COMPUTER MEDIATED COMMUNICATIONS: AN ANALYSIS OF THREE MASS COMMUNICATIONS MAILING LISTS

by

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A THESIS

IN

MASS COMMUNICATIONS

Submitted to the Graduate Faculty
of Texas Tech University in
Partial Fulfillment of
the Requirements for
the Degree of

MASTER OF ARTS

Approved

Chairperson of the Committee

Accepted

Dean of the Graduate School

May, 1995

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CHAPTER I
INTRODUCTION

We are in the midst of a telecommunications revolution, a tumult so widespread that heretofore recognized conventions of communication, economy, and politics will experience a comprehensive shifting of paradigms. According to John Naisbitt (1994), forces are in motion to create a global information system so massive that it will eventually overthrow the way we, the citizens of planet Earth, will do business, govern ourselves, and communicate with one another. He predicts that the products of this revolt will be the blending of technologies, forming a unique synergy of mass communications, international networks of seamless information transmission structures, and instant access to vast amounts of data to anyone with a telecomputer. In the process of all this change, one thing is certain, journalism will never be the same again.

The architects of this brave new world envision a future fraught with virtual classrooms, interconnected laboratories, global communities of commerce, and other information repositories (Abernathy, 1993). This bold vision for the future is already well underway. A versatile new environment for the circulation of public and private information is imminent. The complementary resources of computers and networks are providing the public and private sectors with unparalleled access to information (Kahin, 1991). The result will be the emerging of a new world order; one that is increasingly linked by telecommunications, and one that is becoming increasingly dependent on those links (Bates & Lansing, 1993).

Imagine what sort of repercussions the printing press must have made in the days of its introduction. Consider the telegraph or the telephone, the radio or

the television. Each of these innovations threatened the established models of politics, economy and communications of their day. In the same way, the advancement of global telecommunications, will cause profound and comprehensive change in the way we harvest and process information (Reddick & King, 1995).

Whereas in the past there were unique and distinct mediums of mass communications (i.e., print, audio, and video), the advent of new technologies is causing a blending of these recognized standards of communication. What we are experiencing is the converging of these media into one digital format.

Computer hardware is faster and more robust than ever before. At the same time, software is more creative (Wallace, 1995). Desktop computers, today, can manipulate digitized print, audio and video to create a wide variety of multimedia offerings. Computer generated audio is now 16–bit stereo sound, while digital video approaches broadcast standards (i.e., 30 frames and 60 fields per second). On the horizon stands virtual reality, a new dimension of multimedia where one can virtually experience, for example moving around in an imaginary desktop environment (Canon, 1994).

Greg Johnson is a multimedia developer for Magnet Interactive–Washington, D.C. In an interview with *New Media* (1995) he envisioned a day when enormous chunks of digital media will be connected to a spontaneous multi–user network. This multi-user network he went on to descibe as a completely navigable, online 3-D world.

Telecommunications is in a time of shifting paradigms. We are confronted everyday with the new media and it will not go away. Eventually, the effects of these sweeping changes will be felt by every member of the communications industry. Journalism is no exception.

By the beginning of the 1990s, computer-mediated information processing was fast becoming a chic investigative beat among reporters. A journalist could gather volumes of information without ever having to leave his/her desk. All of this information processing was made possible because of the introduction of powerful computers and the computerization of more and more information. These tools gave the investigative reporter the ability to retrieve, exchange, and publish digital data without physical and geographical constraints (Bland, 1991; "IABC Communication World," 1991; Chesebro, 1993).

The process of information gathering and the production of news is undergoing a fundamental change (De Riemer, 1991). Journalism is entering a new age of computer–mediated communications (Abernathy, 1993). Reporters are beginning to take advantage of the emerging power of collaboration in the production of news. The role of E-mail, electronic bulletin boards, and electronic discussion groups, have made a profound impact on information culture (Ashley, 1992). These collaborative mass media arrangements represent a new and significant egress from conventional mass media forms. Researchers argue that they expand the very definition of mass media from "one-to-many" to "many-to-many" communication (Rafaeli & LaRose, 1993; Clausen, 1991).

Phil Meyer is a database consultant for *USA Today* and author of "The New Precision Journalism." He speaks of computer-mediated investigative reporting saying, "We need reporters, editors who can extract [information], analyze it and put it in a package" that readers can understand (cited in Bland, 1991). This is a difficult process.

Margaret DeFleur (1991) recognized the need to train a new generation of journalists. In her research of computer-assisted investigative reporting, she

developed some essential strategies to help reporters examine and analyze the incredible amounts of information now available on the networks. These strategies range from advice on how to access the information to how to perform a statistical analysis on the data obtained. The methodology she prescribes is rigorous; nevertheless, she claims it is the future of investigative reporting.

Reddick and King (1995), in their discussion of the online world, showed how computer-based communication networks can broaden a journalist's access to information. They argue that this increased access to information will lead, ultimately, to better journalism. To illustrate these claims, the writers presented the new White House beat for the online journalist.

> For years, the White House beat was considered the most prestigious in journalism. At the bottom line, the role of a White House reporter has been defined by access to information from the White House. The first White House reporters hovered close outside the Executive Mansion itself, monitoring who entered and left for meetings with the Chief Executive...That situation is rapidly changing. With the development of commercial databases, computer bulletin boards and the Internet, journalists working anywhere can have the same access to much of the information once restricted to White House reporters. (pp. 12, 13)

Not all reporters are assigned to write news about the Chief Executive. Information about the White House is only one example among many types of information now available to the online journalist. For example, those on a business beat can access great electronic information directly from Dow Vision or the Securities and Exchange Commission. Science reporters can delve into the databases of the National Science Foundation, the National Institutes of Health, the National Library of Medicine and the National Aeronautic and Space Administration among other information resources. No matter what beat the

reporter covers, there very likely will be online information available to assist him/her in the production of the news (Reddick & King, 1995).

It has been shown that mass communication professionals are in the midst of a comprehensive paradigm shift in virtually all facets of information processing. As the infrastructure of computer networks matures and more mass media professionals begin to take advantage of this new environment, new paradigms of communication are emerging. In the midst of all these changes, it remains to be seen, however, how mass media professionals are adapting to the emerging media of computer-mediated communication.

The purposes of this study are threefold: (1) to gather a chronological synthesis of prior literature in computer-mediated communication; (2) to describe the nature of computer-mediated communication taking place among mass media professional E-mail lists; and (3) to compare the patterns of computer-mediated communication among three mass media professional E-mail lists.

CHAPTER II
LITERATURE REVIEW

In the literature review that follows two important areas of computer-mediated communication will be discussed. First, a history of packet-switched internetworked telecommunications will be presented as a technological primer. Second, there will be a review of prior research in computer-mediated communication.

Internet Technological Primer

For the purpose of this study, all discussion of remote computer resources will be limited to the Internet. This technological primer will discuss four subjects: (1) the evolution of the Internet; (2) the impact of the National Science Foundation on the Internet; (3) how to access the Internet; and (4) relevant Internet software applications for online communication: E-mail, and mailing lists.

The Evolution of the Internet

The Internet is a massive collection of networks tied together. It once was the exclusive domain of the military, researchers, and academics; however, in 1983 the Internet became available to all. It has grown phenomenally since that time. The Internet now includes a large number of geographically dispersed networks in private, academic, corporate and research communities. It functions as an infrastructure for a broad population having various interests. But it has not always been this way (Clark, 1994; O'Mara, 1994; Malkin, Marine & Reynolds, 1991).

In the late 1960s, the United States Government, realizing the enormous impact that computers would have on military research and development, decided to fund an
experimental computer network. One of the primary goals of this research effort was to develop a telecommunications system that could withstand nuclear attack. In order to do such a thing, the network protocol had to allow for the addition and removal of nodes with minimal impact. The challenge was to develop a standard set of rules for network communication that would allow information to be sent over many different kinds of networks without regard to the underlying operating systems incorporated. These initial efforts in military research resulted in the formation of the Advanced Research Projects Agency, or ARPA (Pike, 1995; Reddick & King, 1995; Hahn & Stout, 1994; Verity & Hoff, 1994; Krol, 1992).

ARPA focused its efforts on the development of hardware and software to render an advanced data transmission technology, called packet switching. This enabled geographically remote, heterogeneous computers to exchange information. Packet switching technology provided for a multiplexing of data streams, allowing remote computers to interchange data. In order to do this, each stream of data had to be divided into packets at the point of transmission, and then reassembled sequentially at the remote destination. It was to be a daunting task (Pike, 1995; Dern, 1994).

On January 2, 1969, the packet switching software development began. The responsibility fell upon Bolt, Baranek, and Newman, a consulting firm based in Cambridge, MA. By September of that year, the first Honeywell 516 minicomputers arrived at the campuses of UCLA, Stanford Research Institute (SRI), UC Santa Barbara, and the University of Utah. A few weeks later, the pilot

packet-switched network began (Dern, 1995). This network became known as the ARPAnet. Ed Kroll (1992) describes these early days as follows:

> In the ARPAnet model, communication always occurs between a source and a destination computer. The network itself is assumed to be unreliable; any portion of the network could disappear at any moment. It was designed to require the minimum of information from the computer clients. To send a message on the network, a computer only had to put its data in an envelope, called an Internet Protocol (IP) packet, and "address" the packets correctly. The communicating computers—not the network itself—were also given the responsibility to ensure that the communication was accomplished. The philosophy was that every computer on the network could talk as a peer, with any other computer. (p. 11)

ARPAnet had its "coming-out party" in October of 1972. It was a public demonstration hosted at the International Conference of Computers in Washington, D.C. The demonstration was a great success. Representatives of ARPA demonstrated remote access and file transfer procedures across a long-distance high-speed network. It was at this conference that members of the global interconnected computing community began envisioning a global network (Dern, 1994).

In 1975, the ARPAnet was put under the control of the Defense Communications Agency of the United States Department of Defense. Here the ARPAnet packet switching technology became the basis of the Defense Data Network (DDN). By the early 1980s, ARPA was developing satellite, radio and high-speed telephone packet networks. These heterogeneous packet networks created the need for expanded packet switching protocol to allow for interconnection. The resulting protocol was named Transmission Control Protocol/Internetworking Protocol, or TCP/IP (Dern, 1994).

