

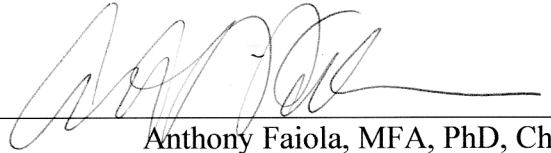
THE EVERYDAY USE AND EXPERIENCE OF COMPUTER-MEDIATED
COMMUNICATION

Heather R. Wiltse

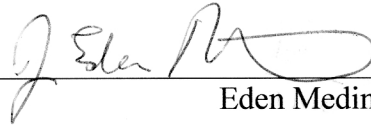
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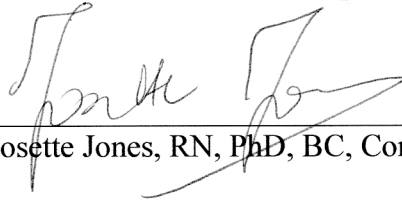
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Dedicated to those who have believed in me.

TABLE OF CONTENTS

LIST OF TABLES	viii
LIST OF FIGURES	ix
ACKNOWLEDGEMENTS	x
ABSTRACT	xi
CHAPTER ONE:INTRODUCTION & BACKGROUND	1
Introduction to Subject.....	1
Importance of Subject.....	1
Intention of the Study.....	2
CHAPTER TWO: LITERATURE REVIEW	4
Background.....	4
Computer-Mediated Communication	4
Philosophy of Technology	9
Research Questions and Hypotheses	13
CHAPTER THREE: METHODOLOGY	16
Participants.....	16
Treatment	17
Data Analysis	19
CHAPTER FOUR: RESULTS	21
Usage Patterns.....	21
Email.....	21
Instant Messaging	23
Text Messaging.....	24

Summary.....	26
Factors that Interact to Influence Use.....	26
Properties of Communication Technologies.....	26
User Motivations.....	30
Social Contexts.....	34
Summary.....	36
Interactions Among Technological, Motivational and Social Factors.....	36
Technology Selection and Use.....	36
Language.....	38
Summary.....	41
CHAPTER FIVE: DISCUSSION.....	42
Perception and User Experience.....	42
Immediacy.....	43
Formality.....	46
Summary.....	48
Summary of Findings.....	49
Implications of Findings.....	50
Summary.....	53
CHAPTER SIX: CONCLUSION.....	54
Limitations.....	54
Future Research.....	55
Summary.....	55
REFERENCES.....	57

APPENDICES	61
Appendix: Interview Questions	62
VITA.....	64

LIST OF TABLES

Table 1: Participant Characteristics	17
Table 2: Factors Influencing Communication Technology Use and Experience	27

LIST OF FIGURES

Figure 1: Influences on Communication Technology Selection and Use.....	38
Figure 2: Influences on Language.....	39
Figure 3: Factors Influencing Experienced Immediacy.....	46
Figure 4: Factors Influencing Perceived Formality	48

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ABSTRACT

Heather Wiltse

THE EVERYDAY USE AND EXPERIENCE OF COMPUTER-MEDIATED COMMUNICATION

Communication has become one of the most popular applications of information technology. A considerable body of work addresses both theoretical and applied aspects of computer-mediated communication. However, much of this work has not been able to capture the complexity and significance of everyday communication activities and the mutual shaping of technologies and their use. This study uses a qualitative methodology based on interviews with undergraduates to explore how the properties of communication technologies, user motivations and social contexts interact to influence use and experience. The three specific technologies addressed are email, instant messaging and text messaging. Factors identified as relevant during interviews are presented, and their interactions explored. Findings suggest that use and experience of communication technologies are shaped by a variety of factors and their interactions, and that study of information and communication technologies cannot validly be removed from the personal and social contexts in which they are used.

CHAPTER ONE:INTRODUCTION & BACKGROUND

Introduction to Subject

Communication is one of the most popular uses of information technology. While technological advancements such as the telegraph and telephone have shaped past communication practices (Bargh & McKenna, 2004), the unique qualities of interaction through digital communication technologies (e.g., Turkle, 1995) and their increasing integration into many facets of life have captured the attention of researchers and the general public alike (e.g., Harmon, 1998). The use of new media technologies like email, text messaging, 'blogging', online social networking, mobile phones, instant messaging and the like are becoming commonplace. Understanding the dynamics that shape the use and experience of information and communication technologies (ICTs) can facilitate better and more informed design.

Importance of Subject

Information and communication technologies (ICTs) have been both lauded and vilified, but the amount of research in this area indicates that they provide a significant area of inquiry. Perspectives have included the often-overlapping fields of communication, psychology, computer-supported cooperative work (CSCW), human-computer interaction (HCI), philosophy of technology and public policy. These represent a wide range of approaches, from the theoretical to the applied. The social sciences (like communication and psychology) have used ICTs to study human communicative behavior (e.g., Walther & Parks, 2002) and issues of self (e.g., Turkle, 1995); studies in the philosophy of technology have analyzed the dynamics of interacting with and through technology (e.g., Ihde, 1990); and the disciplines of CSCW, HCI and public policy (e.g., Petric, 2006) apply principles from the former areas of inquiry in their

respective domains. Computer-mediated communication represents a significant area of inquiry for understanding ourselves and our relations with and through technology. Understanding the dynamics involved in these relations can also allow for better informed, more responsible and more effective design of communication technologies.

Intention of the Study

The intent of the present work is to inform the practice of HCI design by focusing on interactions with and through technology that are involved in computer-mediated communication. It should be noted here that computer-mediated communication represents interaction both *with* technology, in the actions necessary to use a device or program; and *through* technology in attention to social interaction. For example, in instant messaging a friend one must simultaneously attend to the mechanics of using an instant messaging application (such as typing messages, monitoring for responses, etc.) and navigate the interpersonal processes involved in any social interchange. The degree of attention that is paid to each will vary depending on the circumstances and the design of the application being used. In phenomenological terms, one could say that a technology “withdraws” when the mediated interaction, and not the tool itself, is the focus of attention (for a related discussion see Ihde, 1990). Interactions *with* technology have traditionally been the focus of HCI. However, interactions *through* technology can be equally important for designers to consider, in light of the ways that design can enable and/or constrain these interactions.

The aim of this thesis is not to propose specific recommendations for interface design; rather, the intent is to provide a better understanding of how ICTs are used and experienced. This is in keeping with Dourish’s (2006) admonition that ethnographic work need not lead to specific implications for design; and it is also in line with Räsänen and Nyce’s (2006) assertion that

anthropology can play a needed role in HCI research by drawing attention to a broader context of use than might typically be considered in interaction design. HCI practitioners can utilize this richer understanding to inform their work on particular designs.

The present study is roughly situated at the intersection of communication, psychology, and philosophy of technology, with the goal of elucidating issues of computer-mediated communication relevant to the practice of human-computer interaction. Specifically, social and situational dynamics that shape the use of computer-mediated communication in everyday life will be explored. These dynamics will be considered in terms of interactions among the properties of specific technologies, user motivations and social contexts.

CHAPTER TWO: LITERATURE REVIEW

Background

The present study is informed by two general schools of thought: studies of the processes and outcomes of computer-mediated communication (CMC) and the philosophy of technology. It also draws from what could be termed more generally ‘internet studies’, which are interspersed in a variety of fields. CMC and the philosophy of technology, particularly phenomenology, represent two very different vantage points. While studies in CMC have generally focused on the effects of a particular communication medium in general terms, phenomenology emphasizes the importance of individual experience. It is these opposing perspectives that will be considered jointly here, if not reconciled.

Computer-Mediated Communication

Social science studies of communication technologies have typically used the term computer-mediated communication (CMC). CMC has been defined as “any symbolic text-based interaction conducted or facilitated through digitally-based technologies” (Spitzberg, 2006). This includes email, instant messaging, newsgroups, electronic bulletin boards, MUDs, MOOs, etc.

Much of the early work on CMC focused on the impoverished quality of the media. Theories of social presence, media richness, and reduced cues used engineering metaphors to emphasize the inability of CMC to convey the rich nonverbal and emotional content of face-to-face interactions. It was thus assumed that CMC lead to more negative and impersonal interactions (see Bargh & McKenna, 2004; Spears, Postmes, Lea & Wolbert, 2002; and Walther & Parks, 2002 for a review). The influential HomeNet study even indicated that internet use was associated with increased loneliness and depression (Kraut, et al., 1998); although a longitudinal

followup study of the same population showed that the negative effects had dissipated, leading the researchers to allow that other mediating variables might be involved (Kraut, et al., 2002). Cummings, Butler and Kraut (2002) similarly concluded that relationships enacted over the internet were not as close as those maintained by other means. What these theories have in common is a model of direct effects, where a given medium determines social outcomes in predictable ways. They can therefore be described as technologically deterministic.

In opposition to these early theories came an approach that emphasized the social construction of technologies, although this social determinism was as one-sided as technological determinism, according to Spears, Postmes, Lea, and Wolbert (2002).¹ One approach in this vein is social information processing theory, which asserts that the goals of the communicators are the primary determinant of outcomes in CMC interactions (Walther, 1992). In other words, if communicators are motivated to establish a relationship, they will use the cues available to make inferences about the other person and facilitate relational exchanges. This approach also emphasizes interactions over time, as relationship development takes longer through CMC than in face-to-face conditions since it takes longer to communicate the same amount of information. (Since social information processing theory acknowledges the technology's role in influencing outcomes it does not represent a strict social constructionism, but it does fit the general position by giving primacy to the goals of users.) More recent work has taken a more moderate approach, and referred to the social *shaping* of technology. One example is Bakardjieva and Smith's (2001) study of internet appropriation in everyday life, and the new cultural practices that arise from it.

¹ Social construction in a broader context would typically refer to the ways in which society develops and deploys technologies; however, in the context of CMC, it is used to emphasize the role of the user in determining the outcome of use, rather than the construction of technologies themselves.

Other perspectives acknowledge the mediating role that context of interaction plays in determining effects of technologies. Boczkowski (1999) refers to these as “mediated impact perspectives” because of their acknowledgment that factors outside of the technology and the individual alone can mediate the effects of technologies. One example of this type of approach is adaptive structuration theory, which proposes a model of technology adoption and use that includes the role of social processes in determining actual practice (DeSanctis & Poole, 1994). The Social Identity model of Deindividuation Effects (SIDE) also recognizes contextual factors, but in the form of group identity and the role it plays in impression formation (Tanis & Postmes, 2003). If the information available to communication partners is vague but a group identity is known, SIDE predicts that individuals will make assumptions about their communication partners based on characteristics of the group to which they belong.

