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1 Development of New Media Research

As we become aware of the technological developments and widespread uses of the new communication media, one might expect that social scientists in general, and those specializing in communication behavior in particular, would play an important role in conducting policy-relevant investigations and in establishing research agendas. But this has not yet occurred to a great extent. As an eminent Finnish scholar recently stated,

> Communication scholars could have been in the forefront of not only studies of new communication technologies but also in planning its applications. However, research has been both late and inadequate; many fine research opportunities have been lost forever. Research data have been replaced with personal opinions and normative value judgments [Wiio, 1981].

Newness, of course, is in the eye of the cohort. At this time, we might consider "new media" to include personal computers, videotext and teletext, interactive cable, videodiscs, electronic mail and computer conferencing, communication satellites, office information systems, and the like. But when television was first publicly demonstrated in England in 1927, or the first time radio was commercially broadcast—from Pittsburgh in 1920 to cover the presidential election results—these were new communication technologies (see Dordick and Rice, 1984). Conversely, the idea of geosychronous communication satellites was first proposed by Arthur C. Clarke in 1945. Or consider the so-called revolutionary office technologies such as the typewriter and vertical files discussed in Chapter 7.

It is not misleading, however, to talk about the new media of the last decade or so. One indication of their expansion consists of the frequent advertisements for video games and personal computers on television. More emphatic are the actual dollar amounts being spent. The percentage of consumer media spending allocated to cable and pay TV, videocassette recorders, video games, and home computers rose from 7.5% in 1978 to 30.8% in 1982. Total new consumer media revenues rose 573% in 1978-1981. Spending for new media by 1987 is expected to rise 411% for home computers, 104% for videocassette recorders, 85% for cable and pay TV, but only 5% for videogames. Spending on more traditional media will rise considerably more slowly (20-50%) (Knowledge Industry Publications, 1983).

Another indication is the frequency of mentions of such media in the literature. The DIALOG information service contains over 200 data bases consisting of bibliographic, abstract, and time-series information. Searching the computerized DIALOG information service or references to new media,[1] and noting the occurrence of these references by year, we can gain insight into the growing interest in new media over the years—from 1974 through early 1982—and across three categories of literature—the *Magazine Index*, *Management Contents*, and *Sociological Abstracts*.

Figure 1.1 shows the rise in the number of articles over time in new media topics. The greatest rise by far is in the so-called popular magazine literature, from 39 in 1974 to 1326 in 1982. The second greatest rise is in the management/business literature, starting from 2 and growing to 503 in the nine-year period. The social science literature—or the subset included in *Sociological Abstracts*—shows a near-conscious avoidance of the subject, with 17 articles in 1974 and only 1 in 1981. (Frequencies for 1981 and 1982 in *Sociological Abstracts* are not representative because that data base is updated more slowly than the business and popular data bases.) The 17 articles in 1974 come primarily from a special issue of the journal *Communications* (1974: Vol. 21) concerned with cable studies.

Of course portrayals of frequencies from data bases with constantly growing and differing populations of literature can be misleading. Figure 1.2 shows the trend over time in the three data bases for the ratio of new media articles to total articles in each data base each year. Because of the much larger base in the magazine data base (over 800,000 in the nine

