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INFORMATION SOCIETY PROJECT.
PHASE II.

PAPER NO. I-9

PUBLIC ACCEPTANCE OF THE
NEW INFORMATION TECHNOLOGIES:
THE ROLE OF ATTITUDES.

W.LAMBERT (SCOT) GARDINER, Ph.D*
Research Associate
GAMMA. (Université de Montréal/
McGill University)
Suite 210
3535 Queen Mary Road
Montreal H3V 1H8

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*Scot Gardiner holds a Ph.D in psychology from Cornell University and is the author of three text-books. A former professor of psychology at Concordia University, Dr. Gardiner is now a Research Associate at GAMMA. His current specialization is in the problems of the person/machine interface.



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W.LAMBERT (SCOT) / GARDINER, Ph.D*
Research Associate

GAMMA. (Université de Montréal/
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3535 Queen Mary Road

Montreal H3V 1H8

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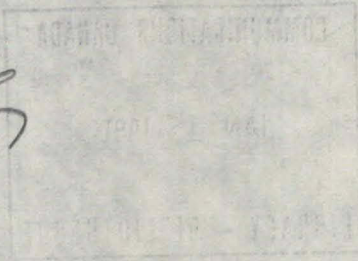
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GAMMA INFORMATION SOCIETY PROJECT:

PAPERS AND REPORTS

- PAPER 1: The Micro-Economics of Information. Structural and Regulatory Aspects. (J.Bernstein). GAMMA: 1979.
- PAPER 2: Macro-Economie de la Société Informatisée. (R.J.Bernadat) GAMMA:1979.
- PAPER 3: La Poussée Technologique et les coûts unitaires décroissants en télématique. (J.Louis Houle). GAMMA:1979.
- PAPER 4: Public Policy and the Canadian Information Society. (P.S.Sindell) GAMMA:1979.
- PAPER 5: Social Implications of the Information Economy. (E.I.Fitzpatrick-Martin). GAMMA: 1979.
- PAPER 6: Research and Development in the Information Sector of the Canadian Economy. (R.Wills). GAMMA:1979.
- PAPER 7: The Information Society: The Issue and the Choices. (K.Valaskakis). Integrating Report on Phase I. GAMMA:1979.
- PAPER 8: Tele-Informatics, Productivity and Employment: An Economic Interpretation. (Y.Rabeau) GAMMA: April 1980.
- PAPER 9: Public Acceptance of the New Information Technologies: The Role of Attitudes. (W.L.Gardiner). GAMMA:April 1980.
- PAPER 10: Industrial Strategy and the Information Economy: Toward a Game Plan for Canada. (K.Valaskakis, P.S.Sindell). GAMMA:April 1980.



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PREFACE

Dr. Gardiner's paper on public acceptance and rejection of the new information technology is a background study relevant to all the other papers in the GAMMA Information Society Project. This project was initiated in 1978 to examine the socio-economic implications of the new information technologies (i.e. principally computer and telecommunication hardware and software). A first phase was completed in April 1979 which identified three major scenarios describing the coming information age. The Télématique scenario (from the French for telecommunications-informatics or what is sometimes called "compunication"), implies complete adoption of the new technologies, and the maximum interconnection of computers and telecommunications in a national "central electronic highway". The second scenario is "Privatique" (i.e. Private informatics to use the word coined by Bruno Lussato in France) where stand-alone computers predominate without interconnection. Privatique is a high-technology decentralized Information Society while telematique is a high-technology and a highly-centralized option. The third option identified in Phase I of our study was termed the Rejection scenarios*. It raised the possibility that the new information age would induce resistance and rejection symptoms and end up using low and intermediate information technologies instead of the most advanced hardware and software.

*For details see K. Valaskakis, The Information Society: The Issue and the Choices. (Integrating report of Phase I). GAMMA: 1979.



Dr. Gardiner's paper is a first exploration of this possibility. In this initial report on the subject he focusses on attitudes since these underline and explain behaviour.

The thrust of his argument is that the public at large, including both private producers and consumers may legitimately reject a great part of the new technology. Quoting McLuhan, he claims that the eighties might witness a public backlash where 'runaway technology' will be treated with the same apprehension as runaway inflation. Drawing on various psychological studies, Dr. Gardiner identifies ten reasons for technology-rejection each of which is the subject of individual sections in his paper.

The policy-recommendations made by the author are listed in Section 3 of the paper and fall into two categories. First, more fundamental empirical research is required to analyze and test each of the causes for resistance or rejection. Second, various policy options to deal with the problem are mentioned and could also be part of the next research stage.

The importance of the issues raised in this paper should not be underestimated. The hypothesis of a major change in the mode of production and consumption, implicit in many of the analyses of the information revolution, including our own, rests on the assumption of public acceptance of these new technologies. If, on the contrary, this is not entirely the case, important constraints may develop both in connection with the optimum industrial strategy for Canada in the face of the information revolution and the question of social costs and benefits of the emerging Information



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Society. These two dimensions i.e. industrial strategy and social costs and benefits are in fact, the two leading foci of GAMMA's current effort in this field.