Probably the most recent perspective is that of the mutual shaping of users and technologies. This perspective recognizes the reciprocal processes of technology development and use. It “emphasizes users’ active roles in making choices about how to engage technologies depending on their circumstances, personality traits, and needs” (Baym, Zhang & Lin, 2004, p. 302). This is illustrated by Boczkowski’s (1999) description of the development and use of the Argentine Mailing List (AML), which he describes in terms of a national virtual community. He illustrates how technology influenced, enabled and constrained behavior surrounding the distribution list, which in turn influenced choices made regarding the technology that supported it. A mutual shaping approach is also implicit in Gotved’s (2006) framework for describing the role of space and time in the construction of cyber social reality. dana boyd (2002) addresses the relationship between system architecture and social interaction and its implications for presentational self-awareness and identity management in another (implicit) take on mutual

shaping. Specifically, boyd (2002) advocates a design approach that will allow people to be aware of and regulate their self-presentation in online contexts. This can be framed in a mutual shaping perspective by seeing that the current designs (that boyd sees as inadequate) influence users' behavior (or possibility for behavior) in suboptimal ways; boyd is then reacting to the situation on behalf of users by redesigning the technologies in question so that they allow for different behaviors. Finally, in a dramatic example of social influences, Oksman and Turtiainen (2004) describe how Finnish teenagers have "acted as developers and pioneers of text message culture" (p. 326), taking a format that was originally intended for communication of information between business people and using it in rich and evocative social practice.

One of the overarching characteristics of the first three perspectives (technological determinism, social constructionism and mediated impact) is that they have often relied primarily on laboratory experiments, survey data and other carefully-controlled studies for drawing their conclusions. For example, Walther, Slovacek and Tidwell (2001) examined the effects of the presence of pictures of communication partners in international virtual teams. They found that the presence of pictures in new, previously unacquainted teams enhanced social attraction, but dampened it when introduced in long-term teams. This study provides insight into the effects of pictures on social attraction in a fairly contrived situation, namely, working in international teams that were set up so that the participants would have no prior acquaintance. However, the validity of these findings in other, less contrived contexts is questionable because of other variables that would inevitably be involved. Another example is the work of Bargh, McKenna and Fitzsimons (2002) in which they assessed people's ability to express their 'true selves' in interactions over the internet. Data were gathered in lab-based experiments, in which communication partners interacted either face to face or via internet. This experimental setup is

similarly contrived, purposefully eliminating the influence of social context and communicator motivations. And for a final example, impression formation research, such as Tanis and Postmes (2003) and Hancock and Dunham (2001), by definition deals with interactions between communication partners with little to no information about each other. Real-life situations where this is the case would seem to be rare, as people typically must have at least some contextualizing motivation to communicate (which would most likely not be credit for an introductory psychology or communication course!).

The drawback of these approaches is their rather limited applicability in real-life settings, where ongoing practice shapes technologies and their use. The mutual shaping perspective makes these processes visible, and is thus the approach used here. The general wisdom gleaned from work that can be said to take a mutual shaping approach is that both technological and social factors influence how technologies are used. Boczkowski (1999) outlined these influences in terms of linear cause and effect. In the group he studied, the users were able to have a fairly direct impact on how the technology was deployed, so that cause and effect relationships could be seen.

Another way to acknowledge mutual shaping is as Lee (2005) does in challenging “the blatant simplification of a Net Generation” (p. 316) by looking at the interaction of a variety of factors that lead to the opportunity and inclination necessary for the existence of the Net Generation. As she states, technologies “are constructed through their design, content, function and representation in social and policy discourses, but also reconstructed and re-appropriated by individuals” (p. 318). She also points to the need to understand how micro and macro level variables interact. This echoes van Zoonen’s (2002) question regarding what would be a more nuanced mutual shaping approach to studying gender and the internet, which would

acknowledge multiple dimensions of gender and culture. As van Zoonen (2002) states, the “theoretical issue behind that question concerns how social meanings of technology come into being, and whether there is a decisive moment in the circuit of culture that is particularly relevant in relation to the gendering of technology” (p.15). Interviews conducted to address the question showed, van Zoonen (2002) concluded, “the complexity of articulations of gender and the Internet at the micro-level of everyday lives” (p. 19).

In summary, much research in CMC has attempted to ascertain the main effects of particular communication technologies through reducing the influence of personal or situational variables in laboratory or other carefully contrived experimental settings. However, a growing body of evidence suggests that people’s interactions with and (particularly in the case of communication) through technology cannot be accounted for on the basis of such simplistic perspectives. Rather, there are a variety of dimensions that come into play at the micro-level of everyday use that should be considered as well. A mutual shaping perspective, broadly speaking, recognizes that a technology in itself is only a single variable in any given situation, and that there are other personal and social variables that also shape use and experience. These situational variables are the focus of more phenomenological perspectives, which will be discussed next.

Philosophy of Technology

Within HCI and other related disciplines there has been a recent turn to a phenomenological approach to examining the use of technologies. While there are quite a few different versions of phenomenology, the common thread that is useful here is the emphasis on lived experience. A prime example of this is Dourish’s (2001) work that brings the phenomenological tradition to bear on the increasingly pervasive technologies and ‘embodied’ interactions of HCI. Other examples drawing from this tradition include Croon Fors’ (2006)

work on the lived experience of technology, and McCarthy and Wright's (2004) treatment of the aesthetic experience of technology. There has also been other, more 'practical' work, which, although not overtly phenomenological, looks at everyday experiences using technology. For example, Oksman and Turtiainen (2004) studied Finnish teenagers' mobile communication practices, using a "media ethnographic" approach to "understand the everyday experiences of young people in their daily use of new media and communication technologies" (p. 322). The researchers used interviews and other qualitative data in trying to understand adolescents' perspectives on communication through new media and the meaning this type of communication had for them, using a symbolic interactionist framework. Other related work includes Bakardjieva and Smith's (2001) study of people's appropriation of the internet; Palen, Salzman, and Young's (2001) account of developing practice among new users of mobile phones; and Grinter, Palen and Eldridge's (2006) analysis of text (SMS) and instant messaging among teenagers.

Discussion

A mutual shaping perspective on technology use suggests that it is necessary to look at the social practices that develop through the use of communication technologies, and that in turn influence how the technologies are used. This also builds on the phenomenological tradition by studying the everyday use of communication technologies. The literature reviewed above provides the necessary framework and foundation for approaching an investigation of computer-mediated communication in everyday life, while also highlighting areas where work is needed.

First, there is a need for a deeper understanding of how and why people communicate using technology. While an abundance of laboratory and survey studies have elucidated some of the dynamics involved in computer-mediated communication, they have (for the most part) not

addressed the rich and evolving practices of use that occur ‘in the wild’ and that determine how (or if) they are appropriated. In fact, one of the most striking things about theories that attempt to predict the effects of technologies is how often they are wrong. For example, according to technologically deterministic models, such as media richness, text messaging should have remained confined to transmitting information between professionals (and only when absolutely necessary). Because one can send only text, and a very limited amount at that, using a text message, it could be seen as very ‘lean’ and impersonal medium because of its seeming inability to transmit rich nonverbal and emotional cues. Instead, it has become part of a rich social practice among teens (Oksman & Turtiainen, 2004) and many others who use it in maintaining relationships.

Much of the work thus far has also taken a very technology-centric approach. This is usually manifested in a standard format of: ‘Given a particular technology, what social effects ensue?’ So another goal of the present study is to place users and their lives at the center of the analysis and look at technologies that are important to them.

In order to apply this perspective it is necessary to frame the areas of interest in more detail. The considerable work that has been done on communications technologies has identified some important themes, even if they have often looked at them in isolation. One area is clearly the technologies – it is necessary to identify technologies that play a significant role in individuals’ social lives and their relevant characteristics. Viewed as a whole, they constitute what Oksman and Turtiainen (2004) term an individual’s “media landscape.” Baym, Zhang, and Lin (2004) similarly emphasize the need to look at the multiple media that are used in maintaining relationships.

These various media have different properties that make them relatively more or less suitable in any given situation. Properties can relate to temporal (synchronous or asynchronous) or spatial (place-based or mobile) aspects of communication, message persistence, ability to redistribute messages, amount of information that can be sent, effort required to send or receive messages, etc. For example, email works well for (among other things) conveying detailed information, such as sending a friend who is picking you up at the airport your flight itinerary. However, it would probably not be the best communication technology for coordinating a meeting in the next half hour. So, specific technologies used and their characteristics make up the first component of interest.

A second factor is the motivations of users. As Tyler (2002) states, “efforts to understand the influence of new technologies must view those technologies as means that people can use to achieve their social goals” (p. 198). This addresses the function of various communication technologies in one’s life, whether to coordinate meetings with friends, to flirt, to communicate with business colleagues or to keep in touch with members of a distant social network.

Finally, social context is another significant and pervasive feature, as discussed in the literature (Bargh & McKenna, 2004). Whether one is communicating with her boss or with her best friend will influence her choices regarding how to communicate. It also seems clear that social context plays a role in shaping how and which communication technologies are used. For example, Oksman and Turtiainen (2004) refer to a “mobile communication culture” among adolescents; a recognizable culture implies the presence of relevant norms, which would influence the behavior of the members of that culture. So for the purposes of this study, social context will generally be viewed in terms of social networks and their accompanying (perceived) social norms. However, it should also be pointed out that when communicating via CMC there

are potentially two distinct social groups represented at any one time: the one that is physically proximal and the one that is ‘mediated’. This can be easily seen in the common anecdotes about people talking on their cell phones in public places: they may be physically in one location, but (to the irritation of some) bring their mediated communication into that space as well. This issue is also reflected in the discussion of conflicts in self-appropriation when one is in both a physical and virtual context simultaneously (Boyle & Greenberg, 2005). This means that issues of place are also relevant here.

It is clear that goals and social context are interrelated, and at times may be quite indistinct. However, it is this negotiation between these social variables (operationally defined as user motivations and social context) and communication technologies that the mutual shaping perspective identifies as important in influencing how technologies are used. It is therefore the *interaction* among these three areas that will be the focus of the current study. Phrased another way, the variables considered deal with the *how* (technological properties), the *why* (user motivations) and the *who* (social context) of communicating using email, instant messaging and text messaging.

Research Questions and Hypotheses

The goal of the present study is to explore the interaction among technological, motivational and social factors that influence how communication technologies are used in everyday life. In order to delineate the research question more precisely it is necessary to first specify the population and technologies to be studied.

Baym, Zhang, and Lin (2004) suggest that college students are a particularly appropriate demographic for this type of study because they are “pioneers” in communication technology use, and because they are at a stage in their lives when communication is an important part of

their social lives. College (undergraduate) students will thus be the target population for this study as well, for reasons of both suitability and accessibility.

Although there are a wide variety of communication technologies that may constitute an individual's 'media landscape', looking at them all simultaneously would make for a rather unwieldy analysis. Therefore, three specific technologies will be the focus of this study: email, instant messaging and text (or SMS) messaging. Email and instant messaging have been identified as constituting a majority of significant online social interactions among midwestern college students (Baym, Zhang, & Lin, 2004); and text messaging has also been established as a significant digital communication medium for the target age group, through both empirical (such as Oksman & Turtiainen, 2004) and anecdotal evidence. This triad of technologies also provides a mix of synchronous versus asynchronous and (relatively) place-based versus mobile technologies. In addition, addressing only text-based communication technologies keeps the study within the bounds of traditional CMC research, and also maintains at least one constant across media.

