original post-industrial thesis in the new, fashionable terms, emphasising the importance of computer and telecommunication networks and speaking of an "information explosion" constituted by:

. . . a set of reciprocal relations between the expansion of science, the hitching of that science to a new technology, and the growing demand for news, entertainments and instrumental knowledge, all in the context of rapidly increasing population, more literate and more educated, living in a vastly enlarged world that is now tied together, almost in real time, by cable, telephone and international satellite, whose inhabitants are made aware of each other by the vivid pictorial imagery of television, and that has at its disposal large data banks of computerised information.²⁸

This statement was simultaneous with and succeeded by a spate of similar academic studies; by best selling popularisations such as Alvin Toffler's The Third Wave and John Naisbett's Megatrends; by a burgeoning business literature devoted to managing in the information age; and by journalistic coverage of the type which made the microcomputer Time's "Person of the Year" for 1982.²⁹ All of this translated theories of the information revolution into a popular idiom of the 1980s.

These theories revamped the post-industrial vision of epochal transition, giving it glossier sheen, leaner design, and enhanced computing power. Post-industrialism had primarily defined the new era in terms of its departure from the crises of industrialism. Information society theory gives this shift a more substantial content: industry is succeeded by information. The borderline between eras is that dividing mechanical from digital machines, steel mills from silicon chips, railroads from communication networks. Post-industrialist technocracy, moreover, had worn the mark of an attachment to governmental bureaucracy. Information revolution, more attuned to the climate of Thatcherism and Reaganism, dispenses with this. Technocracy is replaced by high-tech, organisation men by intelligent machines, experts by expert systems, intelligentsia by artificial intelligences, mainframes by microcomputers, pyramidal hierarchies by distributed systems, central office by cyberspace.³⁰

In this form, the idea of an information revolution--a revolution simultaneously inevitable and desirable--became a crucial intellectual and rhetorical component in a project of high-technology restructuring pursued collaboratively by state and corporate sectors throughout the advanced capitalist world.³¹ For corporations, the image of an approaching information age provided a slogan to accompany the robotising of factories,

automating of offices, selling of cable television, and marketing of microcomputers, new media and on-line services. For government, the approach of the information society was invoked to justify public subsidisation of corporate high-technology research, the forging of academic-business partnerships, the deregulation of phone companies, and the privatisation of telecommunications and other information utilities in the public domain.

Those who propounded its doctrine--political leaders, corporate executives, state bureaucrats, research scientists, academic theorists, journalistic popularisers--did not merely describe the future. They prescribed it. Although the arrival of the new epoch was declared inevitable, definite steps were demanded to adjust to its realities, hurry its benefits, pre-empt its problems, and secure positional advantage within it. These included massive investment in new machines, vast restructurings of work and unemployment, the stimulation of new markets, the inculcation of unfamiliar leisure habits and cultural forms, the reorganisation of research, education and training, the treatment of technophobia and the crushing of 'Luddism.' The proffered choice was adaptation or obsolescence. And insofar as such exhortation did indeed result in a deepening social commitment to, and dependence on, information technologies, it secured for itself the virtuous circularity of self-fulfilling prophecy--generating the reality it predicted.³²

Revolutionary Doctrine

Theories of the information revolution are not all the same. At each stage in the unfolding of the doctrine advocates of the most recent version urge the novelty of their position and distance it from the preceding one. There are also substantial differences within each generation of the argument, as well as significant variations of tone between its various academic, popular and official registers.³³ Nonetheless, the principle claims of the

information revolutionaries can be summarised in seven points of 'revolutionary doctrine'.³⁴

1. The world is in the midst of a transition to a new stage of civilisation, a transition comparable to the earlier shift from agrarian to industrial society. In this transition computers and telecommunications play a role equivalent to the steam engine and railroad in the 19th century. Underlying this idea is a powerful technological determinism. Masuda writes:

When epoch-making technological innovation occurs, changes take place in the existing society and a new society emerges. The steam engine precipitated the industrial revolution, bringing about the changes that lead to a new economic and political system . . . The information epoch resulting from computer-communication technology will bring about a societal transformation just as great or even greater than the industrial revolution.³⁵

Other accounts acknowledge that the effects of technology on society are not immediate, nor the interaction entirely unidirectional. But the overall tenor of the argument is usually that machines are the real makers of social change. The transformative effects of information technologies are usually conceived of as becoming visible in the 1960s, although originating earlier, starting in developed economies--Japan, the US, and other OECD countries--and proceeding at an accelerating rate and with expanding scope as we approach the millennium, moving on a trajectory that is basically benign, eventually universal, and certainly unavoidable--the latest phase in the march of progress.

2. The crucial resource of the new society is technoscientific knowledge. While technological innovation is understood to have always been the critical factor in societal

transformation, the distinguishing mark of the current epoch is generally held to be the direct harnessing of scientific research to this process. Whereas previously scientific discovery and technological application proceeded with relative independence and only sporadic intersection, now the pure knowledge of science can no longer be sharply distinguished from its practical realisation in technology. Science and technology are so institutionally integrated as to fuse in a single operation, which Bell designated by the phrase "research and development" and is more recently signified as "technoscience."³⁶ The result is what Drucker calls a "knowledge society," or what Alvin and Heidi Toffler term a "powershift" whereby "both force and wealth themselves have come to depend on knowledge."³⁷

3. The principle manifestation and prime mover of the new era is the invention and diffusion of information technologies--that is, technologies which transfer, process, store and disseminate digitalised data: computers, telecommunications, and, by some accounts, biotechnology. Information revolutionaries point to the extraordinarily swift and broad development each of these fields of informatics has undergone since 1945--computers passing through successive generations, each of smaller size, larger capacity and higher speed; telecommunications moving from analogue to digital signals, and adopting new switching and transmission methods which dramatically improve performance, reliability, and costs; biotechnology advancing from the initial discoveries of DNA and RNA to everyday in-vitro fertilisation and transgenic species creation. Information revolutionaries anticipate that this pace of innovation will not only continue, but accelerate at an exponential rate.