The conclusions and recommendations of Dr. Gardiner's study are incorporated in Paper I-10 in this series entitled: Industrial Strategy and the Information Economy: Towards a Game Plan for Canada. (K.Valaskakis and P.S.Sindell to be available in May 1980).

*K.Valaskakis,
Director.*



1 INTRODUCTION

The makers of public policy tend, understandably, to consult experts on institutions (sociologists, economists, political scientists), since such experts help clarify the "big picture" within which they must act. However, our various social, economic and political institutions are (or, should be?) simply tools for the satisfaction of the needs of individuals. Enlightened public policy, therefore, requires some understanding of the impact of that policy not only on our institutions but on the individuals who are served by those institutions. If the evolving information society is to be a humane society, then the technologies which characterize this society must be used to liberate rather than to oppress the individual.

Another reason for focussing on individuals as well as on institutions is that the rejection or acceptance of technological innovations ultimately depends on their rejection or acceptance by individuals rather than by institutions. This applies in the case when the consumer appears to be an institution (e.g. when an individual in the role of purchasing agent buys X Telidon/Vista terminals on behalf of a company or another individual in the role of secretary in this company uses this terminal) as well as in the case in which the consumer is obviously an individual (e.g. a householder buys the terminal for the home).



If we assume that the emerging information society is an inevitable and positive development, then a coherent industrial strategy is crucial. An important element of this strategy is an understanding of attitudes to technological innovations, since the information society depends on the acceptance by individuals of the technological devices which characterize it. Concertation of federal and provincial governments, of departments within each government, of government and industry, of labor and management, of company A and company B, of departments within each company to supply those devices is futile if there is no demand for them (a).

The behavior of rejecting or accepting a technological innovation is determined by the attitudes to it. Other things being equal, a person with a negative attitude will tend to reject it and a person with a positive attitude will tend to accept it. If behavior is determined by attitude, then behavior can be predicted from attitude and behavior can be changed by changing attitude. In a democratic society, people must be convinced rather than coerced to accept a technological innovation. Assuming technology helps rather than hinders, it is important, therefore, to be informed about attitudes to technology, in order not only to predict acceptance or rejection of technological innovations but to encourage positive attitudes to increase the acceptance and discourage negative attitudes to decrease the rejection.



2 CONCERNS ABOUT TECHNOLOGY

Marshall McLuhan predicts a backlash in the 80s from future-shocked consumers trying to curb runaway technology (12). Rather than dismissing those who reject technological innovations as "latter-day Luddites", we should seriously consider the bases of this rejection in order to discover how negative attitudes can be changed. There is appropriate anti- technology too.

In this section, ten sound bases for a negative attitude to technology, each of which could contribute to its rejection, are presented (b). Each is represented by a statement of a legitimate concern, followed by a key word which encapsulates that concern. In some cases, a corresponding positive attitude, which could contribute to its acceptance, is also presented.

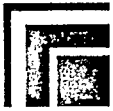


2.1 The technology may replace me (OBSCOLESCENCE)

The information-processing devices which characterize the information society will indeed, like the energy-consuming devices which characterize the industrial society, deprive many people of their jobs. Obsolescence in the information society is however qualitatively different from obsolescence in the industrial society (c).

One way to clarify this difference is to consider these tools as extensions of the human nervous system (4). Since the nervous system consists of sensory neurons (to receive stimuli), motor neurons (to initiate responses), and internuncial neurons (to mediate between sensory and motor neurons or, in more familiar terms, to think), tools may be classified as sensory, motor, and reflective tools. Motor, sensory, and reflective tools are extensions, respectively, of motor, sensory, and internuncial neurons. Energy-consuming devices are sensory or motor tools but information-processing devices are reflective tools as well.

Sensory tools (e.g. television cameras which replace security guards in the surveillance of buildings) and motor tools (e.g. bulldozers which replace laborers) threaten blue-collar workers, but reflective tools (e.g. accounting computers which replace clerks) threaten white-collar workers. As those inform-



ation-processing devices get more and more "intelligent", more and more sophisticated jobs become vulnerable to replacement by machines.

Information technologies further threaten a more profound form of obsolescence than simply replacing more sophisticated workers. Some people fear that they will be replaced not just as a worker but in other roles. The golf widow of yesterday could be replaced by the chess widow of tomorrow, as her husband plays more and more with Igor, his electronic chess partner, and less and less with her. As a more serious example, references to the television set as the "little square schoolhouse" and as the "third parent" imply that it can take over some of the functions of the school and the home.

A history of science and technology could be written in terms of progressive challenges to our human self-concept (14). Copernicus plucked us from the center of the universe and placed us on a broken-off fragment of one of a myriad stars, Darwin plucked us from our exclusive niche as the Divine creation and put us where we belong with the other animals, Freud taught us that we are not even rational animals - and now, a final insult to our dignity, we are told that we can be replaced by machines.