As discussed earlier, the mutual shaping perspective identifies interactions among social dynamics and technologies as key in influencing technology use. The three areas highlighted as significant in these interactions are the properties of communication technologies, user motivations and social context. However, it is necessary to first identify specific instances of these general categories in order to explore how they interact. So the first research question is:

RQ1: What properties of communication technologies, user motivations and social contexts are relevant in shaping how undergraduates use email, instant messaging and text messaging?

Once these instances are identified, they can be explored to see how they interact with other factors in shaping use. This leads to the second research question:

RQ2: How do properties of communication technologies, user motivations and social contexts interact to shape how undergraduates use email, instant messaging and text messaging?

CHAPTER THREE: METHODOLOGY

Participants

Participants were recruited from the population of undergraduate students on the campus of Indiana University Purdue University at Indianapolis (IUPUI) using on-campus advertising. Compensation for participation was entry into a drawing to win an MP3 player (iPod Shuffle). The only qualification was that students must self-identify as users of at least one of the technologies addressed in the study.

A total of 16 undergraduates participated in the study. They ranged in age from 19 to 38 years, with a median age of 24.5. There was 1 freshman, 4 sophomores, 7 juniors, and 4 seniors. A number of the participants were non-traditional students, older than what is considered normal college age and currently working. This likely reflects the urban campus setting. A wide variety of majors were represented, from art to mechanical engineering technology to sports management. Almost all of the participants use email and text messaging, with somewhat fewer using instant messaging, at least on a regular basis. (See Table 1 for further details.)

<i>Participant number</i>	<i>Sex</i>	<i>Age</i>	<i>Year</i>	<i>Major</i>	<i>Uses email</i>	<i>Uses text</i>	<i>Uses IM</i>
1	Male	23	Freshman	Painting	x		x
2	Female	25	Junior	General fine art	x	x	
3	Male	31	Senior	General studies	x	x	x
4	Female	25	Sophomore	Psychology	x	x	x
5	Male	21	Junior	Computer technology	x	x	
6	Female	19	Sophomore	Marketing / International business	x	x	x
7	Female	19	Sophomore	Mechanical engineering technology	x		x
8	Female	21	Senior	Criminal justice	x	x	
9	Male	35	Senior	Exercise science / Sports management	x	x	
10	Female	29	Junior	Paralegal / social work	x	x	x
11	Female	27	Junior	Biology	x	x	x
12	Female	24	Junior	Informatics	x	x	x
13	Female	26	Senior	General fine art	x	x	x
14	Female	21	Junior	Health administration	x	x	x
15	Male	38	Sophomore	Computer graphics technology	x	x	
16	Female	20	Junior	Pre-nursing	x	x	x

Table 1: Participant Characteristics

Treatment

The methodology is qualitative and based on semi-structured interviews. Participants were scheduled for interview sessions of approximately one hour (although most did not take the full hour). Upon arriving they were given an informed consent form. This described the procedure and stated that the interviews would be audio recorded, but that, although comments might be shared and/or published, they would in no way be associated with a particular individual.

Participants were asked to sign this form, indicating that they understood and agreed to its

conditions. They were also given the option of providing an email address (on a separate form) for entry in the raffle for the MP3 player.

Since there was no pre-existing framework for addressing the questions of this study, interview questions were created from scratch. Initially, questions were created to target specific interactions among the categories of factors considered (i.e., social context and technological properties, user motivations and social context, and user motivations and technological properties). While thinking in terms of these interactions aided in developing questions, it became clear after the first set of interviews that it was not realistic to expect that certain questions would target specific interactions of variables. The reality turned out to be much more complex. Also, interesting issues that came up during the first few interviews were raised as explicit questions during later ones, such as which technologies are the most personal (or impersonal) and informal (or formal).

The first set of interview questions addressed basic demographic information, such as age, major field of study and experience using communication technologies. The rest of the session consisted of a series of open-ended questions aimed at eliciting a rich description of the role that the technologies in question play in students' lives, and specifically information relevant to the interactions specified in the research questions. These addressed basic information regarding which technologies participants use, how much, with whom, and for what purpose; motivations; and issues related to social norms and physical and technical constraints. While the basic information was relatively easy to obtain, it was rather more difficult to uncover the influence of things like motivations and social norms on technology use. The approach that seemed to be the most fruitful was to present questions such that participants were required to discriminate between different technologies, situations, people, etc. For example, what is each technology the

best at? Why would you use one rather than another? Under what circumstances would you not use one of these technologies? And in addressing social norms, questions regarding formality and intimacy similarly proved to be quite fruitful. See Appendix for interview questions used.

Taking a mutual shaping perspective allowed for asking questions about how communication technologies influence behavior, and how more situational variables influence appropriation of technologies. In the absence of standard interview questions in the literature along these lines, interview questions were necessarily exploratory, and evolved as the interviews progressed. Later interviews in particular included questions about which technologies are the most personal, formal or intimate, as early interviews indicated that these were relevant concepts.

Data Analysis

All interviews were transcribed and analyzed to look for emerging themes related to the interactions among the three areas (properties of communication technologies, user motivations, and social contexts) specified in the research questions. Although interview questions were targeted at specific areas, a strict separation among the specified categories is not realistic. A significant amount of overlap was anticipated.

Interview transcripts were analyzed by first taking quotes or key points and collecting them in a separate document under appropriate category headings. For example, one theme that emerged early in the interview process was that of email being used for business purposes. So a heading of “Email for business” was created, and relevant comments from interviews were copied or paraphrased underneath. There was less consensus among participants on whether personal uses of email were appropriate, so this led to a more tentative heading of “Email to friends/family?” This process was iterated for many more categories, such as “Formality,”

“Language norms,” “Tech properties,” “Work/personal distinction,” and “Allowing access to self.” Categories were refined as analysis progressed, so that what might originally have been lumped under the general category of “Email for business” might be put under the category of “Self-presentation,” “Language norms” or “Formality,” as appropriate.

The first level of analysis presented here deals with basic usage: What technologies do participants use, how much, with whom, for what purpose, etc. The second level looks at factors that interact to influence use. These can be categorized in terms of the research questions as properties of the technologies, user motivations and social context. These first two levels address the first research question. The final level will sketch some high-level phenomena that emerge at the intersection of these three factors. This final level addresses the second research question.

CHAPTER FOUR: RESULTS

Usage Patterns

All 16 participants reported using email. Fourteen use text messaging, and 11 use some form of instant messaging. Several people said they used to use instant messaging, but do not currently, or use it very little. Main themes from participants' reported usage patterns for each of the three technologies will be addressed in turn.

Email

Most participants described email in terms of business use. They viewed it as something to be used when communicating for work purposes, with professors and others of greater authority, or when needing to be professional. Several reasons were cited. One theme was that email is a generally accepted means of communication for business purposes; most professionals have their email address on their business cards, one can find email addresses to contact company representatives, and it is a standard communication tool in the office. Besides being commonly accepted, it also lends itself to communication that is detailed and planned, and therefore more formal and professional. Messages can be as long as necessary, and one can take time to proofread an email message and run spell check. One participant (number 13), who handles administrative duties for her father's trucking company and gas station, said she likes the fact that with an email she has time to plan out what she wants to say, so she does not get flustered.

There was consensus among participants that, when compared with text messaging or instant messaging, email is the medium of choice when it comes to professional use. However, there were differing opinions when it came to more personal uses of email. One 21-year-old male computer technology major (participant number 5) was emphatic that "email is for work, texting

is for personal,” and the two “almost never mix at all.” This participant clearly valued his friendships, and used text messaging heavily in maintaining them. He also seemed to serve as something of a ‘mother hen’ to his friends, worrying about them when he cannot reach them for an extended period of time, cooking dinner for his roommates, and even reminding his friends of their schedules when they do not remember where they are supposed to be. He sees email as something that has become “much more of a formality nowadays.” And as he puts it, “who wants to be formal with their friends?” Participant 7 echoed this position. She referenced the use of email predominantly in the business world and the need to think through what you are saying and to be appropriate; she said this is not right between friends, because “when you have to think about something that you’re writing to your friend it’s like you’re not being so open with them, and so it changes things between you.” (She uses instant messaging heavily with her friends, which provides far less time to think through what to say.) This deliberate decision to *not* actively control self-presentation contrasts with descriptions in the literature, which generally emphasize the advantages of text-based communication media for managing self-presentation.

Other positions on personal uses of email were more flexible. For example, one 27-year-old participant (number 11), who is a biology major and mother of four, uses email (as well as postal mail) to keep in touch with several pen pals around the world. Another, a 19-year-old business major and entrepreneur (participant 6), uses whatever communication technology is the most effective in a particular situation, and will use email to send updates on her life to family members. Several other participants also email for personal reasons, although some still prefer text messaging or instant messaging for personal communication.

The style of language used in emails was seen as decidedly different from that of text messaging or instant messaging. This is due partially to the typically business nature of email

communication, but seems to apply more generally as well. Several participants said that they are careful to have correct grammar, spelling and message structure (with a greeting, several-sentence body and close) in email. Some seemed to feel an obligation to have more substance with email. As one participant (number 5) put it: “you can text somebody three words and it’s fine,” but with an email “you have to say something in it.” However, the other side of that is that there are basically no restrictions on message length as there are with text messaging and, to some extent, instant messaging, making it better for lengthy conversations or communicating a large amount of information.

Instant Messaging

Instant messaging use was generally described as something to do just for fun when bored or procrastinating. An exception to this was participant 7, who chats constantly with friends back home in India, who are also always online. She does not have a cell phone and is unable to text, so she said instant messaging was the best option for her. Several participants reported that they used to use instant messaging much more than they do currently. And in addition to the classic instant messaging clients, such as AOL’s Instant Messenger, some participants reported using the chat features integrated into the Facebook, MySpace, and Gmail websites.

Instant messaging use was also seen as opportunistic. Participants described logging in just to see who is online. A couple participants said they would use it to talk to classmates about homework or a group project if they happened to be online. One participant, a 23-year-old art major from El Salvador (number 1), said it is “like walking down the street” with people saying ‘hey’, and that it is a good way to reach distant people.

Text Messaging

Text messaging is the newest of the three technologies addressed here, and participants represented varying levels of adoption: two of the international participants do not use it at all, while others use it constantly (participant 14 estimated that she sends her roommate at least 50 text messages a day), and some are more in the middle of the spectrum. While email is seen as something for business, text messaging is seen as something very personal for use with friends and family. It is very immediate and casual, something for mundane, daily things and just for keeping in touch. The 31-year-old network administrator (participant 3) gave an example of using text messaging for ribbing his family in Chicago during the recent Super Bowl game between the Chicago team and the local Indianapolis team. The 19-year-old business major (participant 6) said that the last time it snowed she sent a text message to three of her friends to say “hey, it snowed, we’re going sledding!” Other similarly lighthearted uses mentioned included forwarding jokes or sending silly messages to make people laugh.

