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Communications, Computers and Networks

by

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There was a time when communication from computer to computer via satellite links was the exclusive domain of the military, of highly specialized scientists, and of 'hackers'. That is no longer true. The serious scholar, even of the humanities, sometimes feels a bit 'out of it' when separated from his or her computer and modem. Technical assistance is being provided to development workers in remote areas by means of relatively cheap ground stations and low-orbiting (non-geostationary) satellites. 'E-mail', using a bewildering array of special interest computer networks, generates whole new forms of society, united by electronics, rather than geography.

Communication science studies the relationship between messages and people. More and more of these messages are being transmitted by computer networks; and more and more people are finding themselves caught up in the global network of networks. Many are optimistic, even enthusiastic about the effects of this new mode of instant worldwide communication. Some are doubtful.

The social, personal and ethical significance of this rapidly escalating process is attracting the attention of increasing numbers of researchers. This issue of *Trends* attempts to spotlight some of the results of their work.

I. The Social Context

Martin Lea (Ed.). *Contexts of Computer-Mediated Communication*. New York/London/Toronto/Sydney /Tokyo/Singapore: Harvester Wheatsheaf, 1992.

Computers and communication technologies directly or indirectly affect everyone in the world. Not even hunting and gathering societies, living in small, nomadic bands in rain forests or on tundra can long expect to escape their impact--an impact which can be positive, but too often is negative as petroleum companies, loggers, armies or ranchers use technology ever more efficiently to invade and exploit the most remote environments.

One of the most fertile technological marriages of our time has been that between telecommunications media and the computer. The two technologies are estimated to have expanded at annual rates of more than twenty-five percent per year, in terms of cost-performance ratios, for at least the past two decades. If automobiles had kept pace with this cost performance ratio it would be cheaper to drive to your destination, throw the car away, rather than repair and service it, and buy another for the return trip!

This interaction has compounded the technologies' capabilities, transforming a faint promise of synergy into a force which is changing the world. Hundreds of millions of computers are in service, many linked by satellites and fibre optic cables into networks which permit their human users to exchange massive amounts of information at the speed of light. Some parts of some networks are so efficient that the computers themselves can carry on 'conversations' indefinitely, passing data back and forth around the world without direct human intervention.

Society, culture, and even the ways we think about the nature of human beings, all are deeply affected by this revolution. We can no longer regard the computer and the communication technologies as mere tools, to be taken up, used, then put down, at will. Their very existence and near omnipresence are changing our lives in intimate ways of which we must be aware to make the informed judgements the new conditions demand.

The Importance of Context

As Martin Lea stresses in his introduction (Lea 1992, 1) computer-mediated communication (CMC) cannot usefully be considered apart from its contexts, which shape the ways CMC has developed and is used and the results which emerge from its use. A rather large area of research has opened up, in recent years, to study the features of the social context which influence CMC behaviour. Some of these are listed (Lea 1992, 7) as 'group norms and social learning (Schmitz and Fulk, 1991), social identity (Lea and Spears, 1991), communities of users (Kling and Gerson 1977), structural, relational and physical proximity among groups (Rice and Aydin, 1991), communication network features (Papa and Tracy, 1988), thresholds for critical mass (Valente, 1991), work group cohesiveness (Ryu and Fulk, 1991) and group size (Poole, et al., in press).'

When is it 'social'?

In their treatment of social-psychological dimensions of CMC use (in Lea, 1992, 30), Russell Spears and Martin Lea complain, however, that much other literature on the subject implies 'that the social dimension is of very little relevance to CMC.' They feel that such a view would deny the presence of 'social cues' or any other social or normative context. If such a context were lacking, they say, CMC would be 'a particularly inefficient medium for social influence'.

The two authors add, 'Indeed, we shall argue that paradoxically CMC may represent a more intrinsically "social" medium of communication than the apparently "richer" context of face-to-face interaction, and one that gives fuller rein to fundamentally *social* psychological factors' (pg. 31). The 'theoretical blind spot' they discern in three major 'social cues' models is described as those models' underlying assumption that 'what counts as social' is 'equated with the *interpersonal* and the *informational*', implying that the 'social' is most powerfully present in face-to-face, interpersonal interaction, and therefore must somehow be diluted, or even negligible, in computer-

mediated encounters. Spears and Lea contradict this, saying that 'the social is in certain crucial respects the opposite of the personal or interpersonal' (pg. 45), and they develop their own, 'SIDE' (social identity/de-individuation) model to more fully account for 'the very important social dimension to CMC' (pg. 58).

'With Whom Am I Communicating?'

As the film 'Jumpin' Jack Flash', starring Whoopi Goldberg, illustrated fictionally, computer-mediated communication can obscure many cues--such as 'race' and gender--which often determine the outcomes of face-to-face encounters. In the comedy, Jack, a British secret agent, sends a call over interactive electronic mail for help out of a life-or-death situation. His transmission is accidentally picked up by Whoopi, a humble New York bank employee. Assuming, in his desperation, many inaccurate things about her identity, Jack gets her into increasingly dangerous situations, until he is finally rescued and the 'baddies' vanquished.

Providing a foundation in research for this common sense perception that many social psychological factors affect the dyadic relationships of computer communicators, Kimberly Matheson (in Lea 1992, 78) cites several studies in which the perception of gender was found to influence CMC behaviour. Kiesler, et al. (1985), for example, had found that self-disclosure was five times higher in mixed-sex computer communication dyads than in same-sex or face-to-face dyads. In the absence of other cues, stereotypes may become more significant in establishing perceived identities in CMC relationships (Matheson 1991), and frustration can be intense when the 'rules of the game' are violated by the communication of deceptive identity cues, as when a male psychiatrist represented him-

self as a handicapped female to elicit information from female users of a large computer network. When they discovered the truth, some of the women described the experience as 'mind rape, pure and simple' (Van Gelder 1985).

Matheson's survey of research findings suggests 'a consensus that mediated communications shift users' focus of attention.' 'Attention may be directed towards the self, the other communicator or the task.' Although what factors influence the shift to which focus remains unknown, the direction of the shift does tend to influence the subsequent process of the communication. Task orientation, for example, can reduce self-awareness to the point where inhibitions are shed and self-revelation is increased. Matheson (in Lea 1992, 74) relates that Kiesler et al. (1984) and Siegel et al. (1986) also found that, because of their absorption in the discussion, 'individuals tend to change their decisional positions during computer-mediated group discussions more than they do during face-to-face discussions'--more easily losing sight of their original positions.

The Electronic Society

From the chapters cited, and other sources, in Lea's book and elsewhere, it is clear that computer-mediated communication does, indeed, have a strong social dimension. In fact, it can be said to create a whole new kind of society, resembling face-to-face social groups in some respects but also involving factors which generate new kinds of relationships, either not present at all in other societies or present under very different forms and functioning by different rules. The sociologist of computer-mediated communication is, in effect, 'silent, upon a peak in Darien' (Keats 1817), with a vast new ocean of social relationships to explore.

II. The Technological Context

Vary T. Coates. 'The Future of Information Technology'. *Annals of the American Academy of Political and Social Sciences*. No. 522 (July 1992), pp. 45-56.

Michael L. Dertzous. 'Building the Information Market-Place.' *Technology Review*. January 1991, pp. 29-40.

If it can be said that computer-mediated communication has an important social context, the reverse is equally true: people using computers for communication function within a set of parameters established by the technological environment. That environment is changing rapidly. Lawrence G. Tesler (1991) has summarized some of the changes in computers which have occurred since the early 1960s. The size of the equipment has been reduced from machines which filled a room to machines of comparable or greater power and far greater flexibility which can be held in the palm of one's hand. Input has shifted from cumbersome punch-cards and tapes to machines accepting oral and handwritten commands. It took highly-trained experts to run the computers of the 1960s, but today almost anyone can learn to use a computer with far greater capabilities than those of the sixties.

Networking technology has shown equally dramatic expansion. Personal computers can be linked to each other and to mainframes, and through the mainframes and satellite connections those linkages can be expanded to all similarly-linked PCs throughout the world.

The Information Business

Information has become a 'big business.' The value of computer hardware and software in use in the United States has been estimated as almost one-tenth of the country's annual gross national product, and sixty percent of Americans are employed in information-intensive jobs. But the real value of much of this 'production' has been questioned. To be valuable, computers and networks must help users to achieve tangible goals, not just to bury others--and be buried in their turn--in a mass of 'infojunk'. Information systems can be used to produce tangible wealth--food and other raw materials, manufactured goods, and human services. But if they neglect that goal in favour of producing only more and more useless information they will subvert the economic and social commonweal, rather than improve it.

Benefits and Limitations

Information and its processing have less economic value in poor countries simply because there is less potential for the production of tangible goods in a poverty-stricken environment. But there are other ways in which information can be of use to people in those countries. It can help teach people to improve their health, to repair their machinery, or to improve their farming practices, as well as to assist in the distribution of food and medicine.

Properly used, information networks have the potential for relieving humankind of many of its burdens. They can eliminate many of the repetitive and boring tasks related to the processing and communication of information. Part of their success in this will be dependent on how successfully they can be programmed to exclude unwanted and useless information, to filter out and pass on only what is worthwhile. The information infrastructure should help us speed up existing processes and improve their quality--it can never eliminate entirely the human element involved, since, as Dertzous (1991b) has pointed out, no matter how fast the information flows, assembling a real car out of real parts still takes real time. Computers and networks also will touch our lives by opening up as yet unanticipated and unexplored possibilities. Our access to a wider world than our limited, local geography is literally at our fingertips, through electronic mail and other computer networking applications.

There is no question, either, that computers and networks will democratize human communications. Computer networks are inherently decentralizing and interactive, thus leading to greater democratic participation, unlike television, for example, which is inherently centralizing and one-way, leading to homogenization and passive audiences. A complete, earth-encompassing network would ensure that nearly everyone would be able to put forth his or her ideas, concerns and demands, where all who are interested can see them. This freedom undoubtedly will bring social and political consequences. One might foresee the creation of electronic 'tribes': individuals united to each other more closely by worldwide communication than they are to

their physically proximate neighbours.

A foretaste of this was seen in the Chinese demonstrations preceding the Tienanmen massacre of 1989, when Chinese students overseas used fax machines and computers to supply information otherwise unavailable to their counterparts in China, and the latter used the same means to inform the outside world about their movement and details of government repression (Frederick 1993: 236)

Prospects for Development

Vary T. Coates, of the Office of Technology Assessment of the United States Congress, notes that the adoption of computers in large organizations has gone through four phases: dependence on large central mainframes; personal computers and distributed data processing; the networking of micro-computers; and, finally, the networking of networks. Each phase has added to the capabilities of the preceding phase, rather than superseding them. In a large organization there is likely to be a mainframe computer--used for central billing, inventory control, data processing, and system management--in addition to networked personal computers on the desks of secretaries, clerks and executives throughout the organization (Coates 1992).

Millions of components can now be put on a small computer chip. Early microprocessors had about 2,300 transistors; the new 486 personal computer has 1.2 million; and the emerging 586 pc, with about 4 million transistors, should be able to perform billions of instructions per second. The limiting factor remains the speed of input and accessing, so improvement in those two areas promises to be a major focus of research and development.

Hardware and more powerful, easier-to-use packaged software are being made increasingly compatible. Another innovation which is becoming more readily available is the 'expert system'. Expert systems are software packages incorporating decision rules and knowledge used successfully by experts in various fields and now made available to users through interactive dialogue with the computer.

Economists see two factors as driving rapid computer communication development at the present time: 'market pull' and

'technology push'. Market pull is industry response to perceived customer needs and demands. Technology push is the imperative to 'get ahead of the competition' by exploring and developing innovations even before potential applications or demand can be seen. Early stages of information technology development are felt to have been motivated by technology push, but continuing developments are more the result of market pull--as users see new possibilities and demand greater efficiency and 'user friendliness.'

Digitization of Data

Technological standardization appears to make it inevitable that all data--text, numbers, sound, and visual images--will increasingly be stored and transmitted in digitized form. That is, they will be translated into binary codes--electronically expressed by open or closed circuits--which can be reconverted to the original form for delivery. Digital networks will then be able to carry audio, data, text and video signals simultaneously. The resulting standardization and ease of manipulation of signals can be expected to increase competition for delivery of information services and drive down costs to their users. Digital radio transmission will revolutionize radio broadcasting by making more channels available and making even the weakest station into virtually a 'clear-channel' station within the reach of its signal.

