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Behavioral Impacts in the Information Age

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As we look to the behavioral impacts of the communications technologies, the question arises as to general areas of inquiry. Are there impacts that tend to transcend individual technologies and reflect changes in our attitudes and behaviors in communication? Examples of such loci of impact are described, including: attitudes, perception of time and space, connectivity, mobility, increased choice, and socialization. These are intended to illustrate the concept of generalized impacts rather than to be an exclusive list. Moreover, they carry strong implications regarding the direction of needed research into the new technologies, research that of necessity will be markedly interdisciplinary.

The Behavioral Perspective

In the midst of the burgeoning body of research literature on the new communication technologies, it is important to ask whether such inquiry should not be given more visible direction. Much current literature is more practically than theoretically oriented—focusing, for example, on problems of implementation, productivity, or most pragmatically, market analyses. Also, research tends to be technology specific—that is, often concerned with a single medium, such as cable, word processing, or electronic mail. The present chapter, by contrast, proposes a concentration more upon behavioral and theoretical lines of inquiry, topics more reflective of human impacts than of the technologies themselves.

This article is speculative and prescriptive, rather than a review of research. In essence, it is argued that there are certain generalized types of

behavioral impact regarding human reaction to, interaction with, and management of the new communications technologies. They reflect such topics as attitude, perception of time and space, a phenomenon we have chosen to call connectivity, mobility, increased choice, and child socialization. These are but a sampling, offered mainly to illustrate a general point about the importance of behavioral impacts. Nevertheless, our main point is to stress the importance of thinking more behaviorally and theoretically about technological impacts and of devoting at least some of our research to these aspects.

Six Areas of Behavioral Impact

Attitudes

That *attitude* would be an important behavioral correlate of the impact of new communication technologies might seem at first overly obvious. Yet, as one analyzes the components of attitudes, layer upon layer of interrelated and increasing complexities are apparent. For example, there are the attitudes involved in the diffusion of innovations (Rogers 1983). Among the components in this theory is the concept that the attitudes of individuals vary as adoption and use of an innovation becomes increasingly imminent—for example, from initial knowledge to the desire to reaffirm that a choice was correct. The attitude cycle ranges from fears or uncertainty associated with encountering change to feelings of self-satisfaction about the decision made—even if it was one of rejection. The notion that decisions require confirmation and reconfirmation is an important component of innovation theory.

Although most of the development of theories in this area involved such innovations as agricultural methods, public health, or family planning, the premises remain very relevant to communication technologies, and indeed, have been applied to such innovations as videotex (Rice and Paisley, 1982), word processing (Rice and associates 1984), home computing (Rogers, Daley, and Wu 1982), and computing in the schools (Williams and Williams 1984). These and other studies tend to show that prior attitudes about the medium or the utility of the information obtained through the medium greatly influence actual adoption and use of the medium.

Other attitudinal dimensions of media use were explored in the monograph *The Social Psychology of Telecommunications,* by Short, Williams, and Christie (1976). Among their contributions was an examination of the concept of the "social presence" of a communication technology. One major question concerned the consequences of technological constraints upon interpersonal perception. For example, because a telephone link cannot easily transmit nonverbal information, we may be restricted from

many of the subtle cues that support a highly personalized interpersonal exchange, as in face-to-face communication. Or, in another example, a business letter, because it also lacked paralinguistic cues, could be even more impersonal.

Yet, as emphasized by Short and colleagues, it is not simply the technological restrictions that affect our attitudes about the personalness or social presence of communication via a particular medium. There are further complexities relating to the choice among alternatives as well as stylistic variations within the limitations of a given medium.

As for choice, the idea is that if one has selected a medium of less social presence over another one, this is itself a message of impersonalness. One example would be the proverbial "Dear John" letter in place of a face-to-face conversation or telephone call. As for style, every medium, regardless of its technological constraints, provides some latitude for textual variation which can affect actual and perceived degrees of personalness. That is to say, a telephone call or a telex can vary in personalness, depending upon what is said. Even a computer message exchange can be worded personally and have a quality of informality—in fact, this is encouraged under some conditions. In essence, choice of medium and style are complex attitudinal considerations, and although this idea has been with us for nearly all of the history of commentaries upon communication, it is still being overlooked in many contemporary studies of the new technologies.

