Expanding the Scope of Localization:

A Cultural Usability Perspective on

Mobile Text Messaging Use in American and Chinese Contexts

By

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A Thesis Submitted to the Graduate

Faculty of Rensselaer Polytechnic Institute

in Partial Fulfillment of the

Requirements for the Degree of

DOCTOR OF PHILOSOPHY

Major Subject: Communication and Rhetoric

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Rensselaer Polytechnic Institute
Troy, New York

July 16, 2004
(For Graduation August 2004)

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Acknowledgements

Although my name stands alone on this document, it would never have been completed without the support of countless other people. I take great pleasure in this opportunity to thank many people who generously furnished assistance and advice while I was working on this project.

First, I would like to thank my dissertation advisor, Bill Hart-Davidson, who not only teaches me how to do research, but helps me discover the excitement and joy of doing research. I appreciate and remember the many brainstorming sessions I spent in his office. Without his careful guidance and his dedication to this project, this dissertation would be greatly diminished.

I am also thankful for my dissertation committee who contribute to my growth as a researcher and to the quality of this dissertation. Cheryl Geisler, Bob Krull, and Linnda Caporael have all helped tremendously throughout the course of this dissertation. I have been impressed at their generosity as each has, in different ways, helped me accomplish this project.

I feel very grateful to all participants in this study. Without them, this project would not be as interesting as it is. I appreciate those participants who have treated me as their friend and shared their stories with me. I am also grateful to Xie Yaqin, who helped me collect data at the Chinese site, to Yang Jiang who did the second coding for me, and to Liza Potts who proofread my draft.

I would like to thank Mrs. Robert Wagner for the Joanne Wagner Memorial Fellowship and the Society of Technical Communication for the STC Graduate Student Scholarship. The research stipends from these two scholarships greatly assisted in the funding of this project.

I owe thanks to friends and colleagues who are working with me on the same path. Thanks for your time, help, encouragement, suggestions, and comments for making this piece of work more interesting. Ashley Williams, Kellie Carter, Shaun Slattery, Jennifer Davis, Maureen Murphy, Kofi Amponsh, and Judy Tarbox, it is so great to have been working with and being friends with you all.

Finally I thank my parents and my brother for their unflagging encouragement, support and care. It is them who make my life so beautiful. Special thanks go to my husband Zhouxuan who always supports me and stands beside me throughout these years.

Abstract

Current localization practices suffer from a narrow and static vision of culture resulting in usability problems for IT product and design. Such a narrow focus of an artifact and its functionalities creates a situation in which such IT is unable to support complex activities in a concrete context. The recent success of mobile text messaging challenges our prior assumptions of technology use and pushes us to think of issues of culture, usability, and localization in a broader spectrum.

To improve current localization practices and better understand cultural issues in usability studies, my dissertation examines and compares multiple cases of local uses of mobile messaging technology in American and Chinese contexts. This study employs a framework of cultural usability, bringing social-cultural contexts into user activities and integrating key concepts and methods from activity theory, genre theory, and British cultural studies. This framework regards usability as a mediation process consisting of an instrumental aspect (mediation of practices) and a social aspect (mediation of meanings). More than 40 frequent users of mobile messaging in the US and China participated in the study. An expanded view of localization is surfacing from various use histories collected by questionnaire survey, diary study, qualitative interview, and observation, which urges us to look at the localization work occurring at the user's site. This study illustrates how each specific local use develops in a concrete activity situated at the intersection of the immediate context and social context and how this local use echoes with both the subjectivity of the user and the ethos of the surrounding culture. It calls for a change in localization practices from localizing for operational affordances by simply applying

cultural conventions in localization work to localizing for social affordances with rich understandings of use activities in context.

From a broader perspective, this study has implications for information design and technical communication pedagogy by urging us to move from a functional perspective to a broad socio-cultural perspective to develop information products that resonate with users' lifestyles.

Introduction

Localization of IT products is gaining more attention in the age of globalization, especially because the profits of the IT industry in the American domestic market remain stagnant (Fujinuma & Risden, 2002). Besides manufacturing products in cheap labor-cost areas and selling products to the overseas market, the newest trend for big companies is towards moving their development division offshore to reduce costs (Forrester Research, Nov. 2002). Since computing technology entered the commercial market, we accepted the fact that the product designer was not the end user any more and that the user's context (including social and cultural factors) was distinctively different from the designer's. The current situation suggests it is now normal to design IT products for users in other cultural contexts, and the cultural gap between designers and users is growing larger. In this dissertation, I use the term "developer localization" to refer to the localization work occurring at the developer's site.

The design challenges for localization have become more demanding because a large amount of today's IT products are consumer-oriented information appliances (Bergman, 2000). Compared to enterprise information systems that are designed to improve work practices in the organizational context, information appliances are expected to fit into the fabric of individual user's everyday life, having "the capability of becoming attached to their users socially and emotionally" (Norman, 2000). While the local uses of IT enterprise products in organizational contexts might share similarities in work flows and

organizational structures across cultures, the local uses of IT consumer products take on various cultural and social meanings in individual life spheres located in different cultural contexts. In this dissertation, the localization work at the user's site is referred to as "user localization."

All these demanding challenges from both the developer's site and the user's site urge us to develop an effective way to address cultural issues in IT localization and design well-localized products to support complex activities in a concrete context. However, current localization practices have not been very successful yet. The lack of a broad and dynamic understanding of culture is one of the major problems hurting localization practices. From the development side, localization work is usually carried out with a narrow scope and only on a surface level (Sun, 2002). Localization specialists focus their attention on delivery aspects. They are interested in techniques of localizing interface features, such as what colors will not work for an audience in a specific country and what page layout would be preferred by some ethnic cultures. Their enthusiasm for the forms of information products—the tip of the iceberg—usually results in their ignorance of the huge underwater iceberg—the broader cultural context where information products are situated, and where products are designed, produced, distributed, and consumed. This shortsightedness finally results in the lack of an overall vision of localization strategies in product design, leading to poor usability in actual use at the user's site.

The problems discussed above cannot be blamed only on localization professionals. These issues are actually common in current IT product design and development environments. The popular concept of usability originates from the field of cognitive science and computer engineering, which causes two major problems for usability research. First, researchers tend to regard usability as an isolated quality and ignore the social-cultural context surrounding the product (Adler & Winograd, 1992; Brown & Duguid, 1994; Spinuzzi, 1999b). Second, researchers typically focus on half of the mediation process, i.e., the mediation of activities, and discount the mediation of meanings in a socio-cultural context. As Hales observed, design approaches are usually strong on the "tool" perspective — the instrumental aspect of design, but weak on "text" aspect — the social aspect that interprets the product from its social-cultural context of use (1994).

To address these problems, I studied mobile messaging technology that is poorly localized at the developer's site but then rescued by users with their localization efforts in this dissertation. By examining and comparing the *user localization* of mobile text messaging in both American and Chinese contexts, I search for ways of improving the *developer localization* in the design process and helping localization professionals better meet the demanding challenges in cross-cultural IT product design.

Mobile text messaging is a technology that challenges our prior assumptions of technology use and pushes us to think of issues of culture, usability, and localization in a

broader context. It is a hard-to-use technology with inherent limitations but great market success. It is a technology originally designed as a business application and marketed accordingly, but people primarily use it in their personal life sphere. It is a technology people adopted for its instrumental convenience, but now a completely new social world is being built because of it. It is a technology people not only use but integrate into their daily lives to fit their lifestyles as well. It is a technology that is becoming a popular communication mode in East Asia, Europe, Australia, and other parts of the world no matter if the cultures in those regions are described as high-context, low-context, collectivist, or individualist[1].

The use of mobile text messaging keeps increasing. In the Unite States (US), 1.7 billion text messages were sent during the third quarter of 2003, up from 1.2 billion during the first quarter, and up from 1.2 billion of the yearly volume in 2002 (Forrester Research, October 2002; Richtel, 2004). In China, 220 billion text messages were sent in year 2003, up from 90 billion in 2002 (Kahn, 2004; SINA, Dec.30, 2002). What happened and is happening behind these huge numbers of text messages exchanged on wireless phones? Why is mobile text messaging so popular even though mobile phones are not a good tool for writing? How do users "localize" a hard-to-use technology into their everyday life to augment work and life?

[1] The terms "high-context" and "low-context" are used by E. Hall (1976) to describe how the meaning is conveyed by the amount of information or implied in the context in different cultures. "Collectivist" and "individualist" are used by Hofstede (1991) to measure the ties among individuals in a society.

A new framework of cultural usability is developed and employed for studying this intriguing technology use phenomenon. This framework brings social-cultural contexts into user activities and integrates key concepts and methods from activity theory, genre theory, and British cultural studies. It regards usability as a mediation process consisting of an instrumental aspect (mediation of practices) and a social aspect (mediation of meanings). More than 40 frequent users of mobile messaging in the US and China participated in the study. An expanded view of localization is surfacing from various use histories collected by questionnaire survey, diary study, qualitative interview, and observation, which urges us to look at the localization work occurring at the user's site. It argues that every situated use is a local use with specific "localization strategies" developed by users. This study illustrates how each specific local use develops in a concrete activity situated at the intersection of the immediate context and social context and how this local use echoes with both the subjectivity of the user and the ethos of the surrounding culture. It calls for a change in localization practices from localizing for operational affordances by simply applying cultural conventions in localization work to localizing for social affordances with rich understandings of use activities in context.

From a broader perspective, this study suggests that IT product design and use is a complex and dynamic interaction between designers and users and between various processes such as production, consumption, representation, and regulation, asking us to study it in rich social and technological contexts. At the same time, this study has

implications for information design and technical communication pedagogy by urging us to move from a functional perspective to a broad socio-cultural perspective to develop information products that resonate with users' lifestyles.

Structure of the Dissertation

Chapters 1 and 2 are literature review chapters. Chapter 1 introduces the technology of mobile text messaging in the localization context with a review of the dilemma of culture in localization practices. Chapter 2 reviews different approaches to cultural and contextual issues in HCI research and describes the framework of cultural usability employed in this study.

Chapter 3 describes the research design with detailed discussions of research sites and methods of data collection and analysis.

Chapters 4-7 report the findings from the fieldwork with an in-depth analysis informed by the framework of cultural usability. Chapter 4 summarizes the general patterns of use across cases. Chapter 5-7 presents three individual cases by examining the dynamic interactions between situated uses and the surrounding cultural contexts.

Chapter 8 explores the implications of this study by theorizing local uses within the cultural usability framework and proposing an expanded view of the localization process.

Chapter 1

Challenges of Mobile Text Messaging In Localization Context

> "The first signs of the next shift began to reveal themselves to me on a spring afternoon in the year 2000. That was when I began to notice people on the streets of Tokyo staring at their mobile phones instead of talking to them.... I've learned that 'texting,' as it has come to be called, is only a small harbinger of more profound changes to come over the next ten years."
>
> — Howard Rheingold: *Smart Mobs: The Next Social Revolution* (2002, xi)

This chapter situates the phenomenon of mobile text messaging within the research context of localization practices. It reviews the current problems with localization practices and discusses why a localization study of mobile text messaging will be significant for future localization practices.

The Dilemma of Culture in Localization Practices

The concept of culture is a dilemma in localization practices. It is such a pervasive term that one can expect to encounter the word "culture" in almost every piece of localization literature, and usually more than once. However, a review of literature in this field indicates that culture is either narrowly defined or operationalized into practices, or situated nowhere in the localization process. In this section I will first define the term

"culture" used in this dissertation project and then review how cultural issues are approached in localization practices.

