

COMPUTERS AND SOCIETY

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Abstract:

Mr Laver described some of the social problems of the post-industrial era, with particular reference to those caused by the use of computer systems.

Informatics and Employment

Introduction

Society could be described as the hand in the glove of its technology, where the glove is an iron glove and the hand grows to fit it. In the pre-industrial, agricultural society, men were either landed aristocrats or serfs; and in the industrial era, man's position in society and role in the production process depended on whether he was an owner of capital, or manager of a factory, or simply a hand in a factory. Now, in the post-industrial era, it is reasonable to suppose that the new technology, in particular informatics, will dominate our society, affecting employment and politics.

Everyone of us is already affected by others' use of computer systems, and it is important that as many educated individuals as possible are aware of the range of current possibilities, practical constraints and the fundamental limitations of computer system design and operation. We should also be made to think a little about the expanding consequences of the accelerating slide towards computer-communication systems in all aspects of our lives: we stand on a rather slippery slope on which it is harder to check or change course the further we go.

It is a fair question to ask if the consequences of computer systems are any different from those of other innovatory technologies, or if the media men have chosen computing systems as a favourite technical bogey? (I once suggested that the crest of the British Computing Society should be a 'scapegoat rampant on a field of variable length'.) There is more than a touch of this with computing communications systems, but the pace of innovation is faster, the scope of applications wider, and the influence more subtle and more pervasive. Information Systems are becoming the nervous systems of our society, and as our Western democracies become even more highly strung, the health and strength of these nervous systems is ever more important to us. War, famine, and pestilence apart, continued innovation is inevitable, and although this is not necessarily a bad thing, we need to stay on guard.

Our political problem is to attempt to direct the course, and vary the pace, of innovation so that it meets our human needs and matches our finite capacities to adapt as individuals and as social groups, remembering that society adapts slower than the individual.

Today, I would like to look at three particular aspects of informatics, of which the first is

1. Design Objectives for Information Systems

My context will be UK commercial data processing systems only. Data processing systems have the highest potential for generating social problems. Data processing has been commonly sold to top management as a means of reducing and stabilising costs and eliminating labour-intensive paper work. Partly for this reason, and partly because the first machines were quite fantastically costly compared with other items of clerical equipment, the proposals were justified and planned in financial or investment terms. Top management was then able to handle a proposal which they did not begin to comprehend, by reducing it into a familiar investment decision, which they do understand, that is by setting return on capital employed to match the risk.

While 'return on capital invested' is valid for comparing alternatives, it is not valid for setting the objectives of system design as a computer proposal is rarely being compared with all other investments.

As a consequence, too many schemes are dominated by narrow objectives, are hagridden by cost criteria with resulting rigid and unhuman design, and rarely attempt to put a smile on the face of anyone but the Finance Director.

Financial criteria may pretend to be a neutral metric but they never are, and soon become an objective in their own right.

You may say: naturally enough, he who pays the piper should call the tune. Moreover, without exception, computer schemes have been initiated by management, not by the workers. It is certainly true to say that computer salesmen sold to those who controlled the means to pay, and selling was done in terms that could be expected to appeal to buyers.

It is also true that 'the workers' have not generally been invited to take part in the design process: but equally they have not sought this, contenting themselves with the passive defence of their pay and jobs.

In asking 'Is efficiency and cost efficiency enough?' we need to be clear what we mean by efficiency. Let us consider three aspects.

(a) Efficiency in Operating: programs should be effective and accurate. No one quarrels with this, so long as the costs are not cut so tight as to produce hieroglyphic bank statements, or in the future, to erode privacy protection. Privacy has to be paid for.

(b) Hardware efficiency: no one wants unnecessary equipment, but management and workers may hold different views on more kit versus more shifts. Again, operating staff are required to work in a needlessly restricted environment to suit the machine's design.

(c) Efficiency in the rest of business from using the computer: here there is scope for a compromise between ruthless cost-cutting and a union's paradise.

Because top management has not understood computers, nor wanted to, regarding it as a matter of servile detail unbecoming to their status, system design has been left too much in the hands of computer experts, system analysts and programmers. This is fine for settling technical details but not for setting broad objectives of design. The experts set up targets which appeal to them, usually technical performance, quantitative matters in their own area of competence, and they neglect or overlook the untidy, qualitative, unpredictable human factors. To lapse into a bit of sociological jargon, the reward-value systems of systems analysts have nothing to do with human benefit as opposed to technical efficiency.

Again systems designers tend to be young hawks who have frightened the plump, elderly doves of management. These system designers have no experience or long term commitment to the craft or jobs which their systems affect. They design conceptually-clean, naively simple systems based on the total and absolute compliance by the man and women affected by them. These systems are rule-bound, rigid, blind to the real world outside with its fatigue, boredom, wet Monday mornings and Poets days (Push Off Early, Tomorrow's Saturday).

I am not saying that systems analysts are stupid or motivated by malice; indeed they are usually surprised when militant workers castigate them as being tools of management. They see themselves as honestly and impartially seeking to do their best for their paymasters in the light of their own training, but this too is dominated by the drive for technical efficiency.