A similar line of research has been applied to assess individual's experiences in teleconferencing, and attitudes loom large as an explanation of the impact. For example, in an analysis of computer teleconferencing in Phillips's (1983) study, the transcripts of three computer conferences were studied and their content analyzed, with emphasis placed on whether (and if so, how) the medium's special characteristics enhance or diminish the emotional dimension thought to exist in such conferences. Results indicated that the ability to communicate asynchronously, while alone at a terminal, in a written mode, and without the expectation of immediate feedback, encouraged "stream of consciousness" communication of thoughts that exhibited spontaneity and creativity. Once users passed the initial period of frustrations associated with learning new procedures there was a tendency to be very open, conversational and personal in writing style, with numerous instances of emotional expressiveness, humor, metaphorical language, and overt sociability.

The necessity of having to write down thoughts did seem to negatively affect the amount of participation by some users, and several people expressed discomfort with the literacy and computer skills required for the computer conference. Several others mentioned that lack of immediate feedback was somewhat disturbing. In general, however, the study revealed

a predisposition towards acceptance of and positive attitudes towards computer-mediated communication.

The attitudes associated with a medium—*media stereotyping*—is itself an intriguing theoretical topic. How do such attitudes arise? Do they have some type of general nature? Some thoughts on this were earlier advanced in a paper by Williams and Rice (1983; see also Rice and associates 1984, chap. 3) in which it was argued that such stereotypes are often multidimensionally complex (see also Phillips 1982). For example, results of an ongoing media-attitude survey of university students had yielded a multidimensional factor structure showing differentiation of newspapers, broadcast, television, cable television, videocassette machines, telephones, radio, and computers, relative to attitudinal factors of familiarity, importance, and personalness (Williams, Phillips, and Lum 1982).

That stereotyping studies might even be applied in a "developmental" sense to children was advanced in one of the author's projects involving investigation of youngsters in computer camps (Williams, Coulombe, and Lievrouw 1983). Children, roughly 9 to 12 years old, who had just several hours of initial experience with small computers, related complex attitudes about them. Factoral dimensions corresponded to general evaluation, quality, ease of use, and expense. Moreover, by use of these factors, it was possible to determine certain differences by age and sex of the subjects. Generally, younger children as well as girls found the machines a bit more complex.

The notion that stereotype attitudes might be used to predict the probability of adoption of a technology is another avenue of attitudinal research. Examples of this are the studies conducted in conjunction with the establishment of a teleconferencing system by the Atlantic Richfield Company. Ruchinskas and Svenning (1981) examined individuals' intentions to use video-conferencing, as well as factors predicting use of current communications options, in an 800-employee study spanning ten operating companies of a large U.S. corporation. Use of available communication alternatives (telephone, face-to-face, writing) is predicted primarily by current work activities and cross-locational communication needs (Ruchinskas 1982). When considering use of a new communication option such as video-conferencing, employee attitudes and beliefs assume a much more prominent role (Svenning 1982). Beliefs about teleconferencing's attributes and expected benefits appear to be particularly critical to whether employees intend to use this new technology (Svenning 1983). Cross-locational communication needs become more influential in explaining the frequency of projected video-conferencing use. Svenning and Ruchinskas (1984) suggest that although beliefs and expectations about new communication technologies will influence initial or trial usage—that is, communication behavior—the cross-locational communication requirements and work activities will be more influential in predicting routinized use.

However interesting researchers might find the relationships between attitudes toward and behavior with new media, let us conclude this first section with a caveat. Although attitudes can be readily associated with behaviors such as the adoption of a communication technology, experience involving it, or even with message effects, there is nevertheless no comprehensive theory of the matter. One is still hard pressed to argue theoretically as to the fundamental structures or processes that link attitudes to use of new technologies. Are we researching the "fringes" of somewhat interesting, yet superficial correlates, or are we moving toward some type of comprehensive modeling? To date, we have few results or even little thinking to help us answer this question.

Time and Space

Another area in which behavior is influenced by new media is communication through time and space. Marshall McLuhan drew much attention to this issue in the 1960s. McLuhan claimed that "pre-alphabet people integrated time and space as one and thus lived in acoustic, horizonless, boundless, olfactory space" (McLuhan and Fiore 1967, 56). The arrival of print media led to the disintegration of this boundlessness. The length of time through which communication content existed could now be varied, and the duration between transmission and response could be extended past the originator's lifetime. Communication could also be transmitted through geographical space. Speaker and listener did not have to be co-located in either time or space. But the linear, sequential nature of printed text constituted a severe limitation compared to the simultaneity and holism of pre-text communication. McLuhan and others have argued that this constraint has led to everything from poor memory to the Enlightenment, though there are convincing counterarguments (see Pattison 1982).