Input and Access Improvement

Digitization of data will improve the capability of capturing data at the source, already far advanced in such devices as automated teller or 'cash point' machines and supermarket checkouts. Handheld computers and optical scanners will stimulate this tendency. Speech-recognition capability is improving, but may not be widely available in the immediate future. Notepad computers which accept hand-written input are coming on the market. Then there is 'hypertext', which is especially useful as a characteristic of programmes designed to search complex databases and networks, and its even more sophisticated descendant, 'hypermedia.'

'Hypermedia' is a database that consists of digitized visual, audio and textual information, and the connections among these pieces of information, delivered to a

computer screen. The information is linked in multiple ways, possibly by two or more designers. The end user of the system can navigate through the information as he/she chooses, thereby connecting information in potentially novel ways' (Lea 1992, 210).

Virtual Reality

The simulation of real perceptual phenomena by means of special gloves, goggles, etc., which permit users to project their bodily motions to interact with computer-manipulated representations of reality on a screen, in what has been called a 'three-dimensional interface' (*Information Week* 1990), is being steadily perfected. The use of virtual reality in computer games is already developing. Flight-training simulations and other training applications also are in place, but additional practical applications may lie further in the future.

Mobile Communication

Cellular telephones already are in wide use in the United States and other countries where the telecommunications systems are relatively de-regulated. Eastern Europe, where the existing telephone systems are antiquated, is turning to cellular phones as a stop-gap, which may become so low-cost and popular as to permanently replace wired systems. Digital cellular telephones, now under development, will be able to handle data-transmission, vastly increasing the flexibility and capacity of cellular systems (United States Congress 1992). Low orbit satellites may soon be used to link hand-held radio telephones.

Hardware Specialization and Diversification

Information technology is moving in two contrasting directions: greater specialization

and greater diversity. Although computers are becoming cheaper per unit of power, general-purpose computers often prove less cost effective than simpler machines tailored to specific jobs. At the same time there is a complementary trend toward less specialized, multiple-purpose equipment. Multipurpose integrated work stations are being developed, combining the functions of today's personal computer, fax machine, copier, printer, telephone and other equipment.

Networking of Networks

Digitization of data promotes even greater convergence and integration of computing and communications. Digitized networks can handle many different functions, making possible an interplay among a wide range of transmission technologies. There is a strong movement towards the 'intelligent network', with computer control distributed among switching centres throughout the network. Some serious problems of interconnectivity among presently incompatible systems and computer languages are gradually being overcome by the development of interface devices and services.

Looking Further Ahead

Within a few years we should see rapid progress in several areas. High-definition imaging systems are on the way, and the rivalry blocking high-definition television seems to have been resolved. Parallel processor computers have recently demonstrated speeds one hundred times that of conventional supercomputers, and a 'teraflop' computer capable of one-trillion calculations per second is expected by about 1996. Scientists are working toward 'nanotechnology', including molecule-scale computers and photonic computers, which use photons rather than electrons. The end of the century will probably see at least some of these developments in common use.

III. The Network Context

Howard Frederick. 'Computer Communications in Cross-Border Coalition-Building: North American NGO Networking Against NAFTA.' *Gazette: the International Journal of Mass Communication Studies*. Vol. 50 (1992), pp.217-224.

Burkhard Luber. *The World At Your Keyboard: An Alternative Guide to Global Computer Networking*. Oxford: Jon Carpenter, 1993.

Complex networking introduces a new dimension to computer-mediated communication which is not reducible to either social or technological factors but emerges from the ways the networks are organized and their own developmental dynamics. All sorts of networks are coming into existence, and anyone with access to a PC with a modem and a line to a mainframe computer with satellite uplink seemingly can start one.

The new networks provide magnificent opportunities for innovation. Although they usually are public thoroughfares, they are being built not by governments but by many different companies and individuals, seeking to serve first their own needs, then the needs of others. In this the networks are more like early nineteenth century railway systems than they are like roads; although neither analogy does justice to the task that the builders of this new infrastructure face.

The sheer diversity of the networks now being developed makes it hard to see what the finished system--if it ever can be said to be 'finished'--will look like. Predictions about it are made harder by the fact that, while data networks and telephone networks are intertwined, data-networkers think of the task of communication in a fundamentally different way from their colleagues in the traditional world of telephones. Both need linkages between places--wires, fibre-optic cables or radio waves--but the ways they use those linkages differ profoundly and, as yet, irreconcilably.

People who run telephone networks think of communication in terms of channels and connections. They see their job as creating a channel between two machines, a pipe through which a steady stream of information can flow. To make money, telephone companies charge for a 'pipe' according to its length, the amount of information it can carry (its width), and to the time it stays open.

But digital information does not travel in steady streams. It travels in 'packets', more like bits of freight being shipped across country than water flowing through pipes. One can think of a message as a large superstructure--the old London Bridge, for example--that has to be moved from England to Arizona. First, it must be broken down

into movable pieces. Since the pieces will be shipped separately, and possibly by different routes, each needs a 'Bill of Lading' to say what it is and where it should go. The packets sent through a data network also carry such 'Bills', as well as 'error-correcting codes' that enable the recipient to see if the data have been damaged in transmission. All this makes things quite complicated--much more so than just letting data 'flow down a pipe'. But complexity does not matter, as long as there are computers to deal with it and keep it out of sight.

The hidden complexity of data 'networks' gives them great flexibility. The size and shape of a data network are easily changed, more or less at will. Any computer added to the system can help to manage the flow of messages, passing packets on towards their destinations by reading their 'Bills of Lading'. Packets can be sent by whichever route seems best to the computers involved. And they need not arrive in the order they are sent. Networks can be designed so that the receiving computer will take responsibility for reshuffling the packets into order, asking that garbled packets be sent again and generally making up for any deficiencies along the line.

Internet

Currently the world's biggest computer network, Internet links about fifteen million people (Burgess, 1993), mostly academics and researchers, around the world through more than 750,000 'nodes' or 'electronic mailboxes', where outgoing electronic mail is assembled before being transmitted in packets, and where incoming packets are opened, sorted and distributed to individual users. Individual computers are normally linked to a host mainframe computer by small 'local-area networks', which use wires owned and operated by universities, businesses or other institutions. Nodes are linked to each other via long-distance, high-capacity lines leased from telephone companies. Because each node is itself a powerful computer, it can keep constant track of the other nodes it is connected to and how busy the connections seem to be. Packets can then be routed accordingly. Network management is distributed among the nodes.

So complete is the lack of centralized management in Internet that no one really knows how many nodes the network contains.

Every three months a computer at Stanford Research Institute asks all the hosts that can hear it to speak up and tell Stanford their names. Each time, it receives 20-30% more replies than it did the time before. Recently, many of the new voices have come from hosts outside the United States and from companies that are rapidly growing up around the original heart of Internet--which initially was paid for by the U.S. Defense Department, in 1969, and was at first available only to officially sanctioned researchers (Burgess, 1993).

So extensive and complex is Internet today, that finding an individual file in its associated networks could be almost literally like looking for a needle in a haystack. However, several software programmes have been developed to help. One, Archie, is a 'freeware' database programme which searches the network's various sites once a month. Users can find out what is where from Archie, more or less in the way they would use a library catalog. Gopher is another freeware programme which runs on a remote computer. It acts like an Internet reference librarian, searching through on-line databases for requested information. More recently, a global attempt to organize the contents of Internet into a hypertext searchable format, called 'World-Wide Web' (WWW), has been under development (Vaughn-Nichols 1993).

Many academic networks and 'gateways' in different parts of the world--Janet, BitNet in the U.S., EARN in Europe, UseNet worldwide, etc.--connect with, and have their communications expedited by Internet.

UPSNET

One example of a commercial network is UPSNET, put together by United Parcel Service to keep track of the million or so packages it picks up and delivers each day. It is more controlled and much less ambitious than Internet, but it already links 1,300 distribution warehouses in 46 countries. It was anticipated that by mid-1993 more than 50,000 UPS delivery lorries in the United States would be linked to the network by mobile telephones. Built with the help of four regional cellular communications companies, at a total cost of around half a billion dollars, UPSNET will be the

first national mobile data network in the United States.

USENET

For the freer of spirit there is USENET, an international network linking millions of people without any central guidance at all. USENET provides electronic mail and a series of 'news-groups' where networkers can debate politics, technology, religion or any other common interest. To join USENET, all you need do is to find a member who will forward messages to your machine and agree, yourself, to forward mail and news to others.

Non-Governmental Organizations (NGOs)

Some of the most imaginative applications of computer networking have been carried out by non-governmental organizations, often operating 'on a shoestring', supported by contributions or small grants. Among these are GreenNet, based in Britain, and EcoNet, in the United States, both devoted to promoting ecological awareness and action; PeaceNet, working for peace and human rights; ConflictNet, for those interested in conflict-resolution; and many more.

The Association for Progressive Communications (APC) is a network of networks recently organized to coordinate linkages among networks promoting human rights, ecology and other liberal causes. APC networks, involving over 15,000 NGO computers in 95 countries (Frederick 1992: 218), are even more decentralized than most other systems. In addition to e-mail, the APC networks oversee about 800 electronic 'conferences' on a vast range of subjects of special interest to people concerned with human rights, the 'Third World', ecology, etc. APC also carries a number of important alternative news sources, including Inter Press Service, the largest news agency based in, and focussed on, developing countries.

Political Implications of Networks

The potential of computer networks for facilitating social movements of various kinds is hinted at in the above listings. For the first time they make it possible for such movements to be instigated simultaneously in many parts of the world. As was noted above, this capacity is opening up a whole new dimension of social relationships. The same must be said for its political implications.

IV. The Human Factor

Tom Forester (Ed.). *Computers in the Human Context*. Cambridge, MA: MIT Press, 1989.

Urs. E. Gattiker (Ed.). *Technology-Mediated Communication* (Studies in Technological Innovation and Human Resources 3). Berlin/New York: Walter de Gruyter, 1992.

Alan C. Kay. 'Computers, Networks and Education'. *Scientific American*. September 1991, pp. 100-107.

Lee Sproull and Sara Kiesler. 'Computers, Networks and Work'. *Scientific American*. September 1991, pp. 84-91.

Myron C. Tuman (Ed.). *Literacy Online: The Promise (and Peril) of Reading and Writing with Computers*. Pittsburgh/London: University of Pittsburgh Press, 1992.

Sherry Turkle. *The Second Self: Computers and the Human Spirit*. London/Toronto/Sydney/New York: Granada, 1984.

As the earlier sections of this issue of *Trends* suggest, we are, year-by-year, becoming more and more inextricably bound up in computer-mediated information networks. They influence our everyday thoughts and actions, and they even raise questions about the nature of the human species. Studies of 'artificial intelligence', for example, have called into question the uniqueness of human mental abilities--although students of 'AI' are gradually coming to recognize that there are aspects of human cognition which computers can never duplicate. Sherry Turkle (1984, 247-278) reviews some of the arguments, pro and con, of early enthusiasts and critics of AI. She quotes Joseph Weizenbaum (1976), who said that theories of mind based on AI programmes will yield 'a flattened, mechanical view of human nature', from which the truly human, 'the uncodable', is eliminated (Turkle 1984, 323).

Turkle (pp. 321-322) calls the computer a 'new mirror', an 'evocative object' in which our narcissistic generation, unsure of its understanding of its own identity, searches for ways to see itself. Computers have surpassed the apes as the most humanlike non-human entity in our experience. Children used to ask, 'How am I different from the animals?' Now some are found who ask, 'How am I different from a computer?' (pg. 326). The computer is the 'first psychological machine', with which we can interact to fend off loneliness while at the same time avoiding feared intimacy.

At a more mundane level lie many other questions, such as whether a disadvantaged

and unemployable social class is being created among people who find themselves constitutionally or culturally unable to adapt to the demands of the computer age. Adaptation is a problem not only for the computer illiterate but also for those under stress from the almost constant retraining and updating required to compete successfully in a computer-oriented labour market. It has long been recognized that computers and their networking make invasions of privacy and the violation of human rights much easier than earlier forms of record keeping and communication. Male/female differences in computer use are being studied (e.g., Turkle 1984, and many others).