The development of TCP/IP was the major contribution of the ARPAnet research. With this unique internetworking protocol "Internet traffic can move over almost any physical channel—telephone lines, cable-TV setups, satellite links, wireless phones, or high-speed fiber-optic trunks" (Verity & Hoff, 1994, p. 83). TCP/IP is the common name for a collection of more than 100 protocols used to connect computers and networks. These systems for data transmission provide for information to be broken down into small packages called packets which are then sent over a network, where the IP transports them to the remote host. At the other end, the remote TCP receives the packets, waits for all the packets to be received, and then sequentially reconstructs the original message. All of this happens in almost real time because the work is done by the computers (Hahn & Stout, 1994; Pike, 1995). The TCP/IP protocol allows users to make remote access, transfer files, and perform a whole host of other applications. In this way it serves as a unifying quasi-operating system, allowing Internet applications to interact cross platform (Reddick & King, 1995).

During the early 1980s, all the interconnected research networks adopted the TCP/IP network protocol as the de facto standard. The ARPAnet became the backbone (the physical connection between the major sites) of what was now being called the Internet. The conversion was complete by the end of 1983. This date is commonly referred to as the birth of today's Internet (Pike, 1995; Dern, 1994).

The Impact of the National Science Foundation

In 1985, the National Science Foundation (NSF) began its Supercomputer Program. At the launch there were five regional supercomputer centers, each

with its own regional access network, and all interconnected to a national backbone network. The objective was to give universities and research centers remote access to the regional supercomputing centers. At first, the NSF tried to use the ARPAnet for the national communications backbone, but this strategy failed because of bureaucracy and staffing problems. In the end, NSF decided to build its own network, based upon the ARPAnet's IP technology. The foundation connected five regional supercomputing centers with 56,000 bit per second (56k bps) telephone lines. Collectively, the supercomputing centers, the regional research networks, and a few other mid-tier networks constituted the NSF Network, or NSFNET (Pike, 1995; Krol, 1992; Kahin, 1991). Daniel Dern (1994) provides a good summary of these steps:

> The NSF built a high-speed Internet backbone between various supercomputing centers. And then from this backbone established a middle tier of networks. These were called regional networks, providing (1) connections between the organizations that they served and (2) connections to the NSFNET backbone. For example, to connect to a computer in San Francisco, a user at M.I.T. would (1) be on the network at M.I.T. which (2) connected to the New England regional network, which (3) connected to the NSFNET backbone, (4) connecting to the San Francisco area regional network, (5) which in turn connected to the network at the remote computer site. Packet switched networks handle all this computer traffic automatically. (p. 12)

An important aspect of the NSFNET was that it allowed more people to have access to the network. Prior to this, Internet access had been available only to researchers in computer science, to government employees, and to government contractors. The NSF promoted universal educational access. As a result, the Internet began to experience phenomenal growth (Krol, 1992).

The NSFNET became so popular, and thus so overcrowded, that in 1987 a contract to manage and upgrade the network was awarded to Merit Network

Inc. Merit, in partnership with IBM and MCI, established a new company in 1990, named Advanced Network & Services, Inc. (ANS), to oversee the NSFNET. This new corporation provided a dedicated network of leased lines (increasing the speed of the telephone lines by a factor of 20) and installed faster network switches to control the traffic (Dern, 1994; Pike, 1995; Krol, 1992). It was at this time that Merit proposed allowing the Internet to carry commercial traffic, resulting in the emergence of network service providers. These were a grouping of both for-profit and nonprofit organizations (Reddick & King, 1995).

In April of 1993, the NSF awarded three five-year cooperative agreements for the management and operation of the network to a by Network Information Services (NIS) consortium. The administrative branch of this group worked together to manage the Internet Network Information Center (InterNIC)–a body responsible for providing information about getting connected to and using the Internet. By awarding the NIS management privileges of the NSFNET, the NSF has moved closer to its goal to remove themselves from the direct funding of the network (Pike, 1995).

The Internet, today, is beginning to carry a substantial amount of commercial and private traffic. In the future, regional networks will pay for their own connection fees to the high-speed backbone. This will mean that any commercial and/or educational institutions that want to connect to the regional networks will have to pay network usage fees to the regional providers. The NIS seeks, in the future, to have every user pay its own way (Pike, 1995; Reddick & King; 1995, Krol, 1992).

In the 22 years since the birth of the Internet, it has grown from 213 registered hosts (service providers) to more than 4.8 million registered hosts

world wide. It is said that every 30 seconds, another network of computers joins the Internet. The Net grew in 1994 alone by 95 percent. Twenty-two nations joined in the same year. Today, there are 159 interconnected nations, with more than 56,000 interconnected organizations worldwide. This includes 1.3 million business computers (up 628 percent in three years), 1.1 million schools and universities, and 209,345 government computers online (Pike, 1995; U.S. News & World Report, Feb. 27, 1995).

The Internet is not the property of any one person or organization. It has no president, chief operating officer, or Pope. If there is any recognized authority, it rests with the Internet Society or ISOC. This is a voluntary organization whose purpose is to promote global information sharing through the advancement of Internet applications and technologies. The ISOC is the guardian of the internetworking protocols (Pike, 1995; Reddick & King, 1995; Krol, 1992).

Internet Access

The Internet is undergoing a major paradigm shift. Notwithstanding, the factors influencing this shift, the commercial models emerging and the resulting pressures of explosive growth, are deeply rooted in the history of the Internet. Through it all, the Internet has been, and continues to be a "phenomenal" success story (Weis, 1992).

Essentially, the requirements for Internet access are simple and straightforward. They are as follows: (1) open an account with an Internet service provider; (2) acquire appropriate communications software; and, in most cases, (3) install a modem at the remote site. The extent and privileges of the Internet access will depend on the type of account a person has and the software he/she will use (Clark, 1995).

There are different types of Internet service providers, depending upon the type of connection option an individual opts for. These Internet services can be sorted into four broad categories. First, one can connect through an online service or through the Internet gateway of an electronic bulletin board service. Second, an individual may contract with a dedicated Internet access provider and utilize a shell account interface. This type of link uses a UNIX command line or a proprietary, depending upon the service provider's software interface. Third, a person searching for access may choose to contract with an Internet access provider and set up a SLIP or PPP account. This involves the installation system level TCP/IP along with a collection of search, retrieval, and communications utilities. Finally, users may choose to connect their entire organization. This would mean installing TCP/IP and Internet utilities on their office server and hooking up the Local Area Network (LAN) to an access provider via high-speed dedicated phone lines (Abernathy, 1995).

Electronic Mail and Mailing Lists

Electronic Mail. One of the biggest surprises to the creators of computer-based electronic networks has been the extent to which their technologies have been used to connect people to people. The builders of the global information networks envisioned a future where massive online database repositories would be computer linked to permit wide-area information searches, remote access, and standardized file transfer protocols. As bold as the vision promised to be, it was limited in its scope because it did not include point-to-point electronic mail. E-mail was only added later as a postscript to the prototype project. No one had a clue of the transformational aspects of electronic mail, and the singular role it

would play as a media for computer-based communication (Hardie & Neou, 1993; Gordon, 1986).

Electronic mail incorporates global communications possibilities. And in this regard, represents a new model of rapid asynchronous interaction, different in many ways from traditional print media. E-mail is responsible for a transition from conventional mass media forms to a new communication paradigm. It is a fast, easy, and inexpensive way to communicate with other Internet users around the world. In many ways, E-mail represents a new egress in telecommunication technology, opening doors to important sources for information, collaboration and professional development (Garnette, 1985).

Electronic mail is a new-fashioned media for human communication. It is fundamentally different from paper-based or face-to-face communication. Some of these differences are advantageous, such as its speed of distribution and simultaneous broadcasting capabilities; however, others are not so advantageous. E-mail tends to be sloppier than paper-based communications, and more ambiguous. It is more ambiguous due to the lack of vocal inflection, gestures, and shared environment (Sherwood, 1994; Heslop, 1994). It stands to reason, therefore, that E-mail compositions should have different style and composition guidelines.

Kaitlin Duck Sherwood (1994) wrote a beginner's guide to effective E-mail. One of the most important communication skills, she asserts, for effective E-mail composition is to provide the reader with enough context to be able to interpret the text. With E-mail, one cannot assume anything about his/her correspondent's location, time, frame of mind, mood, health, marital status, affluence, age, or gender. Care should be taken, therefore, to give the reader the right amount of

background to make the message clear and specific.

Gestures are possible in an E-mail document. One simply must learn how to imaginatively use them. Using them will provide the reader with some important contextual parameters for effective communication. There are many ASCII stand-ins for gestures, ranging from being smiley :-) to angry < :- < to kidding ; -) to sad :- (to ill %^ p to astonished :- o (Sherwood, 1994).

Mailing Lists. E-mail is not only known for being quickly distributed and global, it also can be sent to many people at the same time. This mass distribution capability is the function of a mailing list. A mailing list allows the user to participate in collaborative forums of discussion. The mass distribution capabilities of mailing lists are what makes this media a new paradigm of communication. With E-mail, everyone can be a sender, everyone can be a producer of information, everyone has an equal chance to be heard, everyone with the appropriate connection that is. E-mail is unique in this regard: it allows for "many–to–many" communication (Schmitz, 1995; Tennant, 1992).

A mailing list is a cross between a magazine subscription and a discussion group. It allows users to harvest and discuss information with a group of subscribers by means of electronic mail. Membership on a mailing list is free because all of the information is generated by the members. An interested participant in a mailing list must subscribe to a list before he/she will receive any mail from that particular mailing list (Strangelove & Fraser–Fazakas, 1994).

Mailing lists are one of the richest resources for computer–mediated communication. There are hundreds of lists on the Internet covering almost every topic imaginable. These lists allow individuals to be joined together by mutual interest, to collaborate their thoughts and discoveries in a unique communication forum (Hardie & Neou, 1993).

The technology of an electronic mailing list is such that any member can send messages to and receive messages from the whole group. In this way, they provide real–time forums for discussion, almost like taking part in a conversation (Hardie & Neou, 1993). This is accomplished through the use of an E-mail reflector.