A more positive attitude with respect to the impact of



information-processing devices on jobs is to consider that new technologies while destroying some jobs tend to create other more challenging jobs. Just as the internal combustion engine made the hansom cab driver obsolete but provided jobs for people manufacturing, maintaining, selling and servicing cars, so the computer makes many assembly line jobs obsolete but creates more challenging jobs. There is, for example, a great current demand for people who can do the creative job of programming (3).

People are required not only to work with the machines but to work with the person-machine interface. Many traditional jobs can be upgraded when seen in the light of mediation between sophisticated information-processing devices and people dealing with a complex information society - librarians become mediators between electronic data terminals and researchers, secretaries become mediators between word processors and executives, and writers find a new role as Master of Ceremonies introducing each machine to its potential audience as it enters the electronic stage.

The person-machine interface offers not only upgraded old jobs but many new jobs. A number of new disciplines, which have been called collectively the "interaction sciences", are evolving (7). They include cybernetics, bionics, human engineering, intelectronics, and robotics. Each of those sciences within its



own sphere is struggling with the difficult issue of the appropriate synergistic relationship between the person and the machine.

This positive scenario is no consolation, of course, to someone who has lost a job but is not qualified for one of the more challenging jobs which replace it. It is important, therefore, to upgrade skills as well as jobs. Retraining programmes are necessary to prepare people for the new jobs.

A more positive attitude with respect to the impact of information-processing devices on our self-concept is to consider that machines can, by definition, only do mechanical things. Therefore anyone who could be replaced by a machine should be replaced by a machine. Let the machines do the mechanical things and thereby set us free to do the human things. The shift from considering machines as labor-saving devices to considering them as labor-replacing devices is a fine example of our great capacity to turn solutions into problems. Machines have saved many of us from drudgery and are now accused of stealing our jobs.

This attitude requires a fundamental shift in our economic strategy. It should not be directed toward full employment but to the generation of wealth. This wealth if well distributed can free many of us from doing mechanical things (like making mach-



inelike motions to earn money to look after mundane maintenance matters to live) and enable us to do human things (20).

The difficult question of what is essentially human may be illuminated by considering contractual and intimate relationships. The distinction between contractual relationships (e.g. with your grocer in which both you and he could be replaced by anyone else who can perform the same function) and intimate relationships (e.g. with your spouse who can not be replaced with anyone else) may be useful in considering when it is appropriate to replace people with machines. As long as the machine fulfils the conditions of the contract, it is okay to substitute it for the person. However, in the case of intimate relationships, the person can not be replaced by another person, far less a machine.

A strict application of this criterion could have saved us much misery, for example, caused by the misguided attempt to replace parents by machines. The relationship between a parent and a child is an intimate relationship - indeed, the primary intimate relationship. In his Magical Child, Pearce documents the fact that our attempts to replace biological functions by cultural devices in child-rearing have all, in the long run, been disastrous. Boris Sidis force-feeding his son through Harvard at 15 (13) and B. F. Skinner raising his daughters in a Skinner box are extreme caricatures which help illustrate our tendency to



replace the inside-out biological process of growing with the outside-in cultural process of learning.

In his famous studies of love in infant monkeys, Harry Harlow demonstrated the need for adult care in our close cousin, the Rhesus monkey (6). Monkeys raised on wire surrogate mothers with bottles attached become neurotic, spending most of their time huddled in the corner of their cage. He assumed that what was lacking was "contact comfort" and offered another group of infants a terry-cloth mother which supplied contact comfort and a wire mother which supplied milk. They spent significantly more time with the cloth mother than with the wire mother. Contact comfort is thus very important. However, contact comfort is not enough. Monkeys raised by cloth mothers appeared normal but, when they grew up, they turned out to be poor lovers - the males were impotent and the females were frigid. The few females who conceived were poor mothers. Real mothers can not yet be replaced.

Indeed, they can never be replaced. Intimate relationships depend on empathy which depends in turn on an awareness, whether conscious or unconscious, of another person on the same planet in essentially the same predicament. Machines, by definition, can never cross this empathy barrier. The caring relationship established between parent and child is the basis of the caring relat-



ionship between that child and a mate when they grow up. The current divorce rate is a reflection of our neglect of this fact and our misguided attempt to do in intimate relationships what is possible only in contractual relationships.

This positive scenario in which people shift more and more from mechanical to human activities by allowing mechanical slaves to look after the mundane maintenance matters as much as possible requires not just retraining for more sophisticated jobs, as argued above, but retraining for leisure. The sad statistics on people being so inept in amusing themselves that they commit suicide on Sunday, the day of rest, and of people being so defined by their jobs that they die of rolelessness soon after retirement attest to our need to learn not so much how to work as how to play. It also depends on a recognition of the fundamental importance of child-bearing and rearing and a tolerance of people who choose to "neglect" mechanical activities in favor of human activities. Whereas in contractual relationships, we may be made obsolete to our dismay by machines, in intimate relationships, we plan our own obsolescence. That is, the basic task of a parent (as of a teacher and a therapist and other intimate roles) is to arrange that we are no longer necessary.