Coordinating activities was another common theme in text message use. Participant 5 gave an example of texting his roommates to let them know he was making dinner and to not get fast food. Other scenarios mentioned were texting people to ask them to pick something up at the store, or arranging to meet in the near future. The 31-year-old network administrator (participant 3) also gave the example of text messaging his wife to let her know he put gas in her car. So in general, participants use text messaging for things that are immediate and do not require lengthy explanation.

Several participants mentioned that they would not text message or instant message their boss, professors, or business associates. The 21-year-old computer technology major (participant 5) said it would just be weird, and that “texting... is just a very personal thing, it’s something

you use with your friends and family.” He also said that if he could not reach his boss by “normal means” that he would potentially be interrupting him at home, and in that case he would rather call. He would text message a coworker, but only about things not related to work, like plans to go out later. Participant 10, a 29-year-old getting her paralegal certificate before switching to a social work major, said it would be a matter of respect; a professor might accept a text message and even respond to it, but it would be different because there would not be a close relationship there.

It is also a matter of permission. The 26-year-old art major who works for her father (participant 13) said that an email address is generally on someone’s business card, meaning that it is acceptable to contact him that way; if he had his instant messenger screen name or ‘text me’ on his business card that might make it more acceptable. However, even if permission were to be given in that way she still would not feel comfortable with it. The 19-year-old mechanical engineering technology major (participant 7) does not use text messaging, but said in regard to instant messaging that it would be weird to email her boss because it would be like talking to a friend, and so it “would change the relationship.”

There were a few who dissented from the general opinion that text and instant messaging should not be used for work. The network administrator (participant 3) would use text messaging and instant messaging to communicate with coworkers, but only when email is not accessible. He would also use different, more proper language in those cases than he would if he was communicating with family or friends. The 19-year-old business major (participant 6) draws her friends mostly from work, and will communicate with her “work friends” through text messaging and instant messaging. However, she does differentiate between when she is communicating with them for work and when she is communicating as a friend.

Summary

While each of the participants appropriated email, instant messaging and text messaging in slightly different ways, it was clear that there were definite commonalities and similar factors taken into account when choosing how to communicate. These factors will be presented next.

Factors that Interact to Influence Use

Factors that are relevant to the ways in which communication technologies are used are here roughly categorized in terms of the properties of the technologies, user motivations, and social context. These factors work in combination. So while this analysis highlights different aspects that participants brought up, it should be noted that none is ever the sole determinant of how technologies are used. Also, user motivations and social context can be particularly problematic to differentiate. However, the goal here is not to impose a strict categorization, but rather to use the lens of these different factors to examine use and experience of communication technologies.

Properties of Communication Technologies

One of the most obvious factors is the functionality enabled (or constrained) by a particular technology. Email, for example, enables lengthy messages, attachments, printing, and storing. One can sit at a computer and type a message easily, although, at least in the absence of a web-enabled cell phone², this does require one to be at a computer. Instant messaging is also typically done from a computer with a full keyboard, making it also easy in terms of typing; but

² The burgeoning number of hybrid communication technologies makes it difficult to do a comprehensive analysis. These hybrids include email- and instant messaging-enabled cell phones, instant messaging web applications in sites like Gmail and Facebook, and computer widgets for sending text messages. For purposes of this analysis, the three technologies will be considered primarily in their basic form (i.e., email and instant messaging on a computer, text messaging on a cell phone).

in terms of the temporal dimension it is much more immediate than email due to the (typically) real-time interactivity. The technological properties that participants referenced as being relevant considerations are discussed in the following section, and summarized in Table 2.

<i>Properties of Communication Technologies</i>	<i>User Motivations</i>	<i>Social Context</i>
Maximum message length	Control self-presentation and formality	Norms regarding communication technology use
Difficulty of composition and review	Maintain business and social norms	Place
Accessibility	Entertainment	Influence of communication partners
Cost	Keep in touch and maintain social contacts	Communication permissions
Obtrusiveness	Get or communicate information	
Interactivity	Keep up with friends / technology	
	Allow or restrict access to self	

Table 2: Factors Influencing Communication Technology Use and Experience

Maximum message length. The limited length of text messages was pointed out by several participants. This means that text messaging is not conducive to having lengthy conversations, whereas email is more so due to the fact that email length is practically unlimited. Instant messaging has fewer constraints on message length than text messaging, but its interactivity makes it more conducive to relatively short messages.

Difficulty of composition and review. Text input differs significantly between email and instant messaging and text messaging. Email and instant messaging are generally done from a

computer with a full keyboard for input, whereas text messaging is done through a numeric cell phone keypad with little buttons. The buttons must often be pressed repeatedly to enter the correct character. Even using predictive text input can be problematic since it will frequently predict the wrong word. Several participants mentioned the difficulty of composing text messages and how this encourages them to abbreviate as much as possible to minimize text entry.

Text messages are also more difficult to review and correct before sending due to the small screen and cumbersome editing. In contrast, email is quite easy to review and edit, and typically has a spell check tool, which several participants reported using. Instant messaging has some of the same features of email in terms of text entry and editing, but the level of interactivity is much higher and therefore the expected response time is much shorter than with email, meaning less time to review.

Accessibility. Participants frequently referenced spatial factors when talking about how they choose which technology to use. Using email or instant messaging means going to a computer and signing in, or pulling out their laptop. Text messaging is done from a cell phone that is usually readily accessible. Several participants mentioned that they or people they know find it difficult to be separated from their cell phones! So the accessibility of technologies is a consideration, with text messaging (i.e., cell phones) being, in general, relatively more accessible than email and instant messaging.³

Cost. The cost variable seems to directly affect only cell phones at this point, since most email and instant messaging accounts used by college students are free. Cost can affect text

³ One could also imagine that whether or not one has a laptop computer and wireless internet access would make a difference in terms of accessibility to email, although this was for the most part not brought up by participants.

messaging use in two ways. One is if text messages are not part of a person's usage plan – a couple participants mentioned that it costs a certain amount for each text message that they send, which causes them to limit their use. Someone also mentioned that in sending a text message you might be spending money on someone *else's* plan. A second way that cost can be a factor is when it is actually cheaper to send a text message than it is to call, resulting in users sending more text messages.

Obtrusiveness. The extent to which a technology is obtrusive in sending or receiving messages is something that several participants mentioned, although there was no consensus on which of the technologies was the most or least obtrusive. One participant (5) mentioned a situation where a friend started to get annoying, and he instant messaged a third friend in the same room about this. He chose to instant message in this situation because it was easy to do without anyone else knowing. Email can also be easy to do without anyone noticing, especially at work. However, there is also the issue of people walking by and seeing what is on your screen. Some participants thought text messaging was more obtrusive because it causes the recipient's phone to "go off," and some thought it was less obtrusive because it is easy to send discreetly. So whatever a particular person's thoughts on the matter, the amount of attention that is drawn to oneself and to the recipient of a message can be a consideration.

Interactivity. Communication technologies differ in the level of interactivity that is possible and expected (interactivity in this context being defined as the extent to which a message sent elicits an immediate response). While it may be possible for two people to email back and forth at a rate similar to that of instant messaging, the general expectation seems to be that an email recipient may respond in her own time. In contrast, when instant messaging, people typically expect a more or less immediate response. This may be good when chatting with a

close friend, but not as desirable for communicating with people one really does not want to interact with. Participant 7 addressed this when she said that she will email people she wants to keep up with but not really talk to, but instant message her friends. Text messaging is in a way in between email and instant messaging in terms of interactivity. Text messaging is asynchronous like email (and unlike instant messaging), and yet there seems to be more of a general expectation that text messaging will get a quicker response. This is due partially to the fact that a text message recipient will probably receive the message close to the time it is sent and often respond to it right away as well. The fact that text messages are typically short – and expected to be short – is another factor making it more likely that a person will be able to send a quick reply to a text message.

User Motivations

The reasons a person has for communicating or using a particular technology influence the manner in which he communicates or uses the technology. The reasons may be very specific, such as asking a roommate to pick up milk on the way home; or they may be more general, such as keeping up with technology. There are reasons that are specific to a situation and reasons that are related to the decision to use a particular technology in general. They may be straightforward (such as keeping in touch with friends), or more complex (such as controlling self-presentation). While these motivations clearly operate on different levels, their interrelatedness and similarities make it useful to address them under the same heading.

Control self-presentation and formality. Controlling self-presentation has been a common theme in the CMC literature, and it was a concern that participants mentioned. This was usually in regard to appearing professional through using email (as opposed to the more ‘casual’ instant messaging or text messaging) for business purposes. The ability to take as long as necessary in

writing email messages and in proofreading them was seen as a way to put forward a professional appearance. On the other hand, controlling self-presentation through using email with friends can be seen as not being so open with them (according to participant 7). So this factor can also be seen in the opposite sense of *not* controlling self-presentation as much and being informal. This is a new perspective on self-presentation, where one deliberately chooses to relinquish control over self-presentation as a sign of friendship and intimacy.

One other aspect that the 19-year-old business student and soon-to-be manager (participant 6) brought up was that of being taken seriously. Text messaging is so informal that she did not expect anyone to take her seriously when she used it, whereas she thought an email would be more effective.

Maintain business and social norms. There seems to be a common perception that email is used professionally, and that instant messaging and text messaging are (at least predominantly) for personal use with friends and family. This perception influences participants' technology choice (i.e., using email for more formal communication). One participant (number 5) took it to the opposite extreme as well, saying that he would almost never email friends. The exception is when a friend is sending him a document to proofread, and even then the friend will send a text message to let him know he sent the email! So there was a definite sense among (at least most of) the participants interviewed of what is appropriate or inappropriate in terms of technology use, in general terms or in relation to their particular social circle.

Entertainment. One of the most frequently mentioned uses of instant messaging and text messaging across participants was for entertainment, communicating 'just for fun' or because of boredom. Text messaging is something that can be done during a boring class or meeting or

while at work, and instant messaging can be a good aid in procrastinating on homework or killing time on the weekends.

Keep in touch and maintain social contacts. This is one of the most obvious uses of communication technologies, but participants described using all three of the technologies considered for keeping in touch with friends and family and maintaining social connections. It can be even easier to do this using CMC than phone or face-to-face interaction with people one wants to keep in touch with but not really have a conversation with. One participant (7) said that she uses email to keep in touch with friends who help her to stay informed with what is going on but with whom she does not really want to have a conversation. Another (participant 14) uses instant messaging to talk to her little sisters at home, and likes that with instant messaging she does not have to have a real conversation – she can just say what she wants, and then say that she is busy and leave.

Participants in general reported using communication technologies in maintaining relationships. This was mentioned particularly in relation to ‘best’ friends who may not be close by, but text messages or an email going back and forth help in staying connected.