Electronic media such as radio and television supposedly reduce the constraints of print-mediated communication by removing the linear form of text and by reintroducing sound and visual dimensions. Yet each medium has temporal and spatial limitations. The listener/viewer does not control the content or timing of the programming, although he or she may control, to some extent, decisions about whether and where to receive the communication. Thus, the time element is constrained while spatial and aural elements are expanded.

Now, with computer-based communication systems, these elements have been further released from constraints. Admittedly, the visual and aural elements have not reached life-like quality, but for the purposes of this argument, they will soon become satisfactory. Technologies such as elec-

tronic mail, computer conferencing, voice mail, personal computers and the like, facilitated by value-added networks, local area networks, videodiscs, and communication satellites, remove many limitations on communication. Content can be sent independently of the location and timing of the intended recipient; the recipient does not have to receive the message at a specific time or location—or even at a specific terminal. Communication may be simultaneous but may also be sent and received at the convenience of any participant. The technical devices themselves are now small and light enough to be carried around. This release of communication from temporal, spatial, and technical constraints leaves perhaps only the most intractable constraints—economics, politics, and education. Only a small segment of society may have the resources, access, and training necessary to use these media.

Let us now consider some of these concepts relative to social organization. For one, the new technologies may cause many of the inherent economies of scale in information exchange and evaluation to be lost as communication becomes temporally and spatially unconstrained. Specialized users will be better able to focus on specific information unencumbered by indexing, queuing, scheduling, and physical and cost obstacles. However, as these individuals become involved in their own world of electronic communication, they may also become overloaded not only by the amount of information and communication they receive—a common enough concern—but also by the speed of information processing demanded from them.

The Japanese are particularly concerned about this; their term for information overload is "information speed." This increased speed and amount will not only burden the cognitive and logistical abilities of users, but could change the nature of intraorganizational relations. For example, physical or cultural aspects of the office will have less affect on electronic communication between participants, so the shared meanings and social behaviors necessary to understanding each other may be harder to identify. Thus, misunderstandings may develop because of the incomplete nature of the communication in spite of increased speed and amount of information. Further, because the regulation and immediate adjustments inherent in physically or temporally simultaneous communication may be lessened, exchanges may become uncoordinated, lagged, overlapped, or misinterpreted. For example, if one person has a communicative style developed from familiarity with rapid feedback from electronic messages, while the other has less demanding expectations because of the natural delays involved with meeting people face-to-face, the first may interpret small delays in response as unreciprocated messages, leading to negative evaluations of the relationship.

Related to this potential behavioral consequence of changed information patterns is that individuals may be less able to use organizational filtering and evaluation processes to control the content, timing, and amount of information, seen by many as the primary function of organizations (see Galbraith 1977; Rogers and Agarwala-Rogers 1976; Weick 1969). That is, the electronically mediated communication may displace organizationally mediated communication.

This is particularly paradoxical, because one of the primary rationales for office communication technologies is to reduce, by filtering and evaluating, the amount of information managers must process. Contrary to the popular belief that managers need more rapid information, managerial attention may be the scarcest organizational resource (Simon 1973). For example, within an organization, individual managers may at once gain control of information processing technologies (personal computers, electronic mail) while losing control over what information they must process.

Results from some electronic mail studies show that the introduction and use of such systems leads to increased upward and diagonal organizational communication. Perhaps higher-level managers do not want (or need) this increased communication and will then decide to instruct their secretaries to filter these messages. This implies some loss of control over the system. People who have slightly overlapping interests and information sources will be less likely to "bump into" others with whom they might gain from unplanned communications. These coincidental communication activities may prompt fruitful exchange of rumor, contextual information, quickly diffused crisis information, insider tips, warnings about subsequent activities, insights into organizational culture, first impressions, and the like.

Or, consider an area such as supervisory evaluation. Office information systems can increase managerial span of control—how many subordinates are supervised by the single superior (Rice 1980). At the organizational level of analysis, this is efficient, may be effective, and clearly reduces costly managerial overhead. From the point of view of supervisors and workers, however, the amount of interaction between them declines. Supervisors will not be able to devote as much time in training, socialization, or evaluation of each subordinate. The strategy then taken may be to use the technology to aid in performance evaluation—such as using line-counts as an indicator of performance by word processing operators, or using the number of transactions processed by insurance clerks. These indicators may be largely unrelated to the organization's mission or the performance of the employees, however.

Forms of social integration that allow the development of commitment, quality control, and adaptation may be lost as temporal and spatial co-

location lessens. One alternative, of course, is to simultaneously relocate the supervisory functions—allow the subordinates to evaluate their work, develop new procedures, and create self-designing work groups. The lesson here is to transform the control mechanisms in ways appropriate to transformations in spatial and physical communication interactions.