The modes of thought brought into being by successive communication technologies have been extensively explored, by McLuhan (1962), Ong (1982), Havelock (1986), Gronbeck et al. (1991), and others, but the complex influence of computers on literacy and culture is just beginning to be studied (Tuman 1992). Also barely touched, as yet, are the vast implications for the developing world of the innovations in computers and networking initiated by the industrially developed nations (see, e.g., Schoenhoff 1993, and Schwere and Choudhury, in Lea 1989).

The interface between human and machine which is at the heart of these issues has been with us since the start of the Industrial Revolution, but has been transfigured with the advent of 'thinking machines' and 'real-time communication'. It will require intense and sustained research attention during the twenty-first century to ensure the preservation and fullest realization of human dignity in that sphere.

The Workplace

Unfortunately (because it distracts attention from other important areas), but understandably (because that is where the research money is), much of the research on human/computer/networking interfaces has been focused on business efficiency--from the point-of-view of management, not the individual worker. Sproull and Kiesler (1991) have highlighted some of the questions which arise about the effects of highly developed computer systems and networking in the business organization. Managers often are attracted to both by the promise of faster communication and greater efficiency. But the impact of networks, in particular, on the overall work environment and the very structure of the enterprise may be of greater importance. Managers can use networks to foster new kinds of task structures and reporting relationships. Through their design of the networks they can determine who talks to whom and who knows what.

Gattiker's book, one in a series edited by him on technology management in large organizations, focuses broadly on 'structure, organization and coordination within firms' (1992: 11). Rachid Zeffane asks (in Gattiker 1992: 15-62) the basic question, 'What can computer technology contribute to a business?' He found a two-fold answer, in a study of organizations in Australia, namely informational achievements on the one hand, and operational achievements, on the other. These types vary in importance depending on the differing structures and activities of different organizations. Zeffane suggests that organizations should be analyzed to determine whether information or operational efficiency is of greater importance, and that computer systems should be structured accordingly.

A significant application of computer networking to businesses is 'telework', whereby people work from home, communicating with their firm by wire, cable or satellite. Although such work may seem to involve less stress than working in an office, Angelo S. Soares (Gattiker 1992: 117-145) found, in research in Brazil, that it generated different kinds of stress, although the exact sources of the stress need to be studied in greater detail. Also, although

productivity initially rose when telework was introduced, there was no guarantee that the higher levels of productivity could be sustained. Different management styles also seem called for in telework. A tendency towards rigid and static organizational structures seems to develop in some telework situations, resulting in a sense of isolation and tension on the part of the workers. Managers should be more tolerant of informal communication among work stations, since what might appear to be largely gossip or 'soldiering' often is a necessary way to solve problems. Overall, however, Soares feels that the advantages of introducing telework in many cases are outweighed by the disadvantages and problems to which it gives rise (pg.140).

The possibilities arising from networks raise the following questions, among others, for managers: Can people work as closely together when their only contact is through a computer as they can when they are in a face-to-face relationship? What holds the organization together if all contact among employees is electronic? Networking permits almost unlimited access to data, plans, formulas and people. Where is the line to be drawn on freedom of access in a way which will guarantee security and at the same time allow the freedom necessary for creativity, innovation and flexibility? How are the costs of networking to be allocated and controlled?

The effects of networking technology--both internal and external to an organization--are difficult to predict. Early researchers thought group decision-making would be improved by networking, since computer messages were plain text, unencumbered by the many other signals--body language, etc.--which introduce 'noise' into face-to-face group discussions. They predicted, accordingly, that networked discussions would be more 'intellectual'. But experience proved them wrong, in many ways. The anonymity and lack of cues as to the identity and personality of other parties to the discussion actually inhibited the development of group dynamics which would have facilitated the decision-making process. On the other hand, as was mentioned earlier, the lack of cues as to the others' identities may stimulate boldness on the part of some participants.

The technology of networks is changing rapidly. Sound and video introduced into an electronic conference situation will provide

some of the cues previously missing. This will introduce some of the 'feel' of the face-to-face discussion, but other cues may, at the same time, be distorted or subjected to reinterpretation by such electronic mediation. And on such factors will depend the shape of the business organization of the future.

User-friendliness

Frustration and anxiety are part of the daily lives of many users of computerized information systems. They struggle to learn command languages or menu selection systems that are supposed to help them do their job. Some people suffer such serious cases of 'computer shock', 'terminal terror', or 'network neurosis' that they avoid using computerized systems. These electronic-age maladies are growing more common; but the computer industry says that help is on the way.

Researchers have shown that redesign of the human/computer interface can make a substantial difference in the time it takes to learn to operate a machine, in performance speed, error rates, and general user satisfaction. Design alternatives, in both hardware and software, are constantly being tested for their impact on these human performance indicators. Obviously, there is commercial advantage in this, since the most user-friendly system will have a competitive edge in a wide range of applications. Both programmers and quality control experts are paying more cautious attention than in the past to the point of view of the end-user, which they now realize will affect the 'bottom line' in a highly competitive industry. 'Human engineering'--which, in this case, simply means taking account of the human factor--was once regarded more or less like the paint applied to the product at the end of the production process. Now, it is being thought of more as the steel frame on which the structure is built.

Gremlins and Gremlin Hunters

But the enemies of the user are many. They include inconsistent command languages, confusing operation sequences, chaotic display formats, inconsistent terminology, incomplete instructions, complex error recovery procedures, and misleading or

threatening error messages. Designers, managers and programmers must stand ready to battle such opponents on behalf of the user if their products are to earn the user's trust.

New technologies provide remarkable, even seemingly preternatural, powers to those who master them. Because of the newness of all computer technology, great excitement is generated by the introduction, refinement or dissemination of new functions performed by simple and elegant interactive systems. The opportunities for system builders and entrepreneurs are considerable, since only a fraction of the potential functions the technology might perform has been explored, let alone developed for the market.

Like early cameras or automobiles, computers are available only to people who devote extensive efforts to mastering the technology. Computer designers are needed who simultaneously understand the technology, are sensitive to human limitations and needs and can apply the principles of both computer science and psychology.

Computer manuals always have been a big stumbling block because of the dense and incompetent style in which they have been written. Efforts are being made to remedy this with manuals, on-line tutorials, and other training aids produced by teams of experts who combine both knowledge of the technology and the ability to explain its use. Psychologists, sociologists, policy-makers, managers, and even philosophers are trying to cope with such questions as organizational impact, computer anxiety, redesign of jobs, retraining, work at home terminals, and long-term societal changes.

Progressively more powerful interactive systems are the 'Holy Grail' sought by most computer designers, but the challenges of user friendliness in such systems is especially great, and painstaking testing, redesign and retesting is essential. As Ben Schneiderman points out (in Forester 1989), the best designers even go beyond mere user friendliness to probe deeper into the diverse characters of their users and the tasks they may want to perform. Effective systems generate positive feelings of success, competence and confidence among users. The users can predict what is going to happen with each of their actions. In a well-designed interactive system, the system should almost disappear from the user's awareness, enabling

the user to concentrate on the task at hand, rather than the means to accomplish it. But to create such an effortless user environment requires a great deal of effort and hard work on the designers' part.

Education

The mere presence of computers in schools, alone, will not improve learning. They are only additional building blocks in the process of 'constructing minds' in which teachers and students are collaborating.

The fast pace of change in recent decades has made the educational enterprise increasingly problematic. What one generation learned in childhood no longer seems to be relevant twenty years later, in adulthood. Education has become less focused on learning 'facts'--although that, too, is necessary--but more on learning how to quickly learn new paradigms, or ways of viewing the world, since many of the old ways will soon no longer be useful. Part of the challenge is to do that in an orderly manner, which promotes the needed qualities of flexibility without discarding those elements from the past which remain valuable.

Although they are not the 'final answer', computers, networks, hypertext, hypermedia, expert systems, and other such exotic tools can be applied to education in ways which will assist the process.

An example, from the study of animal behaviour, might start with the simple question any child might ask, 'Why do animals do what they do; and why is it different from the ways humans would do the same things?' Theories of the innateness of animal instincts can be learned from books, but they only go so far. On the other hand, the children can now create dynamic simulations of animal behaviour on a classroom computer, testing the theories and gaining a broader and more internalized understanding of that particular field of knowledge.

Attributes of modern computer-mediated education which can be beneficial include their greater interactivity and flexibility; their ability to 'become' any and all *other* media including books; their ability to present information and 'facts' from many different perspectives; their ability to

generate dynamic simulations such as the animal behaviour example cited above. They can reflect and fabricate goals to supplement, critique and enhance the goals of their users. Finally, networking will provide online library resources and data banks accessible to everyone and far beyond what any individual or institution could call upon in the past.

Alan C. Kay (1991) foresees that contemporary developments will lead to massively interconnected, intimate computers so commonplace that the relation of humans to them will change qualitatively. Much of the information the systems yield will be conflicting, so the ability to critically assess the value and validity of many different points of view and to recognize the contexts out of which they arise will become increasingly crucial. Somewhat the same needs arose when printing made books readily available, but they were on a much smaller and less immediate scale. If the full potential of computers and networks is realized, comparison of many texts may actually become easier, hopefully resulting in more adequate bases for judgement.

Effects on Literacy and Culture

Computers, networks and interactive hypermedia undoubtedly will change our practice and understanding of literacy, although, as Tuman points out (1992: 3), 'literary debates of the 1980s often either ignored computers or treated them as obstacles.' The authors in Tuman's volume, however, are said to see in computers 'the possibility for extending literacy by making more accessible all sorts of stored materials, pictures as well as texts.'

Many of the social and psychological changes necessitated by a computerized culture have been touched on in other sources cited above, but the authors in Tuman's book bring them into sharper focus. George P. Landow, for example, discusses how 'hypertext, metatext, and the electronic canon' will change the ways we use books--even the great literature of the past (in Tuman 1992: 67-94). The context of a work--whether historical, literary, ideological, or in terms of the author's psychology and personal history--will be instantly available at any point in the reading. Passages can be juxtaposed in any way the reader wishes. Variant readings can be called up at will, as can comparisons with other works,

commentaries, reviews, etc. In short, the non-sequential ways of reading hypertext open many possibilities not present in the sequential reading of printed books.

The advantages of hypertext include breaking down the tendency to canonize literature--wherein certain works were required and others, often of equal value but simply 'out of style' were ignored. The various fads which have created canons of literature in the past can be evaluated more readily through the use of hypertext, and a truer picture of quality and value can hopefully emerge.

Some of the disadvantages and dangers of such an approach to literature are addressed in the discussion section following Landow's chapter. Landow notes (Tuman 1992: 109), that some 'see the potentially atomizing tendencies of computing.' Computer users

'will increasingly avoid human contact as, squirrelled away in their rooms, they commune with their video screens.' But studies have shown that shy students may, in fact, be liberated by computer communication, participating in computer communities in ways they could not do in classrooms.

In the same discussion, Tuman asks Landow if there is not a danger of 'channel-surfing', as students with television-induced brief attention spans jump around in the hypertext environment to find the path of least resistance. Landow answers that hypertext offers a far wider range of relevant material than traditional classrooms and texts can provide, thereby offering more to keep students interested; but he admits that hypermedia materials 'offer little to the student who wishes to avoid choice, active learning, and independent thought' (p. 111).

V. 'South', 'North', Computers and Networks

Linda Harasim and Jan Walls (Eds.). *Globalizing Networks: Computers and International Communication*. Cambridge, MA: MIT Press (forthcoming, August 1993). [Unfortunately, the text of this book was only available to us after the main articles had been completed - please see end notes P.31].

Robert Schware and Ziauddin Choudhury. 'The Role of Information in Third World Development'. In *Computers in the Human Context*, edited by Tom Forester. Cambridge, MA: MIT Press, 1989, pp. 502-508.

Doris M. Schoenhoff. *The Barefoot Expert: The Interface of Computerized Knowledge Systems and Indigenous Knowledge Systems*. Westport, CT: Greenwood Press (forthcoming, July 1993).

Computer technology has largely been developed in the industrialized countries of 'The North', and its effective application, for business, industry, research, education, warfare, and most other human activities, has largely been carried out in those same countries. A few former 'Third World' countries--particularly the emerging industrial powers of East Asia--have made the technology their own, entering into its lowest levels initially through manufacturing, but later climbing to the rarefied heights of independent design and application of software and systems.