Get or communicate information. Another fairly obvious and straightforward use of communication technologies is to get and communicate information. The business major (participant 6) who frequently uses communication technologies to contact other people for information said that the response time she wanted back was a big consideration in choosing which technology to use. Others said that email is best for communicating detailed information, while text messaging is good for communicating brief messages that need to reach the recipient right away.

Keep up with friends/technology. When asked why they started using specific communication technologies, many participants said they simply used it because it was available, and it was new and interesting. Some participants started using text messaging after they got a message from a friend and wondered what it was, or discovered that it was part of their phone plan and started playing around with it. In any case, the ability to explore and experiment with technologies is crucial.

This can be viewed as ‘soft’ technological determinism, where people feel that they must either keep up with the latest technologies or be left behind. However, this sentiment was expressed in regard to an *initial* decision to use a technology. Perceptions of *use* being dictated deterministically by the technology were notably absent.

Allow or restrict access to self. Interviews seemed to indicate that participants use technology choices in negotiating the access to themselves that they allow certain people to have. Specifically, email is seen as a way to maintain distance (if desired), while text messaging or instant messaging can be used in maintaining closer connections. Text messaging is seen as very personal because it goes to a device that most people have with them constantly. Since both sender and recipient know this to be the case, there is often a shared sense that an immediate response is called for.

While accessibility regarding text messages is mainly related to space – the message goes directly to people wherever they are – instant messaging dynamics are more related to time. One does not have much time to craft responses when using instant messaging, so in a sense this allows access to one’s thoughts and what immediately comes to mind, since one will not have much time to plan her response without it being obvious that she is doing so.

Social Contexts

The social contexts of an interaction come in many different forms. One context is that of the particular person one is communicating with and the relationship with him; another is the more general context of social norms and conceptions of what is appropriate or inappropriate. The physical situation of the person sending a message is also a factor – things like where she is at, what she is doing and whom she is with. The sender may also take these issues of place into consideration when choosing how and when to communicate with a particular person.

Norms regarding communication technology use. Maintaining social norms was mentioned in regard to user motivations, and here norms can be viewed from another angle as a social context variable. Norms can be general or related to a specific environment; there may be a general sense that email is the proper mode of business communication, and yet in some business contexts the norm may be that instant messaging is also used, for example. Personal norms also operate on the level of social or family interactions, with different social or family networks having their own norms regarding what technologies are used and for what purpose. Participant 15, for example, uses text messaging mainly for coordinating schedules with his family.

Place. There are several issues regarding place. One is location, whether someone is at home, at work, in class, etc. Another is the people that are around; participant 14 said that she probably would not send a text message when she is out with a group of friends, for example, or when at work where coworkers would notice. This can also be seen in terms of activity, such as working, sleeping, going to class, etc. Finally, the accessibility of a given technology will be associated with all of these factors to some extent.

These issues apply to someone sending a message, but some participants also said they considered the context of the message recipient when choosing how to communicate with him. This means that variables of place can apply to both the sender and the receiver.

Influence of communication partners. There are several ways that people can influence others to use particular technologies. There is the straightforward way of asking if someone uses a particular technology, such as instant messaging, and thereby applying pressure to use it (as participant 10 reported). However, there are also more subtle ways. There may be situations where a person will respond to communication in one medium but not another. For example, participant 3 said that he knows he is more likely to get a response from his father and father-in-law by text messaging than by calling. Similarly, another participant (number 11) has a friend who is good about responding to email, but rarely responds to text messages or voice mail. So in that situation, if she wants to reach him, she knows she needs to send an email. In this way someone can essentially reinforce (or not) another's use of a particular technology by responding to one but not others. This can make it more likely for the message sender to use the 'successful' technology in the future based on past responses.

Communication permissions. Email addresses are often publicly available, especially business addresses, whereas a cell phone number is rather personal and not given out as freely. One can get all kinds of junk mail in an email box, but usually what comes to one's cell phone is a message from someone who has essentially been given permission to communicate through giving out one's cell phone number. One participant (number 2) seemed to be somewhat irritated when an acquaintance abused this permission and sent bulk text messages several times a day. This issue of permission is another reason mentioned for why instant messaging and text

messaging would not be used for business: one needs to be given permission to use these more personal forms of communication.

Summary

Factors falling under the categories of properties of communication technologies, user motivations, and social contexts have been identified and analyzed. However, none works in isolation, and the influences of their interaction will be discussed in the following section.

Interactions Among Technological, Motivational and Social Factors

There are several instances where one can see how the interaction of a variety of the factors outlined above can influence use. One of the most straightforward is the selection of which technology to use in a particular situation; it is a choice made in the context of technological limitations and capabilities, personal motivations, and social contexts. Another behavior that can be viewed in terms of a variety of factors is grammar and general use of language.⁴ Participants in general reported definite differences in the language they use with different communication technologies, which is again influenced by several factors. Each of these cases will be discussed in more detail.

Technology Selection and Use

When someone wants to communicate something to another person, there are usually several options available. Certainly any of the three technologies specifically considered here could be used to communicate many kinds of messages. For example, if one needs to ask a spouse or roommate to pick up milk on the way home, it could be possible to email, instant message, or text message that information. Which one is the most appropriate and which is used

⁴ This does not refer to a choice between *different* languages (such as between English and French), but rather a *way of using language* to communicate. This includes things like grammar, word choice, spelling, punctuation, etc.

will depend on a variety of issues, some related to physical constraints (can I get to a computer to send an email?); some related to the specific situation and motivation (will my roommate get the email in time?); and some related to social and interpersonal norms (would my roommate think it strange to email about picking up milk rather than sending a text message?).

There are also factors that influence use of a communication technology in general. One may be influenced by friends to use a certain technology to keep in touch; or, conversely, groups of friends may stop using a particular technology (as it seems quite a few people no longer use instant messaging as heavily as they used to). There may also be the motivation to stay current with technology. While many of these issues may be fairly obvious, it is informative to view use in terms of the constellation of things that influence it.

Technology selection and use can be viewed as in Figure 1. This is the most general case discussed, and is essentially an illustration of the influences of all the factors previously identified. When participants were asked during interviews how they choose which technologies to use in different situations and how to use them, these were the issues that surfaced. Since all of these factors were elaborated on earlier they will not be addressed further here. This case serves as a basic illustration of the factors and dynamics involved.

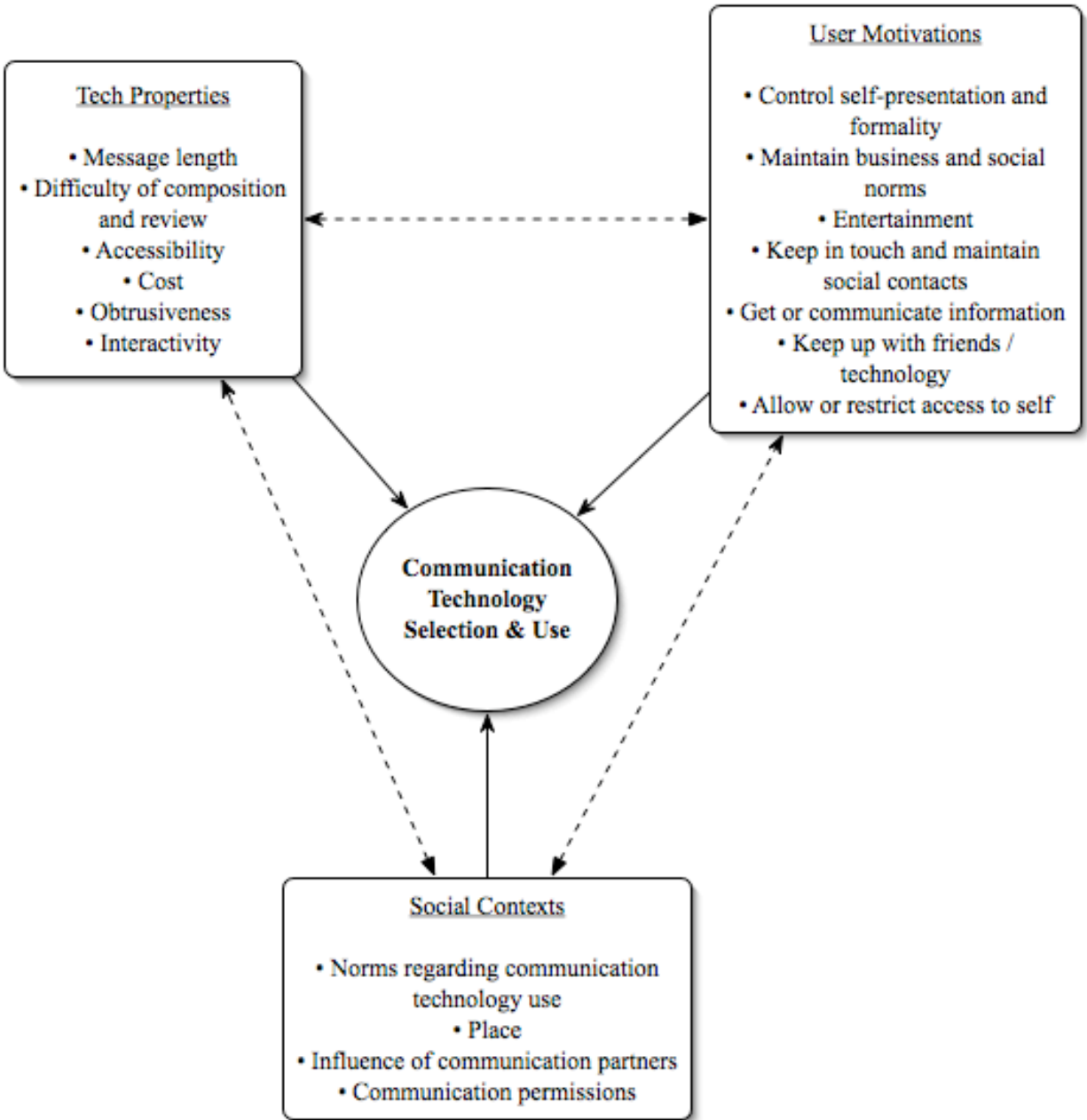


Figure 1: Influences on Communication Technology Selection and Use

Language

The way undergraduates use language in different communication mediums differs substantially, and is affected by several variables. This can be illustrated as in Figure 2.