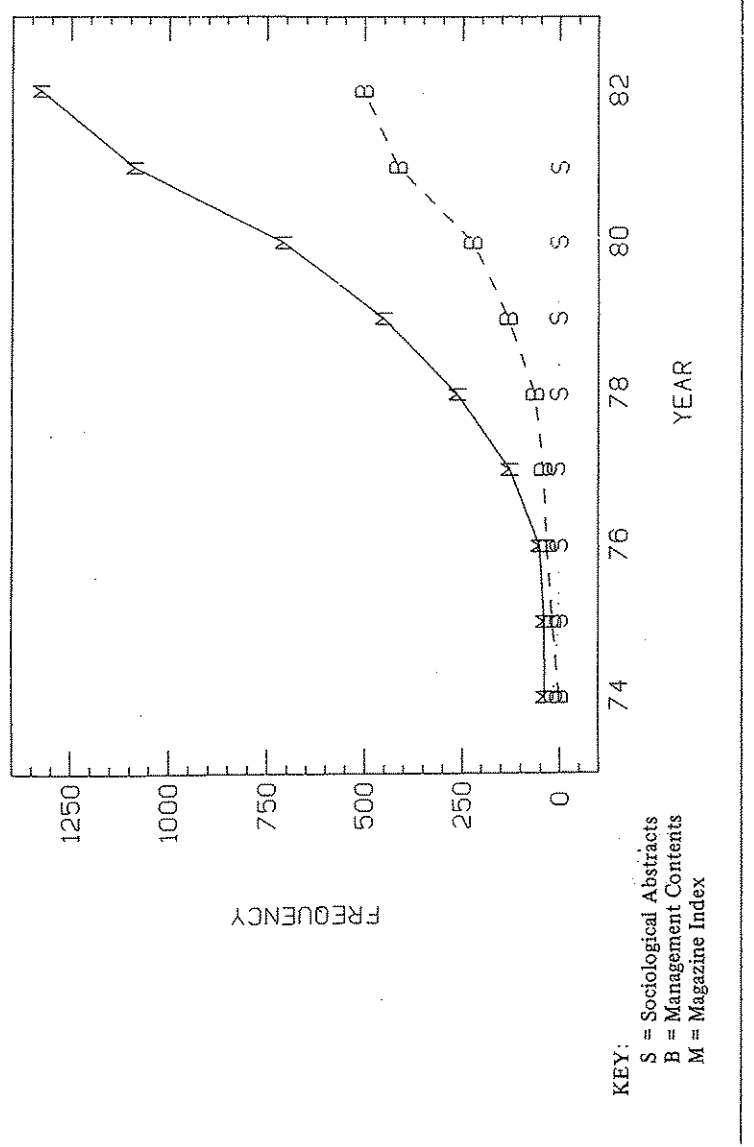

FIGURE 1.1 Number of New Media Articles Contained in 3 Data Bases, by Year

years) than in the management contents data base (over 120,000 articles), the actual greater importance to the business and management communities of new media is masked by the raw frequencies.

Figure 1.2 shows a much larger rise in the percentage of business articles concerning new media than the rise in the popular literature. So, although there is absolute exposure in the popular literature, there is greater density of coverage in the business literature. Again, however, we see that the sociological literature, even relative only to social science, seems unconcerned about a topic that is growing in absolute and relative importance for the majority of serials readers. Table 1.1 especially indicates the relative emphasis on new media in four data bases. Academic researchers may dismiss this lack of emphasis as the rightful adherence of social science activities to nonconsumer issues; but this approach, as reflected in the low (or, we might hope, only delayed) concern with new media, assumes no sociologically relevant impacts or contingencies of a major variable in the communication process. That variable is the communication channel, and the general and business publics seem to judge that new channels of communication are indeed important.

The then-new media of radio and television spawned tremendous social science research into their organization, uses, content, and effects. (An example is the early radio studies by Lazarsfeld and Stanton, [1942].) Some communication research on the current new media fits easily into those paradigms, research approaches, and hypotheses (see Chapter 3). But the bulk of this research tradition did not consider the medium itself as a variable. This is moderately surprising, because the Shannon and Weaver information-theoretic model became, along with revisions by communication scholars, the basis of the linear model of communication (see Shannon and Weaver, 1949; DeFleur and Ball-Rokeach, 1975: 126-127). This linear model clearly includes "channel" as a necessary component of the process of communicating.

The importance of the channel with such a wider definition is particularly salient when the linear model is rejected for a model of convergence (see Rogers and Kincaid, 1981: Chap. 2). The particular medium would be especially crucial (for example) if, because of its attributes, it prevented interaction or rapid feedback, or if it tended to centralize content and switching functions (such as network television). Conversely, if a medium (such as computer conferencing) facilitated the convergence process, then again the medium would be a critical variable in the process. Even models of the persuasion process explicitly show the role of the channel (see McGuire, 1981: 45), although the medium has rarely been manipulated by persuasion researchers, except for social psychologists and sociologists such as Short, Williams, and Christie (1976), Johansen (1977), or Hiltz and Turoff (1978), and a specialized group of psychologists (see Taylor and Thompson, 1982; Williams, Paul, and Ogilvie, 1957).

The notion that the channel of communication might be as important a variable in the communication process as source, message, receiver, and feedback, may have been overlooked (or at least underemphasized) in the