Moreover, they point out, the real power of information technologies lies not so much in their independent capacities, but rather in the fact that their common digital language permit the convergence of their discrete capabilities into increasingly powerful, combined, synergistic technological systems. Thus the full potential of communications and computer technologies only emerges at their confluence into a single stream of 'communications,' 'telematics,' 'computer mediated communication,' or 'intelligent networks,' enabling the creation of on-line data bank, email services and global computer connectivity. There are signs of similar fusions between biotechnology and microelectronics.³⁸ This process of convergence is seen as eventually culminating in the creation of a generalised digital medium within whose networks an enormous range of transactions and operations--from manufacturing through messaging to medicine--will be conducted. The information revolution is thus perceived as a technological change that does not just alter individual products but pervades the fundamental processes of an entire culture.³⁹

4. The generation of wealth increasingly depends on an 'information economy' in which the exchange and manipulation of symbolic data matches, exceeds or subsumes the importance of material processing. Since Porat's study of the "information economy" the idea that information technologies are provoking a qualitative change in the nature of employment and the sources of wealth has been variously interpreted but widely accepted.⁴⁰ The prevailing view now declares that information is a central "economic resource" of the 21st century.⁴¹ Jorge Schemett has aptly characterised this creed as "informational materialism."⁴² Its main tenets are summarised in the Tofflers' account of the contemporary "super-symbolic economy"--a "new system of accelerated wealth creation"

increasingly dependent on "the exchange of data, information and knowledge," where land, labour, financing and raw materials become less important than the symbolic knowledge which can increasingly discover substitutes for them; where technological and organisational innovation are at a premium; where faster decision-making and better internal communication are a central commercial objective; where mass production is replaced with flexible production systems synchronised to detailed customer feedback about market conditions and preferences; where electronic transfers replace metal or paper money as the major medium of exchange; where goods and services are modularised and configured into systems requiring a constant multiplication and revision of standards; where new abstract and intellectual skills demanding high levels of education and training become the crucial attributes of the labour force; where computerised monitoring governs the profitable recycling of wastes; and where global news and data flows are an essential strategic asset.⁴³ Although other information revolutionaries might dispute the details of this portrait, it embodies most of the conventional wisdom about the economic importance of technological knowledge.

5. These techno-economic changes are accompanied by far-reaching and fundamentally positive social transformations. Here information revolutionaries display their most enthusiastic optimism. The undesirable features of industrial society--meaningless work, huge impersonal organisations, rigid routines and hierarchies, anonymous and alienating urban existences are seen dissolving. In their place, the information age holds out the hope of diversification, localism, flexibility, creativity, and equality. Promises include the computer-aided recovery of craft skills and artisanal traditions; the convenience of universal teleshopping, telebanking, and interactive

entertainment; the assistance of expert systems for education, health care, psychotherapy and home security; the revivification of domestic life in an electronic cottage; the participatory democracy of electronic town halls; and an historically unprecedented diffusion every sort of knowledge--'all information in all places at all times.' A brilliant culture of individual and collective self-actualisation is seen arising from the matrix of the networks.

This is not to say that information revolutionaries deny potential problems. Technological unemployment, intrusive surveillance, electronic crime and 'future shock' are all duly acknowledged. But they are represented as problems of adjustment--temporary setbacks or avoidable hazards on what remains in essence an ascending path. Bell, no facile utopian, recognises anxieties about technological domination and dehumanisation, especially in the cultural realm, but nevertheless insists that the tendency of information systems is toward "the freeing of technology from its 'imperative' nature," and the creation of "alternative modes of achieving individuality and variety within a vastly increased output of goods."⁴⁴ Others have been less restrained: Dizard, for example, speaks of the information society as one where the "the search for a new Eden through the melding of nature and machine" eventually yields "social salvation through better communication and information."⁴⁵

6. The information revolution is planetary in scale. Although early post-industrialists focused on changes in the developed world, they quickly identified a tendency toward a unified world economy as one major consequence of enhanced communication technologies.⁴⁶ Recognising the disparity between advanced economies and the Third World, they nevertheless believed in the overall trajectory of 'development' by

which Western societies pioneered advances that would eventually, given suitable aid, expert direction and trading connections, be adopted and emulated by other regions. Later information society theorists followed this logic. Some, strongly influenced by Marshall McLuhan's notion of an electronic "global village," amplified on this one-world theme in a very optimistic manner.⁴⁷ Some have argued that rapid computerisation would enable Third World countries to leap right from a preindustrial to a post-industrial society--leapfrogging over the industrial stage. Others suggest that computer and telecommunications would open up possibilities for decentralised, de-urbanised, village-based industry bringing material prosperity to the Third World without destroying cultural autonomy and tradition--what Toffler calls "Gandhi with satellites."⁴⁸ Even those who don't share these high hopes tend to see global disparities being rectified by a trickle-down economics in which huge technologically-generated increases in productivity, although at first concentrated in the developed world, will eventually be disseminated across the planet.

7. The information revolution marks not only a new phase in human civilisation but also a new stage in the development of life itself. At the extreme limits of their prediction, many information revolutionaries see the augmenting powers of intelligent machines tending logically toward the creation of "synthetic life."⁴⁹ The steady transfer of human abilities to machines will, it is argued, lead to the production of technologies whose capacities exceed those of their creator. Roboticist Hans Moravec typifies this view. "Sooner or later," Moravec asserts, "our machines will become knowledgeable enough to handle their own maintenance, reproduction and self improvement without help."⁵⁰ When this happens, humanity will pass away, "having lost the evolutionary race to a new kind of competition," superseded by its own "mind children."⁵¹ Computers are thus not merely

viewed as servants for humankind but also as a potential successor species--the next stage in evolution.

Tofflerism: Marx Against Marx

As the thesis of post-industrial society transformed into the theory of information revolution, its anti-Marxism simply remodulated itself. There was perhaps less talk of a new technocratic class mediating the tensions between capital and labour. But increasingly the direction of technological development itself was claimed to contradict Marx's analysis. The computer was discovered as the nemesis of socialism, a machine whose astounding capacities confounded class struggle.

Again these arguments appeared particularly telling because their proponents often claimed to be not so much repudiating Marx as simply updating him--following his own logic through to unanticipated conclusions. Pointing to Marxism's customary emphasis on the development of the means of production--and interpreting it as referring entirely to innovations in machinery--information society theorists said, in effect, that if "the handmill gives you society with the feudal lord; the steam-mill with the industrial capitalist," then what arrived with the microcomputer was the information society.⁵² The real 'historical materialists' are those who recognise the arrival of this new order rather than clinging to outdated notions of capital and class.

No one has pursued this line more energetically than the indefatigable populariser of information revolution, Alvin Toffler. Toffler is himself a former Marxist convinced by Stalinism and American affluence that:

Marxism was a misleading, obsolete tool for understanding reality in the high technology world. Using Marxism to diagnose the inner structures of high technology societies today is like limiting ones self to a magnifying glass in the age of the electron microscope.⁵³

But although Toffler, and his co-author and wife Heidi, are relentless polemicists against "antique Marxist ideas, applicable at best to yesterday's industrialism," their own concept of history owes an obvious debt to Marx.⁵⁴

The Tofflers' work hinges on a narrative, adapted from Bell's schema of preindustrial, industrial and post-industrial societies, of civilisation propelled forward by a series of "waves"--the First agrarian, the Second industrial, the Third, current, wave, informational.⁵⁵ Hendrick Hertzberg has recently pointed out an eerie, if superficial similarity between this and Marx's story of how feudalism (the equivalent of Toffler's agrarian First wave) gives way to capitalism (the equivalent of the Toffler's Second Wave), and capitalism, in turn, is replaced by communism (the equivalent of Toffler's cybernetic Third Wave). As Hertzberg observes,

Each stage, in its time, constitutes a tremendous advance in human progress; each eventually becomes obsolete (the "contradictions," as the Marxists say, begin to get out of hand); and the next emerges from the collapsing ruin of its predecessor.⁵⁶