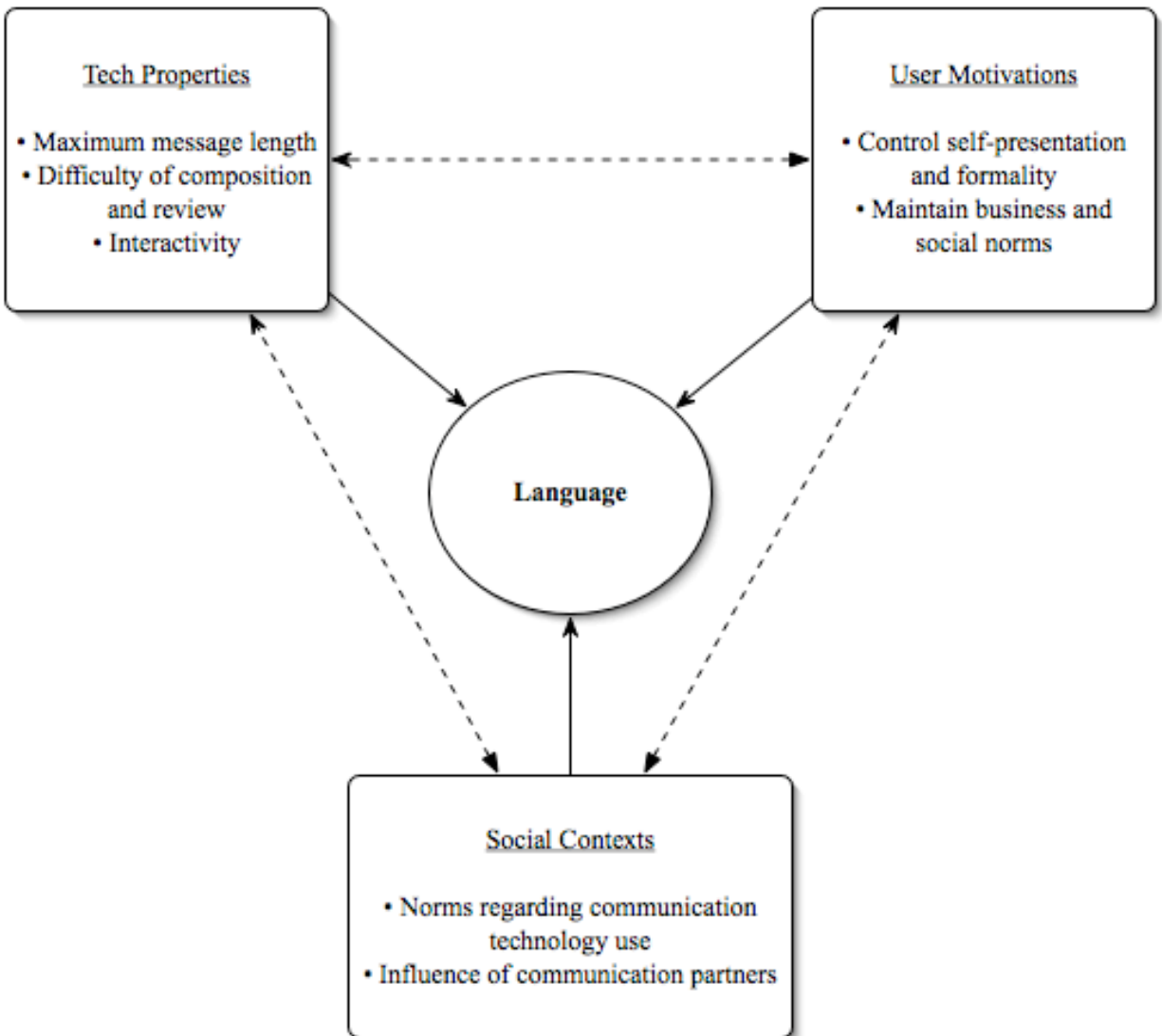


Figure 2: Influences on Language

Differences in language use were the most noticeable when comparing email with text messaging. One of the key characteristics of email that participants mentioned was the ability to thoroughly plan and review messages, and to run spell check. It is also relatively easy to type an email message at a full computer keyboard. In contrast, composition of text messages is rather difficult, as is review and editing of text messages. The fact that text messages are often sent when people are on the go provides an added challenge. Participants indicated that this has a

direct effect on the type of language they use in these different mediums. Most participants (with the exception of participant 13, who is very particular about using proper language in all mediums) reported abbreviating as much as possible when using text messaging, so much so that they sometimes get messages from confused recipients asking what they were trying to say! The general opinion seemed to be that as long as the recipient understands what the sender is trying to communicate, anything goes. However, language use in email was quite the opposite: participants reported spending more time planning and reviewing emails, or they at least pointed out the ability to do this with email. This was true particularly in business or professional contexts. Instant messaging seems to be the middle ground, with it being easy to type messages like email, but also having the temporal pressures of interactivity that tend to result in language that is not as planned and therefore not as proper as might be used in an email.

Participants often referenced the use of email in business or professional contexts, and the need to appear professional. The motivation of wanting to appear professional or to maintain business norms thus influences participants to use a communication technology that will allow them to do this: namely, email. One can see how the technological capabilities of email reinforce the business norm of using email for communication. Similarly, participants reported using instant messaging and text messaging when communicating with people with whom they are friendly and informal, and these are the technologies that best support this kind of language.

The social context of language use is relevant in that one is communicating with another person in a particular social role (i.e., business associate, professor, friend, relative). Participants (particularly 5 and 6) distinguished between these different roles even when one person played more than one role, such as coworker and friend; sometimes they communicate as a coworker, and sometimes they communicate as a friend.

Summary

The cases of technology selection and use and language outlined above emerged during interviews as instances where a variety of factors are at play. Different factors may be more or less salient, depending on the person and situation; but it can be said that no one factor ever operates in isolation.

CHAPTER FIVE: DISCUSSION

The findings of this study illustrate the complexity of ICT use. A given ICT does not have a single effect; rather, its use is constantly negotiated in the context of a variety of technological, motivational and social factors. While the properties of the technology itself may make it more or less suitable for different purposes, they are by no means the only consideration.

In addition to identifying technological, motivational and social factors that influence use, this study has also illustrated ways in which these factors interact with each other. The two general cases presented in the previous chapter – technology selection and use, and language – are fairly straightforward. They illustrate how observable behavior can be shaped. However, the way use of a technology is *experienced* also plays a role in recursively shaping patterns of use. These patterns of use may then become norms. Some tentative findings regarding perception and user experience will be discussed in the following section.

Perception and User Experience

Findings gleaned from the interviews conducted seem to indicate that some select aspects of the user experience of ICTs may be even more amenable to description in terms of the language of complex systems than that of mutual shaping. Specifically, the concept of emergence, where interactions among components of a system lead to phenomena that are more than the sum of their parts, seems applicable. (For a characterization of complex systems, see Amaral and Ottino, 2004). There seem to be certain types of experience that emerge when certain factors are present. In the case of interactions that influence behavior, any number of considerations may be relevant, and if one is not present, behavior will be only marginally

affected. In contrast, it would seem that a threshold of relevant factors must be met before some of these more experiential aspects of use and perception arise.

Two instances will be discussed here: immediacy and formality. This analysis is based on participant comments regarding their attitudes toward communication technologies. In some cases, it was actually the following constructs that participants mentioned first, and the specific factors outlined in the previous section were distilled from them.

Immediacy

Immediacy can be operationally defined as the quality of being instantaneously connected. A sense of immediacy is closely related to accessibility, and involves *both* the sender and the recipient. It is also related to intimacy. This was an issue that came up in some of the early interviews, thus prompting more explicit questions later regarding which technologies are the most and the least intimate or personal. It was in this context that many of these issues were raised. The quality of being personal or intimate is probably something that participants could think about more easily than immediacy, but the term ‘immediacy’ was chosen here because it is somewhat easier to describe in formal terms. While it may be connected with intimacy, in this context it would seem to be a primarily symbolic intimacy. This is particularly true of text messaging, where the mere act of sending someone a text message can indicate a certain level of friendship. This is in contrast with the kind of intimacy that could be experienced when ‘pouring one’s heart out’ to a friend in an email, where the intimacy would be based on message content.

Technologies with the greatest immediacy in most situations are instant messaging and text messaging; several participants mentioned that text message recipients would get their message *right then* and most likely respond to it right away as well. A sense of immediacy could clearly be expected in the case of instant messaging, which is inherently interactive; but participants

generally feel a sense of immediacy with text messaging as well. One can envision a message sender, with phone readily accessible, sending a text message to a friend as soon as a thought comes in her head, and knowing that message is going to go to the friend's phone wherever he is and he will most likely see it right away and perhaps respond to it. This sense of connection came through in several of the interviews. Interactivity is also a factor here. With increased accessibility comes a reduction in the amount of time between a thought coming into a person's head and communicating that thought to someone else. Planning the presentation of a message was associated with a higher level of formality, and so conversely a lesser degree of planning was associated with informality and camaraderie. This contrasts with the typical focus on controlling self-presentation by drawing attention to situations where users may wish to *give up* some amount of control as an expression of friendship.

In terms of user motivation, a sense of intimacy is usually experienced in conjunction with allowing access to oneself, or being allowed access to someone else. Instant messaging and text messaging both require knowing a piece of information (screen name or phone number) that is generally more private than an email address. So communicating in this way means taking advantage of communication permissions granted by another, which was cited previously as an element of social context.

In situations where people are communicating in order to keep in touch with friends, a sense of immediacy is seen as desirable. It gives a sense of closeness to people who may be far apart physically. Even if they are not far apart, sending even 'stupid' messages provides a way to maintain a sense of connection. It is also entertaining, as reflected by the use of text messaging during boring classes or meetings! On the other hand, when communicating with people of greater authority or when trying to appear professional, more distance is appropriate.

Issues of place are also relevant. One of the things several participants mentioned is that a text message will go to the recipient wherever they are, and one can also send a text message from any location (even from bed, as participant 9 pointed out!). This is in contrast to email, which is often perceived as something a person will get when in the office. Even if it is not this strictly limited to business hours, the general perception is that since it requires the recipient to have time to go to a computer and log into their email account there will at least be more of a time delay in receiving an email than there will be with a text message.

The construct of 'immediacy' can therefore be viewed as an emergent product of the interaction of the factors of accessibility and interactivity (properties of communication technologies); control of self presentation and formality, allowing access to self, keeping in touch, and entertainment (user motivations); and communication permissions and place (social contexts). This interaction can be envisioned as in Figure 3.