The task of an E-mail reflector is to broadcast the messages posted to a mailing list to the E-mail addresses of all the subscribers on the list. It is performed by automated software (unmoderated list) or by a list administrator (moderated list). Unmoderated lists allow for free–form discussion, without any restrictions. Posting to this type of mailing list is practically instantaneous. The unmoderated lists are typically the most active. It is difficult, however, to keep these mailing lists on topic.

Moderated lists, on the other hand, are regulated by a list administrator. The messages are screened in an effort to keep the discussion high quality and on topic. Posting takes more time. The moderated lists, it follows, are more bureaucratic, top–down, in their structure (Abernathy, 1995; Clark, 1994; Hardie & Neou,1993).

Steven Harnad (1991) is part of the Cognitive Science Laboratory at Princeton University. He describes the advent of electronic discussion groups as the "post–Gutenberg galaxy." He postulates that mailing lists on the high-speed information networks could well represent a new revolution in the means whereby knowledge is produced. He argues that multiple reciprocal E-mail has the potential to advance knowledge and refine human patterns of communication.

Computer-Mediated Communication

Recent developments in telecommunication's technology are challenging the norms of human communication. It remains to be seen, however, whether researchers will be able to describe the vast, unique expanses of this new communication media. Computer-mediated communication (CMC) overthrows many previous assumptions about the exercise of interactive communication (Reid, 1993). There have been, nevertheless, certain investigative pioneers in CMC that have left their footprints in the ethereal sands of cyberspace.

CMC is inclusive of both synchronous or asynchronous electronic mail and computer conferencing. It is a process whereby people produce, exchange, and comprehend information using networked telecommunication systems that enable the encoding, transmitting, receiving, and decoding of messages. This process can be viewed from a variety of perspectives (December, 1994).

The studies of CMC are multifaceted and interdisciplinary in their approach and perspective. Unfortunately, the resulting genre of literature is like a multi-tangled web. Steven Dick describes it as being "confused, conflicting and disjointed" (Dick, 1993). Nevertheless, for the purposes of this study, prior research will be divided into three general classes: descriptive, interpersonal effects, and traffic analyses. In the literature that follows, each of these areas will be reviewed.

Descriptive studies in Computer-Mediated Communication

The researcher accessed descriptive studies in CMC over a period of twelve years (1982-1994). Research in this area attempts to explain what types of communication activities are taking place in an electronic media. An electronic

media may include E-mail, mailing lists, discussion groups and bulletin boards. There is no theoretical framework.

Danowski (1982) set out to develop a methodology for both theoretical and practical research in the area of CMC. Content analysis of message concepts was a focal point to his procedures. The researcher examined the different approaches to isolating message concepts. These he argued could be tailored to research objectives. The researcher's methodology advocated the segmentation of communication activity by communication network structure and activity over time; the identification of message content elements, such as stimulus response message pairs; the tabulation of concept co-occurrence with message pairs; and, multidimensional scaling of the aggregated co-occurrence matrix to identify the overall pattern of relationships among message elements. He identified specific content elements. These are shown in Figure 2.1.

Chesebro (1985) analyzed computer bulletin board systems to assess the degree to which these CMC systems create, function and influence relationships. He gathered a random sample of 14 publicly available computer bulletin board systems and performed a detailed content analysis of the messages posted. The messages were classified according to central topic, and listed in order of the most frequently discussed issues. His preliminary research identified five differences between face-to-face and computer-mediated communication. These differences correlate to the type of conduits used, the differing types of discursive modes, the unique feedback arrangements, the different kinds of social roles involved and the use of time embedded in each system.

Chesebro (1985), as a result of his descriptive efforts, identified six important characteristics of CMC systems. (1) CMC had an identity all its own. It

1. Computerized Bulletin Board System (CBBS) procedures
2. Modems/couplers
3. Request help/information
4. Give help/information
5. Offer information at future date
6. Greetings/salutations
7. Give name/address/phone number
8. Computer software
9. Discuss user groups
10. Offer computer-related service/software free
11. Computer games
12. Leave message on computer bulletin board (this or other)
13. Refer to earlier message
14. Computer for the blind
15. Express interest
16. Source listing
17. Computer system (other than CBBS)
18. Hard copy
19. Thank you
20. Acknowledge receipt of message
21. Discuss problems with own computer
22. Delete message
23. Fantasy
24. Ask for participation in discussing topic
25. Will send information by other means (telephone, mail)

Figure 2.1. Message Content Elements (Danowski, 1982)

did not function solely as a vassal of larger, more complex societal organizations. (2) CMC was being adopted wholesale precipitating an informational revolution. (3) CMC was not simply a cold media suited for tasks only. Mediated interpersonal communication was taking place on the bulletin board systems. (4) CMC systems were employed in productive ways. (5) Interpersonal communication took place regardless of the media used. (6) The computer revolution will create and sustain interpersonal communication. The function of computers may be to create a media for outreach whereby relationships are initiated and sustained through a virtual, electronic connection.

Rafaeli (1986) described electronic bulletin boards as a special kind of mass communication arrangement whereby the computer is the media, joining the technology of networking with the dual role of communication: interpersonal conversation and mass propagation of messages. He argued that the uses-and-gratifications theoretical paradigm would be the best approach for researchers to understand this new interactive media, because it would explain some of the effects of CMC.

Sproull (1986) described electronic mail as a new tool for data collection, advocating that under certain conditions it may produce higher response rates at a lower cost than either questionnaires or interviews. He conducted an analysis of individuals completing questionnaires and interviews via an electronic messaging system in comparison to conventional postal systems. His findings indicated a 73 percent response rate, one week data collection time, and no substantive differences in mean responses to questions in comparison to a standard written questionnaire.

Rice and Love (1987) studied electronic emotion. They conducted a content analysis and role analysis of a CMC network. More specifically, the data analyzed were six weeks of transcripts from a computerized bulletin board of a nationwide public computer conference system (Medsig/Compuserv). A total of 2,347 sentences were coded from 388 messages posted to the bulletin board. Fourteen categories were isolated: eight for socio-emotional interactions and six for task-related interactions. Their results indicated that with increased frequency of messaging there was a related increase in the amount of sentences written per message. The content of these messages, however, were not necessarily social or emotional in constitution.

Schaefermeyer and Sewell (1988) explored CMC over BITNET (Because It's Time NETwork). They conducted a survey of three computer forums: COMSERVE—a file and name server for BITNET users interested in the study of human communication, CRTNET—a newsletter for BITNET users interested in communication research and theory, and PSYCHNET—a weekly newsletter and limited file server for BITNET users interested in the study of psychology. The survey focused on the amount and purposes for using E-mail within the context of the BITNET system. Demographically, the respondents were from diverse geographic, academic, and professional backgrounds. The results indicated that the respondents were utilizing E-mail to replace other communication channels, such as telephone, letter, and face-to-face communication.

Adrianson and Hjelmquist (1988) reported the results of a questionnaire given to users of COM–a computer-mediated communication system of the Swedish National Defense Research Institute. They found that the main reasons people started to use the COM system were the need for information, curiosity about a new technology, and as an alternative communication media to other more established medium, such as telephone or fax. Respondents indicated that the greatest benefits for the CMC system were information gathering and dissemination. Of those who had adopted the COM system, all rated themselves with at least a good ability to communicate in writing. In addition, the media was described by the subjects as being easy, friendly and stimulating.

Ball-Rokeach and Reardon (1988) researched what distinguishing factors set apart bulletin board communication from other mediated forms of communication. They established three categories of communication: monologic (one-to-many), dialogic (one-to-one), and telelogic (many-to-many).

Telelogic communication, they contended, is unique in that it emphasizes participation in talking or writing at a distance. It contains characteristics of both monologic and dialogic forms, however, is not necessarily a simple blending of these forms. The following summary represents the authors' comparative analogies of telelogic systems with the other forms:

> Telelogic communication systems, even in their embryonic state, appear to have the potential for development of new ways of organizing personal and social life. They do not have the limitations of geographic range, time-boundedness, and capacity to serve societal goals that limit the organizational capacities of the interpersonal form to certain aspects of personal and group life. Nor do they have the limitations of time-boundedness, limited feedback, low potential for interactivity, and low potential for equality of control of the mass form that limit its organizational capacities, for group, but also for personal and societal life. Telelogic communication, moreover, has the capacity for extremely high storage that both interpersonal and mass forms lack. (Ball-Rokeach & Reardon, 1988, p. 151)

Safayeni, Lee and MacGregor (1989) conducted an empirical investigation of two electronic mail systems. Their accessed the perceived effectiveness and efficiency of an electronic mail system. The results from 130 user interviews indicated that both electronic mail systems were perceived to contribute to productivity, a reduction in paper transmitted documents and a decrease in telephone calls.

Hjalmarsson, Oestreicher and Waern (1989) analyzed how system design and human factors contribute to the function of an electronic mail system. In the area of system design, the researchers claim "that the design of different computer applications requires that both functionality and interface are taken into consideration" (p. 461). In order to accomplish this system, designers and end-

users must facilitate open channels of communication and cooperation. Too often network system designers are not communication oriented. Because of this they tend to create electronic mail systems that are purely functional in their design and, in doing so, tend to neglect the development of a user friendly interface. Users are not willing to climb the steep learning curves involved with adopting a difficult to use network mail system, and the result is that the E-mail system does not get used.

In addition to the limiting factor of system design, Hjalmarsson et al. (1989) suggested that there are human factors associated with the effectiveness of communication across a text based electronic mail system. They conducted a pilot study probing user experiences of E-mail systems in different user groups. Their findings suggested that user groups tend to be more task specific, i.e., E-mail communication dealt more with how to perform or complete a certain job function than, for example, in the formulation of new ideas. In order to overcome this limitation, Hjalmarsson et al. (1989) suggested that E-mail communicators adapt their CMC to include a few essential elements. These include providing the reader not only with a task or directive, but also some context or background information about the task. In addition, the writer of CMC needs to provide for their reader messages that are written using good semantics as well as syntax.

D'Souza (1991) investigated the instructional benefits of communicating and distributing class information and assignments via electronic mail. He considered how this computer communications media would support or enhance the learning process in instructional settings. The findings suggest that E-mail is a viable communications and distribution tool in educational settings. Students using E-mail as a communications aid scored significantly higher assignment

scores than students using only the traditional modes of paper handouts and verbal instructions.