A Working Definition of Culture

The term "culture" has different meanings in the fields of communication, psychology, sociology, anthropology, and information studies. In this study, the working definition of culture is primarily informed by research in anthropology and ethnomethodology. This definition regards *culture* as the meanings and behaviors that groups of people develop and share over time as well as the tangible manifestations of a way of life such as artifacts and values (Geertz, 1973).

More specifically, culture is an open set of practices and a dynamic process in which cultural meanings, objects, and identities flow across institutions, nations and generations in diffuse time-space (Marcus, 1995; Sassen, 1998). It is concerned with the production and the exchange of meanings between the members of a society or a group. Meanings are produced and circulated through several different key processes including representation, identity, production, consumption, and regulation of the cultural circuit within a technological society (S. Hall, 1997). In the field of IT design, culture refers to "the ongoing, mutually recursive networks of processes, and resulting products that form our collective subjectivities" (Kerne, 1998). Thus, the culture of a technology should be investigated in a context where the collective and the individual meet and where the implementation (instrumental aspect) and interpretation (social aspect) interact.

In addition, two types of cultures are also used to describe issues in localization and intercultural communication throughout this dissertation:

- *National/Ethnic culture:* The ethnic group in which one was born into and grows up. Cultural factors from this type of culture are usually referred as dimensional cultural factors or ethnic cultural factors. They include contexting, speed of message, information flow, action chains, time, nonverbal behavior, uncertainty avoidance, power distance, collectivism vs. individualism, specific vs. diffuse, and universalism vs. particularism, as discussed in the section on "Models of Cultural Dimensions" below. It should be noted that this type of culture is what is represented in most of localization literature.
- *Subgroup culture:* The cultural group people have been socialized into. Cultural factors from this type of culture are referred as general cultural factors or subcultural factors include demographic features (e.g., age group and gender), personal background (e.g., professional knowledge and IT knowledge), and values and beliefs shared in subculture groups (e.g., an online community and a local club).

Culture and Definitions of Localization

Culture has a central role in the localization process, as claimed, proven, and validated in localization literature and real-world cases of market failures where companies did not thoroughly consider local culture issues (DeVoss et al, 2002; Dray et al, 1996; Faiola,

2002; Hoft, 1995; Marcus & Gould, 2000; Thatcher 2001; Zahedi et al, 2001). From the beginning, culture is highlighted in the definitions of localization in industry and academia.

According to the Localization Industry Standards Association (LISA), an international association founded in 1990, localization is "the process of modifying products or services to account for differences in distinct markets," which covers three main categories: linguistic issues (the translation of the text for the user interface, documentation, and any linguistic functionality embedded in an IT product), content and cultural issues (the content of information and the presentation of information such as icons, graphics, and colors), and technical issues (redesigning and re-engineering an IT product to accommodate issues such as double byte characters) (2003, p.13). To put it plainly: "Localization is the process of adapting and manufacturing a product so that it has the look and feel of a nationally-manufactured piece of goods" (p.3). Here, we see the industry emphasis on the "look and feel" of the product. In this view of localization, culture seems to be a magic wand that will make a product have the "look and feel" for a local market.

Researchers in academia approach the concept of localization with more of an emphasis on culture. Gribbons (1997) defines localization in a similar way as LISA does, but he gives prominent status to culture by putting cultural issues above technical issues. In his two-level localization process, localization includes adjusting the features of the product (e.g., translation, punctuation, dates, etc.) to mirror the needs and conventions of the target

audience on the surface level and adjusting the aesthetic appeal, images, colors, logic, functionality, and communication patterns on the cultural level.

In some ways, the concept of culture actually gives more opportunities for the field of localization studies. At a recent online conference on localization and translation training (2003), researchers suggest that localization does not have to be limited to the adapting process when translation is involved. It can be “a process of adapting anything to a target locale” (Clark et al, 2003), or “an interdisciplinary process of adapting an IT product to the needs or expectations of a specific target audience” (Drouin, 2003) as long as there is a distinctive culture and locale there.

To illustrate the importance of culture and its complexity in localization practices, almost ten years ago Hoft (1995) presented an interesting Iceberg metaphor (p.59). She suggests that issues of translation, punctuation, and aesthetic appeal are just the tip of the iceberg (the visible section above the water that is only 10 percent of the whole). The iceberg’s huge body is invisible to designers and manufacturers. Ninety percent of the iceberg consists of unspoken and unconscious rules (e.g. common knowledge and values shared within a culture).

Approaches to Cultural Issues in Localization Practices

To address cultural concerns in localization practices and accomplish the goals of localizing IT products on the cultural level, professionals usually adopt the following three approaches.

Ad-Hoc Localization Guides

The quick and easy way is to rely on ad-hoc localization guides. There is a large array of guides about translation, layouts, fonts, graphics, etc. based on personal anecdotes and empirical studies of local cultural conventions. Those guides usually include lengthy lists of do's and don'ts for different ethnic cultures and elaborate thoroughly on coding conventions, interfaces, formats, and other international variables (Esselink, 2000; Kano, 1995; Lingo & LISA, 2000; LISA, 2003). However, this approach is built on a static model of culture and an engineering approach favoring efficiency over context-sensitivity (Sun, 2002). Culture is regarded as something unchanging and congruent without considering the user's gender, age, or ethnic group, and only the dominant cultural values in a national culture are represented in cultural conventions. Through this problematic process of representation, rich contextual data is stripped away to present a "mechanistic and materialistic reality" (Miller, 1979). The whole process of localization is simplified as part of the engineering cycle from the planning stage to the testing stage detached from its use context.

In the pursuit of engineering and automating this process, localization professionals only need to attend to delivery and style such as translating the user interface and resizing a dialog box, as shown in a localization primer for mobile devices (Musale, 2001). Two problems surface from the transmission model (Slack et al, 1993) of localization: First, localized products and services are not fit for use contexts. Professionals are only working on the forms of information products—the tip of the iceberg, and they are ignoring the huge underwater iceberg—the broader cultural context where information products are situated, where they are designed, produced, distributed, and consumed. For example, as this study shows, mobile text messaging is used frequently for exchanging emotional messages; however, not every phone model supports this task by supplying easy-to-input emoticons and smiley, which makes entering an emotional message difficult for some users. Second, the product-oriented localization process separates product design from product use. For many manufacturers, localization only occurs at the developer's site, and it ends when the product ships. They are not aware of the interactions between use and design or user localization. In the case of mobile messaging, though many enthusiastic users localize this technology in their own contexts either to support fun communication or to maintain long-time relationship, these use trends have not been recognized by most manufacturers to improve their text messaging applications. It is shocking to see that the interface design for the mobile text messaging application on most phone models remains the same throughout these years. Overall, these two problems cause poor usability, culturally.

Models of Cultural Dimensions

To address these problems, researchers suggest bringing cultural contexts into practices and research (Bosley, 2001; Dray et al, 1996; Faiola, 2002; Hoft, 1995; Marcus & Gould, 2000; Thatcher 2001; Yli-Jokipii, 2001; Zahedi et al, 2001) by applying popular cultural models developed by E. Hall (1983), Victor (1992), Hofstede (1991), and Trompernaars (1993). According to Hoft (p.78), these four scholars developed four distinct models with different emphases. E. Hall's model focuses on the right response of the message within the cultural dimensions of contexting, time, space, information flow, and action chains. Victor's model focuses on business communication with factors including language, environment and technology, social organization, contexting, authority conception, nonverbal behavior, and temporal conception (LESCANT). Hofstede's model regards culture as "mental programming." His cultural dimensions such as power-distance, collectivism vs. individualism, femininity vs. masculinity, and uncertainty avoidance are well-accepted in the field. Trompernaars' model approaches culture from the problem-solving angle with dimensions similar to Hofstede's.

Models of cultural dimensions are more structured and more research-based than ad-hoc localization guides. For example, Hofstede's model is developed based on his intensive questionnaire research among thousands of IBM employees in 72 national subsidiaries, 38 occupations, and 20 languages from 1968-1972 (Hoft, p.85). Thus, Hofstede's model is the most popular in both industry and academia. A recent review (Meyers & Tan, 2003) of

cross-cultural information systems research finds that 24 of 36 pieces of literature reviewed used some or all of Hofstede's cultural dimensions. In the design arena, Barber & Bader (1998) proposed "cultural markers" to map different dimensions of culture such as power distance onto interface features in cross-cultural website design based on Hofstede's model.

These models provide vocabularies and structured frameworks to compare cultural patterns across nation, which is helpful for localization design. However, we should still be aware of their limitations. First, these models were advanced to study cross-cultural communication rather than for cross-cultural design, and thus they cannot be simply converted in localization heuristics. For example, a closer look at the application of cultural dimensions on cultural markers show that they only deal with features at the delivery level and fall into the trap of the transmission model again: The design approach of cultural markers still interprets culture as ethnic culture in one dimensional view, in a similar way as ad-hoc localization guides do. To solve this problem, we need to have better ways to incorporate cultural dimensions into localization practices.

Second, these cultural dimensions also have their own methodological limitations. As Meyers and Tan noted, Hofstede's method of data collection is problematic. He conducted his survey in an organizational context (IBM), rather than in a broader social-cultural context. The people he studied shared many cultural values and interests concerning their careers and working context. As Hofstede's student, Trompernaars collected his data in a

similar way, and he developed his model based on an extensive survey of only 16 questions among managers and administrative staff (Hoft, p.88). In addition, E. Hall's model came from personal observation, and Victor's primarily came from secondary sources.

Third, those cultural dimensions are mostly based on the concept of a national culture, and the nation-state is actually a relatively recent phenomenon occurring in the later part of human history. In localization practices, we often see local cultures that are related to a subculture group (e.g., instant messaging is more popular in groups of teenagers than in other age groups) in a country, but these cultural models cannot help our design and localization if they are obscured by a set of national culture dimensions.

Furthermore, these views of culture place concrete cultural realities into static dimensions, which contrast with contemporary anthropological findings. Some researchers who employed cultural dimensions in research work found that those dimensions could not fully explain the complex phenomena found in the field. For example, Harvey (1997) concluded his research on a comparative study of geographic information systems between German and American users this way: "Hofstede's dimensions of national culture are a good basis for understanding the influence of national culture on organizations' self-representation, but miss the actual practice of social activities" (p.145).

In fact, missing the actual practice of social activities is a common problem in localization literature. As an example, Hoft's book *International Technical Communication* (1996) covers many aspects of internationalization and localization with "international variables," but none of them come from field studies of use activities in context. Additionally, she does not mention the term "activity." In her mapping of international variables (p.114), all of the variables are static and abstract. For example, when they follow her suggestions of cultural editing (p.123), designers can only beautify buttons with local translations, though the real goal here is to support user activities in their local context. When culture is operationalized into abstract dimensions separated from concrete user activities in localization process, culture is not situated in practices. Moreover, this shortsightedness misses the use moment when certain kinds of local uses are engendered by particular socio-cultural settings and when certain technologies are adopted in a locale to reinforce or transform the social-structural configurations. For example, some Asian users think mobile text messaging is more suitable for Asian people to express implicit feelings and emotions.

Fieldwork Methods

To remedy these problems, fieldwork methods are also used in the localization process to gather more concrete and complete understanding of local uses (Jokinen et al., 2003; Yu & Tng, 2003). This approach interprets culture as a set of things, a process, and a set of practices that are concerned with the production and the exchange of meanings between the members of a society or group in an ethnomethodological sense. The standard

ethnographic fieldwork asks researchers to study how users use a product in their natural context as anthropologists observe aboriginal people. This method provides thick descriptions of use histories; however, it does not have formal models for data analysis and knowledge reuse related to IT product design. As Sullivan (1989) pointed out, successful adaptations are needed before the fieldwork method can really contribute to usability research.