It is true that no-one sets them explicit social improvement objectives, but, as aspiring members of a would-be profession, they might be expected to steer their clients towards more socially

acceptable norms. However, the computer profession is not yet mature enough to have won the respect that allows its members to act in this way.

Of the adverse effects of a too-singleminded pursuit of efficiency, I have already mentioned shift working with special reference to Saturday working, and working in windowless rooms, noisy printers, pale flickering VDUS (Video Display Units), and boring data preparation. Clive Jenkins has said that the boredom of the clerical proletariat has been transferred to the boredom of the data preparation room.

Secondly, unlike scientific users, the status of clerical and lower managerial staff has not been enhanced by the use of computers. Their skill and experience has very often been devalued or scrapped, and they have become peripherals performing residual functions that are uneconomic to mechanise.

Thirdly, the pursuit of efficiency has led to the overcentralisation of authority, due to the misuse of arguments resting on economies of scale and scarcity of talent. The economic arguments are weak because they take no account of, or overlook, the effect of overcentralisation on the performance of the people affected, who respond to responsibility and respond adversely to being directed by rigid bureaucracy.

I believe that we need to explore the trade-off of cost/social benefit, as the current balance is far from being the best that could be achieved. Therefore, systems analysts should promote McGregor's Theory Y view of management (people like to be trusted) rather than Theory X (1), which suggests that people dislike work and have to be whipped.

We must educate our Masters. Top Management needs a new system of values which includes some social and human objectives. These values should be less exclusively financial, more socially aware and voluntary, or be enforced by the logic of events. System

design objectives should be set to take account of people's psychological needs. There should be a general acceptance that maximising the measurable does not guarantee an optimum solution. Economics is now overdominant because it provides a rather facile rationale for choice, but system design is not a technical problem with only one solution. There must also be active staff involvement in system design, instead of the "puppy-on-a-lead" situation as now.

2. Some Social Implications of Redundancy Deskilling

Opinions may vary about the effects of computers on employment, but hard statistics are hard to find and hard to believe when you do find them. Real or imagined threats to their skills and jobs do determine people's attitudes to computers. The ordinary man/woman is hostile to computers.

Most ordinary men and women fear change as a challenge to their security; they are inherently modest about their own ability to cope with new ways. Perhaps, as Churchill said of Attlee, they have plenty to be modest about.

In times like the present, the fear of being made redundant is a most potent factor. Computer Systems have been widely sold and advertised to reduce costs through increased labour productivity. Top management's productivity is the worker's unemployment. Of course, this is not true if production also rises at least as rapidly, but there are few business problems which could not be solved or postponed indefinitely by perpetual growth.

In my experience, staff exposed to the risk of computerisation worry greatly about how many redundancies there might be, and who, when and on what terms. Redundancy is a social as well as a personal problem, for those displaced, retire, remain unemployed or lapse into unskilled or service occupations and so contribute less of value to the economy. Those made redundant by the computing profession do not rise in that profession, but tend to descend on the scale of usefulness to society.

Redundancy poses major problems for unions and strongly colours their attitude to computer schemes. Computers are not unique in this, the same is felt about all technical innovations, as innovations are very rarely used to serve the workers' purpose. Much will depend on whether a union embraces computer, as well as clerical and managerial staff. Even computer staff cannot escape redundancy with, for example, the introduction of real time systems causing redundancy of data preparation slaves.

Some employers seem to have hoped to clip unions' wings by using computers to reduce the size of their large clerical armies; in other words, solving their problems by setting the value 'labour force' to zero, to eliminate labour problems. This is a mistake, however, as unions are well aware of this policy, and will become militant about the reduction of their clerical battalions.

As well as outright redundancy, computer schemes commonly shift the boundaries between different jobs and skills creating structural problems that trouble the affected staff and raise spectres of inter-union rivalry. Few situations could be more frustrating for an employer than to be helplessly entangled in an inter-union battle.

Stock remedies for redundancy are natural wastage and labour mobility. Natural wastage, or silent firing, is mere wishful thinking: it never occurs to the right people at the right time and place, or to the correct numbers or skills. In the U.K., labour mobility appeals to the planners but not to the men affected who may be very ready to move between employers but not to change craft or skills or move to a different part of the country. Both these stock answers to the problem of redundancy are much less relevant than their advocates are ready to admit.

More troublesome in the long term is that computer schemes tend to raise the educational requirement for secure employment, thus doing nothing to help those who always find themselves at the wrong end of every queue for jobs: namely, the ill-prepared, unskilled

young, maladjusted and black. We emphasise equality and tend to ignore the frequency distribution of Intelligence Quotient by designing systems and procedures that the lower deciles cannot hope to master. Perhaps the more intelligent should work to support the rest, but this is not a policy openly formulated. Its casual adoption could cause much social discomfort for it makes large assumptions about the inherent benevolence of the brainy.

The loss of a job is obvious and traumatic for the individual, but the loss of the opportunity to use a skill may be no less troublesome. Automatic methods generally lead to the separation of skills: in commercial work, the craft level of clerks is replaced by a few with the higher skills of system design, and the majority with the lower skills of machine operators. This creates a kind of energy gap or potential barrier that restricts a man's upward mobility and traps the unskilled in the lowest level.