Often, the behavioral strategy taken is not appropriate, however. At the interface between organizations and their customers or clients, there is a growing tension between strategies taken to optimize internal information systems and strategies taken to provide customers the information they need. Singer is a particularly astute critic of the more common approach by organizations—optimize the system at the cost of clients and customers with atypical needs (Singer 1977, 1980a, 1983). This strategy involves altering the human-system interfaces to "buffer" the system from exceptions, complex information searches, communication cycles that do not match processing cycles, and requests for information that are not natural by-products of transaction processing. This choice results in the creation of "crazy systems" and "Kafka circuits." Individuals become caught up in delays, system-generated errors, apathy, form letters, unlisted phone numbers, unidentified service personnel, or an inability to establish a wider context for the information. Thus, the efforts put into rationalizing and streamlining the organization's information processing create economic externalities which are passed on to nearby powerless clients and customers.

Connectivity

One of the most obvious and consequential implications of new communication technologies is that people are able to expand their personal networks (see Rice 1980, 1982; Rice and associates 1984). This capacity can be termed *connectivity*. One indication of the steady growth in the awareness of the importance of communication networks is the burst of network analysis research (see, for example, Rice and Richards 1984; Rogers and Kincaid 1981). Personal networks are crucial in getting a job, meeting people, maintaining psychological and social health and exerting power.

Until recently, becoming part of networks, maintaining them, and expanding them, has been limited by the temporal and spatial constraints of communication channels—telephone calls and letters, exchange of research through journals, or transportation requirements. However, computer conferencing, electronic mail, electronic publishing, community computer-based bulletin boards, online databases and computer-based private packet-switched networks have created the technological potential to communicate with others throughout the world at any time of the day or night (see Glossbrenner 1983; Hiltz and Turoff 1978; Rice and associates 1984). Again, however, economic, political and regulatory constraints still overwhelm this potential.

Those newcomers who do gain access to such systems immediately expand their network of communication partners. The obvious benefits of this ability include better access to needed information, social reinforcement from those with common interests, reduction of social status and appearance as criteria for interaction, or greater exposure to the social activities either in one's nearby community or nationally.

The potential disadvantages are less obvious. For example, the freedom from temporal and spatial constraints leads to increased transience and mobility. If one can work from a terminal that only requires an accessible telephone line and respond to messages at convenient times, there are fewer constraints on mobility, and fewer ties between one's workplace and a residential area. Indeed, one need not work at any specific place—such as a company building—at all. Or one can easily choose a new set of personal or casual contacts based upon interests of other users listed in a directory maintained in computer storage as part of the communication system. Thus, local social structure may disintegrate while "electronic" social structure become more integrated. Another consequence of the loosened constraints of time and space, with concomitant increases in the potential for connectivity, is that as the number of linkages increases, the duration of specific linkages may decrease due to constraints on individuals' information processing capabilities. So, we may have wider, but less substantial, networks.

Perhaps historical, temporal, and spatial constraints on communication established baselines for cognitive and social thresholds. If those baseline constraints are now becoming relaxed, will our typical communication behaviors become insufficient? In a communication environment freed from temporal and physical constraints, information resources are likely to become more important than—or a means of obtaining—material and social status resources. Further, individuals may need to acquire their information wealth early on in order to survive in this environment. Information, freed from temporal constraints, has less tangibility and longevity than some material goods. This need creates pressure to quickly search the communication system for rewarding contacts.

Further, as previously discussed, these systems facilitate contacts that are unfiltered by physical or status differences or control over material goods. But, because humans have limitations on their processing abilities, unlimited contacts thoughout a system cannot be long maintained. Sources of information must be evaluated rigorously and only the useful ones can be maintained; further, they [illegible] or the individual's re-

sources invested will be lost. This hypothesis for the growth and development of networks in an information environment has been tested and generally supported by Rice (1982), who analyzed two years' worth of computer-monitored data from a nationwide computer-conferencing system. Studies of people's recreation of their direct personal communication networks identify numerous constraints:

1. That a network node needs, and indeed can handle, only about seven first-step choices to reach its systems' "others" (Bernard and Killworth 1977).
2. That about seven strong links within a "small world" network are involved before the weak link to a target from a different social structure is found (Korte and Milgram 1970).
3. That knowing a respondent's 7th- and 8th-ranked sociometric choices provides no significant additional information about subsequent choices, while knowing the 1st through 6th-ranked choices provide decreasing, but significant, information (Rapoport 1979).
4. That intensity of relationships involving other nodes becomes asymptomatic around 12 to 15 nodes as, presumably, the time needed to maintain network contacts reaches its limits (Cowell and Wigand 1980). Further, this level of communication activity and recall may be sufficient.