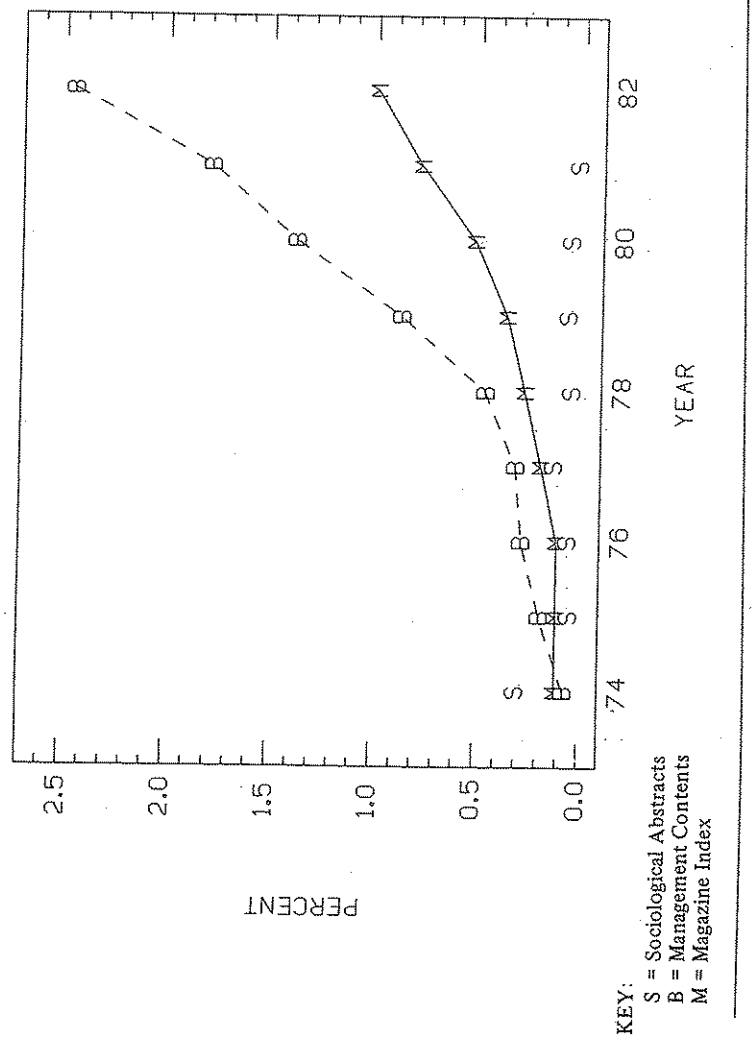

FIGURE 1.2 Percentage of New Media Articles Contained in 3 Data Bases, by Year

TABLE 1.1 Relative Frequency of Articles Mentioning New Media in Three Dialog Data Bases, 1974-1982

Data Base	*Number of Articles on New Media*	*Percentage of Total Articles*
Sociological Abstracts	47	0.09
Magazine Index	4098	0.50
Management Contents	1438	1.12

NOTE: A "mention" is the occurrence of a new-media term in title, keyword, or abstract; 1974 was chosen as the baseline year because it was the earliest year that all three data bases include. *Social Science Citation Index* does not include a publication year index, so it could not be used in the longitudinal comparison; nor does it include text of abstracts, so it would naturally include fewer mentions of new-media terms. However, a very rough percentage—involving 1,126 "hits" on a base of over 1,177,000 records from 1972—of new-media articles is 0.10%, equal to the percentage for *Sociological Abstracts*, in spite of its far greater diversity of journals indexed.

communication research literature, although it had been argued by Innis (1950) quite early on and then taken further (and farther afield) by McLuhan (1964) and Carpenter (1973). One need not be a technological determinist to agree that the medium may be a fundamental variable in the communication process even if a "medium" may be media-independent, such as videotex. (This example of medium-independent media is discussed in Chapter 2.)

This recognition of the influence of media was behind the high hopes for the use of communication (and concommitant media) in the development process in the 1950s and 1960s (Lerner, 1958; Schramm, 1964). The passing of this intellectual paradigm was due largely to failures of political and ideological insight and lack of economic change rather than to an irrelevance of media to development efforts (see Rogers, 1976). A programmatic approach to including the medium as a variable in the communication process, from a communication perspective, awaited the intersection of educational and development research. Although media for educational purposes were compared in a typological sense early on (Bretz, 1971), Chu and Schramm (1967) are the primary communication researchers to investigate the relative effects of the medium itself in the instructional process. However, research concerning educational television has been quite frequent since the early 1960s. Figure 1.3 shows a rise in such studies ("transmission of educational or informational programs or mentioned by television," as defined in DIALOG'S ERIC data base) to a peak of nearly 400 a year, and then a decline after 1974.[2]

It is informative to note the bimodal rise in studies of computer-oriented programs ("the application of computer technology to such tasks as instruction, documentation, research, administration, etc.") to nearly