Very often rigid systems take an instrumental view of man, and the majority of those who work them are schooled to operate as plug-in peripherals. This is a return to the Victorian attitude of workers being just 'hands' with no brains or personality to worry about. For such men and women, the trivial chores of clerical work have been replaced by the meaningless motions of wet-nursing the machine system. It is not surprising that they lose their sense of individuality and contribution, join unions and give rise to the novel phenomenon, for the United Kingdom, of white collar militancy.

Older men and women in particular can be severely shocked by having a lifetime's skill or experience made obsolete and devalued overnight by a machine. Skill and experience have both been hard won and have given the person self-respect and a clear sense of how he fitted into society. Not only general-purpose office workers but professional men and women also are threatened by instant clip-on skills, for example program packages, which seem to trivialise what they have been proud of and write down their past contribution to Society's well being.

Nor is it any consolation that their life-image of responsible high-level work is shattered by a youthful iconoclast of half their age and a quarter of their experience who has crammed their skill into a few hundred Cobol statements.

With craft-pride destroyed and self-respect undermined, the result can be a feeling of alienation from the job and from Society, for today a man's job still sets his status and defines his position among his friends and neighbours. Alienation spawns an unpleasing pair of twins: disillusioned apathy for the dispirited many, and sullen militancy for the resentful few. These unhelpful attitudes spread readily from economics to politics, although a Marxian would not distinguish between the two.

Unwanted leisure

A commonplace solution to loss of jobs is to share out the work among more people by having shorter weeks, longer holidays and earlier retirement. There is surely no law of God or economics that states that a man must work forty hours a week, fifty weeks a year for forty years. However this would pose the severe problem of leisure.

Everyone wants more leisure, time to do only what they want to do. However some have more time off than they know what to do with. These are most likely to be those who are least fitted by education to occupy their leisure. In fact, few of us are; for a formal education for the most part still concentrates on preparing us to earn a living, not to live.

Many people have a natural abhorrence to this time vacuum, to unfilled time which has to be 'killed'. They suffer from temporal agoraphobia when faced with a lengthy stretch of empty time. The result of enforced leisure is boredom and in the active young, alienation and aggression against a society which seems to have no need for them and no satisfactory part for them to play.

Salesmen know a vacuum when they see one. The microelectronic industry desperately needs a domestic mass market and, as we now have his and her pocket calculators in every room, we can expect the rise of a leisure industry, based on microelectronic games designed to distract us. It would be prudent for a cynical government to encourage this growth, as paradoxically it would make work, and also help to control and deflect alienation and aggression by converting us to plug-in compatibles on a national sedation network, for example cable television.

In the end, we may become conditioned to a completely electronic Walter Mitty existence of simulated living.

3. Trades Unions in a Fragile Society

I shall speak only of trade unions within the U.K. as I am not familiar with the trades' union scenes in Europe, USA, Africa or the USSR.

It is a plausible argument that some human aspects of system design would be better handled if the staff affected participated in the design. It would however be impractical for all to do so individually, and hence representatives would be needed. Obvious, but not inevitable candidates would be trade union representatives. It can be legitimately asked if the objectives of the trade unions would be socially superior to those of management, for trade union leaders are also partial. They are responsible only to their members, not to the workers generally, nor to the job, nor to society. They are seeking particular advantages for particular members of a particular union, and this needs to be remembered when TUC preachers climb into their pulpits.

Union consultation should be sought on objectives and broad strategy rather than technical minutiae. Consultation would present a problem to the trades unions because their traditional role has involved opposition not proposition, and resistance not initiative.

trade unions tend instinctively to see consultation as the right to oppose rather than an opportunity to propose and, not content only to be heard, expect to be heeded: in fact, they expect the harlot's privilege of power without responsibility. The realisation that power-sharing implies blame-sharing is causing some of them, at best, agonising reappraisals, at worst, producing unedifying wriggling.

When we speak of unions, we usually mean the leadership, as in practical terms only the leaders or local leaders can participate, for reference to the membership would be too slow. These leaders experience severe problems in these times of rapid technological change, as they must neither outpace nor lag behind their members, and this presents them with the difficult problem of educating their membership.

I have no doubt that there must be the earliest and fullest possible consultation before the design objectives and specification of the system are set, as later it is much more difficult to change. Three reasons, in descending order of altruism, are:

- (1) it is a basic human right;
- (2) good personnel management;
- (3) to avert future crises; that is, trouble if you don't!

It has to be accepted that consultation, simply by the nature of committees, will mean delay, but delay at the planning state is preferable to frustration later on.

Computer Staff unions are not special in that they demand protection of members' interests and Clive Jenkins has said unions are "in the business of redefining the concept of employers legitimate interests".

Issues which have been raised in regular Joint Consultative Committee meetings by computer trade unions include payscales, over-time rates, shift allowance, duty schedules, attendance times in relation to public transport, holidays, accommodation standards, manning standards, personal security, recruitment, training, promotion, careers development, senior appointments, job titles, discipline, use of outside staff, efficiency reviews, moves, redundancy, union

facilities, business plans and prospects, organisation, hardware, software, computer centre location, computer development plans, attitudes to sympathetic industrial action, and political action on such issues as apartheid. Any one of these issues could, at any time, erupt and imperil the smooth flow and timely completion of work and the views of staff and management rarely coincide at every point.