2.2 The technology may be used to exploit me (EXPLOITATION)

Information-processing technologies, like all technologies, have the potential of being used by one individual or institution to exploit another. Control of information has always played a part in exploitation of people whether by religious, political, or economic institutions. The Roman Catholic Church held power in the Middle Ages partly through its control of information. Bibles were read by priests to parishioners in Latin. The nailing of the theses to the church door by Martin Luther was a significant symbolic act because they were written in the vernacular language and the power-through-monopoly-of-knowledge was broken.

The danger of an information monopoly looms again (d). Most on-line databases are "based" on hard copy. However, retrieval is so much more efficient on-line that, in many cases, the intermediate step of making the information available as hard copy is being eliminated and the information is available only on-line (8). This information is essentially classified. It is not marked "top secret"; it is marked "very expensive". That is, it is available only to those who have access to an electronic data terminal, which is very expensive to rent and to use.



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Those databases are owned by multinational corporations (e.g. Lockheed with their Dialog search service and Systems Development Corporation with their Orbit IV search service). Those corporations have moved into the "knowledge industry" seeking profits and the pricing system is beginning to reflect this economic orientation. Since information is a commodity, then information for which there is not a big market (e.g. information sought only by a few specialist scholars at the frontiers of research) is very expensive. There is a danger that the university may be reduced to a supplier of databases to the corporation and the free exchange of information within the academic world be subverted by the buying and selling of information within the economic world.

Since new information will be the fresh life-blood of the information society, it is essential that the research tradition is kept alive and well. Just as any scholar can walk into a library and pore over the Psychological Abstracts at no expense other than time, so any scholar must in future be able to browse in the System Development Corporation's Orbit IV Psychab database, if that becomes the only source of this information. If not, any new information generated by research will be controlled by the rich and powerful and, as history teaches us, used to exploit the poor and powerless.



2.3 The technology may be used to invade my privacy (PRIVACY)

It may not be a good idea to present Telidon as two-way TV. Some people may read this as "Now I can not only watch TV but TV can watch me". This is an ominous thought - especially now that we are so near 1984. There is growing apprehension about telephones being bugged and about detrimental effects of television (10) - plug the telephone into the television and paranoia is piled on paranoia. You know and I know that the two-way character of Telidon gives people more control than in the one-way technology of television, but we must convince others that this is the case.

Apprehensions about Big-Brother technology can not be dismissed as paranoia. It is indeed true that computers have resulted in much more information being accessible to many more people about all of us, and that technocrats would like this information and accessibility to it to be extended for efficient government. The public should be aware of the legislation that they have access to the information available about themselves and control over the accessibility of that information.

There are, however, deeper issues involved than the technical and legal questions about privacy (e). We each have the right to present whatever public image we choose to our various "publics". With so much information floating freely about about



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us, this very central right is denied us. There are wide differences from individual to individual in the degree to which we want to be accessible (some of us have unlisted phone numbers whereas others carry a pager) and from culture to culture (in many Third World countries, apartments on the street side ground floor are most expensive, since tenants there seek conviviality rather than privacy). However, each of us has a right to determine our own level of privacy (f).

Public figures acquire public images which are often in conflict with their self-images. Other people have, therefore, unrealistic expectations of them which contribute to identity problems. This is one of the prices one pays for fame. Computers are, in a sense, forcing us all to "go public" with none of the compensations. Ex-convicts have difficult re-entry problems because of their record, which accounts partly for the high rate of recidivism. We are all acquiring "records" which limit our capacity to change our behavior out of the pattern which is expected of us on the basis of this record.



2.4 The technology is vaguely threatening (TECHNOPHOBIA)

People can describe and justify the concerns about obsolescence, exploitation, and invasion of privacy discussed above. However, many people have an irrational fear of machines which they can not describe and justify but which will, consciously or unconsciously, cause them to reject technology. The Luddite response could be more a product of fear than of rage.

Much research has been done recently on "math phobia" - the irrational fear of mathematics - which excludes many people, especially women, from most prestigious professions (16). Diagnostic devices which measure the extent to which individuals suffer from math phobia, and therapeutic techniques, which are very successful in reducing it, have been developed. It seems that learning mathematics is a function of attitude rather than aptitude, and that the failure to learn mathematics is a function of emotional rather than rational factors.

However, little research has been done on "technophobia" - the irrational fear of machines. GAMMA has commenced research to fill this gap. Technophobia may be as widespread as math phobia and even more debilitating since technophobes must live in an environment which is increasingly alien and alienating since more and more machines are coming into our lives.



The two phenomena have enough in common to make it fruitful to develop methods of diagnosis and amelioration of technophobia by analogy with those already developed for math phobia. The testing of the important findings on math phobia in the domain of technophobia would be an important contribution to our understanding of the behavior of rejecting technology.