Computer simulations of the efficiency of networks for allocation of job tips indicated that ninety percent of job vacancies were filled with three direct contacts and associated two-step links or with only eight direct links (Delaney 1980). The point here is that considerable evidence implies that there are upper limits on the number of communication links we can instantly remember, or which we need in order to function in society. An implication of the foregoing is that an extreme emphasis on increased connectivity may be misplaced effort. Becoming fully connected may not be necessary, both because of natural human processing constraints and because of the nature efficiency of even sparse networks.

All this discussion of information environments is not to deny the role of political and material wealth in the creation and maintenance of social stratification. However, information wealth—increased connectivity and control over production, licensing, and retrieval of information—will interact with material wealth to create different kinds of social stratification.

One aspect of this interaction has to do with increased information wealth—specifically, personal contacts—as a product of social and material wealth. Greater social wealth and status leads to increased likelihood of shared traditions and social means, attendance at certain schools, access to certain job categories. These situations lead to increased density within the social category and greater cohesion, and increased attractiveness as objects of contact. That is, such individuals are seen as leaders or information carriers and are valued as contacts (Rice 1982; Rytina and Morgan 1982). Thus, a minority group with information and material wealth (such as a technocratic elite) can develop high cohesion and considerable contacts with the majority and other minorities, becoming a dominating minority. However, intellectuals without social traditions and material wealth will not be as attractive as potential contacts due to lack of connectedness within their own "class." This is because their ability to focus on specific content and specific contacts rather than on a class-bound group (due to the loosening of temporal and spatial constraints) paradoxically prevents the development of contextual and institutional norms within that group. Until information wealth is converted into social and material wealth, or until it becomes a central social norm itself, purely information-rich social members will continue to be excluded from social and political power.

Change in Mobility

Exchanging communication for transportation has been a dream of telecommunication enthusiasts from the earliest days of our desire to communicate at a distance. But it is not at all clear that these proposed substitutes for travel have indeed reduced travel. On the contrary, the history of the telephone, at least in the United States, provides considerable evidence that travel increased as telephone use increased (Gottman 1977). Contrary to the technology assessments of those who believed there is a trade-off of communication for travel (for example, Nilles et al. 1976), a better argument can perhaps be made that the telegraph and the telephone were the first in a long line of information technologies that have stimulated increases in mobility. This is not to say that some travel has not been displaced by communication but rather that the telephone, the computer, and the emerging information technologies offer society a nontravel choice as well as more reasons and needs for travel—in other words, more mobility.

We are a mobile society; mobility is imbedded in the American psyche. The great historian of the West, Frederick Jackson Turner, viewed the history of the United States in terms of the inexorable westward movement of the new Americans and speculated that once the nation had been traversed we would no longer have the energy and drive of our early years. Census data reveal that at least 50 percent of the American population moves every five years and of these, about 20 percent move to another state (Long and Boertlein 1976; Parsons 1949; Stein 1966; Whyte 1955). Other sociologists have frequently commented on the rootlessness of the American and the decline of family and community. Bennis and Slater (1968), in

particular, have studied the alienation and tensions produced by this transience and rootlessness.

As we have exhausted our geographical mobility—coast to coast, Alaska, Hawaii—we are now seeking the mobility that electronic communication provides. Society will use the information technologies in support of more travel. Links to family and community will be maintained through communication. As the preceding section suggested, there will be fewer reasons to stay in one place because communicating on the move—while driving, while travelling in air or on the high seas—will provide the connection to relatives, community, and perhaps even more important, to jobs. The fragmentation and alienation feared by the sociologists may be avoided by connections provided by the information and communication technologies. *Community* will take on new meaning, as Bell argued. Communities will no longer be bounded by geography but encouraged by common interests on communication networks (Bell 1976).