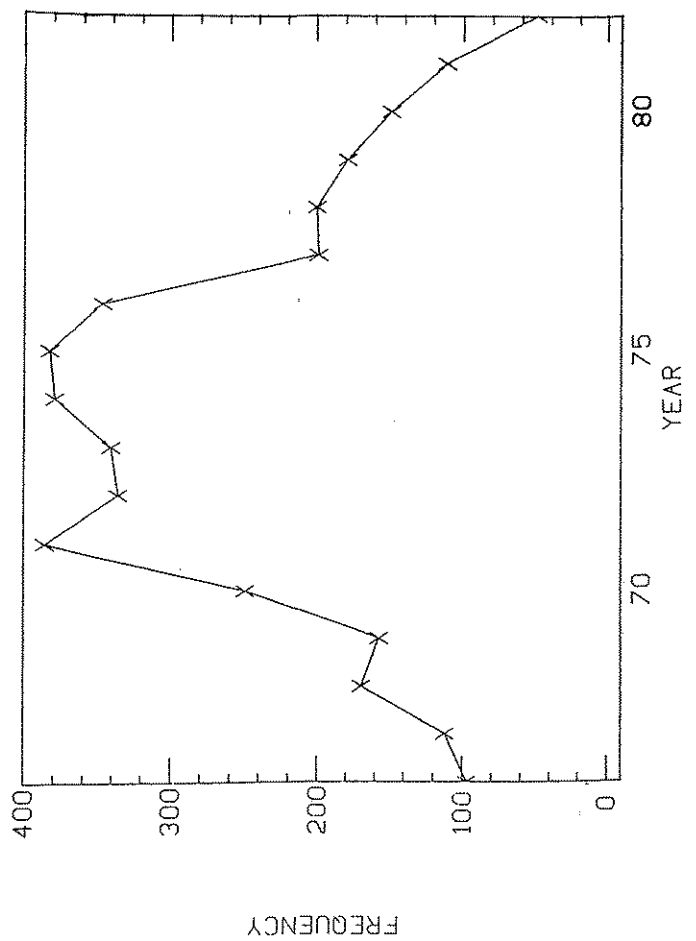

FIGURE 1.3 Number of Articles on Educational Television in ERIC Data Base, 1966-1982

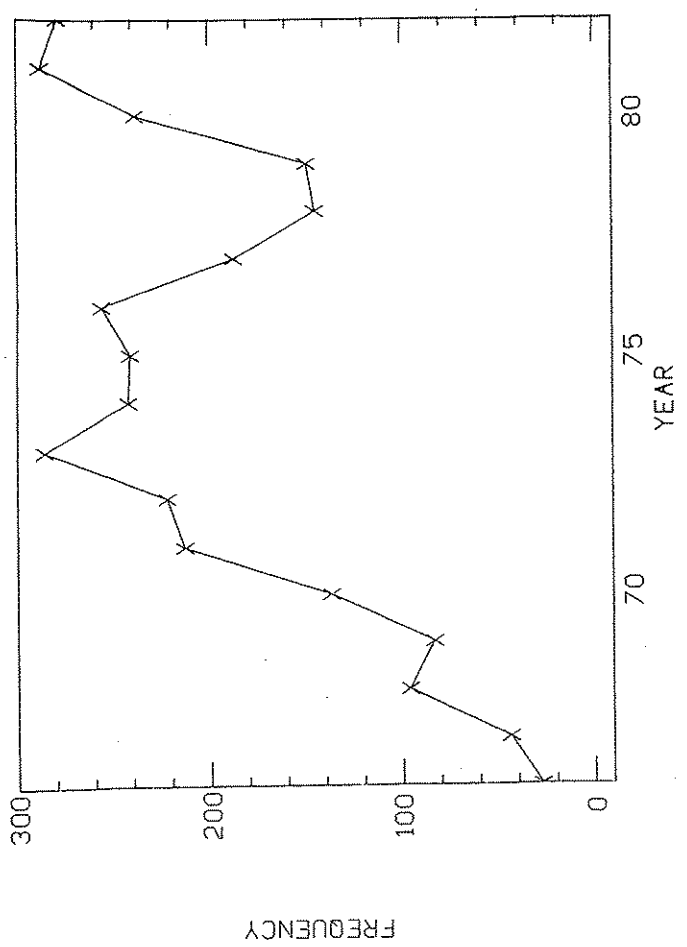

FIGURE 1.4 Number of Articles on Computer-Oriented Educational Programs in ERIC Data Base, 1966-1982

300 in 1973, and then a second rise in 1980, as shown in Figure 1.4. Studies specifically involving microcomputers (not included in Figure 1.3) rose from 0 before 1976, to less than 40 in 1979, to over 320 in 1982. Here, certainly the rise in the number of research studies parallels the rate of acceptance, and the impacts, of the technology.

One other more general precedent for the study of new media should be mentioned; that is the notion of the "information society." (See Dizzard [1982] for technological, economic, and political aspects of the "information age".) Initial works on this topic involved specific aspects of the creation, diffusion, and use of information in an economy (Machlup, 1962) and more general social trends due to the transition of the U.S. economy from an industrial base to a service and then information-handling base (Bell, 1976). Approximately half of the U.S. gross national product is devoted to the creation, handling, and distribution of information, and this fact is one measure of our transition to an information society (Parker, 1978a; Porat, 1977). A wider concept of such a society considers how the transition from manufacturing and agriculture as principal activities in society affects business, community, and personal life. Japan, in particular, places great emphasis on how quality of life incorporates and is affected by the increasing influence and diversity of information (Ito, 1981).

COMMUNICATION RESEARCH TURNS TO THE NEW MEDIA

Before a short discussion of how communication has been turning its attention to new media, it is very important to emphasize that researchers *outside* of the communication field have been concerned about some aspects of the new media since the early 1960s. The bulk of this attention has been focused, of course, on the computer—not as a communication medium, but as an information processor, computational device, and simulator of human mental functions.