Contextual design (Beyer & Holtzblatt, 1998) is one possible adaptation. The idea of contextual design is to enter the user's world as an "apprentice" to learn, and to make observations and inquiries related to the selected focus areas. Compared to ethnographic fieldwork, contextual design has its own set of structured methods. Thus it has been accepted by some companies including Nokia as a participatory method to gather design requirements (Vaananen-Vainio-Mattila & Ruuska, 2000). However, contextual design is more suited to explore individual user needs at the conceptual stage. It does not say much about how to evaluate product usability. Furthermore, its work models focus on design for work practices in the organizational context, which is not very informative for design in the individual context. And it also lacks a way to address cross-cultural issues in localization practices.

User and task analysis (Hackos & Radish, 1998) is another adaptation. Its user research methods draw from varied disciplines including anthropology, cognitive psychology, technical communication, instructional design, market research, scientific management

and so on. It studies users by “observing them in action” (p.7) with a long list of analysis methods on different levels and in different scopes. However, the focus of user and task analysis is still on the action level. Guidelines about cultural issues are very limited and superficial. For example, as a tool to study contextual factors, environment lists and profiles can only help collect observable data while ignoring factors that cannot be watched but sensed or felt.

A common limitation for current fieldwork methods is that they just focus on the aspect of tool-mediated production of an IT artifact in context, but rarely explore its sign-mediated communication. Other limitations include studying product use only at certain stages or in a short period. Long-term research with a focus on a developmental aspect is also very hard to find in the HCI field. To study localization practices in context and improve localization performance, we need an approach to address cultural issues more effectively. It should have a structured and flexible framework to investigate concrete uses via the fieldwork with a robust structure to address issues of dimensional culture and subcultures.

Actually, problems of cultural contexts that undermine localization practices are similar to problems that haunt usability studies. Current usability research suffers from a narrow focus on artifacts and their functionality, and thus fails to consider the complex contextual factors surrounding the artifacts (Brown & Duguid, 1994; Spinuzzi, 1999). Next I will

discuss how mobile text messaging use challenges some of our prior assumptions about technology use, and what this case study will suggest to the field of localization studies.

Challenges of Mobile Text Messaging

In some ways, mobile text messaging is such a spectacular phenomenon that it challenges our old assumptions of technology use and pushes us to think of usability in a broader context. It is a hard-to-use technology with inherent limitations, but it enjoys a huge market success. It is a technology originally designed as a business application and marketed accordingly, but people primarily use it for their personal life. It is a technology people adopted for its instrumental convenience, but now a completely new social world is being built because of it. It is a technology people not only use but integrate into their daily lives to fit their lifestyles as well.

A Short History of Mobile Text Messaging

Mobile text messaging refers to the short message service (SMS) available on most digital wireless phones that allows sending and receiving short text messages (or more colloquially “texts” or “txts”) between wireless phones and other handheld devices. It was originally designed as part of the GSM (Global Systems for Mobile Communication) mobile phone standard and is supported also on digital wireless networks such as CDMA (Code Division Multiple Access) and iDEN (Integrated Digital Enhanced Network). The message can contain alphanumeric characters with a maximum length of 160 characters for

Latin alphabets, including English, and 70 characters for non-Latin alphabets, such as Chinese (Mallick 2003; "SMS Definition," 2004).

Text messaging was originally used as a voice mail alerting service — a simple mechanism to inform subscribers that they have a voice mail ready for retrieval (Hill, 2004). The first text message was sent by British engineer Neil Papworth to colleagues at Vodafone, a UK mobile phone giant, on December 3, 1992 ("Texting," 2004). The message was "MERRY CHRISTMAS," which was similar to many greetings messages sent today. Due to poor radio coverage, interoperability problems between networks, the limitations of one-way messaging, the potential for mobile text messaging was not realized until a few years later. Now mobile text messaging is one of the most popular forms of personal communication worldwide.

With the phenomenal success of mobile text messaging, we now have a generation named by this technology, "Generation Txt" (Rheingold, p.20). Now, the word "text" is not just used as a noun any more but also as a verb[1].

Gap between Design and Use

From the design perspective, mobile text messaging was "an accidental success that took nearly everyone in the mobile industry by surprise" (MobileSMS, 2004). It succeeds even with its inherent usability weaknesses.

[1] "Text" is used as both a noun and a verb in this dissertation.

Hard-To-Use Technology

For many people, it is a hard-to-use technology. There is a big gap between novice users and expert users. While novice users think it is a technology difficult to use with the barrier of text entry, expert users can send a text within seconds even while multitasking. Yet even with its current popularity, many people, including some frequent users, still think it is a pain to enter text into a phone.

From the beginning, it is obvious that wireless phones were designed with little expectation that people would use them for composing and reading text messages. This is evident in the phone's small display and keypad, poor input methods, and limits on message length.

A typical phone screen only displays three to eight lines of text unless the phone is a PDA-based smart phone. Though the message length limit is 160 characters for Latin alphabets and 70 characters for non-Latin alphabets, it is not feasible to input a long message or read it on such a small display.

The data input mechanism is a significant factor in the usability of messaging technology on mobile phones. Currently, there are four options available (Mallick, 2003):

- Keypad input: A12-digit phone keypad is used to enter numbers and letters. All the cell phones have this option.
- Pen-based input: PDA-based smart phones typically utilize graffiti or handwriting recognition technology to allow users to enter text using a stylus.
- Keyboard input: BlackBerry devices and some cell phones (e.g., T-mobile

Sidekick) incorporate small thumb-based keyboards to make text inputting easier and more efficient.

- Voice input: Also known as “voice commands.” A lot of phones allow users to initiate a call or look up a contact using voice commands, but this technology has not yet been applied to text messaging.

Among these options, keypad input is the most prevalent, partially because phones with keypad inputting are much cheaper than phones with other input technology and because most users prefer a small phone rather than a palm-sized PDA.

The 12-digit keypad makes it easy to enter phone numbers but cumbersome to enter text messages. As shown in Figure 1.1, each button on a keypad represents three letters. To get to the desired letter, a user needs to press the associated key multiple times. For example, if a user wants to get “b,” she must press the “2” key twice, pausing between each key press to get “b.” This method is referred to as “multi-tap.”

Figure 1.1 Cell Phone Keypad

To make entering text messages easier, some companies developed predictive typing technologies (see Figure 1.2). This technology preloads the cell phone with a database of thousands of words, emoticons, and punctuation, and can then automatically scan possible variations to determine the correct word. This allows the user to simply press each key once for the letter she wants and then advance to the next letter without pausing—just as people would on a computer keyboard—watching as the screen displays what the cell phone assumes that the user wanted to type. Some smart predictive typing can even do word completion. In this case, after the user types "lu," the technology will automatically complete the word with whatever word the user has typed most often (e.g., "lunch"), and thus the user does not need to type out the full word each time. Currently there are three popular predictive typing technologies worldwide: T9, eZi, and iTap. All three technologies support multiple languages including English and Chinese (SJInfo, 2003; Yesky.com, 2003).

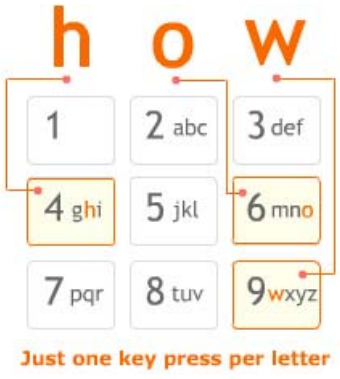

Figure 1.2 Predictive Typing Technology[2]

[2] The picture downloaded from: http://www.t9.com/showcase.html

Business Application vs. Personal Use

Mobile text messaging was originally designed as a voicemail alerting service. After it became popular, it had been marketed for business use until recently: An ad on the Nextel website (accessed on Oct.20, 2003) still touted the business use of text messaging by showing how text messaging could help two employees secretively exchange work-related messages during a business meeting so that they can tell the boss the information he needs. Nevertheless, text messaging became phenomenally popular despite the fact that the design did not effectively support the use of exchanging messages in personal life spheres. It is estimated that close to 80 percent of SMS messages sent are consumer-oriented (Mallick).

The MobileSMS website reviewed the consumer success of mobile messaging in this way:

> SMS advertising went from showing business people in suits entering text messages to bright pink and yellow advertisements aimed at the youth markets that adopted SMS…. SMS was the triumph of the consumer- a grassroots revolution that the mobile industry had next to nothing to do with and repeatedly reacted to.

In all, it was users' efforts that turned a hard-to-use technology into a use success.

Use in Everyday Life

The use phenomenon of mobile text messaging is peculiar as it challenges our prior assumptions about usability, technology adoption, and the affordances of technologies.

Usability in Context

The popularity of wireless phones and mobile text messaging pushes us to revisit our previous artifact-based view of usability and urges us to switch from product-oriented design to process-oriented design.

Traditional usability studies tend to focus on an artifact and its functionalities, ignoring its surrounding contexts, a view which is critiqued by many people (Brown & Duguid, 1994; Spinuzzi, 1999). In some ways, it is understandable that usability is thought of as merely being located in an open Microsoft Word window when a user is attentively interacting with the Word program: There are no other agents in this interacting system.

However, the use mode of wireless phones and mobile text messaging makes the single-agent model of usability obsolete. It calls for a system-wide view of usability. Technologies of wireless phones and mobile text messaging can never be in use only with the handsets. Instead, to get the technology to work, the hardware, software, and service technologies must work together. Thus Palen and Salzman suggest the usability of wireless phones lies beyond the handset (2002a). They indicate that the technological system of a wireless phone should have four socio-technical components: the hardware, software, netware (the network technology for mobile telephony including phone services, calling plan features, and calling coverage), and bizware (policy from wireless carriers). Ketola and Roykkee (2002) describe three types of interfaces for mobile phones: User interfaces (including “input and output devices,” “industrial and mechanical design and software

factors"), external interfaces (including "user support elements," "accessories and supporting software"), and service interfaces (including availability, utility, and interoperability of the carrier's service). They point out that there is a hierarchy between these three interfaces. For example, the user interface is dependent on the service interface, and the external interface is dependent on the user interface.

Use after Adoption: Integrating Technology into Daily Life

Compared to other technologies, the use trend of mobile text messaging shows a strong tendency for integrating this technology into the user's everyday life. This emerging use trend surrounding mobile text messaging suggests how users work to make the technology more usable and meaningful. They usually develop ranges of local uses for this technology and integrate the technology into their daily lives. From the localization perspective, these integration processes are also forms of localization, i.e., user localization, as users are actually localizing a technology to fit into their lives and their local cultures. This use trend asks to consider localization within a broader vision.

Some researchers regard this process as "technology integration" rather than mere use (Mante & Heres, 2003)[3]. They point out there are three aspects of technology integration in the case of wireless technology: The *adoption* of technology by the individual and the *diffusion* of the innovation on the societal level; the *integration* of technology to make it fit

[3] Here is a side note. I was not aware of this set of literature when I was designing my project, and most of these were not published by early last year, either. It is exciting to see that this use trend of lifestyle is recognized by other researchers.

into one's daily life; and the *positioning* of technology among other daily technologies by considering life values, moral economy, and so on.