Although consultation is often considered a bothersome and tedious chore, and the discussions are often emotional and irrational, regular recognised consultation is essential.

There are two new factors of growing importance: white collar militancy resulting from the loss of status of clerical and lower managerial staffs; and the disruption of work for political objectives. This can be for economic reasons, as the blockade of French eggs by farmers in the South West; on ideological grounds, such as Apartheid; or a mixture of both, such as the trade's unions attitude towards the EEC, fostered both by anti-capitalist feelings and the fear of competition.

In all this, computer system operators or planners are liable to be innocent, helpless victims with no course of action open to them to redress the union's grievances. They can easily be caught in the crossfire between competing unions. For example, attitudes to shift work vary from union to union: Clive Jenkins of the Associated Society of Technical and Managerial Staff believes there is "no ideological objection" to shift working and no problem that cannot "be dissolved in a dilute but highly corrosive solution of sterling", whereas Mike Cooley of the Amalgamated Union of Engineering Workers feels strongly that shift working should not be allowed as it upsets men's lives to suit the needs of a mechanical monster - especially in areas where shift working has not been customary, for example, managerial and clerical work. A troublesome feature is that militants and zealots can rise to influence and power, because, as in all voluntary bodies, power gravitates

to the hands of those who want it enough to endure the bores and the chores of office. Thus leadership may not fairly represent the members involved, especially in the large national unions which span a variety of occupations, employers and locations. Such unions often have professional leaders separated by class, education, culture and ambition from the rank and file members.

This non-representativeness is of special significance. Tremendous economic and political leverage can be wielded by unions whose members include computer staff. As more and more large organisations depend completely on computing centres for accounting, records, manufacturing, distribution control they become very vulnerable to any disruption at computer centres, and prolonged industrial action would be a serious threat to the organisation's survival. When unionised, a very few people in computing positions can take industrial action (on behalf of others) and be supported indefinitely by the other 90% of workers. A composite union including computing staff has been dealt a particularly strong hand in the negotiating game. We are putting ourselves in the position of a very fragile society; providing a pressure point for those who wish to pressurise us.

Not to be unfair to the unions, there are other potential disturbers of computer systems - student anarchists, urban guerillas, citizen and consumer action groups, mischievous phreaks, disgruntled ex-employees, jokey systems analysts or programmers, criminals bent on fraud, theft or blackmail, national or industrial spies or saboteurs.

As industrial, commercial and governmental affairs become even more closely coupled by data-linked computer systems, so Society is becoming more highly strung, more vulnerable to pressure groups promoting the interests of minorities.

I am not predicting that this must happen, but merely pointing out that we are forging the instruments which make it possible; and what becomes possible tends to become probable.

The more complex the system, the more catastrophic the failure would be. The moral is to design systems as hierarchies of free-standing independent autonomous sub-systems. This happens anyway under the laissez-aller regime of free enterprise. Again, packet switching with multiple alternative routing is more immune to hostile acts than the more efficient but less flexible channel switching system.

The social problems of industrial action in a tight knit commercial industrial complex are severe enough within one nation, but with today's multinational corporations, we may see international trades unions tomorrow. A not inconsiderable item among other objectives of multinational operations is the freedom from political control by home and host governments. It is easy to foresee international conflicts arising when a multinational corporation acts against economic policies favoured by unions in one of "its" countries. It would be an interesting test of worker solidarity to see whether industrial action occurred on a multinational scale; if it did, it would cut off one escape route, namely the corporation's ability to move essential computer activities to foreign countries by using international data links. Perhaps international data links are already planned so that no one country is entirely at the mercy of its native work force.

To sum up, I have sought to direct your attention to three points.

1. We need to consider the effects of computer systems on those displaced by them, those who operate these systems, and those who are at the receiving end of their services. Refined and skillful cost benefit analyses in the pursuit of financial efficiency are not enough. Humanity is also important, and we need to have social and humane objectives as well.
2. We need to pay more heed to the possible effects of displacing workers, obsoleting their skills and trivialising their experience and past contribution: for these can erode a man's self-respect, and tip him out of his established position in society.

3. We must consider the vastly increased leverage which computers provide for any who may wish to disrupt our affairs in the pursuit of their special interests, be they economic, political or purely quirky.

Although none of these is a problem peculiar to computers, applying also to most technical innovations, I believe however that all those who study Computer Science ought to devote some thought to them.

Discussion

Professor Page started the discussion by asking Mr Laver if he could shed any rays of light on the problems. Mr Laver replied that he had no easy answer, and he thought that our only hope was to educate our masters, namely the Trades Union Congress and the Confederation of British Industry (TUC and the CBI). The TUC must be convinced that computers are not necessarily a threat to their members. Attempts should be made to convince the CBI to make computers more acceptable to workers. Mr Laver again emphasised that financial criteria are not enough in designing computer systems. Professor Page mentioned that this attitude was not peculiar to computers alone and cited the example of the asbestos industry installing dust control before legislation enforced it presumably for some overall financial advantage. In reply, Mr Laver commented that he could not envisage computer manufacturers advising their customers to ease off their use of a machine by, for example, discontinuing the practice of running three of four shifts to keep costs down.