The relationships between computers and society, thought, education, and work were major concerns in books by Greenberger (1962), Simon (1960), and Wiener (1961). Even studies of "office automation" appeared early on, although the term was applied to electronic data processing by authors including Diebold (1964), Dunlop (1962), Englebart (1962), Jaffe and Froomkin (1968), Mann (1962), Mumford and Banks (1967), Rhee (1968), Shultz and Whisler (1960), Stewart (1971), Taviss (1970), and Whisler (1970).

The notion of a knowledge worker is no recent phenomenon, either; Bush set out the issues in 1945; Paisley (1980) ended his review and analysis of the concepts involved in information work with a reconsideration of Bush's propositions. The early work by Englebart (1962) on the "knowledge workshop" is seeing light, more than ten years later, in the design of Apple's Lisa computer. Negroponte's work on videodiscs at MIT's Architectural Machine Group led the way toward interactive learning and mass-storage information retrieval systems. Ithiel de Sola Pool, a political scientist at MIT with strong interests in communication

research, started the Center for Policy Alternatives, which has conducted research on the information economy and on telecommunications policy. Anthony Oettinger formed the Harvard Program on Information Technologies and Public Policy, and created the word "compunications" to emphasize the convergence between computers and communications.

The evaluation of the social and philosophical benefits and dangers in computing continues by scientists in various disciplines, such as Gotlieb and Borodin (1973), Moshowitz (1976), Weizenbaum (1976), Wessell (1976), Winner (1977), and many others. Many of these authors are computer scientists particularly concerned with the effects on human values and thought processes and are involved in the debate as to how "human" computers can become. This tradition is maintained to this day (see Dertouzos and Moses, 1980; Forester, 1981). Clearly, communication researchers were not the first or foremost in considering the origins, uses, impacts, and policies of computers in social and organizational life. However, except for some of those authors involved in office automation (such as Don Tapscott, Dave Conrath, James Bair, and Murray Turoff) or those of Simon's and Wiener's ilk, aware of the role of information in managerial behavior, few were concerned specifically with computers as communication *media* or with new telecommunications media outside of data networks.

As discussed in the prior section, currents in the study of new media by communication researchers had been swirling in the late 1960s and early 1970s, but most remained, with respect to communication research, offshore or isolated in tidal eddies. Perhaps the first concerted effort to include the new media in communication research was by Dr. Edwin Parker. He was a student of Wilbur Schramm's—as a Canadian, aware of Innis and McLuhan's writings—and a coauthor of one of the first books on television and children (Schramm, Lyle, and Parker, 1961).

Yet, while television effects were being studied in the early 1960s, the policy decisions had already been made ten years earlier. Parker thus became convinced that we should look forward, instead of backward, to shape and determine possible (and desired) effects of new media; the medium he was using as a *tool* for research—the computer—was going to have much more social impact and be a factor in social change, than the medium he was then studying—television. Parker started graduate school in fall, 1957—when Sputnik was launched—and new communication media were becoming part of the culture.

Stanford University itself was noted for its achievements in new technologies, and the Silicon Valley was just developing nearby (see Rogers and Larsen, 1984). An Information Systems Program at Stanford was funded by the National Science Foundation, involving Professors Bruce Owen, Donald Dunn, and others in economics and engineering. The National Science Foundation funded Dr. Parker and others in 1967 to develop a multiindexing information retrieval language (eventually named SPIRES), initially to facilitate research efforts at the Stanford Linear Accelerator Center.

Readings in the history of technology, and the industrial revolution, along with the research activities in information systems, led to a series of articles on new media (Parker and Dunn, 1972; Parker, 1970a,b,c, 1973a,b,c,d, 1976).[3] A National Institute of Health biomedical training grant to the Stanford Institute helped produce communication researchers particularly attuned to computers as information and communication media, such as Thomas Martin (Syracuse University), Heather Hudson (University of Texas, Austin), Ray Panko (University of Hawaii), William Richards (Simon Fraser University), and Mark Porat (formerly with the U.S. Department of Commerce and the Aspen Institute.)[4]

This research on communication technology fit well with the strong interest at Stanford in the 1970's on development communication problems in the Third World. It was reflected in a variety of writings (Parker, 1978a,b, 1979; Parker and Hudson, 1973, 1975; Parker and Lusignan, 1977; Parker and Mohammadi, 1977; Rice and Parker, 1979), coming out of research and experience in Alaska, Iran, Indonesia, and other developing nations. Parker himself applied communication theory and his awareness of new media to launch Equatorial Communications, a highly successful telecommunications company in Mountain View, California.