Carroll and her colleagues use the term "appropriation" to describe "the way in which technology or technological artifacts are adopted, shaped and then used" by users with their "technology appropriation model" (2002). Presenting a case study of mobile phone use among Australian young people ranging from 16 to 22 years old, they argue that these users are not just adopting a technology, but adopting a lifestyle. During the appropriation process, the "technology-as-designed" is transformed into the "technology-in-use." They conclude, to design for appropriation, we need to study technology use over longer periods of time rather than conducting standard use tests and evaluations within short time frames. They also want researchers to focus on the psychosocial dimensions and sociotechnical interactions in use.

Haddon describes this process as "domestication" (2003). Proposed by Silverstone and Haddon (1996), "domestication" studies the taming of innovation by the individual, the process that integrates personal technology into everyday domestic life, leading to the real adoption of a technology. Derived originally from British studies on consumption, the concept of domestication emphasizes consumption rather than mere use. The three distinct dimensions of consumption—commodification, appropriation, and conversion—are also three moments of domestication and of the construction of the domestic itself. They propose to use the notion of double articulation to understand the domestication of

communication and information technologies. The first articulation occurs as “the meanings of all objects and technologies are articulated through the practices and discourses of their production, marketing, and use” (p.62). Then communication technologies provide the basis for a second articulation in culture with “their programmes, narratives, rhetorics, genres, and the software” (ibid). The second articulation and the meanings produced are results of the first articulation. Based on “double articulation”, they claim:

> Media and information and communication technologies are central because they are themselves both objects to be consumed and the facilitators, through their status as media, of consumption. Through our involvement with them we learn how to consume and what to consume. And through our involvement in consumption, we learn to display who and what we are. In this lies media and information and communication technologies’ distinctively reflexive role in everyday life (ibid, p.65).

Instrumental and Social Aspects

The phenomenon of text messaging is intriguing because it is a technology affording both meaning creation (text) and task functioning (tool). People adopted this technology for instrumental convenience at first, but users are building a new communication mode and a new form of social relationships through use. This transformation from a tool perspective (instrumental) to the text (social) attracts many researchers from fields such as HCI, mass communication, and science and technology studies to engage in this fascinating research

conversation. Two major trends have emerged. One trend focuses on the "*social* aspect" of this technology: Some researchers are exploring how messaging technologies affect people (especially teenagers) in the Western world by studying the process of social shaping and its implications for future design. Topics include representation, identity, privacy, emotion and social networking (Brown et al, 2001; Eldridge & Grinter, 2001;Taylor & Harper, 2001, 2002; Weilenmann & Larsson, 2001; Lenhart et al., 2001; Grinter & Palen, 2002; Schiano et al, 2002). Another group of researchers are interested in how ad-hoc chats could support collaborative projects and work conversations as a business *instrumental* aspect (Nardi et al, 2000; Issacs et al, 2002; Herbsleb et al, 2002; Hansen & Damm, 2002).

However, in light of the challenges posed by this technology and related use phenomenon, we see little research combining a focus on both the instrumental aspect and the social aspect of the technology, as most research on this topic only studies the use by teenagers. Few researchers approach these localization issues by comparing SMS use in Eastern and Western cultures. In addition, exigency and affordancesof mobile texts, topics in which technical communicators are interested, have not yet been investigated. These issues are addressed and examined in this dissertation project.

A Contrasting Phenomenon of Local Uses

From the localization perspective, the phenomenon of mobile text messaging is more striking.

This technology has become a popular communication mode in East Asia, Europe, Australia, and other parts of the world no matter if the cultures in those regions are described as high-context, low-context, collectivist, or individualist. It is interesting that though text messaging is a popular mode in other places of the world, it is not widely used in the US.

Here are some data from the two fieldwork sites explored in this study: Text messaging was introduced in China by China Mobile in the second half of 2000. Before the year 2000, most cell phones in China did not have the ability to send text messages in Chinese. Soon text messaging took off as both a huge business and cultural phenomenon. 18.9 billion text messages were sent in the year 2001 (Chen, 2002). The volume reached 90 billion in 2002, and then 220 billion in 2003 (Kahn, 2004; SINA, Dec.30, 2002). Starting from May 1, 2002, text messages could be exchanged across the networks of China Mobile and China Unicom[4] (Xinhua News, 2002). At the US site, I am unable to find the exact time when text messaging was introduced to the US, but the earliest time of adopting text messaging reported by my participants was September 2000. All the American wireless carriers were interconnected by the end of 2002 (3GAmericas, 2004). The yearly volume of text messages was 1.2 billion in 2002. 1.7 billion text messages were sent during the third quarter of 2003, up from 1.2 billion during the first quarter (Forrester Research, October 2002; Richtel, 2004).

[4] Two major wireless carriers in China.

These use differences between the two sites can not be simply explained with dimensional cultural factors. For example, if we make a claim that Asian people are more inclined to the implicit communication mode of text messaging, how could we explain the popularity of text messaging in the UK which shares similar cultural dimensions as the US does? Another suggested answer is the low cost of the text messaging services in China. However, users do not have to choose mobile text messaging if they just consider the cost factor, and they might choose email instead or choose nothing as they did before, for example. In fact, users tend to send more text messages than needed and send text messages on occasions they would not have taken any communicative actions before, ending up spending more money. Neither can the cost factor explain the popularity of mobile messaging among a group of people in American contexts. There must be some social exigency behind the emergence and circulation of so many mobile text nuggets. When an artifact with inherent usability weaknesses still enjoys a great use success, this suggests other factors in the network— social and cultural factors—play a more important role on its usability issue than the technology itself. What are these factors? How do they influence the use of mobile text messaging? These questions are investigated in the fieldwork and discussed in later chapters.

Furthermore, it is obvious that the technology of text messaging at these two sites involves only minimal localization work from the engineering side—phone manufacturers mainly translate the interface and menu into local languages. And as discussed in the previous

section, on a general level, the design of a wireless phone itself is not sufficient (actually poor in some situations) to support the messaging task; however, some groups of users still love it. Comparing different use rates of mobile text messages in the US and in China, we can see that the similar phone design leads to different use scenarios. All these suggest that use plays a more significant role than design for the adoption and use of mobile messaging technology.

Clearly users are actively working on the technology to make it fit into their lifestyles through "user localization." And even with minimal localization work by developers, two distinctive types of uses which echo with local cultures have been developed on the technology as reported and discussed in this dissertation. Text messaging is primarily used as a form of fun communication and small talk among American participants to express emotions and feelings, and among Chinese participants, it is used as a way of staying in contact with friends to exchange information. The variety of local uses found from the fieldwork also shows how complex uses are developed around situated activities rather than abstract cultural dimensions as reported in Ch.4.

To study how cultural issues work in the localization process of mobile text messaging at two fieldwork sites and understand text messaging use in context, a methodology that meets the following criteria is needed:

- It studies how users use the technology in context.

- It has constructs allowing probing into social and cultural factors surrounding technology use.

- Its unit of analysis should be appropriate for the scope and dynamics of usability research. Thus the unit should incorporate contextual factors while tracing the developmental aspect of the artifact.

- It not only studies how a technology is used as tool in an immediate context but also explores its signifying practices in the socio-cultural context.

In the next chapter I will review usability research from the cultural aspect and introduce a framework of cultural usability to understand technology use in context.

Chapter 2

Understanding Technology Use with Cultural Usability

In the previous chapter I reviewed the dilemma of culture in localization practices and looked at the decontextulized practices that resulted. Those problems cannot be blamed only on localization professionals. They are actually common issues in current IT product design and development. The popular concept of usability originates from the field of cognitive science and computer engineering. These fields tend to regard usability as an isolated property and ignore the social-cultural contexts surrounding the product (Adler & Winograd, 1992; Brown & Duguid, 1994; Spinuzzi, 1999b). To address these problems, I have brought together ideas and methods from localization/usability studies, activity theory, genre theory, and British cultural studies to develop a framework of cultural usability to study technology use in context.

This chapter reviews contextual problems in current usability studies, compares three approaches of studying contexts in technology use, discusses affordances emerging through use, and outlines the framework of cultural usability employed in this project.

Cultural Considerations in Usability Studies

Usability studies usually take one of two approaches: An engineering perspective or a humanist one. They differ in the way these approaches define the concept of usability and the way they conceive of contextual and cultural factors in design and use.

Engineering Perspective

The engineering approach is the most accepted viewpoint in this field. It regards usability as the quality of an individual artifact and a component within a larger system. The well-accepted definition of usability comes from Jakob Nielsen (1993). From the beginning, usability is mapped as "a *narrow* concern compared to the larger issue of system acceptability" (p.24, emphasis added). Usefulness is divided into two components, utility and usability. The former deals with functionality while the latter examines "how well users can *use that functionality*" (p.25, emphasis added). Usability is usually associated with five metrics: learnability, efficiency, memorability, errors, and satisfaction. Furthermore, usefulness is also a subcomponent of system acceptability (see Figure 2.1) that examines "whether the system is good enough to satisfy all the needs and requirements of the users and other potential stakeholders" and is "a combination of its social acceptability and its practical acceptability" (p.24).

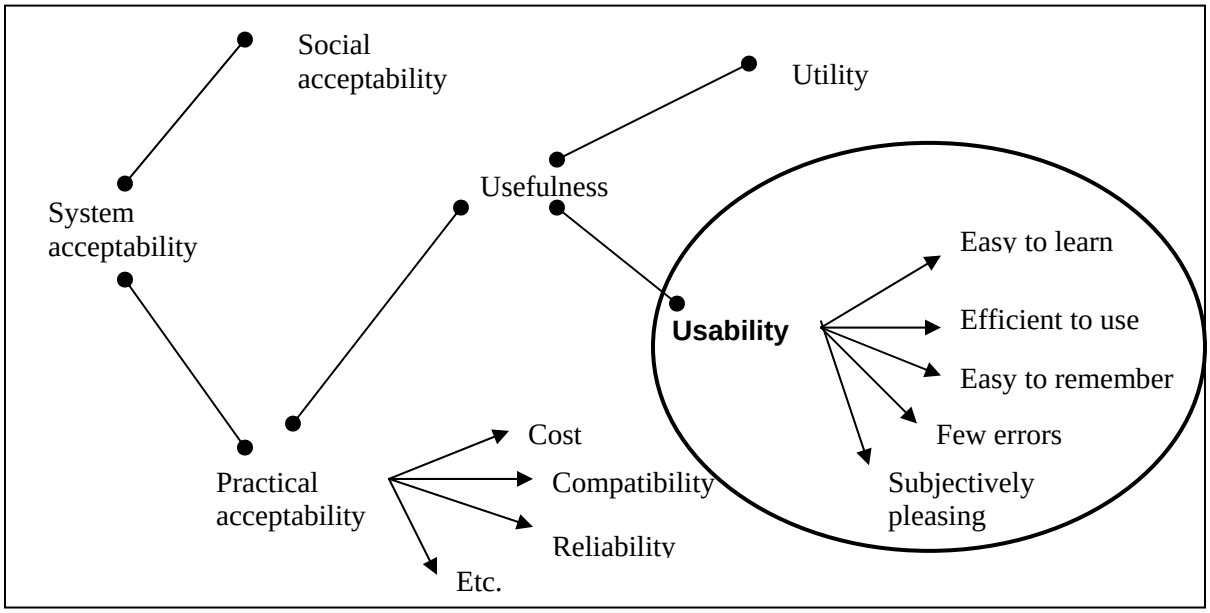

Figure 2.1 Usability as a Product Quality (Nielsen, 1993, p.24)

Figure 2.1 shows that Nielsen's view of usability attends to issues within a narrow scope: Contextual factors such as social and cultural aspects are detached from the use of product functionality. This view favors the system and defines usability as attributes measured by quantitative methods. Though he notices that usability is "measured relative to certain users and certain tasks" (p.27), Nielsen stresses that we should follow a "precise and measurable" way to guarantee that usability will be "systematically approached, improved, and evaluated (possibly measured)." Thus those that cannot be measured in a precise way are ignored in this approach. Even though Nielsen advances ten heuristics to evaluate the product, his heuristics still focus on tangible and quantifiable factors of products.