Moreover, Hertzberg notes, Toffler even sounds like Marx. The first sentence of his most recent book, Creating a New Civilisation, reads "A new civilisation is emerging in our lives, and blind men everywhere are trying to suppress it,"--an obvious plagiarism of the famous opening of The Communist Manifesto: "A spectre is haunting Europe--the spectre

of Communism. All the powers of old Europe have entered into a holy alliance to exorcise this spectre.⁵⁷

The crucial difference is, of course, that in Toffler's account the advent of the new civilisation has nothing to do with class war, and everything to do with computers. Exploitation of labour, alienation, dehumanising mechanisation, centralisation and concentration of wealth, immiseration--all are characteristics, not of capitalism per se, but rather of the fading Second Wave of industrial civilisation--a civilisation to whose premises Marxism is itself profoundly tied. The advent of the information-driven Third Wave will overcome such ills. Struggle against capital is irrelevant, because everything once (and so deceptively) signified by the red flag--the classless society, non-alienated work, the dissolution of property--will be achieved simply by the operation of the technology which capital is itself so frenetically developing. "Archaeo-Marxists" who "nurse dreams of revolution drawn from the yellow pages of yesterday's political tracts" are left standing as we "speed into a new historical zone."⁵⁸

The inability of Marxism to respond to the realities of the new era is, the Tofflers argue, deeply inscribed in its theoretical tenets. Forged in reaction against the Hegelian idealist philosophy, Marx's materialism is predicated on an opposition between the physical, sensuous world of objects--the site of production--and the ethereal, abstract realm of ideas. This binary contrast underpins Marx's notorious 'base/superstructure' metaphor, by which:

... information, art, culture, law, theories and other intangible products of the mind were merely part of a 'superstructure' which hovered, as it were, over the

economic base of society. While there was, admittedly, a certain feedback between the two, it was the base that determined the superstructure, rather than the reverse.⁵⁹

Such dualism renders Marxism inherently blind to the productive power of data-exchange, symbolic manipulation, and the expansion of knowledge--the very activities central to the modern economy. For Marxists," hardware was always more important than software"; now, however, the computer revolution teaches us that the opposite is true. Today, say the Tofflers, "it is knowledge that drives the economy, not the economy that drives knowledge":

Marx, in arguing the primacy of the material base, stood Hegel on his head. The great irony of history today is that the new system of wealth creation, in turn, is standing Marx on his.⁶⁰

In a classic dialectical trope, historical materialism has been dematerialised.

Where the Tofflers find the anachronism of Marxism most obvious is in its concept of the industrial proletariat as the agent of revolutionary change. It was, they say, not so much capitalist ownership of the means of production but rather the crude technology of the "smokestack era" that generated the drudgery against which revolutionary socialism fought. "Marxism," remark the Tofflers in typical style, "glorified beefy workers straining muscles in steel mills and factories."⁶¹ Now the legions of mass labour are vanishing: the information economy is eliminating the factory--and with it, Marxism's historical protagonist.

This farewell to the working class--an adieu bidden not only by the Tofflers and their colleagues but also by many left intellectuals during the 1980s--takes two forms in information revolution theory. The first, most straightforward, simply argues that automation will progressively liquidate labour. There will be less and less work--hence less and less of a 'working' class. Early versions of post-industrialism were often linked to the idea of an emergent 'leisure society' in which the most pressing social problem would be the overcoming of boredom. This vision has never entirely faded from information society theory. However, an obvious problem diminishes its appeal--namely, that in the context of a wage economy such a liberation from work manifests as unemployment. Anxious to refute any idea that they merely aim to replace the tedium of the assembly line with misery of the welfare queue, information revolutionaries like the Tofflers have in fact often tended not to focus on the labour saving consequences of automation, and instead pursue a quite different argument.

In this second version work, instead of being terminated, is transformed. Emphasis falls not on the quantitative reduction of labour but on its qualitative improvement. Automation, it is conceded, will eliminate jobs, primarily in manufacturing. But this will be compensated for by new work, appearing in high technology, information-intensive industries. However, the new jobs will be different from the ones they replace; they will be better jobs. Here information society theory elaborates an argument first influentially stated by the sociologist Robert Blauner during the 1960s in a critique of Marx's theory of alienation--namely, that advanced technology reverses the inhuman, estranging effects of industrial machinery on workers⁶²

Computers, it is claimed, are fundamentally different from earlier forms of mechanisation. Transmuting manual drudgery into mental labour, manipulating symbols rather than objects, informatics not only frees workers from routine drudgery but also places a new premium on critical and diagnostic capacities, co-operative problem solving and the reintegration of previously fragmented tasks. These potentials tend to reverse the Taylorist simplification and fragmentation of work. It either permits, in the weak form of the argument, or, in its more determinist version, requires dissolution of traditional hierarchies and command structures, and the introduction of new dimensions of autonomy and job-satisfaction.

Thus a crucial part of Toffler's description of the Third Wave production depends on the intellect and skills of the workforce. Industrial workers owned few of the tools of production; today however "the most powerful wealth-amplifying tools are the symbols inside workers' heads"⁶³ Workers, therefore, "own a critical, often irreplaceable, share of the `means of production.'"⁶⁴ The foundation for Marx's theory of class conflict thus drops away. The consequence of the high-technology, post-Taylorist workplace is the evaporation not only of the hostility, but even of the distinction, between management and labour; in its place emerges a shared ethos of participation and professionalism, reinforced by profit sharing, stock options and workplace quality circles. While there will still be work, there will be no working 'class,' because class as a collective identity based on adversarial relations of production will have been dissolved.

At some points the Tofflers go even further, and suggests that the Third Wave will transform not only work, but also property. This is often represented as a necessary consequence of the economic peculiarities of information intensive goods and services.

Because information is not exhausted by use, can be reproduced easily and cheaply, and often multiplies in value the more widely it is distributed, such goods and services are--supposedly--immune from ownership or commodification. Since information constitutes the central resource of the new age these property-transcendent features herald the advent of an increasingly sharing, co-operative, equalitarian society. According to the Tofflers, Marxists have an "obsession with ownership" that is anachronistic in an era of "info-property"--"non-material, non-tangible, and "potentially infinite."⁶⁵ In the unfolding of this transformation revolutionary, overthrow of the ruling class is crudely beside the point. What will occur is rather a gentle auto-dissolution of ownership.

At this point there is an interesting bifurcation in the work of information revolutionaries. Some theorists, at some moments, look to a future 'beyond capitalism.' This perspective is exemplified by the early work of Toffler, and by the "computopia" prophecies of Japan's most famous futurist, Masuda. It sees information technology bringing a gradual, spontaneous and non-antagonistic relaxation of capitalist relations--with corporate ownership eventually assumed by technologically-participatory workers and citizens and the abundance of information generated resources dissolving commodity exchange. What results is nothing less than an electronically-created classless society.