Another, related, thrust to the study of new media was set by Dr. Frederick Williams, the founding Dean of the Annenberg School of Communications at the University of Southern California. In 1969, while at the University of Texas at Austin, he had the opportunity to start a new television project, involving the use of television in bilingual language training. He saw this as an opportunity to use the *medium* rather than the *content* to affect language. In 1972 Dr. Percy Tannenbaum invited him to attend a seminar on the Future of Communications at the Center for Advanced Studies in the Behavioral Sciences (at Stanford), where he heard Parker's comments on the impacts of communication technology. The Annenberg School was founded on the principle of the importance of the new media, with the first courses based upon such core concepts as communication technology, practices, and theories. The early faculty included communication technology researchers and consultants such as Thomas Martin, James Carlisle, Dave Holzman, Gerald Hanneman,[5] Herbert Dordick, and James Danowski. Several grants at the University of Southern California at this time helped develop the research focus on new media: (a) one with Jack Nilles, that led to the first comprehensive study of transportation/telecommunications trade-offs (Nilles, Carlson, Gray, and Hanneman, 1976), and (b) another leading to a study of the network marketplace (Dordick, Bradley, and Nanus, 1981). Williams (e.g., 1983) continues to be a commentator on the "communications revolution."

Other influences were the early cable studies by Greenberg and colleagues at Michigan State University (Baldwin, Greenberg, Block, and Stoyanoff, 1978), Rand (see a Rand reprint by Goldhamer, 1971) and Clarke and colleagues at the University of Michigan (Clarke, Kline, Schumacher, and Evans, 1978). Smith (1972) and Maddox (1972) were early on interested in cable and electronic media; see also Pool (1973).

In England the Communication Studies Group established some of the basic principles and results in comparing alternative conferencing media (see Short, Williams, and Christie, 1976). Other members of the group included Champness, Reid, Pye, Elton, Wilson, and Young, all active in telecommunications research and policy. This work was parallelled by the Institute for the Future in California (see Johansen, Vallee, and Spangler, 1979).

It might be of interest to look at how the field of communication research has included the new media on its agenda over time. The International Communication Association (ICA) is the umbrella organization for communication research in the United States, and does hold its meetings in other countries every four or five years. By assuming that the papers and session topics that are presented at the annual conference represent current and acceptable interests, the number of papers involving new media each year is one measure of the importance of the subject to the communication field.[6] Briefly, ICA programs from 1973 through 1983 indicated how many total content units there were and how many of those were concerned with some aspects of the new media. The total number of new papers and the percentage of new media papers relative to the total number of all content units were then calculated.

As Figure 1.5 shows, there was interest in the new media from a research perspective from the 1973 program on. Although one or two were interpreted loosely as new media papers ("Telephone Communication for the Handicapped" and "Some Principles of Information Storage and Retrieval in Society"), most were explicit ("Computer Credibility for French and English Canadians" and "An Intelsat Dilemma"). However, the bulk came from a four-paper panel on "Man-Computer Interactive Systems" sponsored by the American Society for Information Science. Thus the main thrust in 1973 comes from another association. The ten papers in 1974, however, were scattered over seven sessions and typically focused on information system design, teleconferencing, and man-machine interaction. Three papers in the 1975 conference came from a panel on teleconferencing, while the other six were spread over five sessions. Both papers in 1976 were concerned with computer-based communication, while Berlin in 1977 saw the first great increase in communication interest in new media. The 21 papers appeared in ten sessions, also indicating increased "specialization" of interest, or a community awareness leading to organization of panels of more homogeneous concerns. Both because of the number and the clustering of new media topics in 1977, we can say that this was the year that new media became an accepted content area in ICA. Perhaps this was because there were European researchers at this conference who were concerned about direct broadcast satellites.

The next year saw a drop in the number of new media papers (seven) and a return to scattered papers (except for a three-paper panel on "Telecommunications Policy and Human Communications Research"); the following year again indicated growing interest groups, with fourteen papers in only five sessions. Three of these panels were interested in "The