Clausen (1991) investigated electronic mail as a tool for information professionals. This was a descriptive study explaining how Library and Information Science professionals were among the earliest professional groups to adopt the use of electronic mail as a means of communication.

Steven Dick (1993) further investigated online interaction. He chose GEnie Information Services as the test site, selecting three electronic discussion group forums that represented a wide range of subjects—law, aviation and religion. All available messages were collected for a study involving a forty-two month period from April 1987 to September 1990. The final data set contained 10,847 messages. These were subjected to a content analysis to describe the activity of the forums and to look for possible refinements in parameters. The forums were inconsistent. Some areas were active, others were not. Messages rarely were unsolicited; on the contrary, they generally stayed on the topic and were in effect responses to previous messages. Dick concludes his study with the following comment:

> Clearly, forums offer great fodder for research. The problem is that research can be done too easily. Without a frame of reference and an understanding of the medium, expectations produced by researchers can be flawed. Any project should consider forums for what they are—a new and separate medium of communication. Like any other medium, forums have their own traffic patterns and audience motivations. The researchers must understand the normal before they can understand the environment. Otherwise, the researchers will be operating from a set of unrealistic expectations. (Dick, 1993, pp. 22, 23)

Chesebro (1993) examined the relationships that exist between the disciplines of communication and computer science. He argued that both the

limitations and the potentialities of computability theory, computer architecture and software, artificial intelligence, and the origins of life have profound consequences for communication and rhetorical theory. The results were mixed.

Westin, Mundorf and Dholakia (1993) developed CMC methodologies that would allow for in-depth exploration of user patterns and preferences. More specifically, they attempted to design an online, simulation-based research methodology to measure user behaviors, topic preferences and usage paths. They argued that this type of simulation–based research methodologyas externally valid; however their results were inconclusive.

Ogan (1993) examined listserver communication during the Gulf War in an attempt to explain what kind of media an electronic bulletin board is. The analysis was primarily qualitative. She studied the communication pattern of 397 members of the Turkish Electronic Mail List. Her study found that the bulletin board functions as a kind of hybrid communication media with unique characteristics not found in either mass media or interpersonal communication. Support was given to the earlier descriptive work of Ball-Rokeach and Reardon (1988).

The functions of telelogic communication, according to Ogan (1993), are multifaceted. It serves to connect people to people in a new social community defined around the interests of its members, providing users with a specialized media to serve the debate, associational and exchange functions of that community. In addition, CMC provides a new forum for group decision making and mobilization, allowing participants to create collaborative consensus building environments without editorial restraints. Finally, telelogic communication functions to create a democratic medium for the interchange of information, without regard to a participant's status or position.

Burton (1994) conducted a case study of an academic discussion forum. His goal was to indicate how E-mail can serve as a discussion media for academic research topics. To reach this goal Burton analyzed the progress of discussion topics and the subsequent development of themes over time. The case study lasted for two months. During that time the researcher identified twenty-two topics. His findings suggest that ideas exchanged across E-mail messages were unique, without constraints in short, a worthy media for healthy academic discourse.

Interpersonal Effects of Computer-Mediated Communication

Studies accesssing the interpersonal effects of CMC seek to understand the degree to which CMC is an effective communication media. Historically, researchers have approached the topic from an organizational framework. Research in this area can be segmented into two broad categories. These are as follows: (1) theoretical and descriptive studies, (2) decision making and idea generation in computer-mediated groups. In the literature presented below the researcher will seek to provide a chronological synthesis of both of these content areas.

Theoretical and Descriptive Studies

The information richness theory has been a key predictive tool in the study of interpersonal effects of CMC. It predicts the effectiveness of a communication media to deliver an intended message from a sender to a designated receiver. Although this particular study will not be applying information richness theory in its methodology, it is important to review

information richness theory to understand some of the interpersonal characteristics of CMC. A brief description of this theory is provided below.

Daft and Lengel (1986) were the first to propose an information richness theory. They defined it as the ability of information to change in its intended meaning over time. They argued that information richness related to the interactive capabilities of a communication media, in other words the capacity of a communication media to deliver an information rich message. In order to be considered a rich communication transaction, a message had to be able to overcome differing frames of reference or clarify ambiguous issues in a timely manner. Those communication transactions that required a long time to gather feedback would be considered lower in richness. A low richness message was thought to be only effective in the processing of well understood messages or standard data.

A communication medium, argued Daft and Lengel (1986), had different degrees of information richness. Face-to-face had the highest media classification because it provided the greatest opportunity for immediate feedback. This feedback included multiple visual and audio cues, ranging from body language to tone of voice. A telephone conversation was next, followed by personal written documents, and, then, impersonal written documents. Last on their list of media classifications was numeric documents.

Although Daft and Lengel (1986) did not specifically mention CMC in their information richness theory, their propositions have been used by other researchers to measure the interpersonal effects of CMC. Some of the descriptive research in this area is presented below. These are assorted and various. They will be presented in chronological order.

Prior to the development of the information richness theory, Rice and Case (1983) performed a detailed study describing the use and utility of an electronic message systems in the university. Their findings suggested that at the earlier stages of CMC, users did not attribute greater benefits to using E-mail if they had more experience with the media. On the contrary, the respondents tended to prefer different media depending upon the task. Those kinds of tasks which required less social interaction and social intimacy were relegated to electronic mail, while those which required more social interaction and social intimacy were relegated to more face-to-face types of communication. In addition, the respondent's position in the university hierarchy effected their utility of the electronic media. Those respondents with managerial positions tended to have a higher utility for the media than did the other respondents in the sample. Media style and communication preference had a lot to do with reported user evaluations of CMC and its impacts. If a respondent was not inclined to use print media for communication, then he would not rate CMC as a satisfactory media for interaction.

Garramone, Harris and Anderson (1986) found an apparent perceived social value to belonging and particpating in a CMC media. Text-based communication, according to the information richness theory, was a deficient communication media. Participants this type of communication were not supposed to have a perceived social value or personal identity satisfaction from the media. These researchers, however, found that if the interactive capability of a bulletin board system was utilized effectively by an individual, then he/she also reported a personal identity and perceived social presence in belonging to the online community.

Lea (1991) found further contradictions to the information richness theory. In a field study describing users' comparisons between CMC and other forms of communication the researcher found CMC to be an effective channel of communication. He described electronic mail users as not simply processors of information, but also involved participants in a unique form of collaborative communication.

Lee (1994) conducted an empirical investigation that incorporated hermeneutic interpretation to establish that electronic mail was a media for rich communication. Recipients of e-mail, the researcher described, were not passive collectors of data, but active producers of meaning. Media choice for a particular communication transaction, therefore, depended on more than the bandwidth features of the media. It was the result of rational decision making over the course of interactions with many users.

These theoretical and descriptive studies were accessing the effectiveness of CMC media to sustain interpersonal communication. With the passing of time researchers began to contradict information richness theory. Their cummulative findings helped to establish CMC as a media rich enough to sustain interpersonal communication. With this in mind, research examining decision making and idea generation in computer-mediated groups helped to further support this phenomenon. These will be examined in the following section.

Decision Making and Idea Generation.

Siegel, Dubrovsky, Kiesler, and McGuire (1986) were among the first to study the decision making processes of computer-mediated groups. Their

research supported the information richness theory. They found that CMC was a deficient media because it lacked the mechanisms necessary to display or enforce social differentiation among participants. They observed uninhibited, sometimes volatile, behavior in the decision making processes of computer-mediated groups.

Hiltz, Johnson and Turoff (1987) found similar results. In a study observing the process and outcome of small group problem-solving discussions for face-to-face and computer-mediated conferences, they found that the quality of group decisions were equally good for both groups; however, the computer-mediated groups were less likely to reach consensus than the face-to-face groups. The researchers postulated that this inability to create consensus may have been due to the differences in observed communicative interactions. There were two to three times as many communicative interactions in the face-to-face groups than there were in the computer-mediated groups. For this reason the researchers concluded that the computer-mediated groups were better suited for task specific functions.

Adrianson and Hjelmquist (1991) found no differences in problem-solving efficiency between face-to-face and computer-mediated groups. Participant equality and/or dominance in their groups were not found to cause any significant differences in problem-solving processes and outcomes. The researchers did find, however, significant differences among the two groups in the areas of conformity and strength of opinion. Participants in the computer-mediated groups were less likely to conform to group norms or change their opinions than were participants in the face-to-face groups.

Connolly, Jessup and Valacich (1990) were among the first to examine idea generation among participants of CMC media. They studied the effects of

anonymity and evaluative tone on idea generation in computer-mediated groups. They found that groups working anonymously and with the evaluative tone of a critical confederate produced the greatest number of original solutions (measured as a function of total file size, number of comments, or number of goal-directed ideas) and overall comments. The average solution quality per item and average solution rarity, however, were not different across conditions. In addition, those groups working with a supportive confederate were the most satisfied and had the highest levels of perceived effectiveness; however, they produced the fewest original solutions and number of overall comments. This research is important because it substantiates that CMC media does possess enough communication efficiency to foster new ideas, respond to perceived social influences, and to create a sense of satisfaction and effectiveness among the participants.

In a similar study, Valacich, Dennis and Nunamaker (1992) examined the effects of group size and group member anonymity on the idea-generation performance of computer-mediated groups. They found that while, on the average, group members in all conditions made the same number of comments, larger groups generated significantly more ideas (and higher-quality ideas as rated by judges) than did smaller groups. In addition, they found that anonymity had no effect on the idea-generation performance among the groups; however, members of large anonymous groups made more critical remarks than did members of identified and small groups. The researchers descibed an "interaction effect" in the smaller groups, i.e., the smaller groups appeared to develop a sense of community among the participants.

Shaw, Arnason, and Belardo (1993) found a relationship existed between interactivity and creativity. They claimed that a positive human interaction can be

replicated on a computer system, offering individuals the possibility of a collaborative computer-generated group meeting. This collaborative computer-mediated environment was described as not having the same degree of information richness as a true face-to-face meeting, nevertheless it was seen to be an effective media for idea generation and decision making processes. These researchers supported the information richness theory to a degree.