People who share this perspective include Dumas & Redish (1993), Rubin (1994), Weiss (1991), Shneiderman (1998), and Norman (1988). Dumas and Redish claim that "usability is an attribute of every product" (p.4). Rubin maintains that "the design of usability [testing] must be structured and systematic" (p. 18). Weiss adapts five usability metrics into four criteria for documentation: Readability, accessibility, suitability, and availability (p.18). Shneiderman's eight golden rules (p.74-75) are similar to Nielsen's ten heuristics in the way they both focus on similar factors. Norman suggests seven stages of action model from his psychological background and tells us more about users; however, these goal-oriented actions at the mesoscopic level cannot provide us with an overall picture of the cultural-historical activity at the macroscopic level.

Humanist Perspective

Researchers from the humanist side suggest that a broader scope of usability should be employed to interact with more than the measurable qualities of a product. Furthermore, usability research should include the contexts and culture, and give more leverage to users.

Sullivan argues that usability testing should be broadened to usability research that "includes the work of people who design systems, test them, develop educational materials, and study users" (p.256). The subjects should consist of users who learn to use products and would actually use these products in various contexts. Instead of usability testing, usability evaluations should be introduced into usability research, and it should be inserted at an earlier phase of product development. Cultural factors are addressed here with a cultural model. This model approaches usability from the sociological angle and studies how people use products in the context of common use with the fieldwork method.

Based on Sullivan's work, Johnson (1998) describes a three-level structure of "a user's way of knowing" to investigate the interactions among users, social contexts, cultures, and the design process: Users are regarded not only as practitioners who use tools. They are also producers involved in the design process, citizens serving as active participants in the larger technological order, and equally-responsible members of the technology enterprises of our culture (p.46). His user-centered technology model indicates that the engineering perspective of usability cannot really locate users in the center of the design process.

Salvo (2001) moves further by suggesting a focus shift in usability studies "from evaluation of user actions to engagement with users" (p.273). As usability is more widely realized as an integral part of the design process in the collaborative model, a dialogic relationship between technology producers and users has become more critical. He proposes to develop a dialogic ethic for usability to counteract the ethic of expediency associated with the engineering model and to incorporate different local interests in the design process.

Spinuzzi (1999a, b) argues for a distributed model to investigate user activities based on activity theory and genre theory. He maintains that usability is a quality of the entire activity network and is distributed across the network (p.77, 1999a). According to his distributed model, usability is not located in a single artifact but distributed across various actors, tools, and goals. People use an ecology, for example, an interrelated group of tools, to jointly mediate their activities.

As a core concept in human-computer interaction research, usability should represent the interdisciplinary feature of this field. However, current usability studies favor the engineering perspective rather than the humanist one, and the social-cultural context surrounding the product is often ignored in research and practice. This causes problems in practice (Adler & Winograd, 1992; Johnson-Eilola, 1996): Users are treated as test subjects from a mechanical view; only low-level actions are attended to; usability is not introduced to the design process until the last stage; usability studies are reduced to usability testing and only the decontextualized uses of technology are studied; the whole design process is regarded as a means instead of an end.

Virkkunen and Engeström (2001) points out that the real problem here is due to the problematic concept of usability itself: “[I]t projects the qualities of an activity system into one of its components, a tool” during a transformation process. Accordingly, usability explorations usually stop at operation levels (Engeström & Escalante, 1996). The activity level of the interactions and the broader social contexts behind the micro-level interactions are often ignored. Hales (1994) further suggests that current design approaches highlight the “tool” aspect (similar to the “instrumental” aspect in this dissertation) of human action

while discounting the “text” aspect (similar to the “social” aspect) — the interpretation of the product from its social-cultural context of use.

Cultural Usability Research

The growing competition in global markets has resulted in the growing need for cultural usability studies, or in some cases, cross-cultural usability studies. The term “cultural usability” has begun to appear in usability literature. A closer look shows that there is not an official definition; different people refer to it in different ways.

Cultural usability is usually approached in two ways since researchers interpret culture differently. One way is to interpret culture as ethnic culture, and thus cultural usability is a study of cultural effects on product design. This line of thought seems to be more popular than the second one, and it is also what people usually refer to when talking about cultural usability. The issue of cross-cultural usability was brought up by researchers (Barber & Bader, 1998) working on website localization. They state that “usability issues must take on in a cultural context” and coined the term “culturability” as “the merging of culture and usability.” They define culture as “a means of distinguishing among the different countries and their respective web-sites” and regard culturability as a quality that can be added at some stage of the design process. This line of research is discussed in the “Models of Cultural Dimensions” section in Chapter 1.

Another way is to interpret culture as a set of things, a process, and a set of practices that are concerned with the production and the exchange of meanings between the members of a society or group, involving issues of representation, identity, and power. This interpretation comes from cultural studies. The Media Lab at the University of Art and

Design in Helsinki, Finland has done some research in this area. They (Tarkka & Tikka, 2001) define cultural usability as a search for a design approach that "situates the practices of technology within its cultural and social contexts" — a critical design sensibility. It is a combination of culture and technology with interpretation and implementation. The research work at this center focuses on the design practices from the discursive angle and the influences of consumer culture in HCI design.

Similarities surface when comparing these two approaches to two strands of usability studies: The engineering perspective and the humanist perspective. The first approach arises from the engineering approach. This approach is more interested in how to conduct cross-cultural usability research in an instrumental way. Pushed by industry need, more empirical research findings with this approach have been gathered about cross-cultural interface design elements (Marcus et al, 2001; Badre, 1998, 2001; Yli-Jokipii, 2001), cross-cultural user profiles (Faiola, 2002), and usability methods (Dray et al, 1996). The limitations of this approach are due to the engineering mindset: Culture is approached statically and researchers seek universal patterns for different cultures. The dynamic and ever-changing cultural contexts have not been paid enough attention. The second approach studies general cultural factors with a critical perspective in the same vein of the humanist approach. It does not seem interested in workable models in practice. Empirical findings from this angle are limited at this time.

The two approaches study the cultural dimension of usability complementarily, but they do not provide a complete picture of cultural usability. For example, some studies of cross-cultural interface design elements usually stop at the level of ethnic cultural preferences and fail to explore the dynamic relationship between the cultural preference

and structuring forces; those who study cultural usability with a critical perspective did not realize that the ideology frameworks vary in different cultures.

Three Approaches to Contextual Issues in Technology Use

The key issue here is how we should approach cultural and contextual factors in understanding technology use. This approach should help us study both the instrumental aspect and the social aspect of human action and address the dynamic interaction between design and use. Kuuti (1999, p.360) comments on this issue this way:

> We are living in a period of transition— a search for a new paradigm for information systems (IS) is going on…. At the core of the debate lies the question of how to handle contextuality in IS design and therefore in IS research. It now seems to be generally accepted that designing the technical "core system" alone is insufficient, and that in order to design and implement a successful IS some kind of "context" has to be taken into account — a context that includes people and their relations.

We need new research methodologies that help explore contextual factors. Next, I will review and compare three theoretical constructs that are well-accepted in the field to study contextual factors.

Activity Theory: Situating Contextual Factors in Activities

Activity theory is advanced as a potential framework for HCI research (Kuutti, 1997). As a cultural-historical approach, it claims that people's activities are an object-oriented and tool-mediated process in which actions are mediated through the use of artifacts (including tools and languages) to achieve a transformative objective.

Activity theory is significant for the field of HCI to explore contextual issues by bringing the following valuable concepts and principles to practice and research.

First, a focus on the tool (or artifact) on the basis of activities from activity theory helps us see how a technology is interpreted as an object used by people to perform activities in context. A tool becomes a tool only through use. Therefore, a tool needs to be studied in its use setting; it is not meaningful to study a tool in isolation. As Bannon and Bødker point out, "a human activity approach to analysis of artifacts must include the actual praxis of use, as well as the specific material, social, and historical setting of that use" (1991).

Second, all human activities involve the use of tools, and activities are mediated by tools. The concept of mediation is valuable here as it shows the ways that people use artifacts are socially, culturally, and historically determined. And the emphasis of activity theory on the mediation process, the transformational objective, and the activity system suggests a process-oriented view of the design process rather than a product-oriented view.

Third, activity theory uses an activity as the unit of analysis to study human activity and tool mediation, which brings the vision of contexts into the object of inquiry. The activity system includes "a minimal meaningful context." In this "minimal meaningful context," history, development, meanings, community, rules, and even culture are articulated into a unified framework (see Figure 2.2), which makes the context consideration an inherent feature of activity-theory-based HCI research. As Nardi (1996) describes:

> Activity theory… proposes a very specific notion of context: the activity itself is the context…. Context is constituted through the enactment of an activity involving people

and artifacts…. [T]he specific transformative relationship between people and artifacts…is at the heart of any definition of context, or activity. (p.76)

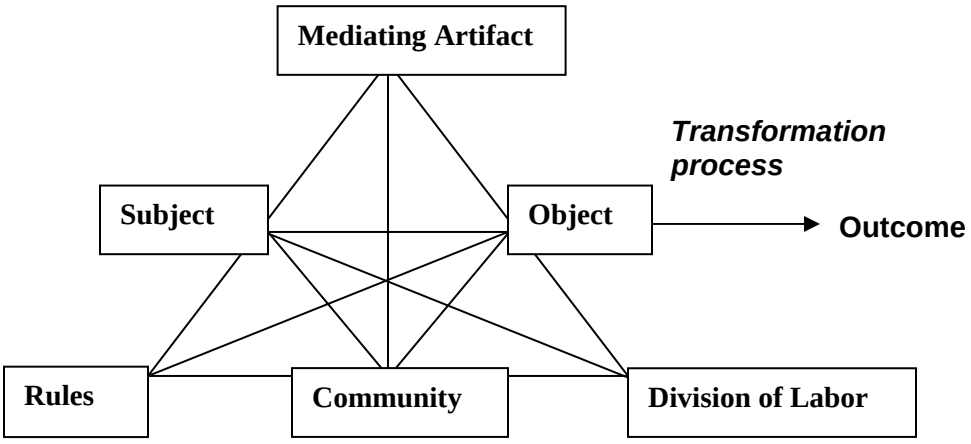

Figure 2.2 Activity Triangle

Fourth, the three-level structure of activity (see Table 2.1) makes it possible to distinguish and describe contextual factors as associated with the instrumental aspect or the social aspect of an activity. According to Leont'ev (1978), the unit of activity is hierarchically structured on three functional levels. A concrete activity is always motivated by general objectives acknowledged and recognized in the local community and in the socio-cultural context. The concrete activity is realized by actions which are goal-directed in an immediate context (e.g., at the workplace or at home). Actions are usually conscious, and they are similar to the "tasks" we often talk about. An action is realized by conditions in a use situation (i.e., a material setting). Operations are usually non-conscious and automatically performed. For example, a concrete *activity* involves a user who wants to maintain regular contact with an old college friend by sending messages of greetings occasionally. As she does not want to disturb her friend who might be busy at that moment, she chooses text messaging for communication. The act of sending a text

message to the friend is *action* here. *Operation* refers to the mundane details when the user interacts with cell phone keypad and text messaging application. In all, the three-level structure is not static but fluid depending on the use situation.