Other information revolutionaries--or sometimes the same theorists at other moments--look only to a 'better capitalism.' This is the view implicit in all the governmental and corporate descriptions of the information society. It is also the perspective of Toffler's more recent work, clearly adapted to the free-market climate of the 1980s and 90s. In this perspective, information technologies still produce incredible economic and societal benefits. But these result mainly from an improved position in an

ever more-intensely competitive market society. Electronics yield, not post-capitalism, but new investment possibilities, more efficient management techniques, better marketing opportunities--faster, swifter, more efficient commodification.⁶⁶

Yet despite their apparent divergence, both the 'beyond capital' and the 'better capital' versions of the information revolution can be seen pointing in the same direction: to a future in which the capitalist development of technology leads to social salvation, whether through the perfection of the market or its transcendence. And in practice, information revolutionaries straddle both positions without apparent embarrassment. Masuda, who writes about the dissolution of the commodity form even while serving the Ministries of the world's most dynamic capitalist power, speaks of his "computopia" not only as a "classless society" but also as the fulfilment of Adam Smith's vision in The Wealth of Nations of a "universal opulent society."⁶⁷ Toffler hopped with ease from talking about post-capitalism to advising ultra-right wing free marketeer, Newt Gingrich.

Indeed, in many moments of information society theory both visions merge in the synthesis of a capital without contradictions, conflict or competition. In a typically nebulous but heartfelt panegyric, William Halal asserts that "the relentless advance of technology has become the driving force for social change," and celebrates the emergence of a "hi-tech/hi-touch" business organisation that unites enterprise and democracy. "Rising like a phoenix from the ashes of a dying epoch" the resulting "New Capitalism" will be so transformed that "it is really no longer capitalism at all" because "it is governed democratically to serve a full range of human goals rather than profit alone--yet it is still free enterprise."⁶⁸

Both the 'beyond capitalism' and the 'better capitalism' version of the information revolution see high-technology reshaping society, and both see this as a good thing. Their shared technological determinism means that the radical possibilities announced by the visionaries of the 'beyond capital' school are conceived of as a direct, linear consequence of the innovation directed by the pragmatists of the 'better capitalism' tendency. For this reason the positions are complementary rather than antagonistic: the one is the perfect idealist counterpoint to the utilitarianism of the other. In both cases the prognosis is the same--more technology. And in both cases, what is decisively off the agenda of the future is Marx's concept of revolution as class struggle.

The End of History: Déjà Vu.

The ultimate vindication of this information-age anti-Marxism was of course the end of 'actually existing socialism.' In the 1970s some post-industrialists had prophesied a certain convergence of capitalist and socialist systems as each resigned 'ideological' attachment to notions of either the free market or world revolution in favour of a common resort to technocratic planning. But in the 1980s, the era of the Second Cold War, this argument gave way to a more aggressive line. Totalitarianism was the inevitable outcome of Marxism, but computers and telecommunications were "technologies of freedom" with an intrinsic antipathy to such statism.⁶⁹ In arguments strongly marked by the influence of Frederick Hayek, it was widely argued that the creation of a knowledge economy was inherently related to the play of the open market.⁷⁰ High technology innovation depended on levels of enterprise and initiative antithetical to rigid state control. Moreover, application

of such innovation would produce a complex and accelerated economy, dependent on data flows elusive of centralised control. Any regime that attempted to restrict these flows would inevitably fall victim to the populist technological empowerment brought by the multiplication of microcomputers, video and fax systems.

It would seem hard to imagine a more convincing vindication of such arguments than the ignominious disintegration of the Soviet bloc in 1989. As the statues of Lenin toppled across Europe, Brzezinski, one of the originators of post-industrial theory, ascribed the Soviet state's degeneration to a failure to grasp the "technetronic revolution" which made its relative achievements in the field of heavy industrialisation and mass education obsolete.⁷¹ Kenichi Ohmae, theorist of business in a "borderless world," enunciated a common verdict when he declared that information "never respected the Berlin Wall":

. . . in an age of instant information, a wired-for-pictures world . . . any government that cannot offer Western style choices of material goods, services and travel will arouse the enmity of its citizens.⁷²

The Tofflers, of course, knew how to truly twist the knife in the wounds of old comrades. Declaring that "the central failure of the great socialist experiment of the 20th century lay in its obsolete ideas about knowledge" they observed that;

Marx himself had given the classic definition of a revolutionary moment. It came, he said, when the 'social relations of production' (meaning the nature of ownership and control) prevent further development of the 'means of

production' (roughly speaking, the technology). That formula perfectly described the socialist world crisis. Just as feudal 'social relations' once hindered industrial development, now socialist 'social relations' made it all but impossible for socialist countries to take advantage of the new wealth-creation system based on computers, communication, and, above all, on open information.⁷³

The most ambitious statement of such ideas was, however, that of Francis Fukuyama, a former deputy director in the US State Department and consultant with the RAND corporation, who in a widely acclaimed article announced "the end of history."⁷⁴ This, he hastened to point out, did not mean a cessation of empirical events, but rather that such events could no longer be "understood as a single, coherent evolutionary process" which would culminate when "mankind had achieved a form of society that satisfied its deepest and most fundamental longings."⁷⁵ Beyond such a point no further progress in the development of underlying principles and institutions could occur, because "all the really big questions had been settled."⁷⁶ This idea of history had, Fukuyama observes, been enunciated by Hegel, but "made part of our daily intellectual atmosphere by Karl Marx," who, he claims, believed that the "end of history" would be marked by the advent of communism. Now, in the aftermath of the collapse of the USSR, it was clear that, on the contrary, the "end of history" was achieved by the triumph of capitalist liberal democracy.

Fukuyama is not a conventional information society theorist. But he shares with these theorists a teleological faith in technological progress. He finds the "mechanism" which explains the directionality and coherence of history in the "logic of modern science."⁷⁷ This, he claims "would seem to dictate a universal evolution in the direction of

capitalism."⁷⁸ Because the unfolding of applied science makes possible the limitless accumulation of wealth to satisfy ever-expanding human desires, and also confers inestimable military advantages, it dictates homogenisation toward the form of society best able to reap its benefits. This form is capitalist democracy, whose competitive enterprise, decentralised market decisions and work-ethic favours technological innovation. This superiority had seemed in doubt when the centrally planned economies of USSR and China were able to rival the capitalist bloc in industrial production. But the inevitability of evolution in the direction of "decentralised decision making and markets" became apparent with the transition to a post-industrial order placing a premium on invention and information:

One might say in fact that it was in the highly complex and dynamic "post-industrial" economic world that Marxism-Leninism as an economic system met its Waterloo.⁷⁹

With this sorry example of the failure of alternatives, the global adoption of capitalism by the countries of the developing world--Fukuyama calls it "the victory of the VCR" --is inevitable.⁸⁰ Whatever problems the future holds will arise primarily from the boredom arising from the universal "peace and prosperity" created by the technoscientific achievement of capitalism.⁸¹

This announcement may provoke an uncanny sense of deja vu. For we have come full circle. The "end of history" Fukuyama presents is a massively enlarged version of the "end of ideology" thesis, now global in scope and engineered not by industrialism but by

post-industrialism. At last, aided by the "mechanism" of information technology, the spectre of Marxism has finally been laid to rest.