Hollingshead, McGrath and O'Connor (1993), in a longitudinal study comparing the work performance between computer-mediated and face-to-face work groups, found no differences in task performance between face-to-face and computer-mediated groups in the areas of idea generation and decision-making over time. The face-to-face groups, the researchers found, tended to adapt to changes more readily than computer-mediated groups.

Valacich et al. (1993) found that groups using CMC generated more unique and high-quality ideas (over a fixed time period) than groups using verbal communication. In addition they found that communication satisfaction between face–to–face groups and electronically distributed groups were the same. In a later study they found that distributed groups outperformed proximate groups in the total number of unique and high-quality ideas generated (Valacich et al.,1994).

The research presented above lends further support for the growing interpersonal capabilities of CMC. It appears from the research that in the areas of computer-mediated decision making and idea generation, CMC has come of age. In approximately ten years, CMC has moved from being an information poor environment, suitable for only task specific communication, to a rich collaborative environment with a greater degree of communication possibilities.

Part of the reason for the evolution of CMC has to do with traffic analysis and critical mass theory. These will be accessed in the following section.

Traffic Analysis of CMC Media

A third area important to CMC is the study of network traffic analysis. Research in this area revolves around discovering objective methods to predict whether an electronic communication media will succeed or fail. There are three interconnected theories that deal with traffic analysis: adoption, diffusion of innovations, and critical mass. Of these three, critical mass is the most elemental. Diffusion of innovations and adoption theories are both derivatives of critical mass. Therefore, for the purposes of this study, critical mass will be explained in detail with the understanding that the research presented (in chronological order from 1986 through 1993) will be inclusive of all three.

A critical mass theory for interactive media was first proposed by Markus (1987). The focus of this theory is to define and explain universal access, interdependence, and diffusion as they relate to interactive communication systems, such as the telephone, paper mail, electronic mail, voice messaging, and computer conferencing. A theoretical framework for interactive system analysis was developed. It addressed the variable nature of interdependence in the use of technology and the effects of this interdependence on the probability for technological diffusion.

According to Markus (1987), interactive media have two characteristics not shared by most other innovations. First, the widespread usage of an interactive media creates the condition of universal access (i.e., the ability to reach all members of a group through a given media). When universal access is

achieved it becomes a public good that individuals can gain benefits from even if they have not contributed to it. The second characteristic of an interactive media relates to reciprocal interdependence (i.e., that is to say that earlier users are influenced by later users and vice versa). These two unique features of an interactive media cause it to be extremely vulnerable to start-up problems and discontinuance (Figure 2.2).

Markus (1987) postulated that if an interactive media is to achieve universal access, certain ideal characteristics must be present. These are listed below.

1. Sufficient resource individuals. Either universal access will be achieved or it will not. There can only be two outcomes: all or nothing. Therefore, there must be sufficient resource individuals who will contribute to the interactive media (Figure 2.3).
2. Reciprocal communication. Factors must be in place that will reduce the number of resource units an individual must contribute in order to maintain reciprocal communication. The fewer resource units (i.e., messages left on voice mail) an individual must contribute to an interactive system of communication before he/she receives reciprocal communication, the more likely that system will achieve universal access.
3. Heterogeneity of resources. There must be a heterogeneity of resources and interests among the members of an interactive community if universal access is to be achieved. The greater the heterogeneity of resources, the greater the likelihood of reaching all members through a given media.

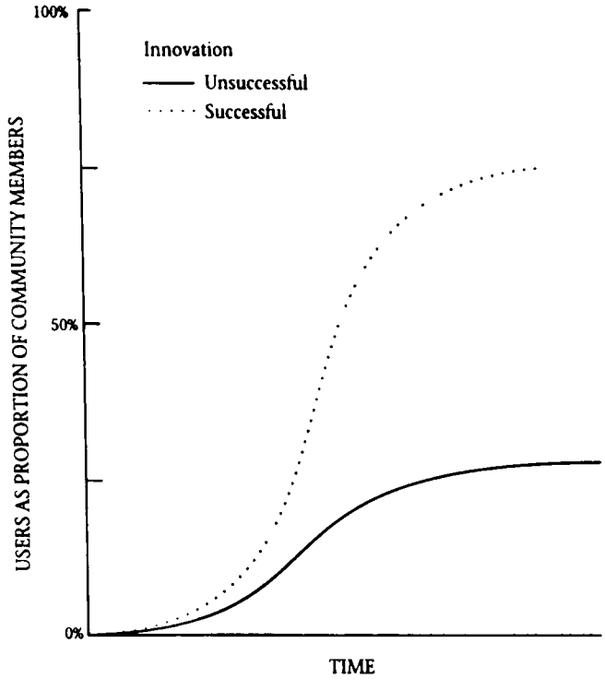

Figure 2.2 Diffusion Theory (Markus, 1987)

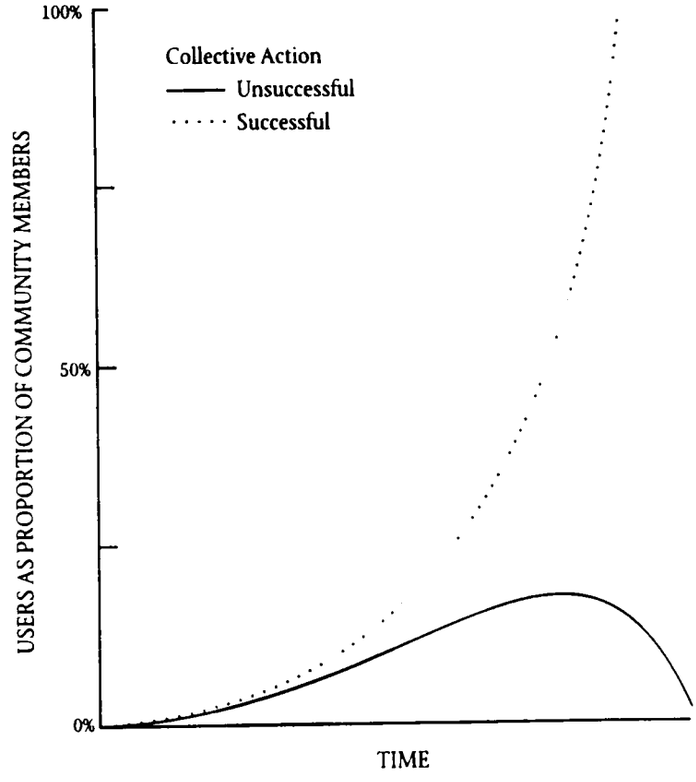

Figure 2.3 Critical Mass Theory (Markus, 1987)

4. High user interest. The early users must be high-interest and high-resource type of individuals if universal access is to be achieved.
5. Planned intervention strategies. Universal access is more likely if there are planned intervention strategies within the community. These intervention strategies serve to increase the resources and/or benefits obtained by the members of the interactive community.

In the section that follows, there will be a literature review of traffic analysis research. Let it be understood that the research presented will not necessarily be applicable to critical mass theory. There is a continuity of research because each of the studies sought to explain the traffic patterns of interactive medium.

Grieve and McCabe (1986) observed E-mail use among the faculty members of the Department of Communication at Ohio State University. They found that in order for this E-mail system to be successful, there had to be certain system design characteristics. These characteristics included the following: (1) providing the users with a relative advantage for utilizing the new media; (2) providing the users with a user-friendly E-mail software package; (3) offering the user enough complexity to meet their individual and diverse needs; (4) providing the users with an E-mail system that would be compatible with a wide range of computer operating systems; and, (5) involving the faculty members in the observation process. If these characteristics were implemented, the researchers concluded, then the E-mail system would reach a successful critical mass.

Hiltz (1988) examined how efficiently and effectively designed computer systems for communication could influence the efficiency and effectiveness of the individual users. She found that the strongest correlates for productivity improvements were pre-use expectations of whether the system would increase

the user's productivity. If the user expected the CMC system to make him/her more productive, then he/she would likely be more productive. There also was a correlation found between leadership skill and enhanced productivity. The greater the leadership skill of a user the more efficiently and effectively he/she utilized the CMC system. In addition, she found that the more intense the competitive attitudes among the members of a group, the more hampered productivity would be. Finally, Hiltz found that the social context of the CMC system and software differences would interact to affect the most productive applications of the system.

Rice, Hughes and Love (1989) conducted an individual-level analysis of the adoption and outcomes associated with the use of an electronic messaging system (EMS) in an R&D organization of nearly 500 members. They found that the utility of an EMS is dependent upon the proximity of those involved in the communication process, in other words, the greater the geographical distance separating individuals, the greater the likelihood that they would communicate through an EMS. Similarly, the usage of electronic messaging is related to critical mass, i.e., the greater the proportionate participation of other users, the greater the likelihood that an individual would use EMS as a media for communication. In addition, the researchers found that higher-level members in an organization are more likely to use an EMS than are lower-level organizational members. Those respondents that did use an EMS reported a corresponding reduction in their paper work, an increased flow of communication, and an increase in the rate, quality and quantity of their work.

Rice, Grant, Schmitz and Torobin (1990) examined individual and network influences on the adoption and perceived outcomes of electronic messaging.

Applying theories of organizational information processing and social influence, they utilized network analytical methods on longitudinal data to build support for the role of critical mass in influencing adoption. They found that individual-level organizational information processing factors played a significant role in explaining the adoption of an electronic mail system. One's perceived appropriateness of an electronic mail system for specified communication activities, the researcher found, would predict improvements in their effectiveness. In the same way, one's current media usage, particularly the higher use of written media, would influence adoption. In conclusion, the researchers found critical mass theory for interactive media to be a strong predictor of an individual's adoption of an electronic mail system and, to a less significant degree, of an individual's evaluations of some electronic mail system outcomes.

Hiltz and Johnson (1990) examined user satisfaction with computer-mediated communication systems. The aim of their research was to understand how the interaction of information network elements with user and task group environments predicts the likelihood of implementation of CMC systems. They argued that interactive computer systems should be viewed as socio-technical systems whose adoption is influenced by an interaction among characteristics of the individual users, the groups of organizations in which they are implemented, and the computer networks themselves.