On the other hand, they are sufficiently different to yield interesting findings beyond those discovered in the investigation of math phobia. For example, since machines are not "taught" in school, people with technophobia can not be described as curriculum -disabled, a term applied to math phobics. Some interesting differences in the distribution of people with technophobia as opposed to people with math phobia may thus emerge. Since mathematics are discoveries and machines are inventions, further differences may emerge between those apprehensive about their capacity to understand our discoveries and those apprehensive about their capacity to use our inventions.

It would be interesting, too, to explore the relationship between technophobia and neophobia - the irrational fear of new things. Perhaps some people are apprehensive not so much about technology per se but about new technology. The unknown has always been a source of both curiosity and apprehension - neophiles (those who love new things) wish to explore them whereas



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neophobes (those who fear new things) try to avoid them. Ancient maps had "there be dragons" scrawled over the unexplored regions. Now that most of the physical world has been explored, the drama of the debate between love and fear of new things shifts to the psychological world. The computer is particularly fearful to neophobes since they tend not to understand it and it is therefore very mysterious (17).



2.5 The technology may involve me too deeply (TECHNOPHILIA)

Each of the concerns expressed so far could be considered as aspects of technophobia (fear of machines). There is, however, also apprehension about the equally inappropriate attitude of technophilia (love of machines). Some people reject technology not because they fear it but because they fear that they may come to love it. It is so fascinating that they worry about embracing it too enthusiastically. As they say of cocaine "it is so good that you should not try it even once".

Once again, the fear is not entirely irrational. Apparently sane people bemoan the fact that this clumsy mechanism - you and I - cannot be upgraded by replacing our brain with a superior model from the next generation and talk seriously about machines being the next stage in evolution (g). The irony of a strange arrogance which claims that the products of our brains are somehow superior to those brains escapes them. Nothing short of leaving them alone on the planet surrounded with their artificial intelligences and inflatable dolls (or guys) would fully convince them of our human need for empathy, which, by definition, can be satisfied only by other humans.

Peter Sellers, with some help from Henry Kissinger, has given us the familiar caricature of the technophile in Dr. Strange-



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love. He has recently updated this image in the more subtle and even more chilling portrait of Chauncey Gardiner, the anti-hero of Jerzy Kosinski's novel, Being There. Chauncey was raised with minimal human contact and is thus lacking in human emotion. However, unlike Harlow's monkeys, he was able to learn some appropriate behaviors by watching television and was embraced as a seer by a television-saturated culture (h).



2.6 The technology may become a "crutch" (DEPENDENCE)

The image of our various motor functions atrophying because they are replaced by technological devices is clear. The muscles of our legs do indeed suffer as we replace their function with the automobile. This issue is not so clear as the technology shifts from motor to sensory functions. Since spectacles replace both motor and sensory functions (that is, they aid the eye muscles in focussing and/or magnify the visual stimulus), the case that they become crutches is controversial.

The case of information-processing technologies, which replace our various central functions which are neither motor nor sensory, is even more obscure. Plato was apprehensive about the invention of writing since our capacity to remember would atrophy. He was indeed right. Few of us in our literate society can recite long stories, word for word, as could griots in pre-literate African societies. Yet many of us would argue that our brains should not be cluttered by such content which is better preserved in such "satellite brains" as books, diskettes, and computers. Such devices enhance rather than replace our intellectual functions and become crutches only if they shift from nice to necessary. There is no evidence that we would no longer be able to memorize books, as did the characters in Ray Bradbury's Fahrenheit 451 when books were no longer available.



Dependence on our technological tools is more likely, not through the atrophy of the functions they perform for us, but through addiction to them (2). There appears to be an optimal level of stimulation, which may vary from person to person. Too little stimulation (sensory deprivation) and too much stimulation (sensory overload) are psychologically disturbing. Those of us raised in a media-saturated environment may have this optimal level raised to an artificially high level. There are compulsive consumers of information as well as compulsive consumers of energy. We are constantly in need of another "fix" to maintain this level. We get "bushed" when placed in an isolated environment where we are deprived of our drug, much to the amusement of the locals who have learned to entertain themselves. Our kids, with their daily dose of the plug-in drug, don't know what to do when the plug is pulled (18).



2.7 The technology may generate too much information (OVERLOAD)

A basic concern in the energy society is that there is too little energy, a basic concern in the information society is that there is too much information. Developing technologies which make more information available may be like throwing water to a drowning man. The idiot savant with a head full of trivial information in his area of expertise is not a good model of the wise person. There is some recent evidence that information overload also contributes to schizophrenia. So much input without corresponding output may be damaging to the healthy nervous system. "No impression without expression" could be the slogan for a second American Revolution.

The solution to the information crisis is not, of course, to reduce the amount of information available but to develop skills of selecting from what is available. We should be providing receivers with better "crap detectors" as well as providing transmitters with bigger shovels (i). The tree structure within which the Telidon information is organized is one strategy to teach people how to zero in on the precise information which they require.