The Road Ahead?

Since 1989 history has, of course, refused to lie down and die. Nothing, however, has diminished the prevailing conviction that the information revolution represents the destiny of humankind. In the USA, the embrace of this doctrine by corporations and state reached a new level of intensity with the Clinton administration's announcement of the so-called 'information superhighway'--a high-bandwidth, omnipurpose, digitalised telecommunications network interconnecting the nation's computers, phones, and televisions by fibre optic strands, coaxial cables, satellites and radio waves. In 1994, the National Information Infrastructure (NII) bill initiated construction of the 'highway' as a governmentally subsidised but privately built, owned and operated network. The immediate consequence was a frenzy of mergers by telephone, cable and entertainment corporations positioning themselves to reap profits from video-on demand, telescoping, telegambling, interactive gaming and on-line advertising.

As many commentators have pointed out, the 'highway' image--with its connotations of linear movement, physical transportation and material solidity--seems hopelessly inadequate to convey the multi-directional, telecommunicational, virtual interactions of cyberspace.⁸² Yet it clearly displays the purposes of the promoters of digital infrastructures. For the metaphor invokes memories of the post-World War II Golden Age of capitalism--the period sometimes known as Fordism, in tribute to the central role of the

auto-industry as a provider of jobs, production techniques and consumer goods.⁸³ In this era, road-building was an essential component in the reordering of social life that integrated assembly-line labour, mass consumption of manufactured goods, suburban housing and privatised mobility in an industrial regime that sustained three decades of extraordinary prosperity. The rhetoric of the 'highway' serves to summon up remembrances of this boom period (while, of course, conveniently forgetting about negative effects of automobile centred growth such as pollution, congestion, alienated labour and community destruction). By analogy, it defines information technologies--computers and telecommunications--as the 21st century successors of the 20th century automobiles and roads, the leading technologies in what is hoped to be a new cycle of capitalist growth.

In this context, the formulas of information society theorists have spouted in an unquenchable flow from the mouths of governmental and corporate leaders of all complexions. US Democratic Vice-President Al Gore has made a stock-in-trade of promising a cornucopia of possibilities for virtual education, democratisation and self-improvement. In a speech on the "National Information Infrastructure" to the Television Academy at the University of California in Los Angeles in 1994--a speech stirringly subtitled "Information Conduits, Providers, Appliances and Consumers"--Gore expanded on the highway metaphor by noting that if cars had advanced as rapidly as computer chips, a Rolls Royce would today go a million miles and hour, cost twenty five cents and be one millimetre in length.⁸⁴ Such a rate of development, Gore declared, amounted to a "world revolution." Rhetorically brushing away any hint of conflicting interests from his picture of the cybernetic future, Gore went on to unblushingly promise business a compliant regulatory climate, in which the state would facilitate but not encroach on commercial

opportunities of cyberspace, and simultaneously to guarantee citizens "open access" to the networks. Declaring that the economic future of the USA. depended on its ability to grasp the opportunities of the digital age, he contrasted the "innovation and entrepreneurship" of capitalism with the dire example of the ex-USSR--"a country that used to put armed guards in front of copiers"--and declared his hope that "America, born in revolution, can lead the way in this new, peaceful world revolution" based on digital technology, and exhorted his audience "not to predict the future but to make firm the arrangements for its arrival."

Gore's technophilia was, however, matched by that of his political rival, Newt Gingrich, Republican Speaker in the House of Representatives. An aficionado of the works of the Tofflers--for whose latest book he wrote an introduction--Gingrich synthesised futurist revolutionary rhetoric with the most reactionary of right wing politics, rhapsodising freely on the need to wire every child into cyberspace while simultaneously slashing at the welfare programs. Gingrich's Progress and Freedom Foundation hosts major conferences on the confluence of capitalism with the information age.⁸⁵ In 1994 it published a document, "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age," co-authored by information age luminaries such as Toffler, George Gilder and Esther Dyson.⁸⁶ Beginning with a grandiloquent declaration that "The central event of the 20th century is the overthrow of matter . . . The powers of mind are everywhere ascendant over the brute force of things," the document is built around a Toffleresque contrast between the Second 'industrial' age and the Third 'informational' age, now elaborated with reflections about cyberspace as a "bioelectronic frontier," a "land of knowledge" whose "exploration can be civilisation's truest, highest calling."

After ruminating on "the nature of freedom" and "the essence of community" and rejoicing in the power of cyber-communications to liberate us all from "smokestack barons and bureaucrats from the past," the "Magna Carta" finally gets down to brass tacks with some policy recommendations. These are remarkably to the point: strong intellectual property rights to protect private ownership of information; a 'highway' infrastructure to be owned by an unregulated private monopoly; tax breaks for information-oriented companies; and the widespread dismantling of federal government regulations.⁸⁷ These proposals for the consolidation of information age capitalism are far from airy dreaming; much of the spirit of the "Magna Carta" proposals moves in the 1996 US Telecommunications Bill, a legislative testament of faith in the power of deregulated, concentrated capital to manage the new informational environment.⁸⁸

The corporate sector itself has been almost as fulsome as its government clients about the prospects for virtual capitalism. The ruminations of Bill Gates, owner of Microsoft Corporation and cyberspace's premier captain of industry, can be taken as exemplary. In his biography The Road Ahead--a title that carefully echoes the rhetoric of the information highway--Gates looks forward to what he calls "Friction Free Capitalism." In this scenario, omnipresent digital technologies become the basis for the perfection of the market. Gates, who has the frankness to acknowledge that the driving force behind the information highway is "the race for the gold," nonetheless introduces a utopianism of his own when he suggests that the movement of business into cyberspace will produce Adam Smith's dream of a world of "perfect knowledge" or "perfect information," a prerequisite for "perfect competition." Ignoring the ironies that such words invite in the mouth of the information age's most aggressive monopolist, Gates promises us "a new world of low-

friction, low-overhead capitalism, in which market information will be plentiful and transaction costs low. It will be a shopper's heaven.⁸⁹ Freed by technology from its rigidities and imperfections, the market passes into a veritable paradise of exchange, in which the global digital grids and lattices connect the whole planet in the limitless transaction of prosperity and freedom.

However, even in such utopian pictures a few shadows sometimes appear. In the context of a unified capitalist world economy, discussion of the information revolution is now inseparable from that of `globalisation'.⁹⁰ A harder, more anxious note replaces rhapsodies about the "global village". For it is now the pressure of a communicationally integrated and increasingly competitive world market which enforces adaptation to the information age. Techno-idealism falls to computer-age realpolitik. Rhetoric urging the rapid adoption of new technologies now relies not only on the utopian promises of such technologies, but, even more, on the costs--in terms of lost jobs and declining living standards- of refusing them. However, if this introduces a newly anxious note to the approach of the information revolution, it in no way diminishes its inexorability. While in an era of mounting technological unemployment and global corporate mobility there may be some qualms about the universal benevolence of the information age, there is even less doubt about its necessity.