Levels of Activity	Governed By	About
Activity	Motive	Why
Action	Goal	What
Operation	Conditions	How

Table 2.1 Levels of Activity

Activity theory presents a robust framework to study contextual factors on an activity-basis, and it shows us the complexities and fluidity of activities in context. But it does not tell us how activities are structured by contextual factors. The vision of context and culture here is still limited: Activity theory is good at the interpretation of tool-mediated production but weak at sign-mediated communication (Engeström, 1999; Spinuzzi, 1999). Contextual factors in the activity system are primarily immediate contextual factors based on individual consciousness, without considering broader cultural patterns. In the case of mobile text messaging, activity theory can illustrate why a user chooses text messaging based on instrumental convenience, but it lacks vocabularies to investigate how this use act helps that user maintains her multiple identities in her daily communication.

As Kaptelinin says, as a developing approach, activity theory has an advantage in its "potential for integration with other conceptual frameworks" (Kaptelinin, 1996, p. 64). To overcome these limitations, I am combining concepts from genre theory and British cultural studies. This will allow me to investigate use situations in a broader cultural arena.

Genre Theory: Structuring Contextual Factors with Rules

Genre theory attends to textual and contextual regularities, repeated actions, and technological influences, both across texts and across practices by examining social exigencies of genres (Dias et al, 1999).

Below is a concise summary from Erickson (1999):

> A genre is a patterning of communication created by a combination of the individual (cognitive), social, and technical forces implicit in a recurring communicative situation. A genre structures communication by creating shared expectations about the form and content of the interaction, thus easing the burden of production and interpretation.

A genre is "a collection of practices that finds its nexus in the recurrent, dynamic activities in which users engage" (Spinuzzi, p.37, 1999). It should be noted that genre theory has been used together with activity theory quite often in empirical studies in the fields of HCI and technical communication (i.e., Dias and Spinuzzi).

Genre theory brings the following insights to the exploration of contextual factors during use. First, genre theory provides a foundation for interpreting actions from a social angle. According to Miller (1984), genres are social actions in response to recurrent situations with social motives. Dias and his colleagues interpret a social motive as "a motive that is socially recognized and allowed for" and "that the culture acknowledges you may have and allows you to have" (p. 20). As "the culture's arrangements," genres are "means of legitimately acting on these motives." In a local setting, social motives take the form of "local purposes" (p. 22). Linking genre theory to activity theory, they suggest that genres are "enactments of recognized social motives" and "activities in Letont'ev's sense" (p.25).

Second, the notion of genre can help us better understand the artifact in a social and historical context. By providing socially constructed interpretive conventions, genres serve as "border resources" (Brown & Duguid, 1994), which are also "affordances" here, to help interpret the artifact's use in context. In HCI research, artifacts are broadly interpreted as genres to investigate how the connection of design and use is dynamically settled in different interface features by inquiring about rules and habits related to genres. In this project, I interpret IT artifacts (e.g., wireless phones and messaging programs) in broad generic terms in which IT artifacts function as non-textual genres providing clues (e.g., interface features) for use. Textual genres such as mobile text messages are studied as ITexts — the blend of IT and texts (Geisler et al., 2001). Non-textual genres work together with textual genres to mediate practices in situated use.

Third, the rule-tool relationship embodied by genres is insightful to illustrate how uses of technologies are structured in social contexts. Influenced by Gidden's structuration theory, Miller suggests genres are capable of reproducing social structures with their recurrent nature in situated communication (1994). Yates and Orlikowski (1992) argue that genres are produced, reproduced, and modified by individuals through a process of structuring in organizational contexts. Regarding a technology as a genre can help us reveal the reciprocal relationship between a technology and the social context in which it is produced and used.

British Cultural Studies: Articulating Contextual Factors in Discursive Practices

According to Fiske (1987), the term *culture* used in British cultural studies is neither aesthetic nor humanist in emphasis but instead political. Culture here is "a way of living

within an industrial society that encompasses all the meanings of that social experience" (p.284). Thus British cultural studies is concerned with "the generation and circulation of meanings in industrial societies," or more accurately, in technological societies. It studies popular culture and the interactions of culture and technology in the postmodern period. Its emphasis on popular culture and daily life practices helps us to understand technology use in everyday life and the influence of consumer culture on IT product design and use.

The articulation model (Slack, 1993) from British cultural studies explores contextual factors from a discursive angle, highlighting the mediation of meanings on the social aspect of human action which activity theory does not. According to Slack, articulation as a methodology maps the context, but "not in the sense of situating a phenomenon *in a context*, but in mapping a context, mapping the very identity that brings the context into focus" (1996, p.125). Thus "identities, practices, effects generally *constitute* the very context within which they are practices, identities or effects." It is a process of creating connections between various contextual factors on the level of practices and the level of meanings. Grossberg (1992, p.54) describes the process as follows:

> Articulation is the production of identity on top of differences, of unities out of fragments, of structures across practices. Articulation links this practice to that effect, this text to that meaning, this meaning to that reality, this experience to those politics. And these links are themselves articulated into larger structures, etc.

As an example of such mapping, the circuit of culture (S. Hall, 1997; du Gay, 1997, see Figure 2.3) examines five key processes in a development cycle of an artifact: How the artifact is represented, what social identities are associated with it, how it is produced, how

it is consumed, and what mechanisms regulate its distribution and use (du Gay, 1997, p.3). In the real world, these five elements continually overlap and intertwine in complex and contingent ways. In addition, the cultural circuit illustrates how meanings are mediated by an artifact and suggests a study of the whole circuit of culture is needed to examine a cultural artifact completely.

Applying this model to usability studies can show how other elements (representation, identity, production, and regulation) interact with and contribute to the "consumption" element in the whole lifecycle. It tells us that the consumption process is not the only significant and stand-alone process we need to consider when we design new products. Moreover, in addition to the investigation of subjective experiences with terms such as identity and representation, the construct of this circuit also explores broad cultural patterns in a use context, which serves as a good counterbalance to the individual user-focused perspective of activity theory.

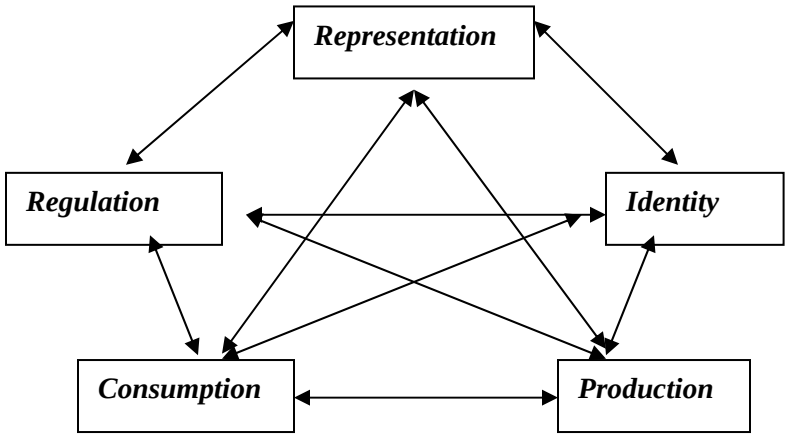

Figure 2.3 Circuit of Culture (S. Hall, 1997)

In the case study of the Sony Walkman (du Gay et al., 1997) with the circuit of culture, researchers find that nowadays text and technology, hardware and software, and product

and use are dependent upon one another and are interrelated; technology companies like Sony are not simply hardware or software companies but part of a culture industry (p.81). Practices in many IT companies support this statement. Cell phone companies not only manufacture phones but also provide free games and cartoons; software companies compete for the technology and the technical support, as well as training services. Since IT companies are defined as part of a culture industry, the high-tech products they produce are also defined as cultural artifacts. The localized product is an actor and an agent of the culture industry in the age of globalization.

Comparison of Three Approaches

All three theoretical constructs are well-accepted approaches to investigate contextual issues in the field of HCI[1]. To illustrate how the three approaches could work together to explore contextual issues in technology use, I compare and contrast their different focuses and strengths in Table 2.2.

[1] For examples of the application of activity theory in HCI, please see Nardi (1996). For the application of genre theory, please see Brown & Duguid (1994) and Spinuzzi (1999). For the application of British cultural studies with the cultural circuit, please see Churchill & Wakeford (2001).

Theories	Methodology of Studying Contexts	Methodological Strength on Different Mediations	Ways of Situating Artifacts in Context
Activity Theory	activity as a unit of analysis	mediation of activities (tool-mediated production) on the individual level	an artifact-practice dyad
Genre theory	genre as social action in the sense of both a cultural artifact and a structuring force	mediation of activities (tool-mediated production) via mediation of meanings (sign-mediated communication) on the social level	an artifact-rule dyad
British Cultural Studies	articulation model	mediation of meanings (sign-mediated communication) on the social and individual level	artifact on a cultural circuit

Table 2.2 Comparison of Three Approaches to Understanding Contextual Factors

Affordances: Realizing Practices through Interactions

Affordances describe the action possibilities posed by the artifact in use and associate the artifact with practices. Affordances are the linking points where factors from socio-cultural contexts come into play during the use process. In this section, I review the development of the term "affordance." We will look at how this term has been expanded by incorporating a consideration of socio-cultural factors; we will also see how activity-based affordances will help us better address use issues.

Origin of Affordances

Coined by Gibson, the term "affordance" is "something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment…" (1979, p.127). He asserts that an affordance is "equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment, and to the observer" (p.129). Gibson's explanation clearly shows that, in the beginning, affordances were considered only as emerging from the context of material encounters between actors and objects. Baerentsen and Trettvik interpret the term in this way: "affordance being a *relationship* (or the possibility of a relationship) between organism and features of the environment, perception of affordances is perception of relations between features of the environment and features of the organism itself" (2002, p.53).

Norman adopts this term from Gibson and introduces it in his famous book *The Design of Everyday Things* (1988). He defines affordances as "the perceived and actual properties of the thing, primarily those fundamental properties that determine just how the thing could possibly be used" (p. 9). Since then "affordance" has become a popular concept in the HCI field. This term helps designers describe the features and functionalities of the artifact they are working on and examine the implicit and explicit interaction cues their designs provide to users with artifacts. However, to Norman, affordances cannot be used to describe every HCI design. He states affordances should be physical affordances only, for example, the computer screen only affords viewing but not pointing and clicking. Pointing and clicking are only "perceived affordances," not real "physical affordances" (1999). For Gaver, Norman's student, pointing and clicking are affordances, but are "perceptible

affordances." He distinguishes perceptible affordances from hidden and false affordances, and asserts, "when affordances are perceptible, they offer a link between perception and action; hidden and false affordances lead to mistakes" (1991, p.79). Today, when practitioners refer to "affordances" it is generally by this definition.

Norman's understanding of affordance implies a focus on artifacts as tools mediating between users and the context of use. However, from the perspective of activity theory, Albrechtsen and his colleagues (2001) critique Norman's vision of affordance based on a matching of two models (user's model and system's model) in that it lacks cultural considerations and places socio-cultural contexts outside the confines of the system's domain, relegating affordances to a kind of "no-man's land." They conclude that both Norman's and Gaver's visions are short-term affordances that do not take the developmental aspect of an artifact into account and thus are "more or less static surface phenomena" (p.10). Because of that, HCI design has thus mostly been focused on "low level interaction modalities" (p.6).

To solve these design problems, Baerentsen and Trettvik assert that the field of HCI must throw away their belief that affordances are "magical qualities of objects in isolation." Instead, "artifacts, technologies, and their knowledgeable users are seen in their actual interdependency and co-existence in processes of activity, ultimately as abstract moments in societal forms of praxis" (p.59).