Most of the less-industrialized 'South', however, has been left out. Lacking both expertise and capital, and often hampered by their large but poorly-educated work forces, many nations of Latin America, Africa,

South Asia, and some in Southeast Asia, have been unable to develop even to the level of bonded manufacturing for foreign electronics companies, where such 'little tigers' as South Korea and Taiwan got their start. 'The South' nevertheless, is interested, sometimes because of a sober recognition that the game of the future is going to be played on that field, sometimes only because electronic technology has become the shiny new symbol of 'modernization'. And sometimes the over-eager become prey for slick salesmen, who dump upon them, at prices they can ill afford--often at the cost of massive foreign debt--technologies inappropriate to their real needs and which they lack the skills to maintain. Sussman and Lent (1991) have collected several reports on such misguided 'development' of communications infrastructure.

Among the most frequently expressed fears is that the present freedom and low cost of individuals' (at least of individual academics') use of networks will gradually be choked off as the profit motive takes over the satellite companies on which they depend. This is of special concern to critical theorists from 'The South', who are consistently on the lookout for signs of capitalist exploitation. However, the very complexity of the networks, easy availability of the necessary hardware and software, and continuing expansion of satellite relay systems under all sorts of control arrangements, all seem to offer assurance that numerous alternative pathways will remain available, outside any hegemonic control.

Who's the 'Expert'?

Expert systems--the incorporation into interactive computer packages of the successful strategies and tactics of experts in the past--can be taken as a case study of how some of the new technologies fare in developing countries. Doris Schoenhoff (1993) recognizes that such systems, based on western viewpoints, priorities and systems of logic, do not encounter a vacuum when they are brought in to solve problems in a developing country. Instead, they confront indigenous 'expert systems', already in place for years or centuries and structured to solve problems from the viewpoint of the local culture, oriented to seek its particular goals according to its own priorities and using its

own system of logic. Also, the dialogue between two people, the 'I' and 'Thou' of Martin Buber (1958), has an internality to both, a deep intersubjectivity which cannot be duplicated when communicating through the digitized programming of even the most sophisticated computer (Schoenhoff 1993: 131-133). Sophisticated expert systems often have programmed into them a 'fuzziness' approximating human thought processes, but the distinctions they make remain too sharp to adequately replicate the ambiguities and flexibility of the human mind (ibid. 135-138).

Nevertheless, if they are properly designed, expert systems and other innovations involving computers and networking need not conflict with indigenous knowledge and wisdom. Schoenhoff cites the case of the priests of the water temples of Bali, whose knowledge and wisdom, codified in religious terms, had created what a computer model confirmed to be 'one of the most stable and efficient farming systems on the planet' (1993, citing Cowley 1989, 50).

It is, in fact, an exciting and encouraging aspect of computer technology that it is open to the imaginative incorporation of all sorts of indigenous knowledge systems. The limitations are more likely to be in the user, rather than the system. Used properly, the system can reinforce and build on the accumulated knowledge of many cultures. The user must, however, be someone who is not limited by ethnocentric assumptions about what is 'logical' or 'rational', but must be open to the wisdom of the 'barefoot experts'.

Perspective¹

Since microcomputers are everywhere there is no question any more about the possibilities of networking. It is possible nowadays to study conditions and develop new practices of work incorporating a growing number of non-expert users.

Development of information technology is based on communications and networks. This fact opens opportunities for many organizations to communicate more easily with each other and to cooperate on different projects.

For the past ten years many institutions have been working on the automation of their information resources. The arrival of

microcomputers was very useful for that purpose. Their main functions include the management, processing and manipulation of information.

The implicit assumption always has been present that information is equivalent to development. Computing technology based on data processing and access has been used to strengthen the idea that progress is a question of volume of information. We have tended to believe that economic and social development meant knowledge or the quantity of available data.

Recently, as we have mentioned, many institutions have begun to interact with

information systems, even if some of them have not yet established a complete electronic infrastructure.

Networking raises problems about information. How can we gain access to information that others have? How can we disseminate our own data? In this context, network systems that began as contact points between persons and their concrete experiences run the risk of becoming mere channels to transmit information.

We have to distinguish two levels: the network as a technical reality composed of computers, cables, modems, satellites, bits and bytes, on the one hand, and, on the other, the network as a human phenomenon for communication among persons. Every computer used to process texts or numbers or for accessing data bases can become a communication station with a software communication programme, a modem and a telephone line (Rodríguez 1989).

This distinction is very important if we keep in mind that the networks are, after all, human networks. The question of how to design such networks and train people to use them then becomes completely different.

Interest in electronic mail had its origin in the need of people to communicate fluently through network systems. In this context, networking is--more than a technical issue--a matter of design of efficient human interaction based on the use of technology (Flores and Winograd 1986).

Technology, by itself, does not produce effective communication. It can help in the transmission of bits and bytes, but it is unable to coordinate efficiently, by necessary

actions, to create conditions to develop new projects. There is an irreducible aspect in human language that makes even the most sophisticated machines incapable of replacing the human capacity to construct human networks based on language.

Networks become less a technological phenomenon and more a design of effective human interactions which only use technological means. From this point of view, a method is lacking for the theoretical and practical analysis of ways to use networks effectively in development projects.

Microcomputers are now less expensive and more accessible to non-specialized users. Telecommunication systems and international transmission services are growing, and even though communication costs remain high they will almost inevitably decline.

In this situation, communication through computers is not just another function that can be added to daily procedures, for processing text or consulting data bases. Communication allows us to develop network systems, share resources, initiate new projects, design new organizations, and, at the end, to coordinate action with others.

Communication networks and the comprehension of the use of information must today be among the central considerations in defining informatics policy for this decade.

Information technology is a powerful tool to transform this affirmation into reality. The future world will be a world of network systems. Concrete actions and the capacity to participate in networks of interaction at a global level will be important factors for organizations that wish to play a central role in development.

1. This 'Perspective' section is largely based on 'Redes de comunicación y nuevas prácticas de trabajo', by Gabriel Rodríguez, in *Telos* (Madrid), No. 19 (1989), pp. 76-82.

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AFTERWORD

by William E. Biernatzki, S.J.
Editor, *Communication Research Trends*

In his 'Perspective' section, above, Dr. Rodriguez emphasized that computer networks are, above all, **human** networks. They allow humans to express their thoughts more cogently and efficiently, both to others and even to themselves. They permit us to control and use more information, to greater effect, than ever was possible in the past.

Nevertheless, computers are more than mere 'tools'. They create new forms of psychology and society. As Sherry Turkle pointed out almost a decade ago, computers even become 'second selves'. My 'dialogue' with my computer supplements my intra-mental 'dialogue' with myself; so my use of the computer becomes almost an extension of my own, internal thought processes. And, not only does my use of the computer change or extend my mental equipment, but communication with others through the computer differs markedly from other forms of communication. In some ways it codifies or structures communication, making its patterns more rigid, but in other ways it makes it freer and more intimate.

The networking of computers, giving access to millions of people in many countries, adds a new

cultural dimension to the new psychological and social dimensions. In a real sense, those in frequent computer communication with each other can begin to create new societies, and even new subcultures, without reference to geographical limitations. With Internet expanding, according to some estimates, at a rate of thirty percent per year, this new human environment is becoming increasingly more important for all of us.

Computer networking started with governments and soon was taken up by businesses, but now its most rapid growth appears to be among academics and non-governmental organizations (NGOs). Networks can be used both for conservative interests and subversively--to reconfirm the status quo, or to undermine it and promote the substitution of new structures for old.

The rapidly spreading use of networks by NGOs and individuals with every conceivable ideology and interest to promote is especially significant in a period when governments and other official sources of authority are tending to lose credibility with ordinary people. That disenchantment is caused much more by historical circumstances and mass media than by computer communication. But the NGOs are rising in influence, as states decline, and

they find a powerful instrument for organization and solidarity in the computer networks.

This new, global socio-political environment should not be ignored by people, such as religious leaders and educators, with more traditional 'causes' to promote. They need to recognize the subtle, but important social and psychological effects these changes are having on people. Neither should they neglect the opportunities to improve their own work which these new media offer to them.

Journalists, broadcasters and other professional communicators often are closer to the new technologies, are using them, and are necessarily aware of the changing human environment, although they may not fully appreciate its implications. Rapid, more economical and more efficient transmission of news and information is only one of the assets offered by the computer networks. Old ethnic barriers can be surmounted more easily. Even the smallest newspaper or broadcasting station can develop its own worldwide network of sources. Imagination and resourcefulness place almost the only limits on how these can be used

for more humanly meaningful, insightful and interesting media production.

The appearance of the communication satellite has prompted fears in non-Western countries of electronically mediated 'cultural imperialism', as floods of foreign mass media products inundate their countries. Computer networking, fully utilized, may have an opposite effect. For example, on-line information sources may soon give any computer-linked library, in even the most poverty-stricken country, inexpensive access to resources approaching those of the world's most advanced research libraries. A major development bottleneck--the lack of information sources for research--may then be overcome, putting each region's scientists, scholars and development workers on the same footing as those in the most information-developed centres.

Getting adjusted to the computer age can be painful--especially for 'old dogs' who must learn 'new tricks' in order to participate. But the pain can be worth it in terms of the many riches to be found in the nooks, crannies and secret rooms of the ever-growing electronic castle to which the networks give access.

CURRENT RESEARCH

INTERNATIONAL

Although not, properly speaking, 'research' institutions, various computer networks provide access to a wide variety of research information from corresponding centres and individuals. Some of their addresses follow:

Addresses of networks which can be reached through the Association for Progressive Communication (APC), 18 DeBoom St., San Francisco, CA 94107 USA; [e-mail: apcadmin@apc.org]:

Alternex: supporte@ax.apc.org (Brazil)
Chasque: apoyo@chasque.org.uy (Uruguay)
ComLink: sysop@oln.zer (Germany)
GlasNet: support@glas.apc.org (Russia)
GreenNet: support@gn.apc.org (U.K.)
Institute for Global Communications
(includes PeaceNet): support@igc.apc.org (U.S.A.)

Also:

Howard Frederick: hfrederick@igc.apc.org (U.S.A.)
Nicarao: ayuda@ni.apc.org (Nicaragua)
NordNet: support@pns.apc.org (Sweden)
Pegasus Networks/EarthNet: support@peg.apc.org (Australia)
Web: support@web.apc.org (Canada)

--source: Luber 1993:133-135.

Academic services:

Internet, Earn (European Academic Research Network), and similar services are best approached by contacting the computer services section of a university or other academic or research institution in your local area or with which you are associated.

ARCHIE, see discussion under 'Canada', below.

Subscription services:

CompuServe: Offers many computer services and information about computers. Contact address: CompuServe Information Service, Inc., 5000 Arlington Centre Boulevard, Columbus, OH 43220, USA; Tel: +1 (617) 457-8600. (Lowest basic rate in the U.S. in 1990 was \$6.25 per hour.) (Source: Glossbrenner 1990:97, 99.)

AUSTRALIA

Deborah Lupton (University of Western Sydney, Nepean, NSW, PO Box 10, Kingswood, NSW 2747. Univ. Tel: +61-47-360222; Univ. Fax: +61-47-360714) delivered a paper at the 1993 conference of the International Communication Association on 'Virus as Metaphor: Computer Technology and Body Invaders'.

AUSTRIA

Michael Latzer (Austrian Academy of Sciences, 1010 Vienna, Dr. Ignaz Seipel-Platz 2. Univ.Tel: +43-1-51581; Univ.Fax: +43-1-513-9541) and **Graham Thomas** (University of East London, Romford Rd., Stratford, London, E15 4LZ, England. Univ.Tel: +44-81-590-7722; Univ.Fax: +44-81-590-7799) delivered a paper, 'Audiotex vs. Videotex in Europe' at the 1993 conference of the International Communication Association.

BELGIUM

Groupe de Reserche pour une Stratégie Economique Alternative (GRESEA) (M. François, GRESEA, 11 rue Royale, 1000 Brussels) serves as a clearinghouse for information related to computer and networking technologies and monitors both political and technological aspects of related issues in Europe and the United States. It publishes a monthly bulletin with information from both developed and less developed countries on relevant topics.

BOLIVIA

Centro de Documentación e Información (Casilla 3302, Cochabamba; Fax: +591 42 51086; Tel: +591 42 21707) is concerned with policy on access to information, especially with access for Andean countries to scientific and technological information produced by the EEC.

BRAZIL

Carlos Alfonso (Instituto Brasileiro de Análisis Sociales y Económicos (IBASE), Rua Vicente de Souza 29, 22251 Rio de Janeiro; Tel: + 55 21 274 4537).