Professor van der Sluis asked if perhaps the blame was being wrongly placed on the manufacturers of computers. He asked if perhaps, a central efficiency agency should not be guiding the use of computers in each country.

Mr Laver agreed that this was a good point, as manufacturers of revolvers were not expected to tell their customers not to shoot people. He suggested that the most appropriate body would be the

British Computer Society which was trying to introduce professional standards. A member of a profession has a duty to lead his client into a more socially acceptable role. Mr Laver also concurred with Professor van der Sluis that there should be more discussion at, for example, university conferences and seminars of the social problems caused by computers.

Professor Griffiths suggested that, as an analogy to health warnings on cigarette packets, each reel of computer tape should state that computers are harmful to society.

Miss Barraclough thought that perhaps computers should not be used to attempt 100% of the job, leaving no loose ends. Instead, computers should only be employed for 90% of the work and the interesting and skillful 10% should be left to clerks. Mr Laver agreed but wondered what would motivate top management to do this. He reiterated that he, too, believed in McGregor's Theory Y, rather than in Theory X: people respond to being trusted rather than having to be driven by dog whips and even then, making mistakes if possible.

Dr Holt suggested that it was a bad myth that tools were neutral and hypothesised that computers, as powerful tools, demanded problems and that design factors thus had very profound implications.

Mr Laver said this had been mentioned by John Culkin who suggested that first we shape our tools, then they shape us.

Professor Page wound up the discussion by suggesting that perhaps research students should be asked to seek the solutions to these problems.

Computation and Democracy

In my earlier lecture I touched very sketchily on three groups of problems which I believe computers and communications systems may pose in the area of employment. Further to that, I would like to make two brief points as post dicta. Firstly, that for once we have a genuine case of synergy on our hands, because computers and telecommunications are a much more potent implement than either separately, and more powerful social force than the mere sum of the two. Secondly, because I focused, as I shall today, on the problems of the unpleasing side effects of computers and telecommunications, you should not assume that I see no benefits; because I am thoroughly convinced that there are enormous benefits available if only we have the wit to seize them and the wisdom to guide their humane application.

Today I would like to touch in a similarly tentative fashion, on three problems that interconnected computer networks could pose for democracy. I shall not attempt to define democracy except ostensibly; by pointing in the general direction of the systems of representative governments in European and American countries, on one of their better days. The first of the problems between computer networks and democracy is:

1. Access to Information

Democracy assumes participation by electors in the governing process; and for this to be effective it implies:-

- 1) The free availability of information.
- 2) The ability to draw sound conclusions from this information.
- 3) The power to have these conclusions heeded or at least heard.

To deal firstly with the availability of information. As more and more information comes to be circulated within and between interconnected computer systems so it becomes less accessible to the ordinary man and woman. Ironically, the measures which may be taken to protect his or her privacy may also prevent him from knowing what he needs to know to act responsibly. This forms an inescapable

dilemma, whence escape demands a great deal of good sense, even more of good faith, on both sides.

Next, on the ability to draw sound conclusions from the information available. Even if the ordinary voter were given access to the basic entries in the governments files and databanks, he would face formidable obstacles in using the data. This is because facts never speak for themselves, they speak only through interpreters: brute facts are dumb brutes. Very few voters indeed, have been equipped with the adequate analytical skills in the ordinary course of their education, and those that have been, for example computer scientists, can scarcely claim any superior moral or political worth to draw the necessary conclusions. To repeat my point, a fact is not just a bare fact - it is always clothed decently in a concept, tailored for some purpose, as it was conceived when its collection was begun, and this purpose inevitably sifts and sorts the facts collected, and colours them. Facts in the social or political arena usually tell you more about the interests of their collectors, than about the state of the 'real world'.

It is as true for economics and politics as it is for science that a fact, especially a numerical fact which derives from a measurement, expresses a fossilised hypothesis. So it is risky to use them for any other purpose than that for which they are collected. For example, productivity which was devised by economists as a convenient index to measure the progress of a business is now used by trade unionists when they negotiate new wage rises, as if it has some kind of social merit or worth. As if, because industry has increased capital investment and hence output had risen, the workers automatically deserved higher wages.

The facts in government's databanks and files will therefore have been processed to suit its needs or beliefs, and hence it is rarely possible for anyone else to unscramble the omelette, recover the eggs, and cook another dish of their own devising. This has always been one of the problems at the change of administrations, because almost

inevitably this is what is desired. It has not been done with any sinister intent but in mankind's naive belief that we had reached an adequate understanding and evolved the best method of analysis.

I can see a possible danger here in the growing use of mini-computers in intelligent terminals and data concentrators in networks, in that data are thereby automatically and irretrievably cooked in the very act and instant of their collection - and one particular, pre-programmed interpretation is imposed upon them. They will tend to force an interpretation upon these data which we cannot reverse. It is a fearfully heavy responsibility, not to mention a grave temptation, for those who program these mini-computers. Let me now make a biological comparison with visual data. This is heavily preprocessed in the retina and sent via the optic nerve to the brain. The preprocessing was arranged by some benevolent economist (celestial) to relieve the load on the optic nerve, but it exposes us to the risk of an optical illusion in unusual circumstances. These could be the situations when it could be especially important to be right.