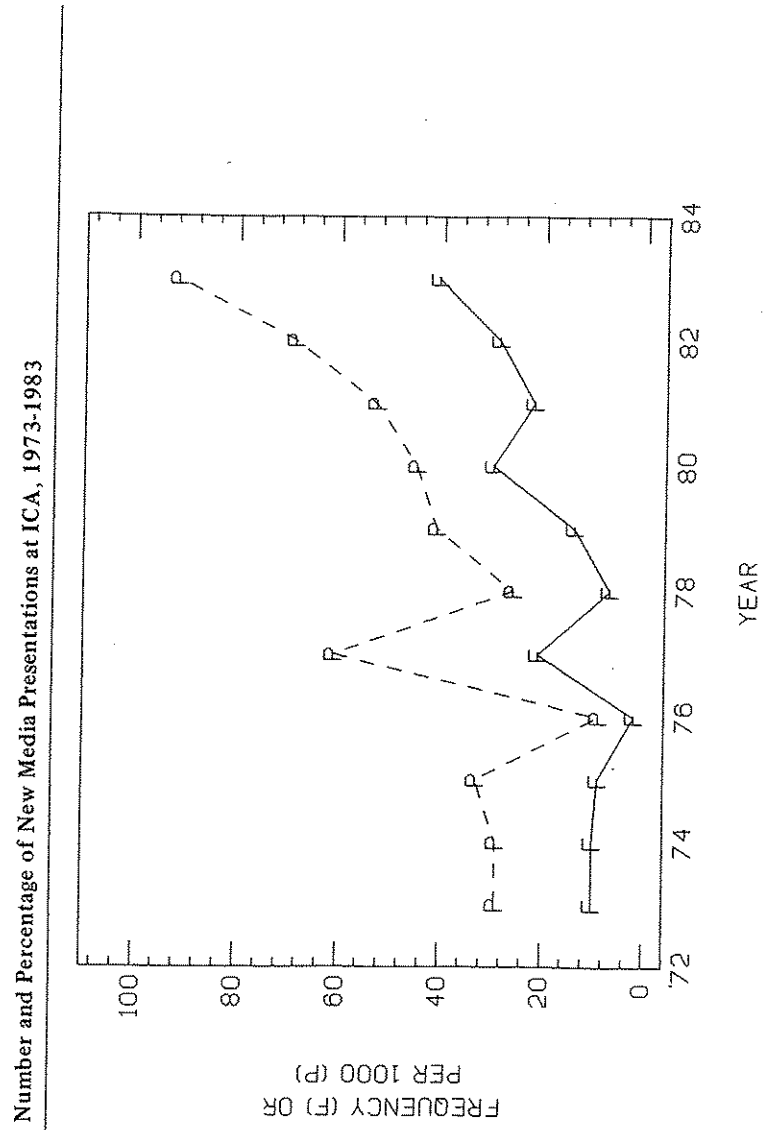

FIGURE 1.5 Number and Percentage of New Media Presentations at ICA, 1973-1983

Impact of New Electronic Media in the Home," "Communication Technology, Culture and Human Communication," and "Interactive Telecommunication for Civic Participation." International conferences seem to draw more people, so there were more than double the number of new media papers (30), distributed over 121 sessions; seven of these were specifically new media panels. The following two years showed continued growth and continued support by panels and groups interested in new media. Indeed, the Human Communication Technology (HCT) Interest Group was started at the 1980 Acapulco conference, and went on to establish continued emphasis on communication research in the new media. In 1983 and 1982, many of the media papers appeared in HCT sessions, although increasingly in conjunction with the other ICA divisions. However, new media papers are beginning to appear regularly in divisional sessions, and 1983 marked a high-water mark in interest, with 41 papers.

As with the other analyses, we need to scale these frequencies by the total number of content units (mostly papers) at each conference, because of the fluctuating number of presentations (from a low of 232 in 1976 to a high of 660 in 1980). The *percentage* of new media papers, also shown in Figure 1.5, clearly indicates a growing trend. The last two years have shown particularly large increases: in 1983, 9.2% of all content units at the annual ICA Conference involved some aspect of the new media. These percentages, right from the start, are greater than that of the magazine and business index rate (see Figure 1.2). This recent high, and growing, level of interest at the communication conference paper level is not mirrored in the published social literature, as also shown in Figures 1.1 and 1.2.

SUMMARY

Three implications follow from this discussion of the sources and development of communication research involving new media:

(1) Communication research conference papers, which may be more informal but are more current than published works, seem to reflect the large and growing social interest in the new media—as reflected in popular trade and business publications—more than the rest of the social sciences.

(2) The established social science journals still consider research concerning the new media inappropriate and insufficiently rigorous, and/or are ignoring an area of great social interest.

(3) It seems that communication research has an opportunity to *lead*, with increased rigor and a growing body of prior research, the social sciences in understanding the nature of the new media, their use, and their impacts. Popular and business segments of society would welcome the useful insights and practical implications; the academic community needs to become more aware of research opportunities and needs generated by the new media.

This is not simply a call for more research. It is part of a growing awareness of the increasing insularity of communication research on one hand, and the opportunity for interdisciplinary growth on the other. The depth and extent of this situation has been analyzed by Paisley (1984). Along with other authors, he points out that the primary norms of science are (a) public disclosure, (b) stimulation and cross-fertilization (implying support for exploration in new areas), (c) feedback and evaluation, and (d) peer rewards. Yet the growing isolationism of disciplines (and even of subdisciplines among the communication sciences) thwarts these norms through xenophobia, ethnocentrism, and dogmatism. This situation is a paradoxical result of the natural development of a new discipline. During the 1930s to the 1950s

> communication was a confluence of interest for leading social scientists in the United States . . . [but with a rise of communication as a discipline] . . . research was published not in the journals of the other social sciences but in new journals of communication . . . indicators of independence may also be indicators of isolation.

Through citation analysis and content analyses documents, Paisley shows that (a) communication science is not cited by other disciplines, except in a lagged fashion that concentrates only in recent materials from a few leading figures, (b) the communication subdisciplines are often segmented from each other, and (c) there is *decreasing* attention paid to "mass communication/mass media" in the disciplines of education, sociology, and psychology.