CANADA

Linda Harasim (Simon Fraser University, Burnaby, BC, V5A 1S6. Univ.Tel: 0101-604-291-3111; Univ.Fax: 0101-604-291-4455), and **Jan Walls** have edited a book, *Globalizing Networks: Computers and International Communication*, scheduled for publication by MIT Press in August, containing contributions from eighteen major authorities on the topic, from a number of different countries.

McGill School of Computer Science Archive Server (ARCHIE), was developed at McGill University (845 Sherbrooke St. West, Montréal, Qué. H3A 2T5. Univ.Tel: 0101-514-398-4455; Univ.Fax: +1-514-398-3594) as a system to search through the maze of Internet for specific files. To reduce the load imposed on McGill by this almost-indispensable service other Archie sites have been made available in various countries, for example, USA: telnetarchie.sura.net (login:

archie); UK/Europe: telnetarchie.doc.ic.ac.uk (login:archie); Finland/Europe: telnetarchie.funet.fi (login:archie); Australia/New Zealand: telnetarchie.au (login:archie); Israel: telnetcs.huji.ac.il (login:archie), etc.

David Mitchell (University of Calgary, 2500 University Drive NW, Calgary, Alta T2N 1N4. Univ.Tel: +1-403-220-5110; Univ.Fax: +1-403-282-7298) delivered a paper, 'developing a Database and Indexing system Specifically for the Networking of Communications Research' at the 1993 Dublin meeting of the International Association for Mass Communication Research.

CHILE

Comisión Económica para América Latina y el Caribe (INFOLAC-CEPAL) (Casilla 179-D, Santiago; Fax: +56 2 480252; Tel:+56 2 485051) studies the implementation of networking in Latin America, the application of new technologies to cooperation in the region, publishes bulletins on networking experiences in different countries, and offers human resources training programmes.

Comisión Nacional de Investigación Científica y Tecnológica (CONICYT) (Canada 308, Santiago; Fax: +56 2 209 6729; Tel: +56 2 274 4537) is a governmental institution designed to implement an information service which will modernize access to data through academic networks. It is involved in research and development of special applications for Internet.

COSTA RICA

Instituto Costarricense de electricidad (ICE) (A. Postal 10032 - 1000 San José; Fax: +506 200933; Tel: +506 206005, and 325052, and 200935) is involved with data bases, technical cooperation, telecommunications, and geographical information.

DENMARK

Robin Cheesman (Roskilde University, POB 260, Marbjergvej 35, DK-4000 Roskilde. Univ.Tel: +45-46-75-77-11; Univ.Fax: +45-46-75-74-01) delivered a paper on 'Authorship and Copyright of Texts on Electronic Networks' at the 1993 Dublin meeting of the International Association for Mass Communication Research.

FRANCE

Marcia Bossy, Ghislaine Chartron, Pierre Jancene and Sabine Coquillat (all of CFRESI/CNRS, Centre National de Recherche Scientifique, 15 quai Anatole, 75700 Paris. Univ.Tel: +33-1-47-53-15-15; Univ.Fax: +33-1-45-51-73-07) delivered a paper, 'Electronic Networks and Scientific Communities: the INRIA Graphlib

Example' at the 1993 Dublin meeting of the International Association for Mass Communication Research.

Yvonne Mignot-Lefebvre (CNRS-CECOD, Université de Paris I (Panthéon-Sorbonne), 12 place du Panthéon, 75231, Paris Cedex 05. Univ.Tel: +33-1-46-34-97-00) co-convened, with **Howard Frederick** (American University, Washington, DC, USA) and **Guy Pelachaud** (see below) a panel on 'Computer Networks and the Emergence of Civil Society' at the 1993 Dublin meeting of the International Association for Mass Communication Research.

Guy Pelachaud (Université du Maine, Ave. Olivier Messiaen, BP 535, 72017 Le Mans Cedex. Univ.Tel: +33-43-83-30-00) delivered a paper on 'The Networks of Scientific Communication: Yesterday and Today' at the 1993 meeting of the International Association for Mass Communication Research, in Dublin.

Isabelle Rieusset-Lemarie (Université de Caen, Esplanade de la Paix, 14032 Caen Cedex. Univ.Tel: +33-31-45-55-00; Univ.Fax: +33-31-45-56-00) delivered a paper on 'User-friendly Transnational Networks and the "Invisible College" of Users', at the 1993 Dublin meeting of the International Association for Mass Communication Research.

Thierry Vedel (Centre National de Recherche Scientifique, 15 quai Anatole, 75700 Paris. Univ.Tel: +33-1-47-53-15-15; Univ.Fax: +33-1-45-51-73-07) and **Laurence Caby** (Institut National des Telecommunications) delivered a paper, 'Comparing Audiotelex and Videotelex in the Land of Minitel' at the 1993 conference of the International Communication Association.

HONG KONG

Benjamin J. Bates (Chinese University of Hong Kong, Shatin, N.T. Univ.Tel: +852-6952111) delivered a paper on 'The Macrosocial Impact of Communication Systems: Access, Bias, Control' at the 1993 conference of the International Communication Association.

IRELAND

Lee Komito (University College, Belfield, Dublin 4. Univ.Tel: +353-1-2693244; Univ.Fax: +353-1-2694409) made a presentation at the 1993 Dublin meeting of the International Association for Mass Communication Research on, 'Electronic Networks and Information: Ireland and European Integration'.

MEXICO

Fundación Arturo Rosenblueth (Insurgentes Sur 670 - 30. Piso, Mexico 03100 D.F.; Tel: +52 523 5200 and 536 4782 and 543 3241 and 523 4704) studies local networking, information activities in organizations, and technological modernization, as well as offering courses at both undergraduate and graduate levels.

Instituto Latinoamericano de Estudios Transnacionales (ILET) (Canadá 190, Parque San Andrés Coyoacán, México, D.F., C.P. 04040; Fax: +52 5 544 1642; Tel: +52 5 549 1106 and 549 6711) **Gabriel Rodríguez** is a member of its academic committee with a special interest in computer networking, and **Soledad Robina** is coordinator of the 'Program of Research into New Technologies of Information and Communication', which involves research on data bases and networking in Latin America, including monitoring telecommunications development in the region, research on access to networks in different countries, and studying users' needs.

Laboratorio Nacional de Informática Avanzada (LANIA) (Enrique Rébsamen 80, Xalapa, 91000 Veracruz, A.P. 696; Fax: +52 281 81508; Tel: +52 281 81302 and 85352, 85662, and 85932), directed by **Cristina Loyo**, is engaged in research to promote development and application of new information technology, especially research on the workgroup environment and transfer of technological innovation to the productive sector.

Red Latina (LATINET) (Periférico Sur 3190, México, D.F. 01900; Tel: +52 5 652 4199 and 568 4472), directed by **Juan José Miró**, does international research on new technologies for networking and for the promotion of network development in Latin America, as well as providing information to users on access to networks.

SLOVENIA

Boris Horvat (c/o University of Ljubljana, Faculty of Social Sciences, Kardeljeva pl., 61000 Ljubljana) made a presentation on computer networking in the countries of former Yugoslavia, at the 1993 International Association for Mass Communication Research meeting in Dublin, Ireland.

SPAIN

Centro Regional para la Enseñanza de la Informática (CREI), directed by Manuel Ruiz Cubiles (CREI, Apdo. de Correos 232, 28080 Madrid; Fax: +34 1 619 6756; Tel: +34 1 91 410 0281 and 410 0661) studies information policies, health informatics and education management. It developed ALTERNEX, an alternative data

communication network designed to interconnect non-governmental and grassroots organizations in Latin America through electronic mail, conferencing and remote access to data bases.

Fundación para el Desarrollo de la Función Social de las Comunicaciones (FUNDESCO) (Alcalá 61, 28014 Madrid; Tel: +34 1 435 1214) is concerned with the whole panorama of the communications media, including telecommunications, publishing and broadcasting.

UNITED KINGDOM

Raúl Espejo (Management Centre, University of Birmingham, Birmingham B47 8E1, England; Tel. +44 (0)21 359 3611) has been continuing research initiated by **Stafford Beer** and his team devoted to cybernetics and human organizations.

Robin Mansell (University of Sussex, Falmer, Brighton, Sussex BN1 9RH. Univ.Tel: +44-(0)-273-606755) organized a panel on 'Restructuring Electronic Networks and Smaller/Peripheral Economies in Europe' at the 1993 Dublin meeting of the International Association for Mass Communication Research, and was co-convenor, with **Yvonne Mignot-Lefebvre** (see, France, above) and **Guy Pelachaud** (Université du Maine, Ave. Olivier Messiaen, BP 535, 72017 Le Mans Cedex, France. Univ.Tel: +33-43-83-30-00) of a panel on 'Information Systems, Services and the "Invisible College"', at the same meeting.

UNITED STATES

At the **University of Alabama** (Tuscaloosa, AL 35487. Univ.Tel: +1-205-348-6010) **Susan Kim Joe** and **Elizabeth S. Lane** delivered relevant papers at the 1993 conference of the International Communication Association. Joe's was titled, 'Socioemotional Use of Computer-Mediated Communication', and Lane's was on 'Discourse and Distortion in Computer-Mediated Communication'.

Robert Bellamy (Duquesne University, 600 Forbes Ave., Pittsburgh, PA 15283. Univ.Tel: +1-412-434-6000) chaired a panel at the 1993 conference of the International Communication Association on 'Networks and Computer-Communications Mediated Group Decision Making'.

Guy Burgess (Conflict Resolution Consortium, University of Colorado, Campus Box 327, Boulder, CO 80309-0327; Tel. +1 303 492 1635; E-mail (Internet): cro@cubldr.colorado.edu) is interested in telecommunications and in information storage and retrieval as they relate

to peace and change research.

Sandra Calvert (Georgetown University, 37th & O Sts. NW, Washington, DC 20057. Univ.Tel: +1-202-687-5055) presented a paper at the 1993 conference of the International Communication Association on, 'Development Differences in Children's Attention to Computer Versus Television Programs'.

Steven Dick (McNeese State University, Lake Charles, LA 70609. Univ.Tel: +1-318-475-5000) chaired a panel on 'Using Executive Support Systems, Computer-Mediated Communications and Policies for the Workplace' at the International Communication Association's 1993 conference.

Linda K. Dobbs (Ohio State University, 190 North Oval Mall, Columbus, OH 43210. Univ.Tel: +1-614-292-6446) presented a paper at the 1993 conference of the International Communication Association on, 'An Examination of the Validity of Computer and Non-Computer Person Stereotypes'.

Howard Frederick (American University, 4400 Massachusetts Ave. NW, Washington, DC 20018. Univ.Tel: +1-202-885-1000; E-mail: Hfrederick@igc.org.apc) heads the Institute for Global Communications, San Francisco, and was instrumental in organizing the Association for Progressive Communications.

Gary Garriott (Director of Informatics, Volunteers in Technical Assistance, Washington, DC) gave a presentation at the International Communication Association 1993 conference on the **VITA** programme for technical assistance to development field workers. Through links by relatively inexpensive, low-powered ground stations (VITASAT) linked in periodic, 100-minute passes to satellites orbiting at 800 km. altitude, ground to ground links (VITAPAC), and low cost e-mail (VITANET), VITACOM already gives 5,000 development volunteers in remote locations to the resources of Internet.

Mazharul Haque (University of Southern Mississippi, Southern Station, Box 5001, Hattiesburg, MS 39406. Univ.Tel: +1-601-266-5001; Univ.Fax: +1-602-266-5756) delivered a paper on 'New Technologies and the Emergence of the Information Society in the Developing World' at the 1993 conference of the International Communication Association.

Doug Heacock (Academic Computing Services, The University of Kansas, Lawrence, KS 66045; Tel: +1 913 864 0100; e-mail: heacock@ukanvax) studies computer-mediated communication.

Abbas Malek (Howard University, 2400 Sixth Street, NW, Washington, DC 20059. Univ.Tel: +1-202-806-2500) and **Howard Frederick** (see above) co-chaired a panel on 'Global Communication as a Field of Study and Education' at the 1993 conference of the International Communication Association.

At the **Massachusetts Institute of Technology (MIT)** (Cambridge, MA 02139. Univ.Tel: +1-617-253-1000), **Nicholas Negroponte** is director of **Media Lab**, a research facility devoted to the study of the convergence of different communications media: TV, telephone, recordings, film, newspapers, magazines, books, networks and computers.