The citizen's band (CB) radio "mass event," shortlived as it was, was nevertheless significant in its illustration of what MacCannell (1976) saw as evidence of a "new species of commodities (do-it-yourself programs) that reflect the modern fragmentation and mutual displacement of work and leisure and the emergence of new synthetic structures as yet unanalyzed," and the blurring of distinctions between work and leisure. A unique opportunity to study the intersection of mobility and human communication was missed when the CB radio boom died, rather precipitously. For a brief period in the seventies, the Federal Communications Commission was receiving more than 500,000 requests for CB licenses a month. In 1977 the FCC estimated that there were more than 25 million CB radio users in the nation (Bowers 1978). What did this suggest about the nature of our societal need for communications? From the few studies of CB users, Bowers found that the expressive uses of the medium ("gossip, messages containing little or no direction") amounted to almost 70 percent of all message content. Only 1.8 percent were classified as instrumental or seeking to achieve some useful end and 29 percent were classified as intrinsic or consciously about the maintenance of the CB community. This seems to point to the ease with which different interactive communication media are adapted to a very wide variety of human needs. It raises questions about the doubts expressed by researchers who have examined teleconferencing, computer conferencing, and other of the new information/communication technologies—for example Williams (1977) on psychological distance and self-confidence, Reid (1977) on evaluation of the person and the substance of the conversation, and Short et al. (1976) on various limitations to teleconferencing as compared to face-to-face meetings.

Increased Choice

There is little doubt that the wide and varied number of new media now becoming available will create new opportunities for societal and individual choice. As mentioned earlier, communication scholars have long been concerned with the processes of choice.

Missing from much of these analyses, however, is the recognition of the human as an economic factor. Theories of the adoption of innovation make only a casual reference to the cost of the adoption process, referring simply to the notion that adoption is more likely if "a comparative advantage" is evident. Whether the resulting comparative advantage is worth the cost of adoption requires measuring the relative value of that advantage. For example, with the rapid emergence of many information technologies and communication media, advantages of one over the other may be revealed by taking time into account—time to change practices and procedures, time to train or retrain staff, or time to install. It is evident that there should be increasing interest in the economics of time.

Time is a scarce resource, but in a rather special way. Time itself is in a sense inexhaustible, but each individual's time is not! As Sharp (1981) so rightly points out, Psalm 90 tells us rather optimistically that "seventy years is the span of our life, eighty if our strength holds." Given that this scarce resource must be spent—over that we have no choice—then it is necessary that it be spent well. Even if we narrow this problem down to the selection of one medium or information technology over another, the value of time, or its cost, depending on how the decision maker chooses to view time, cannot be overlooked. The economics of time has always been important to the processes by which people choose one medium over another. However, it has not generally been made explicit in analyses of such decision making, nor has it been integrated with the attitudinal factors normally used to explore the adoption process and the choices made in that process.

Economics traditionally deals with the allocation of resources where the value of an allocation is a material one. Definitions of economics, indeed, stress this measure of value, usually money. Robbins' (1945, 16) definition of economics as "the science which studies human behavior as a relationship between ends and scarce means which have alternative uses" suggests that time is a proper subject for economists and, further, that its allocation among alternatives may play an important role in making choices.

Because economics has traditionally dealt with allocations of material goods, time allocation studies have focused on time at work, where such

measures are important for measuring productivity improvements following the adoption of new production techniques. Ghez and Becker (1975) broadened these studies of time economics to include time spent for leisure and for "creating intellectual capital"—education. These important studies led to the large time allocation research of Robinson and Converse (1972) which sought to show just how time was being spent. They did not, however, deal with how choices were made. Further, these analyses assumed very sharp distinctions among human activities; few, if any, crossovers or joint allocations of time were considered.

With the advent of new information technologies, distinctions that seek to define work as that which takes place solely in the office are becoming blurred by work that can be performed at home, in a car, or while flying. Communication technologies that allow trading off time in one kind of activity for another kind of activity can easily allow for extremely efficient utilization of time and, indeed, are supposed to do just that. As noted earlier, one can choose to displace time with comparative ease, but with potential attitudinal and behavioral constraints and costs. Clearly, this may raise the question of the value of time saved or shifted versus the cost of human or behavioral efficiency.

Another factor for which time becomes an important economic variable in choice concerns the extent and degree to which these information technologies create the network marketplace (Dordick et al. 1981) and the self-service economy (Gershuny 1978). For the bank or supermarket, will the investment in information technology match the customer's desire and willingness to alter traditional habits? How long will it take? Is the value of the customer's time saved worth the customer's personal investment in learning a new pattern of behavior? Increasingly, labor-saving devices are seen as time-saving devices. Visiting the bank, shopping, and increasing worker productivity are all factors that require an appreciation of the economics of time and how this affects attitudes and behavior.