Rafaeli and LaRose (1993) maintain that to understand the new interactive mass media forms, we must examine the factors that prompt audience members to contribute to the group. Collaborative mass media, such as an electronic discussion group, rely almost exclusively on the contribution from a wide cross

section of audience members with minimal editorial control. In contrast, traditional audience–generated mass media forms have been invariably subjected to considerable editorial control from a small symbolic audience group. The result of collaborative mass media, according to Rafaeli et al., represents a new and significant egress from conventional mass media models, expanding the very definition of mass media, from "one–to–many" to "many–to–many" communication.

Rafaeli et al. (1993) conducted a random sample survey of 126 bulletin board system operators in an attempt to better explain collaborative mass media. They found that the structural characteristics of computer bulletin boards appeared to be more critical to their success than specific management policies applied by system operators. In addition, they discovered that content diversity and the symmetry in contribution levels among the participants were directly proportional to a particular bulletin board's success.

This Study

The present study is an effort to understand the "normal" aspects of CMC as they relate to three electronic mailing lists on the Internet. It will incorporate the methodology of content analysis as a descriptive tool of the unique communication medium of three electronic discussion group forums, CARR-L, Journet and MassComm. These forums are used by mass and interpersonal communications professionals and educators as a medium for debate and collaboration. Communication patterns will be codified in an attempt to take a

"snap shot" of the types of interaction taking place. This study is an exploratory endeavor. The following research questions will be accessed:

Research Question One: What are these discussion groups being used for overall?

Research Question Two: Is there a difference in how each of the electronic discussion groups is using its forum for communication?

(a): Will there be differences among the mailing lists (CARR-L, Journet, and Mass Comm) in the focus of the posted messages(solicitations, answers/responses, unsolicited)?

(b): Will there be differences in the types of messages (research, computer, academic, clarification/other) posted to CARR-L, Journet, and MassComm?

(c): Will there be differences in the types of unsolicited messages posted to CARR-L, Journet, and MassComm?

(d): Will there be differences in the types of solicited messages posted to CARR-L, Journet, and MassComm?

CHAPTER III

METHODOLOGY

The goals of this research methodology are twofold. First, the researcher seeks to conduct network analyses according to message traffic and message topic. Second, the researcher seeks to perform a content analysis of the posted messages to three mass communication professional E-mail lists. These lists will be described later in this methodology.

The objectives of this research methodology are twofold. First, the researcher seeks to access what the E-mail lists are being used for overall. Second, the researcher seeks to compare the posted message types among the E-mail lists.

No theoretical perspective will be applied to the data obtained from this research methodology. It is to be purely a descriptive effort.

In summary, the methodology presented in this paper will incorporate network analysis perspectives and procedures, as well as content analysis of the messages posted to three electronic mailing lists.

Three Electronic Mailing Lists

For the current research application, the researcher chose to perform a network traffic analysis and content analysis of all the messages posted to three electronic mailing lists for a period of thirty days (February 11, 1994, through March 13, 1994). These thirty days were chosen because they provide longitudinal data for another ongoing research project by Reddick and Prater (1993). They took a sample of data from these same E-mail lists, during the

same four week period of 1993. The three electronic mailing lists, for this study as well as the earlier work by Reddick and Prater, were: (1) Computer Assisted Reporting and Research List, or CARR-L, (2) Journet, and (3) MassComm.

CARR-L is an acronym for Computer-Assisted Reporting & Research List. It is a "self-moderated" list focused on using computers to help in researching, gathering, and distributing information. The listserv resides at the University of Kentucky at Louisville (CARR-L@ULKYVM.LOUISVILLE.EDU).

Journet is a discussion list for journalism education. It is an electronic medium for professional as well as academic discussion. The listserv resides at the Queens University in Canada (JOURNET@QUCDN.QUEENSU.CA).

MassComm is an integrated online disciplinary center for scholars and students from human communication studies and related disciplines such as journalism, mass communication, and linguistics. Rennslear Polytechnic Institute, hosts the listserv (Comserve@VM.ITS.RPI.EDU).

There were several reasons for selecting the electronic mailing lists. First, each of these mailing lists represent a mass communication discussion forum being utilized by mass communication professionals. Second, each of the lists appeared to maintain a developed communication forum, in other words, the lists are well known among mass communication professionals. Third, the researcher felt that each list would provide sufficiently high message content, and/or diversity, to conduct a valid comparative CMC analysis among the groups.

A census of all the messages posted to the three electronic mail lists, during the above specified thirty day period, was conducted. Due to a technical error some data were destroyed. These were as follows: CARR-L lost two days

of messages (March 3, 5), along with ten of the twenty-eight messages posted on March 10; Journet lost three days of messages (March 3, 4, 5); and MassComm lost one day (February, 11), along with five of the fourteen messages posted on March 3. The final data set contained 815 messages; 463 from CARR-L, 295 from Journet, and 57 from MassComm.

Identification of Message Concepts

Relevant content classifications were constructed using a coding sheet of Internet Discussion Group Categories developed by Reddick and Prater (1993). They focused on four variables: forum, date, message word count, and message type. These were operationally defined as follows.

Forum is defined as the three electronic mailing lists CARR-L, Journet, and/or MassComm. Date refers to the date on which a particular electronic message was posted to one of the mailing lists in the forum. Message word count is defined as the total number of words in a given message, excluding the address and header. Finally, message type is defined as the type of message posted to the electronic mailing list. These four variables were then divided into three broad groups: solicitations, answers or responses, and unsolicited. These were operationally defined as follows.

Solicitations were defined as any appeals for help and/or information. A message grouped as a solicitation was further categorized into one of the following four subgroups: (1) help sought with research, (2) help sought with computer related items, (3) help sought with academic questions, and (4) help sought to clarify an issue or topic of discussion. The operational definitions for these solicitation sub groupings are as follows:

(1) "help sought with research"—a solicited message seeking assistance with research items was defined as a specific research questions; setting up conferences, meetings, and classes online; opinions or advice on a certain topic; instructions on how to proceed with a project; getting miscellaneous information; and/or personal responses.

(2) "help sought with computer related items"—a solicitation requesting help with computer related items defined as network and/or software issues.

(3) "help sought with academic questions"—a solicited message regarding an academic type question was defined as a request for help with academic administration and/or teaching.

(4) "help sought to clarify an issue or topic of discussion"—a solicitation seeking to clarify or explain an earlier message; and/or to resend previous information.

Answers or responses were defined by messages that provided answers or responses to questions previously posted to a mailing list. A message grouped as an answer or response was further categorized into one of the following four subgroups: (1) answers or responses to research, (2) answers or responses to computer related items, (3) answers or responses to academic questions, and (4) answers or responses to clarify an issue or topic of discussion. The operational definitions for these answer/response sub groupings are as follows:

(1) "answers or responses to research"—an answer or response message to someone seeking assistance with research items such as a specific research questions; setting up conferences, meetings, and classes online; and/or opinions on a certain topic.

(2) "answers or responses to computer related items"—an answer or response to someone seeking assistance with computer related items such as network and/or software issues.

(3) "answers or responses to academic questions"—an answer or response to someone seeking assistance with an academic issue such as help with academic administration and/or teaching.

(4) "answers or responses to clarify an issue or topic of discussion"—an answer or response to someone seeking clarification or explanation of an earlier message; and/or to resend previous information.

Unsolicited is a broad category defined by those messages that provided unsolicited information and/or opinion. A message grouped as unsolicited was further categorized into one of the following seven subgroups: (1) unsolicited news information and/or opinion, (2) unsolicited network information and/or opinion, (3) unsolicited academic information and/or opinion, (4) unsolicited discussion type information and/or opinion, (5) unsolicited employment information and/or opinion, (6) unsolicited clarification, and (7) unsolicited other. The operational definitions for these answer/response sub groupings are as follows:

(1) "unsolicited news information/opinion"— information and/or opinion regarding political moving, legislation, hearings, press releases and other news items.

(2) "unsolicited network information/opinion"— information and/or opinion regarding how to use or find information on the network, network administration, announcements of network service, announcements of new lists.

(3) "unsolicited academic information/opinion"— information and/or opinion regarding announcements of conferences, seminars, study and research opportunities; general calls for academic papers; and, academic administration.

(4) "unsolicited discussion type information/opinion"— information and/or opinion regarding an unsolicited response to an unsolicited comment.

(5) "unsolicited employment information/opinion"— information and/or opinion regarding job vacancies or opportunities.

(6) "unsolicited clarification"— information and/or opinion regarding an unsolicited clarification.

(7) "unsolicited other"— information and/or opinion regarding noise in channel, courtesy responses, and explicates.

The messages were classified by their central topic and subjected to statistical analysis. Each E-mail list represents a population. The analyses made, therefore, will be a comparison of population to population. A contingency table, using chi-square, will be utilized in order to better facilitate these comparisons. These research methodologies are designed to help the researcher determine what the electronic mailing lists are being used for overall, and if there is a difference in how each of these lists is using its medium for communication.

CHAPTER IV

RESULTS

The results portion of this paper is divided into two areas. The first section will present the quantitative measures. These measures will provide a tool to describe the overall network traffic among the electronic mailing lists. Second, a statistical comparison of communication forms will be presented. This will provide a technique to analyze the specific messages people exchanged across their communication forums. The format will follow the same sequential order as the research questions and hypotheses.

Quantitative Measures

An analysis of the frequency distributions for CARR-L, Journet and MassComm indicated that there was a difference, not only in the amount of message traffic involved in each respective mailing list, but also in the way each list is being used. These frequency distributions gave a snapshot of the overall network traffic performance among the groups. The population consisted of a total of 815 messages posted over a thirty day period. Of the three mailing lists, CARR-L was the most active (463 messages), followed by Journet (295 messages), and MassComm (57 messages). Table 4.1 summarizes these differences.

A description of word count summaries by forum, provided information regarding the average number of words per posted message (see Table 4.2). The population average was 227.07 words per electronic message. The MassComm mailing list averaged the most words per posted message (263.39).