NYSERNet Inc. (111 College Place, Syracuse, NY 1344-4100; Tel: +1 315 443 4120), the New York State Education and Research Network, is a regional network of the U.S. National Science Foundation's NSFNET, and Internet. It has issued *NYSERNet Internet Guide*, 'created to fill what we perceive to be a void in user information about the Internet' which is available from the above address (\$25, or \$18 to NYSErNet Affiliates and Interest Group members). Version 2.2 was issued in April 1992. Since Internet is so vast, the 'Introduction' to this guide stresses that its listings, though extensive, can only 'illustrate the types of resources currently available' and that other directories to Internet should be obtained as well.

Elliott S. Parker (e-mail: 3zlufur@cmuvm [Bitnet], or 3zlufur@cmuvm.csv.cmich.edu [Internet]) has been developing a cumulative bibliography on computer communication and networking, available through the following procedure: 'The newest copy of this list can be obtained by sending email to COMSERVE@RPIECS.BITNET and putting only the one line, SEND COMPUNET BIBLIO in the body or from LISTSERV@CMUVM.CSV.CMICH.EDU, inserting SEND NETSTART INFO in the body. It is also available via anonymous FTP from the Library Software archives at HYDRA.UWO.CA in directory LIBSOFT.' (Source: Parker, e-mail preface to Version 2.2 of 'Getting to Start: Selected readings in computer communication', dated November 1992.)

At **Rensselaer Polytechnic Institute** (110 8th St., Troy, New York 12181. Univ.Tel: +1-518-276-6000; Univ.Fax: +1-518-276-6003) **Teresa M. Harrison** (e-mail: harrison@vm.its.rpi.edu [Internet], and harrison@rpitsvm [Bitnet]) and **Timothy Stephen**, of the Department of

Language, Literature, and Communication, are editing a collection of original essays on 'computer networking and scholarship in the 21st Century university'. Rensselaer is also the base of **Comserve**, 'a BITNET-based electronic information service for people interested in human communication studies. The service is also available to internet users. Services include journal citations, job hotline, user directory, fileservers, and more. Access: for Internet-based users, send electronic mail to comserve@vm.rpi.its.edu' (Source: *NYSERNet Internet Guide*, Version 2.2, April 1992).

William E. Smith (School of Journalism, Northeastern University, 102 Lake Hall, Boston, MA 02115-5004; e-mail: billsmith@ds5000.dac.northeastern.edu) has been studying computers and writing and the computer/human interface, as well as artificial intelligence.

An all-**Stanford University** panel at the 1993 International Communication Association Annual Conference focussed on 'Social Responses to Communication Technology.' The panel was chaired by **Clifford Nass**. **Jonathan Steuer**, **Lisa Henriksen**, **D. Christopher Dryer**, **Ellen Tauber**, and **Heidi Reeder** delivered a paper titled, 'Computer as Social Actor II: Voice is the Mirror of the Soul'. **Nancy Green's** paper was, 'Can Computers Have Genders?' S. Shyam Sunder presented a paper, 'Communicator, Programmer, or Independent Actor: What are Computers?' Glenn Leshner's paper was, 'The Effects of Social Roles of Technology on Content Perceptions: A Tale of Two Televisions'. Jonathan Steuer, reported on 'Telecommunities and Social Responses to Communication Technologies.' (Stanford University, Stanford, CA 94305. Univ.Tel: +1-415-723-2300)

Roy Tennant (Public Service Automated Systems Coordinator, The Library, University of California at Berkeley, Berkeley, CA 94720) has written an 'Internet Basics Digest', which describes Internet and how it works. It is available electronically or on paper by contacting

Nancy Preston at NPRESTON@SUV.M. ACS.SYR.EDU or *Eric Digest*, ERIC Clearinghouse on Information Resources, Syracuse University, Syracuse, NY 13244-2340 (Fax: +1 315 443 5448; Tel: +1 315 443 3640).

Jim Thomas (Department of Sociology, Northern Illinois University, DeKalb, Illinois 60115; Tel: +1 815 753 6430; e-mail: tkjut1@niu) is interested in computer culture.

James R. Walker (Memphis State University, Memphis, TN 38152. Univ.Tel: +1-901-678-2000) chaired a panel on, 'Mapping and Measuring Communications Impact in Electronic Space' at the 1993 conference of the International Communication Association.

Scott Yanoff (e-mail: yanoff@csd4.csd.uwm.edu) has developed a list of internet resources. Updated versions are available from his e-mail address.

URUGUAY

Istituto de Comunicación y Desarrollo (ICE) (Avda. 18 de Julio 1431 of 601, 11200 Montevideo; Tel: +598 2 911646) has a wide range of interests in documentation, research, training and consultancy related to

communication, including network applications for grassroot initiatives.

VENEZUELA

Escuela Latinoamericana de Redes (Universidad de los Andes, A. Postal 49, Mérida; Fax: +58 74 401286; Tel: +58 74 401379) does research and training on data transmission and networking management.

Sistema automatizado de información científica y tecnológica (SAICYT) (Avda. Alejandro Hernández, Edif. Maploca 1, Los Curtijos de Lourdes, Los Ruices, Caracas, A. Postal 70617; Fax: +58 2 348304; Tel +58 2 398344 and 390577) provides access to scientific and technological information on line, e-mail access and remote computing services.

ADDITIONAL BIBLIOGRAPHY

NB: This section contains a limited selection of recent books, articles and journals not referred to in the text but which have some significance for the topic. Some works mentioned under 'Current Research' may also be given fuller reference treatment here. Software, networks, etc., normally accessed electronically are listed under 'Current Research' and in the separate section containing on-line sources from GNET, not here.

Journals

Computers in Human Behavior.

Electronic Networking: Research, Applications and Policy. Quarterly. Meckler Corporation, 11 Ferry Lane West, Westport, CT 06880, USA.

The Information Society: An International Journal. Quarterly. Taylor and Francis, Inc., 1900 Frost Road, Suite 101, Bristol, PA 19007-1598, USA; or Taylor and Francis, Ltd., Rankine Road, Basingstoke, Hampshire RG24 0PR, UK.

International Journal of Man-Machine Studies.

In addition, there are many popular computer magazines, such as *PC Magazine*, *PC World*, *Byte*, etc., obtainable from newsstands.

Books and Articles

Abramson, Jeffrey B., et al. *The Electronic Commonwealth: The Impact of New Media Technologies on Democratic Politics.* New York: Basic Books, 1988.

Brand, Stewart. *The Media Lab.* New York: Viking, 1987.

Brody, E. W. *Communication Tomorrow: New Audiences, New Technologies, New Media.* New York: Praeger, 1990.

Burch, Steven. *Teleworking: A Strategic Guide for Management.* London: Kogan Page, 1991.

Dvorak, John C., and Nick Anis. *Dvorak's Guide to PC Telecommunications* (Second edition). New York: McGraw-Hill, 1992.

Gianone, Christine M. *Using MS-DOS Kermit: Connecting your PC to the Electronic World* (Second edition). Bedford, MA: Digital Press, 1992.

Hudson, Heather. *Communication Satellites: Their Development and Impact.* New York: Free Press, 1990.

Jouët, Josiane, and Sylvie Coudray. *New Communication Technologies: Research Trends* (Reports and Papers on Mass Communication, No. 105). Paris: UNESCO, 1990

Lane, Graham. *Communications for Progress: A Guide to International email.* London: Catholic Institute for International Relations, 1990.

Media and Values, No. 61 (1993), special issue on 'Global Communication: For the Powerful or the People?'

Mosco, Vincent. *The Pay-Per Society: Computers and*

Communication in the Information Age. Toronto: Garamond Press, 1989.

Mowlana, Hamid. *Global Information and World Communication: New Frontiers in International Relations*. New York: Longman, 1986.

Quarterman, John S. *The Matrix: Computer Networks and Conferencing Systems Worldwide*. Bedford, MA: Digital Press, 1990.

Rapaport, Matthew. *Computer Mediated Communications: Bulletin Boards, Computer Conferencing, Electronic Mail, and Information Retrieval*. New York: John Wiley, 1991.

Reeves, Geoffrey. *Communications and the 'Third World'*. London/New York: Routledge, 1993. Especially chapters 5, 'The new international information order', and 6, 'Data: technological "dependence" and communications'.

Schrage, Michael. *Shared Minds: The New Technologies of Collaboration*. New York: Random House, 1990.

Scientific American, special edition on communications, computers and networks. September 1991.

Singleton, Loy A. *Global Impact: The New Telecommunications Technologies*. New York: Free Press, 1989.

Sparks, Colin. *New Communication*

Technologies: A Challenge for Press Freedom (Reports and Papers on Mass Communication, No. 106). Paris: UNESCO, 1991.

Sproull, Lee, and Sara Kiesler. *Connections: New Ways of Working in the Networked Organization*. Cambridge, MA: MIT Press, 1991.

Strangelove, Michael (Ed.). *Directory of Electronic Journals and Newsletters*. Washington, DC: Association of Research Libraries, 1992.

Tennant, Roy, John Ober and Anne G. Lipów. *Crossing the Internet Threshold: An Instructional Handbook*. San Carlos, CA: Library Solutions Press, 1993.

United States Congress, Office of Technology Assessment. *Intellectual Property Rights in an Age of Electronics and Information*. Washington, DC: Government Printing Office, 1986.

Williams, Frederick. *The New Telecommunications: Infrastructure for the Information Age*. New York: Free Press, 1991.

Wilson, Kevin G. *Technologies of Control: The New Interactive Media for the Home*. Madison: University of Wisconsin Press, 1988.

Winograd, Terry, and Fernando Flores. *Understanding Computers and Cognition: A New Foundation for Design*. Norwood, NJ: Ablex, 1986.

SPECIAL SECTION ON-LINE SOURCES

This special section consists of titles listed in the GNET ARCHIVE which are obtainable either as abstracts or full documents from GNET. The list is included here because it represents a sampling of up-to-date resources available by computer networking and also because it has a 'Third World' and Eastern European orientation, somewhat compensating for underrepresentation of those regions in other parts of this issue of *Trends*. The list was made available through the courtesy of Howard Frederick, of the Institute for Global Communications and the Association for Progressive Communications.

This list shows the acquisition date and serial number (in GNET ARCHIVE), file

name, title, author, and length of each text file. If 'TXT' follows the file name the full text can be downloaded from GNET ARCHIVE.