In his study of the social impact of the telephone, Pool (1977) makes the point that the telephone is a purposive technology—that is, we can do what we want with the technology. Unlike the example of Robinson Crusoe (Von Neumann and Morgenstern 1964), who was acting as a rational economic man in a "dead" environment (there were no responses to his decisions, at least before meeting with Friday), we make choices among information media, expecting and getting feedback. Moreover, feedback determines our next action. We choose a medium for communication and not merely for consumption. We select a data base for purposes of using the response for some activity that will influence our next action. In other words, there is a sort of strategic game going on in our choice behavior. This leads us to consider new tools for the analyses of choice behavior among information technologies, such as game-theoretic models of behavior.

Information technologies are creating many more opportunities for choosing how we live and work, how we spend our leisure, and how we select among ever growing information and communication-based alternatives. We can choose to do or not do our banking on the network; we can shop or not shop on the network; we can create our own newspaper electronically or purchase one that can be used to wrap fish; we can decide to travel or not travel for a meeting. All of this makes choice behavior an increasingly complex phenomenon. Analyses that do not relate attitudes and behavior to the economics of time and to the passage of time will not yield a comprehensive understanding of how choices are made. The "snapshot" nature of the demographic-style research on which communication science has been constructed must be broadened to include choice as a variable in the analysis, as well as an understanding of time as an economic factor in choice.

Socialization

All that has been discussed in this article may carry significant consequences for the most impressionable segment of our population—our children. Our concluding topic concerns the consequences of information technologies for the process of socialization.

Today's children have access to a broad variety of communication products and services never before as widely available to the nonadult population. Television is an example. According to the 1982 Nielsen summary, youngsters between two and five years old averaged a total of twenty-five and one-half hours of television viewing per week. This was more than their preteen and teenaged counterparts and only about three hours less than the population at large. Young children were nearly as likely as adults to be watching during the prime time hours, and an estimated seven million children under five were still viewing in the 10:30 to 11:00 P.M. period. It is noteworthy, too, that this same Nielsen summary comments on a continued increase in overall hours of television viewing by the general population as presumably an effect of new viewing alternatives (e.g., cable), since network viewing has decreased slightly.

Our children's massive exposure to television, and some of the worrisome consequences thereof, are already well known through surveys of literature by Comstock and his associates (1978), or by the give-and-take between Gerbner's (1979) cultivation theory and its critics (e.g., Hirsh 1980). Now, all evidence points to greater exposure, and especially to adult themes, because of children's increasing access to programs via vid

eocassette, videodisk, cable, pay-cable, and soon, direct broadcast satellite. Many children grow up encountering more life "experience" through media-conveyed depictions of values, ethnic and personality stereotypes, and sex-role characterizations, than they witness in the real world around them.

When children are not viewing television, they now have increased opportunities for exposure to technologically-conveyed experiences via videogames (either in arcades or in the home), electronic toys, and wide use of records, tapes, and entertainment radio. Many children are also avid users of small computers for purposes other than videogame playing. This exposure is expanding rapidly as schools attempt to join the computer age.

Against the context of the world's total child population, those born into this specialized environment are few in number—perhaps 5 percent or less. However, because their environment is so visibly distinctive, children socialized by the media could be the catalyst for shifts in the values and expectations of work and leisure, family, morality, wealth, land, goods, ideas, and even of deity. Because technology is becoming so pervasive, we may be rearing a new generation more likely to ask how rather than why, or when rather than if.

Then there is the possibility of change in the nature of childhood itself. In lay terms, *childhood* simply refers to the period in one's life between infancy and puberty. But in more reflective uses, the suffix *-hood* is critical. The stress is upon the "condition" or "state of being" of that age range. For example, beyond a contrast in chronological age, how is childhood different from adulthood?

Looking to the past, researchers such as deMause (1974) have argued that in the history of Western civilization, until the nineteenth century, there is little evidence that adults associated any separate sort of experience with childhood. In our literary heritage, there are references to children but few to the state of childhood. Art, expecially of the medieval period, has often depicted children as miniature adults.

Our society may be returning to a lack of distinction between childhood and adulthood. Some researchers argue that we are experiencing a "disappearance" of childhood (Elkind 1983; Packard 1983; Postman 1982; Winn 1983). The main evidence is the fading contrast between many experiences of adulthood and childhood. On one hand are the problems of children whose parental circumstances, attitudes, or behaviors deny them a full chance to be "child-like." Of course, this includes the consequences of today's changing family conditions, from single parenting to the attempt to "hurry" a child's development (Elkind 1983). But changes are also a consequence of the new access to adult experiences afforded by changes in the media.