As the smorgasbord of information gets richer and richer, the diners must learn how to select a suitable serving. Select-



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ing from a varied smorgasbord is a much more sophisticated process than sitting down to a set menu. The smorgasbord of Telidon requires a much more sophisticated audience than the set menu of television. Indeed, the term "audience" may no longer be appropriate in this context. A person programming an evening's entertainment and education is more like a producer custom-designing a schedule for an intimate public of one.



2.8 The technology may depersonalize me (INFORMEDIATION)

Information-processing technologies mediate between people. The communication between two people over a telephone is, of course, less personal than face to face. When furthering distancing devices are interposed, like a telephone-answering device, one is tempted to design a telephone-calling device to complete the mechanization of conversation as your machine converses with their machine.

For most people, those devices simply supplement person-to-person communication. However, as they proliferate, we must be alert to the psychological effect of such informEDIATION (5). What happens to a person as the proportion of mediated over non-mediated communication increases? We are already seeing many of our contemporaries jerking about like robots night after night in discos, where person-to-person communication is precluded by the decibels, or spending night after night communicating with machines in amusement arcades.

InformEDIATION contributes to the tendency to live in an artificial world of images rather than a real world of people. The prisoners in Plato's cave had only to deal with the distinction between the real world and the shadows it cast on the wall of the cave. As we are mesmerized by the many images thrown up



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on the walls of our modern caves, we become less and less able to heed the advice of various escapees from the cave who argue that we are dealing not with the real world or, even, as were Plato's prisoners, with a reflection of it, but with various interpretations and distortions of it. Escapees throughout our history have pointed out that various factors, including even our own perceptual and conceptual apparatus, prevent us from seeing the world-as-it-is. Media is a further distorting mechanism which contributes to the discrepancy between the world-as-we-see-it and the world-as-it-is.

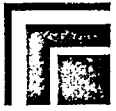


2.9 The technology may change me (MEDIA-AS-MESSAGE)

Most of the concerns expressed so far have assumed the simple-minded position that those information technologies are simply neutral tools which can be used for good or for evil. In each case, appropriate attitudes have been hinted at which help ensure that they will be used as means toward good ends.

However, a number of thinkers - notably Canada's own Harold Innis and Marshall McLuhan (9, 11) - have argued that we are changed not so much by the content of the media (good content making us better and bad content making us worse) but by the media itself. The media is the message or, in more modern terms, the carriage is the content. Joe Blow the carpenter using a hammer five hours a day is a better carpenter, if he uses it well, and a sore carpenter, if he uses it badly, but he is still Joe Blow. However, Joe Blow watching television five hours a day is a different Joe Blow.

We tend to think that our species has changed only within the large time dimension of evolution. However, psychohistorians argue that we have changed dramatically over historical time. For example, childhood and adolescence are relatively recent "inventions" which have changed the nature of our species (1). People living within a media-saturated environment may be dramatically



different from people living in a more "natural" environment as anthropological evidence suggests. The environment is no longer nature but information (15). There is no guarantee that they are superior people. Indeed, unless we learn appropriate attitudes to the information technologies which will become more and more salient in our environment, we are in danger of becoming poor imitations of the mechanisms we have created rather than fine examples of realized human potential.



2.10 The technology may take too much time (OPPORTUNITY-COST)

Since life could be considered as so much time, time could be considered as the ultimate non-renewable resource (19). Many people could reject a new technology simply on the grounds that they have no time to spare for it. The modern world is already so rich, partly as a result of the media already available, that the lives of most of us are full already. Some may say "enough". Yet another technological information-processing device may join other dust-gathering devices which we do not have time to use.

This concern could be reduced somewhat by cutting down the time required to learn how to use the device to a minimum. We must make the technology friendly and convivial by writing clear operating manuals to introduce our machines to people. More attention to the skill of explaining would save much frustration and time in learning how to use our various technological devices - especially those which represent not simply a new model of an old technology but a qualitatively different technology.

Another opportunity-cost factor is money. People will choose to spend their money on something else unless they can be convinced that the technology offers them something which is useful and which is not already available. For example, the



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printed information containing news, weather, sports results, movies in local cinemas, etc. available on cable television in some places in Canada and on the GPO Prestel system in Great Britain, is obviously useful. However, it simply duplicates information already available elsewhere. Neophobes will tend to stick with their familiar sources and neophiles may turn to this new media but, after the novelty effect wears off, return to the old media. Why should a housewife/husband gaze at a screen to catch this information with the eyes when she/he can catch it on the radio with the ears and, at the same time, get on with the housework? Why should the breadwinner wait for this information when she/he can get the same information from the newspaper on the train trip to the office and enjoy the secondary uses of the newspaper - a shield from fellow-travellers who chatter in the morning, a status symbol tucked under the arm as he/she walks to the office, a sun-shade or umbrella if it is sunny or stormy, and kindling for the fire back home?