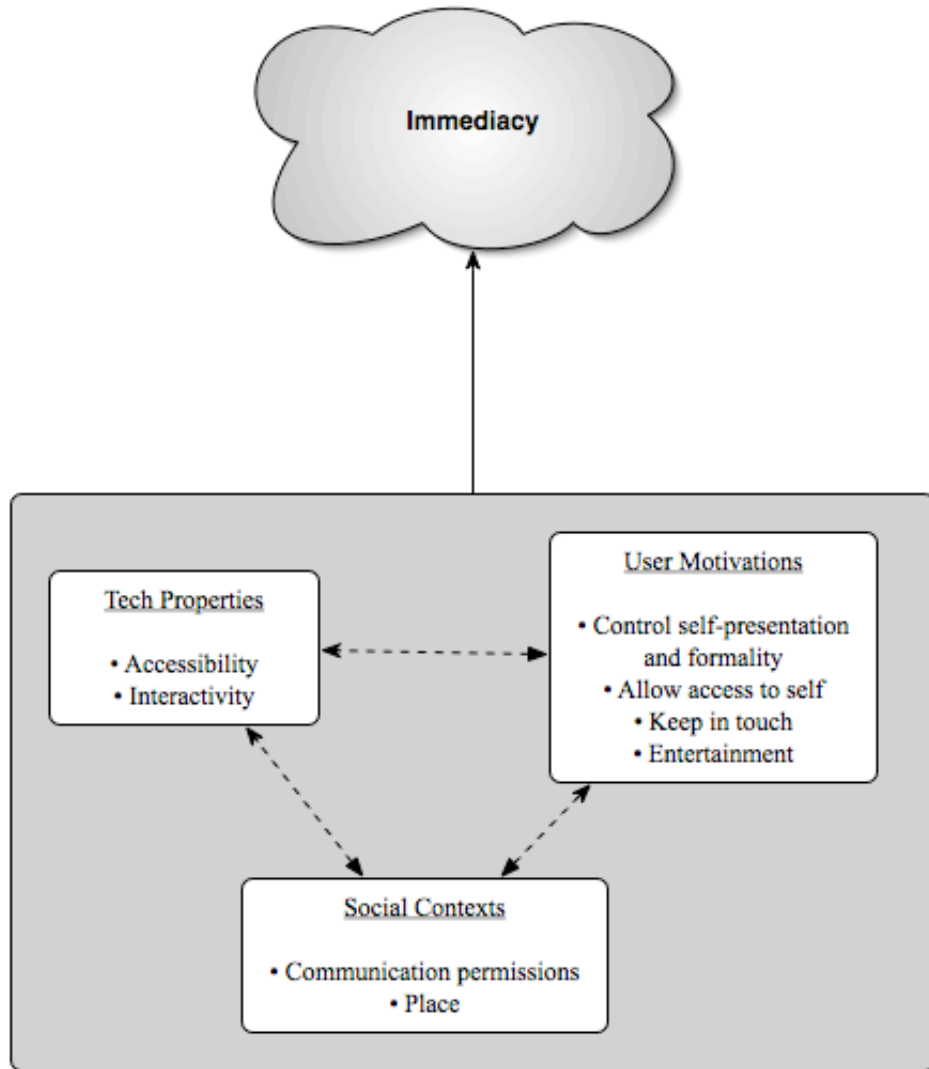


Figure 3: Factors Influencing Experienced Immediacy

Formality

The perceived level of formality afforded by and associated with a communication medium are considerations particularly when the motivation is to come across professionally or to maintain business norms. Although not as pronounced, there may also be a desire to be informal with friends.

The concepts of language and immediacy discussed previously are quite relevant here. Communication technologies may make it more or less easy to communicate formally, or, in

other words, to control self-presentation through crafting and proofreading messages. And formal (or informal) language may be perceived as the norm with a particular technology (e.g., formal language may be perceived as the norm for email, and informal language for text messaging). In this way technological capabilities and norms regarding use can reinforce each other.

The concept of immediacy was used by several participants in characterizing text messaging. There is something about being able to communicate with people anywhere, anytime and having them get messages immediately that leads to a sense of connectedness. However, the opposite of immediacy – what could be referred to as ‘distance’ – was also referenced in the context of email communication. One of the things contributing to the sense of distance in email is that one does not know exactly when an email recipient will receive a message. So this reduces or eliminates the sense of temporal connectedness. They will also need to be at a computer to receive it, unless they have a cell phone capable of receiving emails. This eliminates the spatial connectedness of being able to send and receive messages anywhere. Maintaining a sense of distance through language and choosing a technology that does not allow for spatial or temporal connectedness seem to be ways that participants manage the level of formality in communication.

Other contributors to control or perception of formality are related to the specific people involved. One interesting aspect is what is referred to here as ‘communication permissions’. Participants seemed to think that email is an acceptable medium of communication with just about anyone, whereas text messaging is with only friends and family who have one’s cell phone number. So in this sense not granting permission to communicate through instant messaging or text messaging (restricting access to oneself) is a way of maintaining formality.

Although formality is a somewhat nebulous concept when talking with undergraduates, participants were able to differentiate between more or less formal technologies and give reasons for their opinions. Factors affecting the perceived level of formality are illustrated in Figure 4.

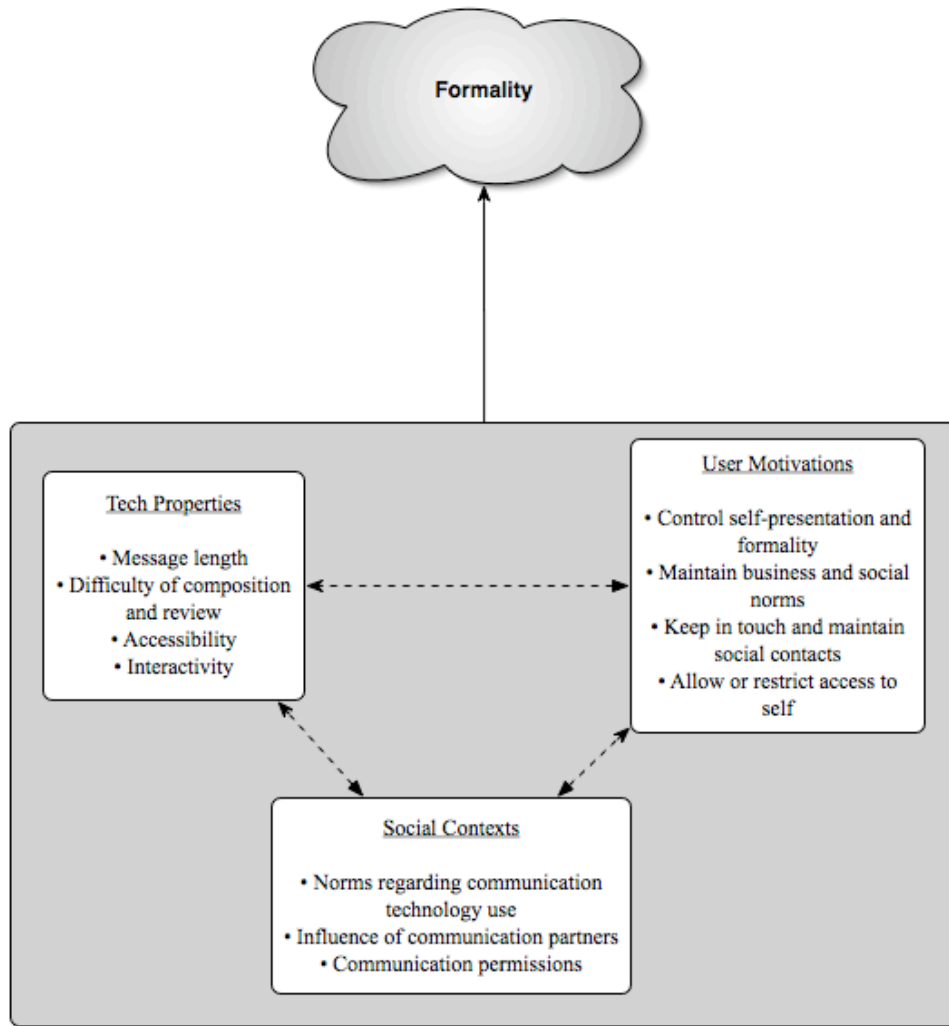


Figure 4: Factors Influencing Perceived Formality

Summary

The experiential constructs that participants used when talking about communication technologies indicates that they are not merely neutral tools for transmitting information. There are a host of issues that shape how they are used and experienced, with use and experience

recursively shaping each other. Moreover, the experience of using a particular technology is something that emerges at the confluence of all these factors at a particular point in space and time.

Summary of Findings

The research questions driving this study were: 1) What properties of communication technologies, user motivations and social contexts are relevant in shaping how undergraduates use email, instant messaging and text messaging; and 2) How do properties of communication technologies, user motivations and social contexts interact to shape how undergraduates use email, instant messaging and text messaging?

A number of factors emerged during interviews to address the first question. The technological properties identified were: maximum message length, difficulty of composition and review, accessibility, cost, obtrusiveness, and interactivity. User motivations that came out during interviews were: to control self-presentation and formality, maintain business and social norms, keep in touch and maintain social contacts, get or communicate information, keep up with friends and/or technology, allow or restrict access to self; and entertainment. Finally, issues of social context that surfaced were: norms regarding communication technology use, place, influence of communication partners, and communication permissions.

The way these factors can interact to shape use was exemplified through two cases: communication technology selection and use, and language. These cases illustrate how technological, motivational and social variables are all involved in shaping use. Findings also suggest that the perception and experience of use, and not just use itself, is shaped by these interactions. Two instances of perceptions and experience of use were tentatively articulated, namely, immediacy and formality.

Implications of Findings

The findings of this study support the assertion that computer-mediated communication cannot validly be isolated from the personal and social setting in which it takes place. The way in which a communication technology is used is inextricably linked to the motivations and social contexts of users. There may be some broad generalizations that can be made, but even fairly well established norms have been built up through time and use. There is no *a priori* characterization of use that can be fully accurate. The benefit of using a mutual shaping perspective is that it acknowledges the multiple variables involved and highlights the ways in which they shape each other over time and use.

The findings also suggest that the user experience of communication technologies is something that emerges in the context of specific variables. While behavior may be shaped and constrained by these variables, certain types of experience may arise *only when all necessary variables are present*. This is particularly salient in the case of experiencing a sense of immediacy through text messaging, a technology that, *a priori*, would be assessed as a very sterile form of communication. Interviews suggested that a combination of technological, temporal, spatial and social factors resulted in this perception. It is cases like these, where more deterministic models fall so woefully short in their predictions, that the need for a more nuanced and holistic approach can be most clearly seen.

This complexity highlights the need to study these issues ‘in the wild’ where they occur, instead of in a laboratory or other well-controlled environment. The main point of control in an investigation is that it provides the advantage of focusing on only one small area at a time, while removing or limiting the influence of other variables. However, the findings of this study suggest that in so doing, one can change the playing field considerably, such that what is elucidated in an

experimental setting has little bearing on activity in the real world. It is the complexity of real-world interactions that result in ‘surprises’ like the popularity of text messaging, and which make it ineffectual to describe and predict real-world use on the basis of experimental findings. In confining research on these issues to a laboratory setting, it becomes almost impossible to not miss the forest for the trees.

This being said, it is immensely difficult to capture this complexity in the wild. One of the challenges of this study was getting undergraduates to articulate how they use communication technologies, and their experiences doing so. Negotiating use of communication technologies is often something that people do without thinking much about it. This means that relying on participants’ recollections may be problematic in the sense that they may not be able to give a clear picture of their use. Getting participants to articulate the way they *experience* use is even more troublesome, because, in addition to not having a conscious conception of their use, they may also lack the vocabulary to explain it. A challenge for future research will be to find ways of addressing these issues in order to conduct a more thorough investigation.