Affordances for Social Interactions

The trend of incorporating social dimensions into affordances started from the mid-90s, when the community of Computer-Supported Collaborative Work (CSCW) began to

loosely use the term “social affordance” to describe properties of technology that afford social behaviors. However, it remained undefined until Bradner.

In her dissertation, Bradner defines social affordance as “the relationship between the properties of an object and the social characteristics of a given group that enable particular kinds of interaction among members of that group” (2001, p.132). For example, a wireless phone affords to stay in touch with friends anytime and anywhere. She argues that social affordances indicate how members of a social group might interact with one another when interaction is mediated by technology. Accordingly, a study of social affordances of a given technology must study both the social context of human-human interaction and the features of technology used during the mediation. As to the relationship of social affordances with physical affordances, she suggests that “social affordances arise out of the physical properties of an object when considered in the context of the social interaction that the object mediates” (p.133).

In addition, Bradner compares the verbs *afford*, *support*, and *enable*, suggesting that the distinction comes from the German root *aufforderungscharakter* for *afford*, meaning demand or invitation. “Both these words connote something compelling, i.e. an object is present that is compelling human action” (p.135). Therefore, the social affordance of a technology comes from the fact that there is something inherent in that technology that *compels* certain social interactions among other similar technologies. For example, in a comparison of calling people and texting people, both technologies *support* and *enable* communication, but texting might *afford* “keeping in touch” better than calling by not disturbing the other party because it is an unobtrusive communication mode.

Bradner's contribution helps distinguish social affordances from physical affordances (the affordances we typically talk about in HCI design). However, her view of social affordances fails to explain how these physical affordances and social affordances are interconnected and interact during a user activity. Other than claiming that social affordances arise out of physical affordances, she does not tell us where the social affordance is located and precisely what relationship exists between these two types of affordances. Her scope of social affordance is also limited. As she herself claims, she only looks at social interactions on the level of dyads and small groups and does not consider interactions at the level of society and culture (p.134).

From the stance of social constructivism, Hutchby (2001) explores "communicative affordances" in technology-mediated conversations with the methodology of conversation analysis. In his view, communicative affordances provide both "constraints and unique possibilities" in social interactions. The concept of "affordance" here is significant in that it can help us "avoid the arbitrariness of the radical constructivist position" and "evade the equally unilateral epistemology associated with technological determinism" (p.33). However, the term "communicative affordance" is not well defined or structured in his book.

Activity-Based Affordances

The activity theory approach makes it possible to develop a structured construct of affordances (Albrechtsen et al, 2001). An informative theorizing of affordances within the framework of activity theory comes from Baerentsen and Trettvik (2002). They approach affordances from a cultural-historical angle and develop a three-level structure of affordances. In their description, they distinguish two types of affordances: Natural

affordance for animals and cultural-historical affordances that "originate from adaptation of (objects in) the environment to suit the satisfaction of human needs, and are nested in cultural-historical *forms of societal praxis*" (p.57). The latter are "produced intentionally and are specifically designed for inclusion in cultural-historical forms of practice. The cultural-historical artifacts and forms of practice are artificial habitats." In simpler terms, affordances emerge "as activity-relationship between actors and objects" (p.59). Their theorizing of affordances introduces the socio-cultural context from the beginning.

Baerentsen and Trettvik place the concept of affordances in an activity-based framework by asserting that "[a]ffordances are not properties of objects in isolation, but of objects related to subjects in (possible) activities" (p.59). As affordances are realized in interactions as activity-relationships between actors and objects, they propose that the concept of affordance should be treated as a generic concept which distinguishes affordance on the operational level with "operational affordance," "instrumental affordance" on the action level, and "need related affordance" on the activity level. As we can see, the need related affordance on the activity level includes the social affordance Bradner discusses at the group and community level and other affordances on a higher level.

The robust three-level framework allows the study of affordances in context by showing connections between different levels of affordances. With this structure, it is clear to see what levels of affordances have been designed and realized in practice. Current HCI design is not good at higher levels of affordances, because it spends too much time developing operational affordances. Baerentsen and Trettvik's structure also makes it possible to distinguish social affordances from other types of affordances in a meaningful way.

Instrumental Affordances and Social Affordances

In this project, I approach issues of affordances based on the three-level structure and distinguish technology affordances into two types: instrumental affordances and social affordances. Instrumental affordances will refer to affordances on both the levels of operation and action by combining operational affordance and instrumental affordance from Baerentsen and Trettvik's work. These are affordances emerging from use interactions in the material context. Social affordances are the affordances on the activity level emerging from use interactions in the socio-cultural and historical context. For example, the instrumental affordances of mobile text messaging include silent communication, convenient use, discrete action and so on. Its social affordances include staying in contact, having fun, and others (for details, please go to Ch.4).

I made this choice as I am focusing on examining the higher-level interactions of situated use and cultural contexts in this project without probing into interactions on the micro-action level. It is not meaningful to describe operational affordances without an in-depth understanding of operations and conditions. Therefore I treat these two levels of affordances in a general manner; however, I recognize instrumental affordances that I am discussing in this dissertation come from both levels of actions and operations, and I do not want to suggest that operational affordance can be ignored in research.

Second, I recycle the term "social affordance" from Bradner to refer to "need related affordance", but use it in a slightly different manner. Here, "social" refers to social interactions on both the community-based level and the society and cultural level, which is broader than in Bradner's interpretation. "Social affordance" here is a more

straightforward and accurate way to describe the relationship between social practices and technology properties than Baerentsen and Trettvik's "need related affordance."

Third, the distinction between instrumental and social affordances corresponds to the two aspects of human actions — instrumental aspect and social aspect — that I am studying in this project, which helps me better address how affordances are designed and realized to support the two aspects of actions.

In addition, I argue both types of affordances are realized not only by the artifact in use, but by other parts in a technological system as well. In the case of mobile text messaging, the whole system consists of the artifact (including its software and hardware), the services received from carriers, and the network technology. We are unable to simply locate the usability issue in the handset or in one component.

Intended Use and Possible Uses

Another issue is how affordances are realized in use. Here there is a gap between intended and possible uses, and between design and use. As people often find in IT product designs, though certain types of affordances are designed into an artifact, they might not be recognized or appreciated by users as what designers expect. Quite often, other uses have been developed through use beyond the designers' intentions. These uses are also the local uses discussed in Chapter 1.

This phenomenon of unintended use appears due to the fact that affordances actually cannot be designed in advance. As I discuss above, affordances only emerge during interactions through use, and they are "but abstract moments of the concrete users [sic] concrete user activity" (Baerentsen & Trettvik, p.60). Thus, "[t]he task of design is in many

cases not to eliminate the possible uses, but rather make sure that the intended use is visible for the user" (p.59).

Cultural Usability: Bringing Meanings into Activities

Based on the discussion above, I propose a framework of cultural usability integrating key concepts from activity theory, genre theory, and British cultural studies to explore contextual issues in usability studies and approach cultural issues in the design process.

With a focus on the mediation of *meanings* and of *activities* in context, the framework of cultural usability regards usability as a diffusing feature across the activity system, incorporates cultural factors from both the *immediate context* and *socio-cultural context* into the object of inquiry, and situates culture in the dynamic interactions of the *instrumental* and *social* affordances of the technological artifact (see Figure 2.4).

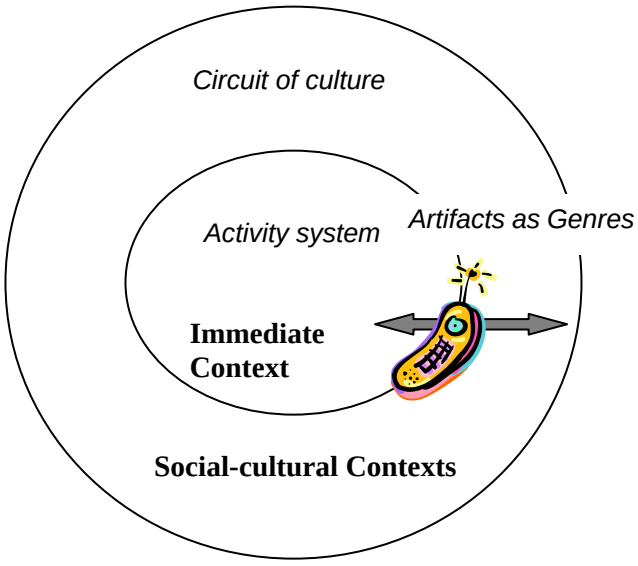

Figure 2.4 The Framework of Cultural Usability

I argue that usability is a diffusing feature that embodies interactions in the network. It is founded on and originates from the process of mediation. In simpler terms, usability is a

mediation process that consists of tool-mediated production and sign-mediated communication. It is both (a) a material interaction with the artifact and its context and (b) an interpretation process of this activity. As Suchman and her colleagues (1999) point out, the integration of technologies with our social and material worlds are actually interactions among agents, actors, and artifacts in the network.

The framework of cultural usability is used as s research methodology in this project. My stance of research here is "praxis." I agree with Sullivan and Porter (1993) that technical communication research is "a design activity involving the construction of a method worked out from the intersection of theory and situation, which leads not to knowledge (in the sense of total truth), but toward understanding, the basis for future rhetorical judgment" (p.237). As Salvo (2001) suggests, usability studies can be both a design mechanism and a critical research practice.

The framework shaped my methods of data gathering and analysis and guided through the fieldwork of this project as described below:

- To explore a concrete use activity situated at the intersection of the immediate and the socio-cultural context, I used the hierarchical structure of activities to examine patterns of uses such as where and when the text messaging practice occurs, who people text to, and what they text about. The activity-based instrumental affordances and social affordances were brought in to understand the dynamic interaction process between the user and the technological artifact and between practice and context.

- To investigate recurrent use situations of mobile text messaging in context and search for structuring forces of this technology in a broad socio-cultural context, I drew from genre theory, linked textual patterns of mobile messages to routinized use behaviors, and analyzed accordingly. In addition, the technology of mobile text messaging was interpreted as a genre which mediates between social motives and local goals with instrumental and social affordances.

- By looking at the circuit of culture through which text messaging technology circulates, I analyzed how the mediation of meanings and the social motives originating from broad cultural contexts affect the adoption and use of this technology in daily life practices and in various life spheres. Furthermore, the circuit view provides a timeline and a developmental aspect to look at the local use process.

The framework of cultural usability makes it possible to transform descriptive accounts of use into prescriptive suggestions for design. It delves into the mediation process of activities and meanings with a developmental aspect and studies general and ethnic cultural factors constituting the process. It uses heuristics such as the activity structure and the circuit of culture for data collection and analysis. With this framework, theory-informed scenarios can be developed to intervene in the design process. In addition, this intervention is part of the circuit of culture.

The following chapter describes how this framework of cultural usability guided me to design and conduct research for this project.

Chapter 3

Research Design

The research goal of this study is to uncover the complex interactions between situated uses and the surrounding cultural contexts via multiple case studies of frequent users of text messaging technology. To explore how different cultural factors are interwoven in situated uses of a technology, I chose to conduct comparative case studies in two distinctively different cultural contexts: the US and China. Qualitative research methods were employed to learn about the subjective understandings of mobile messaging and obtain local explanations. This chapter describes the research design, pilot study work, methods of data collection and analysis, and validity issues.

Research Sites

The fieldwork was primarily conducted in two sites: the capital region (Albany) of New York State in the US and the capital area (Hangzhou) of Zhejiang province in China.

Site Selection

I chose these two research sites for comparison based on three major considerations that I will describe in the following section.