3 RECOMMENDATIONS

This set of ten concerns is obviously not exhaustive. Each of us could probably add others to the list. Nor are the concerns mutually exclusive. "Privacy" and "informediation" dovetail into the central question of identity, "overload" may raise the optimal level of stimulation causing "dependence", and so on.

The only way in which the complex inter-relationships between them can be determined is through empirical research. Some tentative suggestions for such research are presented in Section 3.1. Such research would enhance understanding of attitudes to technology. This understanding would, in turn, help us

- (a) to predict acceptance or rejection of particular technological innovations.
- (b) to determine which policies would increase positive attitudes and thus probability of acceptance and decrease negative attitudes and thus probability of rejection.

Precise policy recommendations would be possible only after such empirical research has been conducted. However, some tentative suggestions are presented in Section 3.2, based on the above theoretical considerations within the framework of the current state of the science of psychology.



3.1 Research strategy

Any combination of the following procedures would yield useful empirical data and theoretical insight into attitudes to technology, which would help those introducing technological innovations to ensure that they are viewed by the public as an opportunity rather than as a threat.

(1) Case studies of occasions in the history of technology when new technologies or new models of old technologies were dramatically accepted or rejected. (e.g. CB Radio, Edsel).

(2) Investigation of the shifting meanings of words used in the person-machine interface. Some of them are borrowed from the person-person relationship (e.g. mediator) and some from the machine-machine relationship (e.g. transformer). The pattern may help reveal which factors contribute to the mechanization of persons and the humanization of machines.

(3) Construction of a scale to measure attitudes to technology. The Mechanization Scale, which measures five aspects of technology, may serve as a useful initial instrument. The above list of concerns could be a source of items to extend this scale and to adapt it to information-processing technologies. The Semantic Differential, which measures the connotative meaning of



words, could yield some interesting data if subjects were invited to rate "machine", "technology", etc.

(4) Use of this scale to determine the distribution of attitudes with respect to variables like age, sex, and education.

Do children have more positive attitudes through playing with electronic games?

Do men indeed have more positive attitudes than women, as popularly assumed?

Do people with less schooling have more positive attitudes because they have traditionally had more experience with machines?

(5) Use of this scale as an instrument in research on the relationship between attitudes to technology and the acceptance or rejection of technological innovations.

Do people with positive attitudes accept new technology and people with negative attitudes reject new technology?

Or are things (as is usually the case) more complicated than that?

What determines acceptance of one technology and rejection of another technology? Size of the machine? Noise? Strangeness? Usefulness? Previous experience with similar machines?

Which strategies in introducing technology contribute to increasing positive attitudes and decreasing negative attitudes?



(6) Development of scales to measure technophobia and neophobia by analogy with scale already available of math phobia - Mathematics Anxiety Rating Scale. Exploration of the relationship between those three phenomena and their role in the rejection of technology.

(7) Development of strategies for changing attitudes to technology. e.g. Perhaps questionnaires which simply raise consciousness on the pervasive role of technology in our lives could contribute to more positive attitudes.

Make a quick estimate of the number of machines in your home? 5 10 20 40 70 100.

Here is a list of household machines - indicate the number of each machine you have in your home. Add them. How many machines do you have in your home?

The actual number of machines will probably greatly exceed the estimated number, as will the number of machines the subject used yesterday, and so on.



3.2 Public policy

(1) The first recommendation, of course, is that the Department of Communications conduct or support research, such as that suggested above, on attitudes to technology and their role in the rejection or acceptance of technological innovations. This research should be conducted concurrently with the development of the hardware. When such research is conducted at all, it is usually conducted after the hardware has been developed. The consumer's needs are not considered beforehand. Rather, the consumer is confronted with a fait accompli and often a cynical campaign to sell a need-and-commodity package deal.

The emphasis on supply over demand is understandable. It is due to the same cause as the emphasis on hardware over software within the supply side of the equation. Hardware is a product which provides concrete evidence of productivity. However, the falseness of this "face validity" is exposed when, again and again, we are faced with the futility of hardware without software or supply without demand.

(2) The second recommendation shifts from the person to the person-machine interface. This too is usually neglected in favor of an emphasis on the machine. However, its importance is becoming increasingly recognized, as evidenced by the work of the Behavioral Research Group at the Department of Communications.



Such work is crucial in improving attitudes to technological innovations. People are appropriately demanding that machines be adapted to them rather than vice versa. They are much more likely to accept a machine which is friendly (that is, which "invites" them to interact with it) and convivial (that is, when one accepts the invitation, the interaction contributes to the quality of life). The distinction is important - in many grim scenarios for the future created by science fiction writers, the technology is friendly enough (Big Brother is, after all, Brother) but it is not convivial.

(3) Public education about those information-processing technologies may help improve their public image. Dumb machines need someone to speak on their behalf. On the other hand, one interesting new feature of those technologies is that they are not as "dumb" as previous generations of machines. They can teach us about themselves. At least some of the early Telidon pages should be about Telidon. If much of technophobia is really neophobia, it could be reduced by making those machines less mysterious than they currently are to most lay people. The mystique is destroyed when the technique is revealed.