The world-wide collapse of socialist regimes, or their clear subordination to market discipline, has meant that anti-Marxist diatribes now seem beyond the point for contemporary high-tech futurists, such as George Gilder, Nicholas Negroponte, Michael Rothschild or Kevin Kelly and the editors of Wired magazine. Rather, they focus on the necessary identification of technological progress and the market economy. Many

commentaries endorse the views put frankly by Rothschild, whose recent "bonomic" analysis of an "economy derived from technical information" asserts that "capitalism is simply the way technology evolves" and is the "inevitable, natural state of human affairs"--a phenomenon which it is a "waste of time and mental energy" to oppose, because "Like it or not, the sun rises in the east."⁹¹

Yet despite the loss of any easily-identifiable ideological opponent, information capital's revolutionary intellectuals retain a messianic sense of mission. Some recent predictions by the roboticist, Moravec remind us of the scope of their ambitions. Envisaging the emergence within the foreseeable future of highly advanced artificial intelligences, he asks us further to imagine that "most of the human universe has been converted to a computer network--a cyberspace--where such programs live, side by side, with downloaded human minds and accompanying simulated human minds."⁹² Moravec then outlines the political economy of this world. The cyberspatial entities will all make their living "in something of a free market way," trading the products of their labour for the essentials of life in the networks--memory space and computing time. Some will convert undeveloped parts of the universe into cyberspace or improve the performance of existing patches, thus creating new wealth. Others will act as banks, storing and redistributing resources, buying and selling computing space, time and information:

Some entities in the cyberspace will fail to produce enough value to support their requirements for existence--these eventually shrink and disappear, or merge with other ventures. Others will succeed and grow.⁹³

Moravec says that the closest present day parallel to the existence of these virtual creatures would be "the growth, evolution, fragmentation, and consolidation of corporations, whose options are shaped primarily by their economic performance."⁹⁴ Noting that "a human would likely fare poorly" in such a cyberspatial market, he looks, without regret, to the necessary conclusion--our species merger with or supersession by these corporatised synthetic entities.⁹⁵ Reading such apocalyptic visions, one cannot but hear the echoes of some lines of Marx's of which McKenzie Wark has recently reminded us in his brilliant discussion of computerised stock markets--lines in which the young Marx speaks of the ultimate destination of capital: "finally--and this goes for the capitalists too--an inhuman power rules over everything."⁹⁶

Appropriations and Exorcisms

The doctrine of the information revolution, as it has unfolded over the last half century, has proven to be much more than just futurist speculation or even sociological description. Rather, it has become an indispensable ingredient in a massive reorganisation of advanced capitalist societies, centred on the introduction of new technologies. Formulated and promoted within the think-tanks, policy institutes, laboratories, government offices and consultancy circuits of the most powerful and prosperous centres of the capitalist world economy, the theory of an inevitable information revolution provides the rationale for this restructuring, legitimisation for social dislocation, and exhortation toward a radiant future.

In its development, this idea has been propelled forward by competition with another revolutionary theory that aimed to become a "material force": Marxism. This was the foe that was meant to have been defeated by the "end of ideology" in the affluence of post-war industrial societies. It was in response to an unforeseen crisis of these societies, a crisis of international and domestic insurgencies permeated by the spirit of supposedly dead and buried Marxism, that Bell and his colleagues produced the concept of post-industrialism. Their annunciation of a new age was not merely a prediction, but a project, an effort both of prophecy and partisanship aimed at setting in motion the social and technological measures necessary to restore the stability of an order threatened by what they saw as chaotic and subversive forces. This is the idea, which has subsequently flowered into theories of the information revolution and virtual capitalism.

The relation of these theories to Marxism is, however, not just one of antagonism, but of appropriation. Produced by intellectuals who were often familiar with or had actually espoused Marxist ideas, the concept of the information society derives much of its analytic force and imaginative power from a rewriting of Marxism that retains the notion of historical progress towards a classless society, but reinscribes technological advance rather than class conflict as the driving force in this transformation. It thus annexes the idea of 'revolution.' The collapse of actually existing socialism in popular uprisings intimately linked to the capacities of new media to carry messages across the walls and curtains behind which Marxian regimes had sheltered from the world market is, in the eyes of information revolutionaries, the vindication of this project. It marks the final, technologically-aided exorcism of the ghost of Marx. In what follows, however, I will

argue that this exorcism has failed. But first we must see what other Marxists have made of 'the information revolution.'

Notes

¹ For a recent discussion see Frank Webster, Theories of the Information Society (London: Routledge, 1995). Also useful, though now dated, is David Lyon, The Information Society: Issues and Illusions (Cambridge: Polity, 1988).

² See Chapter 1, and also the discussion of the Saint Simonian tradition in Krishan Kumar, Prophecy and Progress (Harmondsworth: Penguin, 1978).

³ Daniel Bell, The End of Ideology (New York: Collier, 1961).

⁴ On Bell's early interest in Marxism see his account in "First Love and Early Sorrow," Times Higher Education Supplement 16 Jan. 1981, 9-11.

⁵ G. Ross, "The Second Coming of Daniel Bell," Socialist Register 1974, ed. Ralph Miliband and John Saville (London: Merlin, 1974) 56-84.

⁶ E.G. Mesthene, ed., Technological Change (Cambridge: Harvard University Press, 1970); Peter Drucker, The Age of Discontinuity (New York: Harper Row, 1968); Zbigniew Brzezinski, Between Two Ages: America's Role in the Technotronic Era (New York: Viking, 1970); Herman Kahn and Anthony J. Weiner, The Year 2000: A Framework for Speculation on the Next Thirty Three Years (New York: Macmillan, 1967); Daniel Bell The Coming of Postindustrial Society (New York: Basic, 1973). Although the The Coming of Post-Industrial Society appeared in 1973, Bell published "Notes on the Post-Industrial Society" in The Public Interest 6/ 7 (1967). He competes with Alain Touraine as the first to introduce the term "post-industrial" in its contemporary sense.

⁷ Bell, The Coming of Post-Industrial Society x.

⁸ Bell, The Coming of Post-Industrial Society 27-30.

⁹ Bell, The Coming of Post-Industrial Society 20.

¹⁰ Bell, The Coming of Post-Industrial Society 374.

¹¹ Bell, The Coming of Post-Industrial Society 49.

¹² Bell, The Coming of Post-Industrial Society x.

¹³ On this point see Kevin Robins and Frank Webster, "Information as Capital: A Critique of Daniel Bell," The Ideology of the Information Age, ed. Jennifer D. Slack and Fred Fejes (New Jersey: Ablex., 1987) 95-117.

¹⁴ Bell, The Coming of Post-Industrial Society 374.