Table 4.1

Mailing List Message Traffic
Frequency Distributions

FORUM	VALUES			
	Frequency	Percent	Valid Percent	Cumulative Percent
CARR-L	463	56.8	56.8	56.8
Journet	295	36.2	36.2	93.0
MassComm	57	7.0	7.0	100.0
TOTAL	815	100.0	100.0	

Table 4.2

Summaries of Word Count By Forum

FORUM	MEAN	STD DEV	CASES
Entire population	227.07	324.37	815
CARR-L	255.11	332.62	463
Journet	176.03	279.51	295
MassComm	263.39	429.39	57

It was followed by CARR-L, with an average of 255.11 words per posted message, and then Journet, with an average of 176.03. The deviations for these groups revealed that, among the three electronic mailing lists, the messages posted to CARR-L clustered the most about the mean (Std. Dev. = 333.62). This list was followed by Journet (Std. Dev. = 279.51), and MassComm (Std. Dev. = 429.39).

Table 4.3 summarizes frequency distributions for each of the message types coded among all three electronic mailing lists in this study. These represent raw coding data that were further collapsed into the content classifications identified earlier in the methodology chapter. Table 4.4 summarizes these collapsed message types by category.

A summary of the collapsed messages by category revealed that 16.5 percent of the messages were solicitations, 37.6 percent were answers or responses, and 45.4 percent were unsolicited messages. Among the posted message content types in each category there were several active domains. In the solicitation category, those messages seeking help with research (Frequency = 73, Percent = 8.9) and with computer related items (Frequency = 50, Percent = 6.1) were the most active. In the answers or responses category, those messages giving answers or responses to research (Frequency = 167, Percent = 20.5) and computer related items (Frequency = 94, Percent =11.6) were the most active. Finally, in the unsolicited messages category, those unsolicited messages coded as network information/opinion (Frequency = 88, Percent = 10.7) and discussion type information/opinion (Frequency = 161, Percent = 19.8) were the most active.

Table 4.3

Mailing List Message Types

MESSAGE TYPE	FREQUENCY	PERCENT	CUM PERCENT
Solicitations			
Seek help with research	31	3.8	3.8
Seek help with network	45	5.5	9.3
Seek help with software	5	0.6	9.9
Seek help with academic	5	0.6	10.6
Seek help with teaching	3	0.4	10.9
Seek help with online conferencing	3	0.4	11.3
Seek to clarify earlier message	3	0.4	11.7
Seek opinion or advice	26	3.2	14.8
Seek help how to do a project	1	0.1	15.0
Seek help with miscellaneous items	11	1.3	16.3
Seek personal response	1	0.1	16.4
Seek to resend earlier message	1	0.1	16.6
Answer/Responses			
Answer to research question	49	6.0	22.6
Answer to network question	86	10.6	33.1
Answer to software question	8	1.0	34.1
Answer to academic question	26	3.2	37.3
Answer to teaching question	3	0.4	37.7
Answer to online conferencing question	3	0.4	38.0
Answer to clarify message	15	1.8	39.9
Response to opinion/advice	115	14.1	54.0
Response to send earlier message	1	0.1	54.1
Unsolicited			
Unsought net command	2	0.2	54.4
Unsought how to find message	5	0.6	55.0
Unsought political information	5	0.6	55.6
Unsought seminar announcement	10	1.2	56.8
Unsought announcement of study opportunities	14	1.7	58.5
Unsought announcement of job opening	18	2.2	60.7
Unsought call for papers	2	0.2	61.0
Unsought press release/news	37	4.5	65.5
Noise in channel (mistakes)	5	0.6	66.1
Unsought network administration	10	1.2	67.4
Unsought academic administration	2	0.2	67.6
Unsought courtesy	4	0.5	68.1
Unsought response external stimuli	1	0.1	68.2
Unsought response to unsolicited comment	161	19.8	88.0
Unsought network service/new list	76	9.3	97.3
Unsought clarification	22	2.7	100.0
TOTAL	815	100.0	

Table 4.4

Collapsed Mailing List Message Types

MESSAGE TYPE	FREQUENCY	PERCENT
Solicitations		
Help sought with research	73	8.9
Help sought with computer related items	50	6.1
Help sought with academic questions	8	1.0
Help sought to clarify an issue or topic of discussion	4	0.5
Answers or responses		
Answers or responses to research	167	20.5
Answers or responses to computer related items	94	11.6
Answers or responses to academic questions	29	3.6
Answers or responses to clarify an issue or topic of discussion	16	1.9
Unsolicited		
Unsolicited news information/opinion	42	5.1
Unsolicited network information/opinion	88	10.7
Unsolicited academic information/opinion	28	3.1
Unsolicited discussion type information/opinion	161	19.8
Unsolicited employment information/opinion	18	2.2
Unsolicited clarification	22	2.7
Unsolicited other	15	1.8
Total	815	100%

Comparative Measures

A multistage statistical analysis comparing the differences among the mailing lists was conducted. It was an attempt to describe some of the unique ways the forums in this study are using the electronic medium for communication, and to access the differences in communication types among the groups. These results will be comparing population to population. The statistical test will be an inspection of the percentages. In addition, a contingency table will be presented. The following is a sequential presentation of the results as they relate to the sub-questions of research question number two.

Comparison 1: Will there be differences among the mailing lists (CARR-L, Journet, and Mass Comm) in the focus of the posted messages (solicitations, answers/responses, unsolicited)?

The Internet forum message types were collapsed into three broad categories: solicitations, answers or responses, and unsolicited messages. An inspection of the frequencies indicated that there were differences in the focus of the messages posted to the mailing lists.

The data were collapsed into a three-by-three table comparing forum to message type. Each forum appeared to have its own predominate message types. In the solicitations message type category there were a total of 135 messages posted among the lists. MassComm had the greatest percentage of solicitations (28.1%), Journet was next (19.7%), followed by CARR-L (13.2%). Answer/Response type messages were predominant in both MassComm (56.1%) and Journet (51.2%), with CARR-L having only 26.6% of its messages coded in this category. Correspondingly, nonsolicited messages posted to CARR-L (60.3%) were proportionately much greater than what were posted to

Journet (29.2%) and MassComm (15.8%). These summaries are presented in Table 4.5.

Comparison 2: Will there be differences in the types of messages (research, network, academic, clarification/other) posted to CARR-L, Journet, and MassComm?

The Internet forum message types were collapsed into four broad categories: research, network, academic, and clarification. An inspection of the frequencies indicated that there were differences in the types of messages posted to CARR-L, Journet, and MassComm.

The data were collapsed into a four-by-three table comparing aggregate communication types (solicitation and responses). Each forum appeared to have its own predominate message types. Research type solicitations and responses were the most predominant type of messages posted to Journet (123 messages out of 209, 9.3 residual value) and MassComm (37 messages out of 48, 10.9 residual value). CARR-L, in comparison, posted only 80 messages out of 184, with a residual value of -20.1, to this category. In the network category of solicitation and responses CARR-L was the most active, posting 95 messages out of 184 with a residual value of 34.9. It was followed by Journet (44 messages out of 209) and MassComm (5 messages out of 48). Journet was the most active in the academic category (44 messages out of 209). It had a 16.5 residual value. The clarification category did not display great differences between the expected values and residual values among each of the electronic mailing lists. See Table 4.6.

Table 4.5

Message Type By Forum

Count Row Pct Col Pct Tot Pct	FORUM			
MSGTYPE	CARR-L	Journet	MassComm	Row Total
Solicitations	61 45.2 13.2 7.5	58 43.0 19.7 7.1	16 11.9 28.1 2.0	135 16.6
Ans/Resp	123 40.2 26.6 15.1	151 49.3 51.2 18.5	32 10.5 56.1 3.9	306 37.5
Unsolicited	279 74.6 60.3 34.2	86 23.0 29.2 10.6	9 2.4 15.8 1.1	374 45.9
Column Total	463 56.8	295 36.2	57 7.0	815 100.0

Pearson = 94.30, DF = 4, P<.0001

Comparison 3: Will there be differences in the types of unsolicited messages posted to CARR-L, Journet, and MassComm?

The Internet forum message types were collapsed into seven broad categories: news, network, academic, discussion, employment, clarification, and other. An inspection of the frequencies indicated that there were differences in the types of messages posted to CARR-L, Journet, and MassComm.

Table 4.6

Solicitations and Responses
Communication Type By Forum

Count Exp Val Residual	FORUM			
	CARR-L	Journet	MassComm	
MSGTYPE				Row Total
Research	80 100.1 -20.1	123 113.7 9.3	37 26.1 10.9	240 54.4%
Network	95 60.1 34.9	44 68.2 -24.2	5 15.7 -10.7	144 32.7%
Academic	0 15.4 -15.4	34 17.5 16.5	3 4.0 -1.0	37 8.4%
Clarification	9 8.3 0.7	8 9.5 -1.5	3 2.2 0.8	20 4.5%
Column Total	184 41.7%	209 47.4%	48 10.9%	441 100%

Chi-square = 77.261, DF = 6, P<.0001, Min E.F. 2.177, Cells with E.F. < 2 (16.7%)

The data were collapsed into a seven-by-three table comparing unsolicited communication types by forum. Each forum appeared to have its own predominate message types. There were a total of 374 unsolicited messages posted. CARR-L had the most (279), followed by Journet (86), and then MassComm (9). There were significant discrepancies between the actual and expected values of network type messages posted to CARR-L and Journet.

CARR-L was the most active. Eighty-one of 279 unsolicited messages posted were in the network category. The residual value for CARR-L was 11.6. In comparison, of the 86 unsolicited messages posted to Journet, 10 were network type. The residual value for Journet was -11.4. In addition, CARR-L was not as academic in its message types as expected (Count 15, Exp. Val. 20.9), while Journet was posted more academic messages than expected (Count 12, Exp. Val. 6.4). Finally, Journet had more discussion type unsolicited messages posted than were expected (Count 42, Exp. Val. 37.0), while CARR-L had less (Count 117, Exp. Val. 120.1). See Table 4.7.

Comparison 4: Will there be differences in the types of solicited messages posted to CARR-L, Journet, and MassComm?

The Internet forum message types were collapsed into four broad categories: research help, network help, academic help, and clarification. An inspection of the frequencies indicated that there were differences in the types of messages posted to CARR-L, Journet, and MassComm.