920901 ARGENTINA
NETWORKS IN ARGENTINA
JOHN S. QUARTERMAN 22K

920902 AFRICAN COMM
LOW COST GLOBAL ELECTRONIC
COMMUNICATIONS NETWORKS FOR AFRICA
JENSEN, MIKE, AND GEOFF SEARS 23.2K

920903 AFRINET
GLOBAL NETWORKS AND INTERNATIONAL
COMMUNICATIONS: AFRINET
BELLMAN, BERYL L., & ALEX NDIMUBONA 40.5K

920904 AFR_INFRASTRUCTURE AFRICAN NET QUALITY TESTS USERS' METTLE: DEARTH OF DIGITAL FACILITIES, SUBPAR CONDITIONS, COSTS POSE OBSTACLE TO USERS EXTENDING NETS TO CONTINENT AND PRIVATE SECTOR HELPS AFRICA IMPROVE NETS: GOVERNMENTS ENCOURAGE CORPORATE PARTICIPATION IN BRINGING BETTER TELECOM NETS TO THE CONTINENT. SHETTY, VINEETA 17.9K	DEVELOPMENT GARRIOTT, GARY L. 37.9K
920905 CUBAN_NET A LOOK AT CUBAN NETWORKS LARRY PRESS AND JOEL SNYDER 8.5K	920915 RELCOM RELCOM, AN APPROPRIATE TECHNOLOGY NETWORK LARRY PRESS 23.5K
920906 FIDONET FIDONET(TM): USE, TECHNOLOGY, AND TOOLS RANDY BUSH 23K	920916 RINAF RINAF: A NETWORK INTERCONNECTION PROJECT OF ACADEMIC AND RESEARCH INSTITUTIONS IN AFRICA L. ABBA, S. GIORDANO, S. TRUMPY 40K
920907 FIDO_AFRICA FROM FIDONET TO INTERNET: THE EVOLUTION OF A NATIONAL NETWORK FRANCOIS JACOT GUILLARMOD 28.5K	920917 RIO_NETWORK RIO : AN OPERATIONAL NETWORK IN 6 SUB-SAHARIAN COUNTRIES OF AFRICA AND THREE PACIFIC ISLANDS PASCAL RENAUD & MONIQUE MICHAUX 19.5K
920908 GNET_METHODODOLOGY RESEARCH NETWORKS IN DEVELOPING C O U N T R I E S : A N A L Y S I S , METHODODOLOGICAL PRINCIPLES AND GUIDELINES FOR STARTING DANIEL PIMIENTA 50K	920918 SE_ASIA_PAC SOUTHEAST ASIA AND THE PACIFIC JOHN H. HINE 26K
920909 INET92 INET '92: THE START OF SOMETHING BIG LARRY PRESS 10K	920919 SOFTWARE_EXPORT STRATEGIES FOR SOFTWARE EXPORT LARRY PRESS 30.5K
920910 INETLIST LIST OF ATTENDEES OF THE WORKSHOP FOR DEVELOPING COUNTRIES AT INET92 STEFANO TRUMPY 5.5K	920920 SOUTHERN_AFRICA ACADEMIC AND RESEARCH NETWORKING IN SOUTHERN AFRICA V. A. SHAW 32.5K
920911 NGO_PERSPECTIVE AIMING FOR THE ELUSIVE PAYOFF OF USER NETWORKS: AN NGO PERSPECTIVE RUTH, STEPHEN R., & R.R. RONKIN 28.0K	920921 TOWARD_GNET TOWARD A TRULY GLOBAL NETWORK LARRY PRESS 27K
920912 NGO_SURVEY SURVEY: BASELINE STUDY OF ASIA PACIFIC COMMUNICATIONS ANDREW GARTON 9K	920922 VILLAGES NOTES ON COMPUTER COMMUNICATIONS IN DEVELOPING COUNTRIES ALBERT LANGER 31.2K
920913 OAS_INITIATIVE THE ORGANIZATION OF AMERICAN STATES HEMISPHERE-WIDE NETWORKING INITIATIVE SAUL HAHN, PH.D. 16.5K	920923 WIND_POWER AN OVERVIEW OF WIND POWER FOR REMOTE SITE TELECOMMUNICATIONS FACILITIES MICHAEL L. S. BERGEY 23.4K
920914 PACKET_RADIO PACKET RADIO IN EARTH AND SPACE ENVIRONMENTS FOR RELIEF AND	920924 XUSSR COMPUTER NETWORKING IN THE XUSSR MATTHEW HOGAN 72K
	921001 ASIA_PACIFIC PACTOK - ASIA PACIFIC ELECTRO-MEDIA GETS EARTHED! THE ASIA PACIFIC COMMUNITY COMPUTER NETWORK PROJECT BOB GARNSEY & ANDREW GARTON 22K
	921002 CHILE.TXT INNOVATION AS A CRITICAL SUCCESS

FACTOR FOR THE DEVELOPMENT OF AN
 INFORMATION TECHNOLOGY INDUSTRY IN
 CHILE
 PROFS. RICARDO A. BAEZA-YATES, DAVID A.
 FULLER AND JOSE A. PINO 26K

921003
 GLOBAL_SOCIETY.TXT
 COMPUTER NETWORKS AND THE
 EMERGENCE OF GLOBAL CIVIL SOCIETY:
 THE CASE OF THE ASSOCIATION FOR
 PROGRESSIVE COMMUNICATION
 HOWARD H. FREDERICK 37K

921004 GLASNET.TXT
 GLASNET (TM) - A NEW COMMONWEALTH
 COMPUTER NETWORK FOR INFORMATION
 INTERCHANGE
 DAVE CAULKINS <DCAULKINS@IGC.
 APC.ORG> 15.5K

921005 LIBRARY_BRAZIL.TXT
 PROTOCOLS FOR LIBRARY
 INTEROPERATION ON ACADEMIC
 NETWORKS
 LIANE MARGARIDA ROCKENBACH
 TAROUCO 34.5K

921006 GLOBAL UNIV.TXT
 TOWARDS ESTABLISHING A GLOBAL/LATIN
 AMERICAN (ELECTRONIC) UNIVERSITY
 AKESHI UTSUMI, PH.D. & ARMANDO
 VILLARROEL, PH.D. 68.5K

921008 ZAMBIA.TXT
 ELECTRONIC MAIL IN ZAMBIA: A REVIEW
 AS OF JUNE 1992
 MARK BENNETT 20.5K

921101 CUBAN_DB.TXT
 CUBACIENCIA: A DESCRIPTION OF A
 BIBLIOGRAPHIC DATABASE ON CUBAN
 RESEARCH
 FERNANDO MARTINEZ AND HAYMEE PEREZ
 2.5K

921102 RESEARCH_NET_GUIDE.TXT
 RESEARCH NETWORKS IN DEVELOPING
 COUNTRIES: NOT EXACTLY THE SAME
 STORY!
 DANIEL PIMIENTA 56K

921104 CARIB_LATIN_AM.TXT
 LATIN AMERICAN AND CARIBBEAN
 SURVEY, OCTOBER 1991, MARCH 1992, &
 JUNE 1992
 DANIEL PIMIENTA 11,392 BYTES

921105 CUBA.TXT

CUBA, COMMUNISM, AND COMPUTING
 G. M. MESHER, R. O. BRIGGS, S. E. GOODMAN,
 L. I. PRESS, & J. M. SNYDER 19.5K

921106 ECUADOR.TXT
 ECUADORIAN SCIENTIFIC AND TECHNICAL
 INFORMATION NETWORK (REICYT)
 MARCH, 1992
 EDGAR ZORRILLA 5,248 BYTES

921107 LA_LISTS.TXT
 A LIST OF LATIN-AMERICAN DISTRIBUTION
 LIST AND NEWSGROUPS
 PEDRO SLAZAR 3,072 BYTES

921108 LIBRARY_PACKET_RADIO.TXT
 COMMENTS ABOUT PACKET RADIO
 EDWIN BROWNRIGG, JAMES DALY 8K

921109 PERU.TXT
 RCP: THE PERUVIAN NETWORK, MARCH, 1992
 DANIEL PIMIENTA 4,480 BYTES

921110 VENEZUELA.TXT
 THE SAICYT (AUTOMATED TECHNOLOGICAL
 AND SCIENTIFIC INFORMATION SYSTEM) OF
 VENEZUELA, MARCH 1992
 PABLO LIENDO 3,714 BYTES

921201 CONFERENCIA SERVICIOS.TXT
 CONFERENCIA EN LOS SERVICIOS DE RED
 DANIEL PIMIENTA <PIMIENTA!DANIEL
 @REDID.ORG.DO> 10.5K

921202 SERVICES_CONFERENCE.TXT
 REPORT ON THE NETWORK SERVICES
 CONFERENCES
 DANIEL PIMIENTA <PIMIENTA!DANIEL
 @REDID.ORG.DO> 4.5K

921203 CHILEAN_INFORMATICS.TXT
 COMPUTING IN CHILE: LEADING THE WAY
 FOR OTHER SOUTH AMERICAN LDOS?
 LARRY PRESS<LPRESS@ISI.EDU> 5K

921204 BRAZIL_AMAZON.TXT
 COMPUTING IN THE BRAZILIAN AMAZON
 R.L. LA ROVERE S.E. GOODMAN
 <GOODMAN@MIS.ARIZONA.EDU> 17.5K

921205 CUBA.TXT
 CUBA, COMMUNISM, AND COMPUTING
 G.M. MESHER R.O. BRIGGS S.E. GOODMAN
 <GOODMAN@MIS.ARIZONA.EDU> L.I. PRESS
 <LPRESS@ISI.EDU> J.M. SNYDER 19.5K

921206 EAST_CENTRAL_EUROPE.TXT
 AN OVERVIEW OF EAST AN CENTRAL
 EUROPEAN NETWORKING ACTIVITIES

MILAN STERBA<MILAN.STERBA@VSE.CS> RICHARD BUDD<BUDD@CSPGAS11. BITNET>	32.5K	930104 APC_BROCHURE.TXT ASSOCIATION FOR PROGRESSIVE COMMUNICATIONS	3.5K 10.5K
921207 GLOBAL.TXT THE GLOBALIZATION OF COMPUTING: PERSPECTIVES ON A CHANGING WORLD S.E.GOODMAN<GOODMAN@MIS.ARIZONA. EDU>	12.5K	930105 NETWORKS_AND_DEV.TXT NON-COMMERCIAL COMPUTER NETWORKS AND NATIONAL DEVELOPMENT THOMAS L. JACOBSON<COMACKER @UBVMS.CC.BUFFALO.EDU> & SCOTT ZIMPFER	47.5K
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921209 POLITICAL.TXT POLITICAL ACTIVITY AND INTERNATIONAL COMPUTER NETWORKS S.E.GOODMAN<GOODMAN@MIS.ARIZONA. EDU>	5K	930107 NET_PROGRESS_OPPORTUNITY.TXT THE NET: PROGRESS AND OPPORTUNITY LARRY PRESS<LPRESS@ISI.EDU>	27K
921210 ROMANIA.TXT COMPUTING AND THE RESUSCITATION OF ROMANIA S.E.GOODMAN<GOODMAN@MIS.ARIZONA. EDU>	16K	930201 GLOBAL_VILLAGE.TXT OPENING DOORS IN THE GLOBAL VILLAGE ROSS ALAN STAPLETON<R.STAPLETON @COMPMAIL.COM>	18K
921211 COMPUTING_ROMANIA.TXT COMPUTING IN ROMANIA T. RUS<RUS@HERKY.CS.UIOWA.EDU	8K	930202 INFO_TECH_SUB_SAHARA.TXT INFORMATION TECHNOLOGY IN SUB-SAHARAN AFRICA M. ODEDRA, M. LAWRIE, M. BENNETT, S. GOODMAN<GOODMAN@MIS.ARIZONA.EDU>	24.5K
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930101 BUDAPEST_PACKET_RADIO.TXT REPORT ON THE BUDAPEST PACKET RADIO INTERNET EXTENSION DEMONSTRATION EDWIN BROWNRIGG <EBB@OTLET.BER KELEY.EDU> DEWAYNE HENDRICKS	6.5K	930402 CMC_ACAD_INVESTIG LA COMUNICACION MEDIANTE COMPUTADOR: UNA ESPERANZA PARA EL SECTOR ACADÉMICO Y DE INVESTIGACIÓN DEL TERCER MUNDO. LA EXPERIENCIA REDALC EN AMÉRICA LATINA Y EL CARIBE. DANIEL PIMIENTA<PIMIENTA!DANIEL @REDID.ORG.DO>	26K
930102 APC_NET.TXT THE APC COMPUTER NETWORKS: GLOBAL NETWORKING FOR CHANGE RORY O'BRIEN<ROBRIEN@WEB.APC.ORG>	22.5K	930403 GLOBAL_COMPUTER_NET.TXT DESCRIPTION OF A BOOK ENTITLED: "THE WORLD AT YOUR KEYBOARD AN ALTER- NATIVE GUIDE TO GLOBAL COMPUTER NETWORKING" BURKHARD LUBER<B.LUBER@BIONIC.ZER.	
930103 NET_RESOURCE_CENTER.TXT ANNOUNCEMENT: NETWORK STARTUP RESOURCE CENTER RANDY BUSH<RANDY@PSG.COM> & JOHN KLENSIN<KLENSIN@INFOODS.UNU.EDU>			

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930404 AFRICALIST.TXT CONNECTIVITY TO AFRICA VERSION OF 93.4.26 RANDY BUSH<RANDY@PSG.COM>	9K	921007 CONNECT_LIST.TXT INTERNATIONAL CONNECTIVITY, VERSION 8 - APRIL 15, 1993 LARRY LANDWEBER	10.5K
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BOOK REVIEWS

Stanley A. Deetz (Ed.). *Communication Yearbook/16*. Newbury Park/London/New Delhi: Sage, 1993. Pp. xv, 656. ISBN 8039 4601 5 (hb) £48.95.

This sixteenth yearbook of the International Communication Association focuses on three general areas of communication research: organizational communication in America and Europe, technologies and multiculturalism, and theoretical debates in interpersonal and small group communication. In addition to the editor, forty-one authors and commentators contributed to the volume, most of them based in the United States, but by birth or training representing several other countries, including the United Kingdom, Germany and Sweden.