¹⁵ Bell's technocratic vision retains a connection to his early brushes with Trotskyism. His idea of the "new class" is adapted from the analysis of bureaucratised socialism offered by maverick Trotskyite, James Burnham in The Managerial Revolution. (Bloomington: Indiana University Press, orig. 1940, rpt. 1966) Burnham's thesis of a "managerial revolution" establishing bureaucrats and administrators as the dominant class in capitalist and socialist countries alike was in turn inspired by Trotsky's critique of the "bureaucratic degeneration" of the USSR.

¹⁶ Bell, The Coming of Post-Industrial Society 288, 291.

¹⁷ Bell, The Coming of Post-Industrial Society 40.

¹⁸ At one point Bell speaks of corporate power being "subordinated" to the new class. (The Coming of Post-Industrial Society 270); elsewhere he says it remains "predominant" (270). If at times Bell suggests that the role of organised knowledge supersedes the logic of the market--allowing economic planning--at others he sees such knowledge as itself subject to commodification, defined and prioritised by its marketability

¹⁹ Kumar 190-192.

²⁰ Bell, The Coming of Post-Industrial Society 480. For his later elaboration on the topic of the "adversary culture" see The Cultural Contradictions of Capitalism (New York: Basic, 1976).

²¹ Only Masuda's work is generally available in English. On the other authors, see Tessa Morris-Suzuki, Beyond Computopia: Information, Automation and Democracy in Japan. (London: Kegan Paul, 1988).

²² Morris-Suzuki n.p.

²³ Yoneji Masuda, The Information Society as Post-Industrial Society (Washington, DC: World Future Society, 1981).

²⁴ Alex S. Edelstein, John E. Bass, Sheldon M. Hasel, eds., Information Societies: Comparing the Japanese and American Experiences (Seattle: University of Washington, 1978).

²⁵ Marc Uri Porat, The Information Economy: Definition and Measurement vol. 1, (Washington DC: US Department of Commerce, 1977).

²⁶ Published in English, with an introduction by Daniel Bell, as Simon Nora and Alain Minc The Computerisation of Society. (Cambridge: MIT Press, 1981)

²⁷ Nora and Minc 3.

²⁸ Daniel Bell "The Social Framework of the Information Society," The Computer Age: A Twenty Year View, ed. Michael L. Dertouzous and Joel Moses (Cambridge: MIT Press, 1979), 526.

²⁹ Representative titles include James Martin, The Wired Society (New Jersey: Prentice Hall, 1978); Kimon Valaskakis, The Information Society (Montreal: Gamma, 1979); Anthony Oettinger, "Information Resources: Knowledge and Power in the 21st Century" Science 209 (1980) : 191-198; Barry Jones, Sleepers Awake (Melbourne: Oxford University Press, 1982); W.P. Dizard, The Coming Information Age (New York: Longman, 1982); Tom Stonier The Wealth of Information (London: Methuen, 1983); James Beniger The Control Revolution (Cambridge: Harvard University Press, 1986); John Naisbitt, Megatrends (New York: Warner, 1982); Alvin Toffler, The Third Wave (New York: Morrow, 1980).

³⁰ It is symptomatic of this new tone that when Bell recast his earlier arguments in terms of the information society theory he retained three of his original five descriptors of postindustrialism, but dropped two--those dealing with the professional and technical class and the future orientation which he had previously related to the enlarged scope of governmental planning and public policy. He does not explain this change. It can be speculated that it reflects not only the heightened prominence automated information systems had gained since the early 1970s, but also a rightward political shift, creating a 'free-enterprise' climate hostile to planning and bureaucracy in which computerisation was frequently hailed as means of eliminating professional and technical jobs--technology turned against technocracy.

³¹ For a useful account see Kees Brants, "The Social Construction of the Information Revolution," European Journal Of Communication 4 (1989): 79-87.

³² See William Leiss, "The Myth of the Information Society," Cultural Politics in Contemporary America, ed. Ian Angus and Sut Jhally (New York: Routledge, 1989) 282-299.

³³ See, for example, Kevin Robins and Frank Websters' distinction between "administrative" and "apocalyptic" versions of informational futurism in their "Athens Without Slaves . . . Or Slaves Without Athens? The Neurosis of Technology," Science as Culture 3 (1988) 19.

³⁴ In making this summary I have found very useful the similar synopses by Manuel Castells, The Informational City: Information Technology, Economic Restructuring and the Urban-Regional Process, (Oxford: Blackwell, 1989) and Jorge Reina Schement and Leah A. Lievrouw, "Introduction: The Fundamental Assumptions of Information Society Research," Competing Visions, Complex Realities: Social Aspects of the Information Society, ed. J. Schement and L. Lievrow (Norwood: Ablex, 1987) 1-10.

³⁵ Masuda 46.

³⁶ Bell, The Coming of Post-Industrial Society.

³⁷ Drucker, 271; Alvin & Heidi Toffler, Powershift (New York: Bantam, 1990) 17.

³⁸ For example, the use of computers in genetic analysis, the search for the 'biochip,' the modelling of electronic automata on cellular phenomena, and research into molecular robotics or 'nanotechnologies.'

³⁹ See Castells on this point.

⁴⁰ In his post-industrial thesis Bell drew on the economic model of the "march through the sectors" developed by Colin Clark in The Conditions of Economic Progress (London:

Macmillan, 1940). Dividing the economy into three sectors--primary (agricultural), secondary (manufacturing), and tertiary (services)--Clark had posited a historical process in which, as productivity rose successively in each sector, the bulk of the labour force migrated to the next. Postindustrial society, Bell claimed, marked the point where the majority of the labour force moved into the service sector--a proposition whose definitional clarity and historical accuracy has since been the subject of hot debate. Subsequently, some information society theorists have built on this contested foundation to posit a distinct, delimited 'quaternary' information sector constituted by high-technology industry and succeeding agriculture, manufacture and services at the leading edge of economic growth. However, such models have been strongly criticised for obscuring the actual interconnection and overlap of allegedly discrete sectors. And in fact what studies such as Porat's show is the ubiquity of symbol-manipulating tasks across a wide range of occupations. Many theorists have therefore abandoned the notion of a distinct information "sector," and now favour an analysis which stresses the increased importance of informational activity as a component within *all* aspects of the economy. Information processing is seen not so much as a successor to manufacturing, services, or agriculture, but rather as a "superordinate" function whose productivity-improving powers span each of these areas.

⁴¹ Oettinger 191.

⁴² Jorge Reina Schement, "The Origins of the Information Society in the United States: Competing Visions," The Information Society: Economic, Social and Structural Issues, ed. Jerry Salvaggio (Hillsdale: Lawrence Erlbaum, 1989) 21.

⁴³ Toffler, Powershift 232-234.

⁴⁴ Bell The Social Framework of the Information Society 545.

⁴⁵ Dizard 11, 23.

⁴⁶ See Drucker, and also Marc Porat, "Global Implications of the Information Society," Journal of Communication 28.1 (1978) : 70-80.

⁴⁷ Marshall McLuhan, Understanding Media: The Extensions of Man (New York: McGraw Hill,.1964) 87.