The data were collapsed into a four-by-three table (see Table 4.8) comparing solicited communication types by forum. Each forum appeared to have its own predominate message types. There were differences among the groups in the types of solicitations elicited. CARR-L posted 19.1 fewer messages in the research category than was expected. The message count was 48 of 123 messages. If chance alone were operating, there should have been 67.1 solicitations in the mailing list. In comparison, Journet and MassComm posted more research type solicitations than were expected, with residual values of 9.6 and 9.5, respectively. Inversely, Journet and MassComm posted fewer network type solicitations than was expected if chance alone was the only

Table 4.7

Unsolicited Messages
Communication Type By Forum

Count Exp Val Residual	FORUM			
	CARR-L	Journet	MassComm	
MSGTYPE				Row Total
News	32 31.3 0.7	7 9.7 -2.7	3 1.0 2.0	42 11.2%
Network	81 69.4 11.6	10 21.4 -11.4	2 2.2 -0.2	93 24.9%
Academic	15 20.9 -5.9	12 6.4 5.6	1 0.7 0.3	28 7.5%
Discussion	117 120.1 -3.1	42 37.0 5.0	2 3.9 -1.9	161 43.0%
Employment	14 13.4 0.6	4 4.1 -0.1	0 0.4 -0.4	18 4.8%
Clarification	15 16.4 -1.4	7 5.1 1.9	0 0.5 -0.5	22 5.9%
Other	5 7.5 -2.5	4 2.3 1.7	1 0.2 0.8	10 2.7%
Column Total	279 74.6%	86 23.0%	9 2.4%	374 100.0%

Chi-square = 27.296, DF = 12, P=.007. Min E.F. .241, Cells with E.F.<5 = 9 (42.9%)

Table 4.8

Solicitations
Communication Type By Forum

Count Exp Val Residual	FORUM			
	CARR-L	Journet	MassComm	
MSGTYPE				Row Total
Research Help	48 67.1 -19.1	92 82.4 9.6	27 17.5 9.5	167 54.6%
Network Help	68 37.8 30.2	25 46.4 -21.4	1 9.8 -8.8	94 30.7%
Academic Help	0 11.7 -11.7	27 14.3 12.7	2 3.0 -1.0	29 9.5%
Clarification	7 6.4 0.6	7 7.9 -0.9	2 1.7 0.3	16 5.2%
Column Total	123 40.2%	151 49.3%	32 10.5%	306 100.0%

Chi-square = 77.205, DF = 6, P<.0001, Min E.F. 1.673, Cells with E.F.<5 = 2 (16.7%)

distinguishing factor. Journet posted only 25 messages of 151 total in this category. The expected value was 46.4. This left a deficit residual value of -21.4. The network solicitations for MassComm followed a similar pattern; however, only 32 solicitation type messages were posted. Nevertheless, only one of the 32 solicitations posted to the list were network related. This left a residual value of -8.8. CARR-L, on the other hand, was the only list that had a

positive residual value (30.2). Of the 123 solicitations posted to the list, 68 of them were network related. Finally, in the category of academic solicitations, CARR-L had no posted entries (Residual Value = -11.7), Journet had 27 (Residual Value = 12.7), and MassComm had two (Residual Value = -1.0).

CHAPTER V
DISCUSSION

This study examined the network traffic and message topics posted among the CARR-L, Journet, and MassComm E-mail lists. A content analysis of these posted messages was performed. In the process, the researcher sought to determine what these E-mail lists were being used for and to compare the posted message types among the lists. These will be discussed in this chapter.

Consideration of Quantitative Measures

The mailing list message traffic for CARR-L, Journet and MassComm showed differences in the message traffic patterns between the E-mail lists. CARR-L was the most active list. It had almost twice as many messages as Journet, and approximately ten times more than MassComm. This may be due to the utility of critical mass.

Whether critical mass has been reached for CARR-L, Journet or MassComm remains a point of conjecture. Of the three, given the traffic performance, heterogeneity, and number of proportionate users, CARR-L appeared most likely to have establish an accelerating production function. Journet appeared to be an active discussion group as well. MassComm, however, in spite of being the oldest and most established of the three E-mail lists, was not an active list. Given the all-or-nothing principle of critical mass, it probably will not survive.

The summaries of word count by forum showed some differences to exist between the lists. MassComm had the highest average words per message. This may have been due to the intent of this E-mail list. The focus of this list is

provide a forum for scholars and students of human communication studies (and related disciplines–such as journalism, mass communication, and linguistics) to engage in debate and collaboration. The messages posted tended to be more analytical and reflective. These kinds of messages can get a little wordy.

There were many different message types posted to the three E-mail lists. These communities were engaging in information rich communication. The people were not simply posting information, they were asking questions, getting answers, and giving their opinions. The format for such discussions usually centered around a hot topic for the day. Someone would post his/her opinion to the list and then, if the opinion was a worthy one, the other members of the list would respond to it. These findings led the researcher to conclude that the CMC observed among the three electronic mailing lists, although inclusive of task specific central topics, can function to increase social presence and information richness. Relationships and community can be established in CMC that will foster personal and social human bonds (Chesebro, 1993).

Consideration of Comparative Measures

A multistage population to population comparison revealed that there were observed differences between CARR-L, Journet, and MassComm. The forums were using their electronic medium for different reasons. The lists had different communication patterns. This comparative analysis of the CARR-L, Journet and MassComm electronic mailing lists generated four broad conclusions in how each of these are using their unique forums for CMC.

First, there were differences among the mailing lists in the focus of the posted messages. There were differences in the frequencies of solicitations,

answers and responses, and unsolicited messages. Most of the messages posted to CARR-L were unsolicited, nearly 60 percent. This was not the case for Journet and MassComm. The messages posted to these E-mail lists tended to stay on topic. The greatest proportion of the messages were either solicitations or answers and responses.

Second, the aggregate communication patterns among the three electronic mailing lists exhibited their own predominant types of solicitations and responses. There were observed differences among the discussion groups in the types of research, network, academic, and clarification messages. Most of CARR-L's messages were network related. None of the messages was academic in nature. This was not the case for Journet and MassComm. The messages posted to these lists tended to be more research related. In conclusion, the aggregate communication patterns for CARR-L help to distinguish it as a professional journalists' forum apart from the communication scholarship forums that Journet and MassComm appear to be.

Third, the types of unsolicited messages posted among the three electronic mailing lists were found to be directly related to the purpose of the discussion forum. There were observed differences among forums in the types of news, network, academic, discussion, employment, clarification and other unsolicited messages. CARR-L and Journet were active in this content category. Most of their unsolicited messages were discussion type, helping to substantiate the greater traffic activity in these groups. Notably, CARR-L distinguished itself as the place to go for communication professionals to publish and retrieve news and network related information. In this way, CARR-L functioned more as a bulletin board than a mailing list. Unfortunately, MassComm did not have enough

unsolicited message content to make any conclusions from the data, except that this list is so restrictively moderated that, in effect, it is strangling itself out of existence. If MassComm is to become a successful information repository, there needs to be more unsolicited messages in order to gain universal access.

Fourth, the types of solicitation messages posted among the three electronic mailing lists were directly related to the purpose of the discussion forum. Each forum had their own predominant types of research, network, academic, and clarification messages. CARR-L distinguished itself as the place to find answers for network related questions. Journet and MassComm were both good forums to solicit help with research. Journet was the most active solicitation site for questions related to academics.

In conclusion, CARR-L was the most robust CMC community among the three lists. It had a great deal of message traffic with a wide range of content. It was the best source for journalistic information. Journet was the most developed collaborative group. It also seemed to be the most "user-friendly" of the three. Its environment seemed to invite the participation of both novice and expert communication professionals. MassComm, on the other hand, was a mixed bag. It appeared to be struggling to gain ground as a desirable listing. If it achieves critical mass, this forum will provide scholars of communication with a unique collaborative medium. Unfortunately, there were not enough messages posted during the one-month period to really get a clear idea of its unique characteristics.

Limitations and Suggestions for Future Research

Mailing lists are an ever-changing medium. The results of this study are not generalizable. They are not intended to predict the communication

performance among other Internet mailing lists, neither are they intended to predict the future of CARR-L, Journet, or MassComm. What this study intended to do was to take a "snap shot" of how these electronic mailing lists looked in the spring of 1994. With this in mind, it would be interesting to conduct a longitudinal analysis, using the methodology and descriptive statistics in this study, to describe the communication trends of these lists as they pass through time. Given a sufficiently large enough population, the results might then be generalizable.

Probably one of the most significant technological innovations of Internet history has been the development of the World Wide Web (W3, WWW or Web). Aside from being a significant information breakthrough, the W3 is reported to be the universe of network-accessible information, it also represents an information rich medium for with outstanding possibilities for CMC. Future CMC research must address this rich new interactive medium. Perhaps this development alone has the potential to propel CMC into a new realm of cyber-mediated global communities of information, commerce, politics and entertainment (Berners-Lee, 1995).

The WWW is an initiative started at CERN, otherwise known as the European Laboratory for Particle Physics with locations in Geneva, Switzerland, and France, now having many participants. It is a body of software with a consortium of protocols and conventions, a growing community of linked resources revolving around the client/server model. The Web merges hypertext, multimedia and networked information techniques to provide an information rich environment. It enables users to access any data on the network through a seamless hypertext information browser. Users on the W3 can quickly and easily browse volumes of

online information, as well as publish their own information archives (Berners-Lee, 1995; Wiggins, 1995; CERN, 1995).

Originally, the W3 was developed as a tool to allow for information sharing within internationally dispersed teams. It was the creation of Tim Berners-Lee intended to connect the dispersed members of the High Energy Physics community. The W3 did not stay confined to that community alone, however, it has spread in the past two years throughout the Internet community. Today, it is the most advanced information system deployed on the information networks. It is one of the fastest growing Internet resources, both in terms of number of users and the number of servers online (Berners-Lee, 1995; GVU's WWW Surveying Team Graphics, Visualization, & Usability Center, 1994).

Communicators on the web can prepare documents in a language called HTML (Hypertext Markup Language). This language is not complicated, sort of like setting up style sheets in a word processing program. Through HTML, digital publishers can deliver text, graphics, full-color pictures, audio, and video to the Web community (Wiggins, 1995). Probably the World Wide Web has a greater potential for interpersonal communication than text-based E-mail, because of its ability to deliver information richmultimedia content. This, however, must be researched.

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