Another insight that can be drawn from this research is that it can be productive to consider macro- and micro-level variables jointly. An analysis at the macro-level of technologies and their main effects may miss the crucial dimensions of what happens in actual use, while focusing only on the micro-level can leave little room for insight beyond the experiences of individuals. However, considering the interactions among macro- and micro-level variables (operationalized here as technological, personal and social factors) can help to bridge this gap and lead to a better understanding of some of the dynamics involved. This can be conceptualized as what Löwgren and Stolterman (2004) refer to as the “dynamic gestalt” of a digital artifact, which “emerges in the interaction with the user over time” (p. 137).

In terms of HCI design, this study illustrates the fact that ICTs exist in complex systems including other technologies, people and various other entities. In order to appreciate the effects of a technology, it must be considered in the context of the entire system, and not only in terms of a user's interaction with it. As Nelson and Stolterman (2003) state:

“Complexity, a distinctive attribute arising as a consequence of the dynamic interactivity of relationships, is the rule in the real world, while simplification or reductionist thinking, such as ignoring relationships and concomitant emergent qualities, is a dangerous distraction. Analytic, reductionist thinking (separating into parts for the purpose of study) can create knowledge that is powerful and productive in a positive way only when brought back into a context of inquiry that takes into account the existence of complex relationships and the phenomenon of emergence” (p. 73).

This means that approaches in HCI that focus only on engineering optimal interaction between ICTs and users and neglect the broader context in which they are used miss much that is significant in regard to the effects of a design and the shaping of its use. In contrast, taking a more holistic approach in viewing ICTs in their context of use can lead to more informed and better design. Studies such as the present one can help HCI designers understand some of the dynamics involved in such a context of use.

Finally, the emergent perception and experience of communicating through ICTs may in itself be an important variable influencing use. For example, in the case of email, a strong association with business use may influence people to use it more professionally, while a strong association of text messaging with personal uses may reinforce those uses. Similarly, an

experience of immediacy in instant messaging or text messaging may lead to use of those technologies with people one wishes to be close to. In other words, the present research illustrates how technologies and perceptions and experiences of their use mutually shape each other.

Summary

In summary, the present study identifies ways in which technological, motivational and social factors interact to influence use. However, what may be even more interesting are the perceptions and experiences that emerge during use. There are two aspects that are particularly significant. First, it seems that certain perceptions and experiences emerge only in the presence of certain situational factors, making these dynamics perhaps even more amenable to description in terms of the language of complex systems than that of mutual shaping. This also underscores the necessity of studying ICTs in the actual context of use; experience and use may be emergent phenomena qualitatively different from what might be anticipated on the basis of more contrived studies. Second, use and perceptions and experience mutually shape each other. The ways in which a technology is used will influence conceptions of the way it should be used, while experience and perceptions using it will in turn influence the way it is used. A mutual shaping perspective, such as the one taken here, highlights these different variables and their interactions, and can give HCI designers a clearer conception of the design space.

CHAPTER SIX: CONCLUSION

Computer-mediated communication has become an integral part of many people's lives. Understanding the dynamics of communicating through ICTs requires looking at not only the technologies or at the complexities of individual contexts of appropriation, but rather considering these levels simultaneously. This study has taken a step in this direction by first identifying technological, motivational and social factors that are relevant in shaping the use and experience of technology. Second, it has conceptualized how these factors can interact to shape use, and how perceptions and experience of use may be emergent properties of these interactions.

Limitations

This study has two main limitations. First, it has a small sample of undergraduates drawn from an urban campus, with a large proportion of non-traditional students. This means that it may not be possible to generalize the findings reported here beyond this urban undergraduate population.

Second, there was no pre-validated set of interview questions that could be used to effectively explore the relevant issues. As mentioned previously, figuring out how to pose questions and get participants to talk about their use and experience was one of the main challenges of the study. While some themes had started to emerge by about the second half of the interviews, which made it possible to ask some more targeted and productive questions, the first few were more haphazard and exploratory. This means that some points were discussed in only a few of the interviews, which limits the strength of the conclusions that can be drawn.

Future Research

There is a need for research with a larger and more diverse sample to explore these issues further, and either confirm or refute the findings presented here. The present work is largely exploratory, and an investigation of a novel and more complex⁵ approach than is normally taken to studying issues in computer-mediated communication. While the findings are tentative, the general approach, method and factors identified as relevant can be used as the basis for further research. Further work is needed to more comprehensively and systematically explore the issues outlined here, specifically in terms of the interactions among various factors and their effects. Using the concept of complex systems in describing user experience may be particularly productive, and warrants further consideration.

Summary

This study has explored factors that interact to shape the use of the communication technologies of email, instant messaging and text messaging among undergraduates. Specifically, these factors were categorized in terms of properties of the communication technologies, user motivations and social contexts. Relevant factors were identified and then analyzed to highlight how they can interact in shaping use and experience.

Results support the assertion that a mutual shaping approach is better suited to describing information and communication technology use than a technologically deterministic or social constructivist model. Furthermore, findings suggest that emergent experiential properties of communication technology use may be described in terms of complex systems. This initial exploration provides the groundwork for future work that may be able to more thoroughly

⁵ This is to say that the present study is more complex in terms of the number of variables considered, not in its research design.

articulate the factors and interactions involved in shaping use, experience and perceptions of information and communication technologies.

The major contributions of this research are that it 1) illustrates the complexity of use and experience of ICTs; 2) proposes a multi-variable framework for analyzing use, perception and experience in terms of technological, motivational and social factors; 3) suggests that perception and experience of ICT use may be emergent phenomena which may in turn recursively shape use, perception and experience; and 4) suggests that the interaction of factors that influence use and experience of ICTs can be thought of in terms of complex systems. If this analogy with complex system holds, the implication is that, when complex dynamics are present, *ICT use cannot be understood apart from the functioning of the entire system of variables*. This is because emergent properties cannot be predicted on the basis of one variable alone, such as a particular technology (as illustrated by the case of text messaging). The challenge, then, for future research will be to conceptualize and provide empirical grounding for a framework that addresses the interaction of macro- and micro-level variables and can characterize the dynamics affecting use, perception and experience.

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APPENDICES

APPENDIX: INTERVIEW QUESTIONS

1. Academic year: _____
2. Major: _____
3. Age: _____
4. Work? _____
5. How 'technology literate' do you consider yourself to be?
6. Do you use email/instant messaging/text messaging?
7. How much do you use them?
8. In general, why do you use each of these?
9. When was the last time you used each?
10. What is each technology the 'best' at? Are certain technologies more effective at certain things?
11. What types of people do you communicate with using email, instant messaging and text messaging (friends, family, professors, etc.)?
 - a. What type of things would you email/IM/text to people in each group?
 - b. How does what you are trying to accomplish differ between groups? How are your reasons for communicating different?
12. How does the specific person you want to communicate with influence which technology you choose?
13. How much do you think about what message recipients will be doing or where they will be when they get your message? How does that influence how you choose to communicate with them?
14. What kinds of people do you communicate with using a single technology; in other words, people whom you *only* email, instant message, or text message?
15. What kinds of people do you communicate with using multiple technologies?
16. What types of technologies do your friends/family use?
17. Are the people you email/IM/text generally nearby or distant?
18. How does your physical location influence which technology you choose?
19. In what situations would you feel more comfortable using one technology rather than another? Why?

20. In what situations would you *not* want to use email, instant messaging or text messaging? Why?
21. Has using one of these technologies ever backfired?
22. Which do you think is the most personal/impersonal technology? Why?
23. Which do you think is the most formal/informal technology? Why?
24. How does the language you use differ among email/IM/text communication?
25. How would it feel to use these technologies differently?
26. Do you remember when you started using each of these? Why did you start using them? How has your use changed over time?

VITA

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Education

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|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fall 2007 | Indiana University, Bloomington—Enrolled in Informatics Ph.D. program, concentrating in Social Informatics. |
| Fall 2004–present | Indiana University Purdue University at Indianapolis (IUPUI)—Human Computer Interaction Master’s degree from Indiana University School of Informatics expected Winter 2007.
Cumulative GPA: 3.97/4.0. |
| 1999-2003 | Southern Adventist University—Graduated <i>magna cum laude</i> with Bachelor of Arts degree in Psychology and minor in Computer Science.
Cumulative GPA: 3.85/4.0; within major GPA: 3.94/4.0. |
| 1998-1999 | Forest Lake Academy—Graduated with enriched honors in music and nine hours of college credit.
Cumulative GPA: 4.087/4.0 |

Master’s Thesis

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| 2006–2007 | Master’s thesis looks at use and experience of email, instant messaging and text messaging technologies among college students. Completed fall 2007. |
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Academic and Research Experience

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|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2007 | Served as chair of Graduate Informatics Student Association (GISA) Research and Professional Development Committee - Indiana University, Bloomington |
| 2006 | Attended 4S (Society for Social Studies of Science) conference |
| 2003 | Attended CHI (Computer Human Interaction) 2003 conference with university sponsorship |
| Summer 2002 | Assisted with three research projects in the Psychology Department of the University of Washington (in fulfillment of practicum requirement). |
| 2002 | Attended CHI 2002 conference with university sponsorship |
| 1999-2003 | Tutored in Center for Learning Success at Southern Adventist University (mostly writing/Comp 101 and 102) |

Professional and Honorary Memberships

4S (Society for Social Studies of Science)
ACM (Association for Computing Machinery)
ACM SIGCHI (Special Interest Group for Computer Human Interaction)
Psi Chi—The National Honor Society in Psychology (public relations officer for Southern Adventist University Chapter, 2002–2003)

Awards

Dean's List (high school and college)
National Merit Commended Scholar
National English Merit Award
Who's Who Among American High School Students
Who's Who Among American College Students
Frederic Chopin Piano Award (two consecutive years)

Employment

Sept 2007–present	Indiana University School of Informatics—Associate Instructor
June–July 2007	Pearson Education User Experience Group—Summer intern working on usability
Aug. 2006–May 2007	Indiana University Purdue University at Indianapolis—Research assistant and graduate student
May–Aug 2006	The Anderson Group—Project for PERF (Public Employee's Retirement Fund)
Aug 2005–May 2006	Indianapolis Junior Academy—Secretary and bookkeeper
Mar–Aug 2005	Clay Terrace Lifestyle Center (Simon Property Group)—Guest Services Supervisor
Feb–Mar 2005	Clay Terrace Lifestyle Center—Guest Services Associate
May 2004–Feb 2005	Conseco—Member of Help Desk/Escalation Team in the Health Call Center
Aug 2003–May 2004	Conseco—Customer Advocate in Health Call Center
Sept 2001–June 2003	The Limited—Sales support associate/sales associate part-time during school terms
2001 (summer)	Eli Lilly & Company, Development area of Clinical Trial Materials Quality Control—Summer replacement student
2000-2001(school year)	Southern Adventist University, Music Department—Piano accompanist for women's choir
2000 (summer)	Eli Lilly & Company, Study Drug Coordination Group of Clinical Trial Material Management—Summer replacement student