The topics that have drawn attention from diverse sources are the uses and gratifications approach, the knowledge gap, and the information society. This latter topic has drawn the most diverse attention. Paisley turns this and related evidence into his concluding theme:

> The communication sciences are entering a period of ferment that has already begun at the technological level. Epistemological ferment will follow. . . . No group of social researchers could wish for more than to find their variable (communication) at the center of transformations of work, learning, political participation, play, and other functions of society.

NOTES

1. DIALOG files 47, 37, and 75 were searched for the combined terms cable, cable (w) television, cable (w) TV, CATV, subscription (w) television, videotex?, teletext?, electronic (w) mail, electronic (w) messag?,, computer (w) conferenc?, communication? (w) satellite, microcomputer?, videodis?, fiber (w) optic?, communication? (w) satellite, office (w) automation, word (w) process? office (lw) future, office (2w) future, and viewdata. Then this combined search was sequentially "anded" by year of publication from 1974 through 1982.

The DIALOG Database Catalog provides the following descriptions of the three files. "Magazine Index covers over 370 popular magazines and provides

extensive coverage of current affairs, leisure time activities, home-centered arts, sports, recreation and travel, the performing arts, business, science and technology, consumer product evaluations, and other areas. . . . [Management Contents includes] articles from over 400 U.S. and international journals, proceedings, and transactions . . . fully indexed and abstracted to provide up-to-date information in the areas of accounting, decision sciences, finance, industrial relations, managerial economics, marketing, operations research, organization behavior, and public administration. . . . *Sociological Abstracts* covers the world's literature in sociology and behavioral sciences. Over 1200 journals and other serial publications are scanned."

2. Figures 1.3 and 1.4 are courtesy of Dr. Milton Chen at Stanford University's Institute for Communication Research.

3. One example of Parker's position in the information science and library field is indicated in a recent conomination/cocitation analysis by Lenk (1983). By means of factor analyses and hierarchical clusterings of conomination data within seven scientific specialty fields, researchers central to and within these fields were mapped into multidimensional space. Parker is the lone representative of communication research, and is located in the direct center of information science, occupying a liaison position between algorithmic researchers on one side and information retrieval specialties on the other.

4. The author of this chapter was the last student funded by Dr. Parker.

5. Hanneman, Dr. Williams says, was the first to use the term "new media," and developed the first communication textbook involving the topic (Hanneman and McEwen, 1975: Chapters 15, 16, 19).

6. (My thanks go to Jan Goldman and Bob Cox of ICA for their generosity in supplying the needed conference programs.) The intent of this analysis was to describe the relative attention paid by ICA conferences (1973-1983) to research involving the new media, as reflected in the final ICA programs. Thus the focus was on substantive *content*, and not simply on items on the conference agenda. What was counted included identifiable paper titles, topics of panels, and the topic of a special address. A very rough weighting scheme was used to reflect differential agenda-setting or attention-getting effects of addresses versus panels versus papers. Each identifiable paper title was one unit, so that a typical paper panel totaled around four to six units; a panel with several members but no specific paper titles was three units, representing somewhat less than a typical paper panel; a special address or plenary session with one guest or keynote speaker was one unit. A rough copy of all the enumeration of such papers or content units is available from the author.

Other program sessions that were not counted because they did not represent research content per se included action caucuses, business meetings, no-host bars, poolside parties, workshops, tutorials, curriculum-building seminars, and skill-building sessions.

The total number of units for a given conference represented the total number of research/content items that ICA deemed important enough to include in its program, and, because they were so identified, were in some ways accessible and perhaps even attractive to a conference attender. The total number of new-media papers included all those units identifiably concerned with uses, impacts, regulatory issues and other communication research interests involving new media. Thus a paper on standard cable delivery or use would not be included, while a philosophical paper on telecommunication technology in the information society would. Finally, a title including "computer" because a computer was used to calculate or simulate a communication measure or activity of interest was not included, while a paper about communication data *collected by* a computer (as a communication medium) was included.

Needless to say, there is an ad hoc atmosphere in this coding scheme, but I was sufficiently familiar with the papers to apply it. As with all content-coding schemes, the relative weighting has nothing to do with actual exposure, evaluation, or use of the research and the conference papers themselves. Another difficulty was the changing nature of the ICA conference program itself. There seemed to be more diverse forms of sessions in the earlier programs, making it difficult to be consistent in categorization over time. (For example, in 1977 there were a few tutorials that looked suspiciously like paper panels, with paper titles and authors. These were counted.) Also, until 1978, there were "contributed papers" sessions that did little more than list 25 paper titles. This was changed in 1978 to a "poster session" that in some years listed the titles, and in others did not. This of course will bias the denominator in the percentage of media papers, unless the "contributed papers" included a proportional selection of new-media papers. Because most such poster or contributed paper sessions are in interpersonal or instructional communication, this is not a safe assumption.