This fearful responsibility on those who write programs opens up all sorts of possibilities for a little bit of "sly fiddling". Computer technology could thus widen the gap between an information-rich government and its information-poor population, and will so shift the balance of power even more towards central government. There is no real possibility of an effective, independent, non-governmental network, as this would be too costly in both cash and talents, and for the reasons mentioned earlier would not collect the same facts, as it would start from a different base. There would be a total non-dialogue between the systems.

The development of international data links and the growth of multinational corporations raises the possibilities that commercial and economic data may be stored outside its home country. The reasons for this may be entirely innocent: - economic system design, the location of skills and so forth, but it opens up possibilities

of withholding or concealing the data from the home government, or, indeed, from others who fancy they have the right to know it. Shall we see the data equivalent of numbered accounts in Swiss banks or computer centres flying flags of convenience in foreign countries? Shall we need laws forbidding the export of certain kinds of data, as Sweden already has? This would provide an interesting enforcement problem. Shall we need extradition treaties for data?

Multinational corporations are not the only bodies who will use the information-engineering system to help them to organise and associate irrespective of distance. Should the cost of computers or communications fall, relatively, could we see communities of interest developing between people sharing similar ideas and enthusiasms, but living in different countries.

Computers and privacy have been endlessly discussed and I do not propose to make more than two brief comments. Firstly, that those whose privacy is most likely to be invaded by the state are those who need its help - they are more concerned about having everything recorded so that they will receive the benefits they are entitled to, than they are worried about privacy. Many of the people who get so excited are the self-aware, self-sufficient, articulate members of the intellectual middle class who expect nothing of the state except taxes, and wish for nothing but to be left alone. Considering it democratically, I very much doubt if they are typical of the majority.

My second comment on privacy is to say that I can see no way of avoiding the problems except by some form of public regulation and inspection of data banks, whether private or governmental. But I would hate to be a government inspector faced with visiting some large on-line computer centre which was only part of an information system and not the whole of it, the rest being dispersed either nationally or internationally, and having to certify, on oath, that it was doing what, exactly what, and only what, it had been authorised

to do. It would be very easy to legislate, but very difficult to carry it out. Any one of us, here today, could think of half a dozen ways of building software or hardware gadgets to detect and deflect the inquisitor from what we wished to hide.

2. Electronics and Electioneering

I use 'electioneering' as a shorthand term for the 'democratic decision making process' as I could not resist the rhythmic alliteration of electronics and electioneers. It is also less like a piece of jargon from one of those social sciences that seem to confuse the conferring of labels with the acquiring of insight.

It is arguable, in fact it has been argued, that Parliament was set up as a central decision making system in a time of slow communications, whereas today's instant electronic links plus central processor analysis would allow all citizens to vote on all issues before government and so get an unbiased sense of majority opinion - an instant electronic referendum. This is, for enthusiastic advocates, seen as the rediscovery of the purest form of Athenian democracy. The relevance of the purity of Athenian democracy aside, this is a proposition we may take leave to doubt. Certainly we can agree that the technical means now exist to set up a national network to conduct electronic referenda at the drop of a hat and provide the answers before the hat reaches the ground. However the concept is wrong, and the proposers appear to confuse the mechanisms of democracy with its ethos - its essence is not found in the operational mechanics of voting systems that determine the will of the majority, but in the respect of that majority for the rights of the minority and of individuals (as each of us is a minority of one). Shortening the decision time does nothing helpful to reduce possible errors in information collection, or in judgement, and it eliminates the principal function of Parliament. Parliament comes from the verb to speak and not from the verb to vote.

Another substantial political consequence of instant referenda would be a change, for the United Kingdom, from party-dominated to issue-dominated politics cutting across party lines; for example, the recent party splits over Britain's presence in the European Economic Community would be common. I am not making any judgement about merit, I am just pointing out that it would be different. It also poses the question as to whether this would make Britain more, or less, ungovernable.

Parliamentary democracy rests on two assumptions, firstly that men and women have enough sound commonsense to understand complex issues, and secondly that voting in a national assembly is an appropriate way to determine and control these matters. However, some issues are too complex even for full-time professional legislators and, if put to a referendum would have to be butchered into deceptive simplicity, to make them susceptible to public choice. Even then, the mass persuasion industry, exploited by interested groups or by plausible demagogues, could sway the vote in an irrational or irresponsible fashion.

Very few ordinary men and women have the capacity, or the inclination to devote enough of their spare time to political questions, to reach reasoned conclusions - though it would solve the leisure problem I talked about in my earlier lecture! The result, therefore, of instant referenda would be push button populism rather than an electronic democracy.

Anyone who doubts my point may care to read "The Great Computer: A Vision" by Olof Johannesson, (2) which wittily and perceptively illuminates the problems of compulsory electronic referenda on all issues in his complete freedom democracy, in which all citizens are made Members of Parliament and have a compulsory vote on every issue.