Another aspect of public education is a sensitization to the possible detrimental effects of those technologies, as indicated above. People should be aware of the dangers of dependence,



informediation and of the means of dealing with those dangers (just as they are made aware of the dangers of alcohol, cigarettes, drugs, and so on). Psychological dangers are more subtle than physical dangers but no less destructive. They damage our minds rather than our bodies. We should not neglect those dangers merely because the bruises do not show. There are many university courses on the impact of literature on our lives but few on the impact of media, which is much more powerful and pervasive. Indeed, the only institution focussing on this influence which is well-known outside Canada - McLuhan's Institute at the University of Toronto is being closed down.

(4) Education using those technologies rather than education about them is the focus of the next recommendation. If Telidon merely provides content which is already available on radio and in newspapers, then it is unlikely to achieve anything like the penetration of one-way television. It must be extended to provide services previously unavailable in the home. One obvious example is to provide education to people who are not able to attend traditional educational institutions (e.g. people who live in isolated areas, disabled people confined to their home or their neighbourhood, people in hospitals, prisons, etc.). The use of the Telidon screen as a common visual space could help realize the potential of tele-conferencing. Animators could provide the inspiration necessary to supplement the information.



FOOTNOTES

(Numbers in brackets refer to the page of the text on which the footnote appears)

- a The image of people representing each of those "actors" crowded on to a stage giving their "concert" with no one in the "audience" may help make this point more vivid (4).
- b It is interesting to note that, whereas most concerns about energy technologies are of physical dangers, most concerns listed here about information technologies are of psychological dangers. In the former case, the concerns are perfectly justified. One technological innovation, the automobile, kills and maims more of us than any single disease, without the decency of a disease to single out those of us who are older and weaker. Psychological dangers, while more nebulous, are no less damaging (5).
- c The qualitative difference may be exemplified by a comparison of the clock and the computer. It has been argued that the invention of the clock triggered the industrial society (Lewis Mumford, Technics and Civilization; it could be argued that the invention of the computer has triggered the information society. If you substitute "clock" for "computer" in various recent book titles - The Brain as a Computer, The Human Machine: A View of Computers, What Computers Can't Do, and so on - you get some intuitive feel for the fact that this device is much more threatening to those who fear obsolescence. The function of the computer - information processing - is such a pervasive aspect of human function that a recent introductory psychology textbook has been called Human Information Processing: An Introduction to Psychology. (Lindsay, P. H. & Norman, D. A., Academic Press, New York, 1972.) (6).
- d This danger is, of course, a favorite theme of science fiction writers (who have, so far, had a better record than futurists in predicting the future). George Orwell's 1984, Aldous Huxley's Brave New World, Ray Bradbury's Fahrenheit 451, Ayn Rand's Anthem, and many others, each in their own way explore this theme (13).
- e This theme was suggested to me by Dr. Arthur Cordell of the Science Council of Canada (15).
- f Those of us raised in villages know the feeling of having one's behavior constantly monitored and many of us thereby welcome the anonymity of the city. As we move into the "electronic village", the village gossip is replaced by the computer. This time there is no place to go (16).



- g This argument was made by Samuel Butler in his novel Erewhon. However, he was just spoofing a theory which had recently been published by a fellow called Charles Darwin. Here are a couple of quotations to help convince you that many modern proponents of this theory are serious.

"I hope that man and these ultimate machines will be able to collaborate without conflict but if they can't, we may be forced to choose sides and if it comes to a choice, I know what mine will be --- my loyalties go to intelligent life, no matter in what medium it may arise."

(A computer-memory expert quoted by Brad Darrach in "Meet Shaky, the first electronic person", Life Magazine, November 20, 1970)

"I don't think machines are bad. If they replace humans, I wouldn't be very concerned. I don't particularly like humans anyway."

(Gary Numan, exponent of machine-age new muzik, writer of songs such as "I disconnect from you and I nearly married a human") (20).

- h Perhaps neither of those characters are as scary as Sellers himself. He has learned his behavior by playing other people in movies. The following interview with Kermit the Frog in the Muppet Show, while played for laughs, could help illustrate the reality of both concerns (3) and (4) - that technology could replace our private essence with our public image and fill that empty shell with mechanical fantasies:

Kermit: Just relax and be yourself.

Sellers: I could never be myself.

Kermit: Never yourself?

Sellers: No, you see, there is no me. I do not exist.

Kermit: I beg your pardon?

Sellers: There used to be a me. But I had it surgically removed. (21).

- i "Crap detectors" is a quotation from Ernest Hemingway. It was a reply to the following question in an interview: "What is the single most important attribute of a young writer to-day?" (Writers at Work: The Paris Review Interviews, Harmondsworth, Middlesex: Penguin, 1977) (24).



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