Mats Alvesson, of the University of Gothenburg, Sweden, reports on a study of cultural-ideological forms of management control as a supplement to the traditional forms of management control studies (pp. 3-42). In a computer consultancy company in Sweden, Alvesson distinguished four types of middle-range theoretical models of control, which he feels explain the empirical situation more adequately than earlier approaches which depended on single factors, such as culture or ideology. In 'collective control' management endeavoured 'to put its imprint on employees' experience of *gemeinschaft* in the workplace and the definition of that *gemeinschaft*'. In their concurrent application of 'performance-related control' management, through publicizing economic results of each subsidiary unit, played on 'a clear feeling of connection between an individual's efforts and the subsidiary's results'. 'Ideological control', in the restricted meaning of ideology as, 'a set of ideals and values that provide a sense of the type of direction feelings, norms, and actions should take according to the ideals and values

espoused by top management and accepted by substantial groups in the company', means the use of various means to persuade employees to internalize the company's goals and values and to work for their realization. 'Perceptual control...consists of systematic efforts to affect how organizational members view organizational reality'. The company Alvesson studied used all these control mechanisms simultaneously and with a high degree of success. The relationships among them may vary, or be less successful in other organizations, but the heuristic value of the four-fold model is regarded as greater than that of single-factor models.

Placing a similar emphasis on cultural factors in organizational communication, Joachim Knuf, of the University of Kentucky, discusses the role of ritual in organizational theory (pp. 61-103). In his commentary on Knuf's article, Gerry Philipsen is favourable to it as a contribution to ethnographic studies of organizational discourse, but feels 'it should be integrated with other, more comprehensive schemes'. Patricia Riley feels that Knuf's formal definition of ritual is too restrictive, and that ritual should include concepts which 'do not form mutually exclusive categories'.

In their article, Peter Shields and Rohan Samarajiva seek 'to identify the main elements of an analytic framework for research on the role of information-communication technologies in the restructuring of the inherited social formation' (pp. 349-380). They believe that understanding the dynamics of change related to information-communication technologies depends on grasping the interplay between capitalism, industrialism and the state, and also on broadening the concept of technology to include forces of distribution, consumption and domination, as well as forces of production. Oscar Gandy, in his critique of the article, suggests that the authors adjust their theorizing more in line with 'consideration of the

knowledge and knowledgeability aspects' which form a central dimension of Anthony Giddens' critical theory.

In the section on interpersonal communication, James M. Honeycutt discusses communication during initial interactions, Theodore E. Zorn carries out a critical review of motivation to communicate, and Dennis S. Gouran, Randy Y. Hirokawa, Kelly M. Julian, and Geoff B. Leatham deal with 'The evolution and current status of the functional perspective on communication in decision-making and problem-solving groups'.

W. E. Biernatzki, S.J.

Everette E. Dennis. *Of Media and People*. Newbury Park, CA: Sage. 1992. 187 pages. £26 (hardcover); £12.50 (paperback).

Broadly speaking, the essays collected here address questions of audience--particularly the journalists' audience. Because Dennis writes from his position as Executive Director of the Freedom Forum Media Studies Center at Columbia University and vice-president of the Freedom Forum (formerly the Gannett Foundation), he tends to restrict his definition of "media" to newspapers, although he does consider the possibilities of television news and changing technologies. He also takes a stance rooted in a U.S. media perspective.

Audience questions for Dennis encompass a gamut running from media ethics to quality of information to availability of resources to news topics in the community. Hence, the book includes essays addressing topics of media performance, international communication, communication education, the convergence of technologies, reporting specific stories, the news industry, and the Gulf war. Since many of the essays originated in Dennis' column in the Center's newsletter, they briefly identify issues and state a position; by necessity they are short. Those pieces which develop an argument in greater depth show Dennis to have mastered the intricacies of the changing face of journalism from both the academic and "industry" viewpoints.

All in all, Dennis is optimistic about the state of journalism and the news media. This comment from his first essay sets his tone: "Standing back from this lively and engaging interaction [regarding Eastern European news reporting], there is a general conclusion that the U.S. media system, despite its imperfections, looks favorable when compared with most of the rest of the world" (p. 8).

Paul A. Soukup, S.J.

Robert Goldman. *Reading Ads Socially*. London: Routledge. 1992. 247 pp. £13.99 (paperback).

Advertising provides an intriguing look at the justifications and ideology of a consumer society. Goldman argues that "the material impact of ads lies in [their] producing and reproducing a currency of sign values that can be joined to commodities" (i). He studies this process first abstractly and then in terms of the analysis of specific print and television ads or campaigns, ranging from *Charlie* to *Levi's* to *Nike*.

Influenced by the cultural studies and neo-Marxist schools, Goldman presents a workable methodology to unmask the commodity form, its social relations, its reifications, and its fetishisms. He follows a simplified semiotic approach to indicate how ads work--at least in outline. Many of his examples are drawn from his own teaching; in this sense, his intended audience consists of students whom he wishes to be more critical in their consumption of advertising.

His topics include the commodity form and the advertising form, the production of commodity-signs, reification, legitimation, gender relations, "commodity feminism," bricolage, and the political economy of sign values. The strength in these chapters lies in their liberal use of examples; the value, in their revealing interpretations of ads many of us take for granted. "The premise of this book is that ads can be flipped over and critically reread to map the cultural reproduction of commodity hegemony" (p. 2). In so doing, Goldman demonstrates a method to better understand our culture.

Paul A. Soukup, S.J.

Martha Nochimson. *No End to Her: Soap Opera and the Female Subject*. Berkeley/Los Angeles/Oxford: University of California Press, 1992. Pp. xii, 237. ISBN 0-520-07763-6 (hb) \$40.00; ISBN 0-520-07771-7 (pb) \$15.00.

Soap opera, 'one of America's few original art forms', has frequently been maligned as 'degrading' to its female characters, or even as verging on the pornographic in exploitation. Nochimson challenges this view, holding that soap operas actually challenge the typically 'Hollywood' formulas in which males are dominant and women weak and dependent.

The author, herself, held that negative opinion before an enforced period of domesticity led her to pay attention to soap operas for the first time. The experience convinced her 'that the critics are in error', and that, 'When things are working well, the daily soap opera episode is a triumph of fresh and unorthodox narrative made possible by a marriage

between technology and the spirit of the creative artist'.

Although pre-1978 soap opera held promise of female heroines who could assume a strong separate identity, the 'realism' of the narrative prevented its full development. After 1978, however, the promise of that earlier period began to be partially fulfilled by 'the fantasy female subject', separated from male desires.

Various American daytime soap operas are analyzed, using the theme that the female heroine represents the mythological character Persephone, who 'dramatizes a developmental choice that would reorder the classical Freudian depiction of the relationship between masculinity and femininity.'

W. E. Biernatzki, S.J.

Andrew Quicke and Juliet Quicke. *Hidden Agendas: The Politics of Religious Broadcasting in Britain, 1987-1991*. Virginia Beach, VA: Dominion Kings Grant Publications, Inc., 1992. Pp. viii, 276. ISBN: 0-936369-77-9.

In a country dominated by a public service broadcasting philosophy, British governments and politicians exercise great influence over the general aspects of broadcast policy and leave the specific implementation to the broadcasters themselves. A recent debate over religious broadcasting in Britain casts the mechanics of this control into high relief. This history of the debate (taking a somewhat partisan stance in favor of Christian Broadcasting) provides a detailed picture of the debate as well as an introduction to the parliamentary, religious, and broadcast administration players.

Late Addition

Linda Harasim and Jan Walls (Eds.). *Globalizing Networks: Computers and International Communication*. Cambridge, MA: MIT Press (forthcoming, August 1993).

Thanks to the MIT Press we received a pre-publication copy of this very important book. Due to pressure of printing schedules we are not able to review it in any depth, but would recommend it as necessary reading for those wishing to study the topic of computer communication more closely. There are chapters by the following authors:

Linda M. Harasim, Associate Professor, Dept. of Communication, Simon Fraser University, Burnaby, British Columbia, Canada. She has previously written *Online Education: Perspectives on a New Environment* (Praeger, 1990), and with

As a context for their history, the Quicques turn to the roots of the BBC and introduce its founding general manager, John Reith, his policies on religious broadcasting, and the Central Religious Advisory Committee. They trace the policy shifts in religious broadcasting stemming from both the growth of religious television and the rise of professionalism among religious television producers. The final bit of background comes in the narration of the 1980s-era conflicts between independent religious producers and the Independent Broadcasting Authority over whether religious programmes should 'proselytize'.

Over half the book tells the story of the 1990 Broadcasting Bill: the Radio Green Paper (1987) and the Broadcasting White Paper (1988), the House of Commons debates of 1989 and 1990, and the House of Lords debates in 1990. The story gives a good introduction to the political realm of broadcast legislation, competing interests among religious groups, and the growing desire for independence among broadcasters.

Paul A. Soukup, S.J.

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Thanks also are due to **Walter Ong, S.J.**, for insights and sources, and to **Doris Schoenhoff**, for generously making the text of her forthcoming book available for consultation.

Roxanne Hiltz, Lucio Teles and Murray Turoff is about to publish *Learning Networks: A Field Guide* (MIT Press, 1993).

John Quarterman, editor of *Matrix News* and partner in Texas Internet Consulting.

Howard Rheingold, editor of *Whole Earth Review* and author of several books on technology, culture and the human mind.

Anne Wells Branscomb, research affiliate at Harvard University Law School and Program on Information Resource Policies.

Lee Sproull (professor of management at Boston University) specialises, with **Sara Kiesler** (professor of social and decision sciences at Carnegie Mellon University), in the study of established electronic mail communities and how they change patterns of communication in organizations.

Marvin Manheim, William A. Patterson Distinguished Professor of Transportation at the J. L. Kellogg Graduate School of Management.

Hiroshi Ishii, senior research engineer at NTT Human Interface Laboratories; teaches human-computer interaction at Chiba University.

Jan Walls, professor in the Dept. of Communication, Director of the David Lam Centre for International Communication at Simon Fraser University.

Michael Kirby, President of the New South Wales Court of Appeal.

Catherine Murray, associate professor Dept. of Communication, Simon Fraser University.

Andrew Feenberg, professor of Philosophy at San Diego State University.

Robin Mason, lecturer in computer-supported co-operative learning at the Open University.

Margaret Riel, educational researcher with AT&T.

Beryl Bellman, professor of communication studies at University of California, Irvine.

Alex Tindimubona, program officer, African Academy of Sciences in Nairobi, Kenya.

Armando Arias, Jr. dean of College of Arts & Sciences, Texas A&I University. Co-founder of BESTNET.

Jeffrey Shapard, "connect-activist" and global networker. Graduate student at Univ. of California, Berkeley.

Lucio Teles, Manager, instructional computing at Open Learning Agency, B.C., Canada.

Howard Frederick (see "Researchers" section)

Mitchell Kapor, chairman, Commercial Internet Exchange: serves on Computer Science & Telecommunications Board of the National

Research Council.

Daniel Weitzner, attorney, Electronic Frontier Foundation, Washington.

Shumpei Kumon, professor & researcher, Center for Global Communications, International University of Japan.

Izumi Aizu, member of study groups on computer networks including Ministry of International Trade & Industry.

Robert Jacobson, president & chief executive of **Worldesign, Inc.**

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LETTER FROM THE EDITOR

Dear Reader,

Communication Research Trends and its parent organization, *The Centre for the Study of Communication and Culture*, will move this summer, from London to Saint Louis, Missouri, U.S.A.

London has been, in many ways but especially in its character as an international crossroads with easy access to most of the world, an ideal location for both *Trends* and the Centre. We have made friends here, whom we are sorry to leave. But the financial aspect has been difficult; and Saint Louis University has generously offered to be our host and to give us substantial fiscal and logistical support.

The move will take place immediately, although we plan to publish one more issue of *Trends* (Vol. 13, No.4) from London. We expect our new office, in Saint Louis, to be operational by 1 September, 1993. The new address, fax and telephone numbers will be as follows:

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We have every intention of continuing the work of both *Trends* and the Centre exactly as they have been carried on in London. We hope to publish *Trends* more regularly than in the past, and look forward to sending you Vol. 14, No.1, from Saint Louis by March 1994.

Special efforts must be made to maintain our international emphasis in the heart of 'Middle America'. We ask our friends and correspondents outside the United States to help us do so by continuing to supply us with information concerning communication research activities in their countries and regions.

Sincerely,

William E. Biernatzki, S.J., Editor

WE ARE MOVING

The address of *Communication Research Trends*, from 1 August, 1993, will be:

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