Instant electronic referenda are not the only example of interaction with computers in the democratic process. Another use is to analyse opinion polls. Of course this could be done without computers,

but the speed of computer analysis keeps up a feverish pace and helps titillate the public. Moreover, the use of expensive computers in combination with eminent statisticians suggests that any results are valuable and important, and we know that they are neither. Political commentators have seen two problems arising out of the use of opinion polls. The first being the feed-forward effect from polls results, people like to vote the way of the majority - jumping on the bandwagon. Working against this are the lazy voters who, once they see that their favoured party is in the lead, stay at home. I, myself doubt if either has much effect as they will tend to cancel each other out, and for the average man or woman the public image of computers is as likely to lead them to discount the poll results if they differ from their own views. (Punch, however, doubts if there is more than one average woman in fifty.)

The second problem is more troublesome, and is that polls can be used to construct political programmes which have been researched to have the maximum electoral appeal. At first glance this, like electronic referenda, may seem the ultimate in democracy. Reflection, however, suggests it would rather rapidly degenerate to a slick sales exercise resulting in foil wrapped, oven-ready packages of popular prejudices rather than well considered political programmes.

To conclude, then, I do not see computers or other electronic aids adding anything of real value to the political scene, and as true democrats we will need to watch all such proposals with wary scepticism.

3. The Effect of the Systems Approach on Decision Making in Politics

I will touch here on the possible effect on the democratic process of the growing use of the systems approach to decision making in the political arena through the use of computer-propelled economic models.

Here also, the effects are those of modelling rather than of computers, but without the speed, storage, scale or complexity of the

computers the models would be of an entirely different order. The point I want to make derives from the complexity which the use of computers makes possible. Model builders face great practical difficulty in choosing the degree of complexity to go to. If they keep it simple it may become too crude to be useful for prediction, but on the other hand it may give deep insights into the relationships which too much precision may obscure. I wonder if Boyle would have discovered his law if he had all the precise gauges available today for measurement? Sometimes a general impression is useful to give a deeper insight. However, complexity in the model is no guarantee of clarity in the thinking. The added detail may be misconceived and even the most elaborate model will omit a great deal; and if we are unlucky we may find later that in modelling the body politic we have included the eyelashes but left out the liver. Because we have employed eminent economists and costly computers it is tempting to believe, however naively that this would not have been done unless the data was accurate (not merely precise), the methods adequate and the results relevant. This does not follow automatically, for when the spell wears off, we may find that economic data is far from being accurate, and that economic analysis does not represent an objective account of reality. If you doubt the point about the distinction between precision and accuracy read, 'On the Accuracy of Economic Observations' Oskar Morgenstern (3).

Life is never linear nor zero sum; subsystems are never independent, only sufficiently so for some particular purpose and that implies a judgement. We have no choice but to simplify to make analysis possible, but in doing so let us not mistake our methodology for metaphysics. For it may be convenient and necessary to assume some feature of the world behaves as if 'X' were true; but we should not delude ourselves or others that it really is so, else we may be tempted to oppress those who disagree with us.

Computers then, allow us to put in more variables and relations than we can easily comprehend. My own view is that it is probably safer to lash about rather freely with Occam's razor, provided that

we do not forget Whitehead's dictum 'to seek simplicity and distrust it'.

Computer-driven models have always been too complex for the average man to understand. Hence their use by governments will raise methods of reaching policy decisions to entirely new heights of mystification - causing a rise from the merely uncomprehended to the incomprehensible. This will exacerbate the ordinary man's feelings of alienation from the decision process - he already feels excluded with consultation only once every three to five years, but a total lack of understanding could cause apathy and alienation. This could lend support to influencing decisions in more direct ways such as demonstrations, voting with the feet rather than the head. The result under a weak government would be mob rule, ochlocracy - an ugly word for an ugly thing.

Excessive reliance on computer modelling as a tool of government could become anti-democratic, as it is inevitably expensive and likely to lie within the grasp only of governments and similar large organisations, so the locus of political power and decision making could thus move further towards them and away from individuals, and so away from democracy and towards a 'corporate state'. This trend is assisted by the use of the same data and techniques by business and government, so blurring the boundaries between them, in a homogeneous managerial state, where electors are treated as consumers of government services as well as of industries' goods. This may not be bad, but it raises political problems.

I have been dilating on modelling, but they are only one example of experts at work. President Pompidou listed three ways for a politician to ruin his career; women, gambling and trusting experts. Of these he said the first was the most pleasant, the second the most speedy, but the third the most certain.

However in today's complex situations politicians may have the authority to act and may see a goal which they are trying to act towards, but they remain helpless until an expert systems man has

analysed and presented the alternatives and consequences, for only thus can we hope to detect and exploit the rationale behind the shifting flux of phenomena. Political power could thus move even more towards an expert bureaucracy, which will tend to be authoritarian in character because it must protect itself against those who wish to criticise it, including those nominally holding the reins of power.

However, a skilful minister will use his experts, and not be used by them for example to crush opponents, to find good reasons for bad policies, and so forth, as many convenient things can be done by a group of prestigious experts, recruited for the purpose, whose privileged access to government information gives them at least a time advantage over any opposition.