⁴⁸ Toffler The Third Wave 328.

⁴⁹ Beniger 104

⁵⁰ Hans Moravec, Mind Children: The Future of Robot and Human Intelligence (Cambridge: Harvard University Press, 1988) 5.

⁵¹ Moravec, Mind Children 5-6.

⁵² Karl Marx , The Poverty of Philosophy (New York: International Publishers,.1971) 109.

⁵³ Alvin Toffler, Previews and Premises (London: Pan, 1984) 195.

⁵⁴ Toffler, Future Shock 361.

⁵⁵ Toffler, The Third Wave. n.p.

⁵⁶ Hendrick Hertzberg, "Marxism: The Sequel" New Yorker 13 Feb. 1995,.7.

⁵⁷ Cited by Hertzberg 7.

⁵⁸ Toffler, The Third Wave.440.

⁵⁹ Toffler, Powershift 421.

⁶⁰ Toffler, Powershift 421-422.

⁶¹ Toffler, Powershift 421.

⁶² Robert Blauner, Alienation and Freedom: The Factory Worker and His World (Chicago, 1964).

⁶³ Toffler, Powershift 240.

⁶⁴ Toffler, Powershift 240.

⁶⁵ Toffler, Previews and Premises 103-105.

⁶⁶ For a sophisticated version of this position, one can do no better than the account of the "control revolution" offered by James Beniger, a former official with the US Food and Drug Administration. Beniger argues that information technologies represent the consummation of a century long quest by capitalism to develop instruments of "technobureaucratic control" adequate to overcome the repeated crises in production, consumption and distribution of goods encountered during industrialisation. As the culmination of this "control revolution", microelectronic methods of automation, coordination, inventory, and advertisement are revolutionary in a double sense. On the one hand, they mark a dramatic advance in human progress, offering means to overcome protracted tumults and disorder of industrialism. But they are also revolutionary in a "cyclical," "astronomical," sense, implying the "restoration of levels of economic and political control" exercised in pre-industrial era. The information revolution is thus both a progressive and a conservative revolution. Like so many information revolutionaries, Beniger tips his cap to Marx, citing the famous aphorism about the way "men make their own history, but not under circumstances of their own choosing," and observing that because these circumstances have shifted "from land and capital to information" social theory inherited from the nineteenth century is now challenged "much as the Industrial

Revolution challenged Marx . . . to reconsider preindustrial theories." But the end to which Beniger's reconsideration of social theory looks is in fact precisely antithetic to Marx's. For what it envisages is a market society in which the development of cybernetic programming and feedback techniques--including, Beniger believes, the eventual creation of synthetic life forms--enables the removal of all blockages and interruptions from the circuits of the commodity. The result is a seamlessly integrated totality, a perfect structural-functional harmony in which every moment of social activity is organically connected with and responsive to the other in fulfilment of the needs of the capitalist whole.

⁶⁷ Masuda, The Information Society as Post-Industrial Society (1990 ed.), 130-131.

⁶⁸ William E. Halal, The New Capitalism: Democratic Free Enterprise in Post-Industrial Society (New York: Wiley, 1986) 7

⁶⁹ Ithiel de Sola Pool, Technologies of Freedom (Cambridge: Harvard University Press, 1983).

⁷⁰ F.A. Hayek, "The Use of Knowledge in Society," American Economic Review, 35 (1945): 519-30.

⁷¹ Brzezinski The Grand Failure: The Birth and Death of Communism in the Twentieth Century (New York: Macmillan.1988).

⁷² Kenichi Ohmae, "Global Consumers Want Sony, Not Soil," New Perspectives Quarterly, 8.4 (1991): 72.

⁷³ Toffler, Powershift 411.

⁷⁴ Francis Fukuyama, The End of History and the Last Man (New York: Macmillan, 1992).

Fukuyama first expressed his ideas in an article in The National Interest 16, 1989, 3-18. He subsequently developed them in book form. All the citations here are from the book.

⁷⁵ Fukuyama xii.

⁷⁶ Fukuyama xii .

⁷⁷ Fukuyama xv.

⁷⁸ Fukuyama xv.

⁷⁹ Fukuyama 93.

⁸⁰ Fukuyama 98.

⁸¹ Fukuyama xxiii.

⁸² See, for example, the excellent discussion of the highway metaphor by Robert Adrian X, "Infobahn Blues" in Digital Delirium, ed. Arthur and Marilouise Kroker (New York: St. Martin's Press, 1997) 84-88.

⁸³ For a fuller discussion of Fordism, see Chapter 3.

⁸⁴ Al Gore, "The National Information Infrastructure: Information Conduits, Providers, Appliances and Consumers," Vital Speeches of the Day, Feb. 1994, 229. See also his "Information Superhighways: The Next Information Revolution," The Futurist, Jan.-Feb. 1991. 21-23.

⁸⁵ See Christopher.Scheer, "The Pursuit of Techno-Happiness: Third Wavers & Tekkie Cults, " Nation. 8 May,1995 632-634: Thomas M. Disch, "Newt's Futurist Brain Trust." Nation, 27 Feb. 1985, 266-270. David Corn, "CyberNewt," Nation. 6 Feb. 1995 154-155.

⁸⁶ Progress & Freedom Foundation, "Cyberspace and the American Dream: A Magna Carta for the Knowledge Age," online, Internet, 1994. Available by email from to PFF@AOL.COM.

⁸⁷ Progress & Freedom Foundation.

⁸⁸ On the Telecommunications Bill, see Robert McChesney, "The Global Struggle for Democratic Communication." Monthly Review. 48.3 (1996).

⁸⁹ Bill Gates, The Road Ahead (New York: Norton, 1995) 171, cited in Michael Dawson and John Bellamy Foster, "Virtual Capitalism: The Political Economy of the Information Society," Monthly Review, 48.3 (1995): 51.

⁹⁰ See Herbert Schiller, "The Global Information Highway: Project for an Ungovernable World" in Resisting the Virtual Life: The Culture and Politics of Information., ed. James Brook and Iain A. Boal.(San Francisco: City Lights, 1995) 17-33.

⁹¹ Mark Rothschild, Bionomics: The Inevitability of Capitalism (New York: Henry Holt, 1990) xiii, xv.

⁹² Hans Moravec, "Pigs in Cyberspace," Thinking Robots, An Aware Internet, and Cyberpunk Librarians., ed. R. Bruce Miller and Milton T. Wolf (Chicago: Library and Information Technology Association, 1992) 15-21.

⁹³ Moravec, ""Pigs in Cyberspace" 17.

⁹⁴ Moravec, "Pigs in Cyberspace" np.

⁹⁵ Moravec, "Pigs in Cyberspace" np.

⁹⁶ Karl Marx, "Economic and Philosophic Manuscripts," in Early Works (Harmondsworth: Penguin, 1973) 366, cited in McKenzie Wark, Virtual Geography: Living With Global Media Events (Bloomington: Indiana University Press, 1994) 175.