Media ecologist Neil Postman (1982) has been the leading proponent of this view. In *The Disappearance of Childhood*, he makes two critical points. First, as others have reflected, prime-time television delivers the adult world of violence, sex, and nearly every deviant behavior directly to the child viewer. Children are left to find meaning in adult themes of murder, rape, and adultery. The loss of the "adults only" barrier diminishes the contrast between adulthood and childhood.

Postman's second point—and one that relatively fewer observers have raised—is that as our culture increasingly moves its messages from the printed page to the audio/visual media, the barrier of literacy is lost between adults and children. Those of us who experienced World War II as children could not follow the gory details of battle very well in newspaper accounts. We were shocked mainly by pictures in *Life* magazine, or by an occasional (and sanitized) newsreel preceding the feature at our local movie house. Compare this to television coverage of modern wars, from Vietnam to Lebanon, where battles are almost literally fought on our television screens.

Surely, Postman's observations on changes in adult-child media accessibility are clear arguments in support of his "fading contrast" thesis. But, there are further considerations. First, if we have learned anything from more than two decades of serious social scientific research into the effects of mass media, we have learned that there are few so-called magic bullet effects. That is, most messages in the media, particularly on television, do not have a direct effect on individuals. Moreover, there are often vast differences in how individuals interpret what they see. Nonetheless, there is an important communication research challenge implied in the "disappearance" thesis: How do children perceive presumably adult themes in modern media? What exactly are the consequences of the steadily diminishing barriers between child and adult media experiences?

The foregoing are but a few symptoms of the transformation of the socializing environment of the modern child. The gap between children who have access to the technologies, services, or experiences of this environment and their parents may be comparable to the gap between agrarian and industrial societies that developed in the last two centuries.

Yet, only a minority of world cultures are rearing these "technological children." The world context is a highly heterogeneous mix consisting mostly of agrarian and industrial cultures, and including a few tribal ones. The growing tension between the "haves" and "have-nots" presents an ominous challenge to ongoing social change in our near future. This tension appears between developed and developing countries and as stratification within contemporary societies. Some countries (and groups) hope to

bypass the historical stages of socioeconomic change by modernization plans—for example, countries like Saudi Arabia or the attempts in our country to retrain industrial workers to compete for high technology jobs. Yet rapidly imposed technological change can create revolutionary responses, such as in Iran.

In the discontinuities between today's generations—parents and offspring, teachers and students—we may be directly witnessing the processes of broad social change. Indeed, the most significant behavioral impact of the information age may ultimately be upon our children. Many of our children's problems—and opportunities—are based on adaptations and responses to this rapidly changing environment. This may ultimately be the most important area of behavioral impact in the information age.

A New Agenda for Research

The topics discussed in this article are meant to illustrate a concept more than to serve as an inventory of specific technological impacts. In most general terms, this concept emphasizes that many of our traditional contexts of communication behavior are changing—some visibly, some subtly. The research questions raised by his proposition are both practical and theoretical. How, for example, can the human benefits of communication be maximized by taking advantage of changes in perception of time and space, new opportunities for connectivity, mobility, and choice? In the closer view, how can current information-related behavior be used to our advantage in the implementation of new communication technologies? Or in the long-range view, how can we maximize the probabilities that our children (and thus future generations) will make the best of these changes?

Such questions, of course, suggest the need for theory, concepts, and research to guide our thinking. But while we might initially see most innovations of the information age as technological extensions of existing communication media, we cannot so easily extend existing communication theories to understand them. Certainly, we can ponder transactional theories of interpersonal communication or group behavior in order to interpret the consequences, for instance, of individuals interacting through computer networks, but none of these theories quite leads in directions that assist the interpretation of many of the areas of impact described in this article. Nor are mass communication theories of particular advantage, for although agenda-setting, the two-step flow, or social dependency theories do aid in interpreting the broad flow of information through large social groups; the context of the new information utilities describes a process many are calling "demassification." Perhaps there are opportunities in the applications of such holistic theories as uses and gratifications or critical theories, yet these approaches may still suffer from the inherent shortcoming of creating self-fulfilling predictions. A most profound implication of our behavioral impacts discussion, we believe, is that new concepts and theories are required.

Moreover, they must be markedly interdisciplinary. For example, the understanding of computer-mediated communication systems requires the joint expertise of technical designers who create appropriate systems, organizational development experts who implement them, communication researchers who attempt to identify how content and interactions will change, information scientists who investigate optimum system interfaces and user strategies, and cognitive psychologists who research the correlates of successful information processing. In all, we can no longer afford to maintain strict disciplinary boundaries if we are to understand the relationships of information and behavior, a concern expressed in the title and spirit of this publication.

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