One group of experts who are of special interest to us is the systems analysts and programmers whose work underpins the whole of government's day to day administration. Only this very small group really understands in detail - and it is the detail which counts - precisely what its systems and programs actually do. Only they know what data has been collected, how it has been filtered and on what bases and assumptions it has been tested, evaluated, processed and presented. This potentially constitutes a dangerously powerful elite. Fortunately, so far they are a reasonably diverse group of relatively modest men and women without political ambitions for power is a temptation and as Lord Acton noted 'Power tends to corrupt' (4). But, they are becoming a powerful elite regardless of whether they want to use their power or not.

Elitism implies an oligarchy, but in England we do not mind that as we are lazy politically; for as long as central government remains benevolent, the average Englishman will be content. For the most part the English are not interested in politics. We tend to treat politics like drains in this country, we are quite content for them to stay underground and out of sight, as long as they do not begin to smell. We hope only for peace, prosperity, low taxes and to be left alone. We will cheerfully leave the chores and bores of office to the

politically active minority. This is not necessarily undemocratic, and I am not criticising it, as long as we define democracy as government in the interests of the people, and not by the people.

However, it is not very likely that people would welcome a central government run by self-confessed experts, for public opinion reveals a deep distrust for experts, especially computer experts, who are seen as dessicated calculators intent on maximising the quantititative while ignoring the qualitative.

IV Conclusion

You may be inclined to say that I have been quick enough to diagnose, but not to suggest any therapy. I have no panacea to propose, no coherent program, but perhaps I could mention a few isolated points that I should like to be deposited in the heads of the educated individuals that go through Computer Science courses. They are not in any coherent order.

- 1) Computer Science courses should pay more attention to the problems of commercial data processing, including governmental. It is academic arrogance to see these problems as trivial; they are far from it. If one looks at comparative numbers of computers, and people using them and affected by them, we should be quite clear which is the tip and which is the iceberg.
- 2) We need to take account of the human factors in system design, and to remember the people affected are human beings. They should be consulted in the setting up of design objectives.
- 3) Systems analysis and design is not simply a technical problem with one single algorithmic solution. There is never only one solution, or a best solution. The graph of 'bestness' is a very flat distribution, which is good, else it would be a major problem in administration. It is important to emphasise that no technological necessity constrains us to develop one form of business or political organisation rather than any other. Information systems can be equally well designed and used to support rigid centralised bureau-

cracy as a decentralised co-ordinated autonomy - or a fluid mixture. There is no need to make either/or decisions, as this is not a binary problem.

- 4) We should teach the implications of information-engineering systems in terms of their current potential, theoretical limitations and practical constraints on design trends.
- 5) Courses should discuss the implications of linked computer systems for privacy and security, and what precautions are necessary and practical.
- 6) The influence of the single chip circuit, its potential for distributed processing of data in networks, the risks of subliminal pre-processing of factual data. Also the future role in domestic systems for home information and home entertainment growing out of telephone and television services.
- 7) To evaluate the importance and effects of tightening the integration of communication and computer systems for commerce, government and individuals; this is the major invention of this century, it is more important than nuclear energy, as it effects mans' thinking; it does not just offer to blow him up.
- 8) We should look at the implications of data sharing and systems interconnection by business and government as promoting the managerial state. I do not feel this is necessarily so, but it is worth discussing. Also the increasing vulnerability of our highly strung society to disruption by dissatisfied and militant minorities.
- 9) Discuss the relevance and accuracy of economic data and models.
- 10) Develop discussions between computer science, economics and political science departments. To take responsibility of informing Trade Unions.

I may have occasionally sounded gloomy but, with Chesterton, I do not believe in a fate that falls on men however they act but in one that falls on them unless they act.

Discussion

Professor Page opened the discussion pointing out that for many years we have had the practice of auditing accounts. The auditor has performed a standard set of checks which were imperfect but after each flagrant fraud they were improved. Could we not have the same situation for databanks; some standard checks could be easily carried out now and more subtle ones would emerge later.

Mr Laver replied that it would only be practical to carry out the most elementary checks, and that virtually the only method would be to catch some one red-handed. We should not seek for perfection just a quantified insurance type risk, which would be similar to safe makers, who do not claim no one can break into their equipment, but see that the best equipment would take three hours to open it, so it should be patrolled every hour. There is no way to test how any one centre is being used. It is not practical to put in a probe, say by trying some test data to find out what happens for it is very easy to have by-passes. Dr A.W. Holt thanked

Mr Laver for the lecture, even if he did not agree with every word. Every politician and demagogue knows that the power to pose questions is a great political power, which determines what issues are to be discussed, never mind how they are to be resolved. Television, let alone computers, has greatly shifted the balance of power, as it is now in only a few people's hands to decide which questions are to be considered by people at any one time. Dr Holt was pessimistic about the topic of the lecture and could see no solution until better tools are available, and a conscientious effort is made to relate these questions to the world situation. Dr Hamming also congratulated Mr Laver on his lecture but wanted to emphasise the time effects on data. He used the example of reducing the legal consequences of suicide; when this occurs doctors will report many more cases as suicides. This makes it very difficult to have reliable time series. He supported the excellence of Morgenstern's book. Mr Laver agreed with this point and said this was what he had meant earlier in the

lecture by the definition of a fact. Professor Randell mentioned another book 'Computers, Communications and Society' (5).

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