First, these specific areas are representative of the typical user-base for mobile telephony in the two countries. As middle-sized cities in the well-developed regions of these countries, Albany and Hangzhou both boast the average or above average penetration

rates of cell phones and text messaging. All major national wireless carriers can be found in these two cities. These factors are helpful for a study of frequent users of mobile messaging and make the fieldwork easier for operation.

Second, these two areas are comparable for case study research. Albany is 150 miles away from the biggest city in the US, New York City, while Hangzhou is 113 miles away from the biggest city in China, Shanghai. Both capital cities are similar in city size and have similar statuses in economical, technological, and cultural institutions of their home countries. The use patterns found from these two sites not only represent the current trends in metropolitan areas but also are meaningful for the future study of the adoption and use of mobile technology on a wider scale.

Third, as a researcher, I am familiar with both areas and local cultures, which is important for a study on contexts of use. I have been living in the Albany area for almost four years. I lived in Hangzhou for eight years, and I still have close contacts there.

Site Description and Comparison

IT Infrastructure

The following table describes demographics and technology usage in the US and China primarily according to a recent report from Morgan Stanley (Meeker, Choi, & Motoyama, 2004).

Categories	USA	China
2002 Population (000's)	280,562	1,284,303
2002 GDP per Capita (US$)	37,231	963
2002 Installed PCs (000's)	198,469	29,159
PC Penetration	71%	2%
2002 Internet Users (000's)	162,100	59,000
Internet User Penetration	58%	5%
2002 Telephone Lines (000's)	177,000	214,000
Telephone Line Penetration	63%	17%
2002 Mobile Phones (000's)	140,767	206,616
Mobile Phone Penetration	50%	16%
Mobile Phone to Internet User ratio	0.9:1	3.5:1
Monthly Volume of Mobile Messages in 2002 (000's)	100,000*	7,500,000**

Notes:

All data come from *China Internet Report* (Meeker, Choi, & Motoyama, 2004) except noted.

* Source: Forrester Research (Oct.2002)

* Source: SINA (Dec.30, 2002)

Table 3.1 IT Use Profiles in Year 2002

As shown in Table 3.1, US and China use profiles contrast with each other interestingly. With 162 million Internet users and 198.5 million PCs in 2002, the US is the top market for personal computing and e-business (ibid); however, American users seem to be very reluctant to use mobile content services such as mobile text messaging. Compared to the US, China boasts the second largest Internet and PC user base; however, the penetration rates of PC and Internet users are still very low due to the country's large population. Among other available ITs, mobile phones stand out as a "revolutionizing force." The penetration rate of mobile phones in China in 2002 was eight times larger than PCs, and more than three times the number of Internet users. In the US the rate of mobile phones was 71% more than PCs, and 86% of that of Internet users. Morgan Stanley states that "[n]o major market comes close to China's 2003 ratio of 3.5 mobile users for every one Internet user…Simply based on volume, interest and momentum, it is likely that China will possess increasing scale advantages in mobile phone and Internet connectivity/messaging" (p.27).

The most recent data from China shows that earlier this year mobile phone users exceeded landline phone users for the first time. And in 2003 the volume of text messages reached the record-high number of 220 billion (Chinabyte.com, 2004).

Categories	*USA*	*China*
2003 Internet Users (000's)	185, 000*	8, 0000*
Mobile Phone Users (000's)	154,000 (by Dec.2003)**	296,000 (by Apr.2004)***
Telephone Line Users (000's)	…	285,000 (by Apr.2004)***
Volumes of Mobile Messages in 2003 (000's)	…	220,000,000 ****

Notes:

* Source: *China Internet Report* (Apr.2004, Morgan Stanley, p.6)

** Source: IDC (http://www.idcresearch.com/getdoc.jsp?containerId=31272)

*** Source: *Monthly Report of Telecommunication Industry* from the Ministry of Information Industry of China (http://www.mii.gov.cn/mii/hyzw/tongji/yb/tongjiyuebao200404.htm)

**** Source: (http://www.chinabyte.com/busnews/21648504341607219 2/20040202/1764690.shtml)

Table 3.2 Most Recent Data of IT Usage

Digital Telephony and Text Messaging

In the Albany area, there are currently six national wireless carriers: Verizon Wireless, Cingular Wireless, Sprint PCS, Nextel, T-Mobile USA, and AT&T Wireless[1]. These

[1] AT&T Wireless introduced their service to the Albany area in the middle of my fieldwork. Therefore I do not have participants who use this service.

carriers offer voice service on digital wireless technologies such as CDMA (Code Division Multiple Access), GSM (Global System for Mobile), and iDEN (Integrated Digital Enhanced Network). Data services are offered on corresponding network technologies such as 1XRTT (Single Carrier (1x) Radio Transmission Technology) and GPRS (General Packet Radio Service), and iDEN (see Table 3.3).

Carriers	**Wireless Technology Standards**	**Wireless Network Technology for Data Service and Internet**
Verizon Wireless	CDMA	1XRTT
Cingular Wireless	GSM	GPRS
Sprint PCS	CDMA	1XRTT
Nextel	iDEN	iDEN
T-Mobile USA	GSM	GPRS
AT&T Wireless	GSM	GPRS

Source: Forrester Research (Oct.2002)

Table 3.3 Digital Wireless Technologies in US

In the Hangzhou area, as in other Chinese cities, there is tight competition between two national carriers: China Mobile and China Unicom. The former offers service based on GSM technology, and the latter offers service on both GSM and CDMA technologies.

American carriers offer two ways for customers to pay: monthly plan packages and prepaid phone cards. Most customers select the former. Wireless plan packages often

include monthly airtime minutes ranging from two hundred to thousands of minutes, unlimited nighttime and/or weekend minutes, free long distance, and other features such as voicemail, caller ID, call forwarding, call waiting, etc. A typical calling plan ranges from $30-40 with 200-300 monthly airtime minutes with free night and weekend minutes. Additional minutes beyond monthly airtime allowance are usually $0.40~50 each.

Text messaging is typically a separate feature American customers need to pay extra money to get. Different carriers offer different choices. For example, customers can opt in a bundled text messaging plan such as $2.99 for 100 text messages (e.g., Verizon Wireless), pay $10 for a “vision package” for text messaging and unlimited wireless Web access (e.g., Sprint PCS), or choose a bundled text and talk plan in which text messaging is included (e.g., T-Mobile). Occasionally text messages are free in some bundled text and talk plans. If customers do not choose a separate text messaging plan, they will pay $0.10 for a message sent and $0.02 for a message received.

Like their American counterparts, Chinese customers also have two choices: monthly plans and prepaid cards. Individual customers often chose prepaid phone cards, as there were usually no discounted service packages available before 2002. As wireless competition became more intense and the wireless carriers introduced discounted monthly packages, more and more customers opted for monthly plans. A common Chinese calling package includes these features: in-network local minutes, out-of-network local minutes, and a couple hundred text messages. Compared to

American calling plans, Chinese calling plans do not include features such as free long distance, voicemail, caller ID, and call forwarding. The monthly fee ranges from 20-50 Yuan with free incoming calls including a few hundred local minutes and a few hundred text messages. Additional minutes outside the network will cost 0.55-0.60 Yuan each, and those inside the network will cost 0.35-0.40 Yuan each. In most cases, text messages are bundled with phone calling plans. Customers pay 0.10 Yuan for additional text message sent, and incoming messages are free.

Table 3.4 compares different features of typical calling plans at these two sites based on information found on carriers' websites.

Features	***American Site***	***Chinese Site***
Monthly airtime minutes	Included	Usually not included. If included, only for local in-network calls
Free night and/or weekend minutes	Usually included	Not included
Free long distance	Included	Not included
Voicemail	Included	Not included, an extra feature to order
Caller ID	Included	Included
Text messages	Not included, an extra feature to order	Included
Additional minutes	$0.40~50 each (same price for both inside and outside	0.55-0.60 Yuan each for calls outside the network,

	the network)	0.35-0.40 Yuan each for calls inside the network
Additional text messages	$0.10 for a message sent and $0.02 for a message received	0.10 Yuan each a message sent, free for messages received

Table 3.4 Comparisons of Calling Plan Features between Two Sites

Text Entry Methods

Currently there are three popular predictive typing technologies worldwide, T9, eZi, and iTap. All three technologies support multiple languages including English and Chinese (SJInfo, 2003; Yesky.com, 2003).

T9, which stands for "text on 9 keys," was introduced by a U.S. company Tegic Communications (now owned by AOL) in 1998. This method is the most accepted predictive typing technology which has been installed on more than 100 phone models throughout the world[2]. Phone manufacturers such as Nokia, Siemens, Samsung, Sanyo, Sony, Kyocera, and Philips use this technology. Its Chinese dictionary has 9,000 words (ibid).

eZi was developed by a Canadian company Zi corporation. This technology is loaded on the phones made by Ericsson, Alcatel, and Amoi. Its dictionary for Chinese has 20,902 words (ibid).

[2] http://www.tegic.com/licensees.html

iTap was developed by Motorola and loaded on phones made by Motorola. Its dictionary for Chinese has 6,727 words (ibid).

For Chinese inputting, each of these three methods is divided into two input modes: Sound-based input (e.g., Pinyin mode or BoPoMoFo mode) and shape-based input (e.g, stroke mode). The sound-based input mode is built on Pinyin, the standard notation for the Romanization of the Chinese simplified character set. In the Pinyin or BoPoMoFo mode, a user spells the character phonetically using Pinyin. In the Stroke mode, the technology divides the Chinese character into a few basic strokes with each key representing one stroke such as dot (), dash (), perpendicular downstroke (), downstroke to the left (), wavelike stroke (), hook (), upstroke to the right () and bend (). T9 is the most popular inputting method which uses five strokes, eZi uses eight strokes, and iTap uses nine strokes. In Figure 3.1, a is a phone keypad with T9 using keys of 1-5 to represent five basic strokes; b is a phone keypad with eZi that uses eight numeric keys to represent eight strokes and Key 8 as a wild card key to represent the stroke the user is not sure of how to classify into one of the eight basic strokes; c is a phone keypad utilizing iTap method with nine numeric keys for nine basic strokes.

a. A Nokia Keypad with T9 Input Method

b. A LG Keypad with eZi Input Method

c. A Motorola Keypad with iTap Input Method

Figure 3.1 Cell Phone Keypads for Chinese Market

The most recent versions of sound-based and shaped-based methods all incorporate time-saving functions such as associated phrases. For example, a phrase (word) in Chinese is usually made up of two characters. With the function of associated phrases, users can get the second character right away after inputting the first character. For example, the word “zhong fan” means “lunch” in Chinese which consists of two characters. When a user chooses “zhong” for the first character, other characters that can be combined with “zhong” for meaningful words would appear at the bottom such as

“fan” (for “lunch”), “wu” (for “noon”), and “jian” (for “middle”). The user could just choose the character “fan” without further entering anything. Some models even allow users to develop their own dictionaries. But old phone models lack this functionality.

If just comparing text entry speeds of English and Chinese with predictive typing methods, entering Chinese text messages is not as hard as one might assume. In my own experiments, I found that entering Chinese texts was not more difficult than entering English texts on a phone keypad, and in fact Chinese messaging sometimes might be faster using the five-stroke input[3]. However, compared to entering texts on a computer keyboard, no matter how easier entering Chinese it is than on a phone keypad, it is still slower than doing it on the keyboard.

Chinese inputting also has its challenges. For sound-based input, since Pinyin wasn’t introduced until the 70s by the Chinese government, most people of older generations are not good at Pinyin at all. Thus text entry is a big barrier for users over 45 who want to adopt text messaging technology. Second, sound-based input requires a user to pronounce each character correctly. There are many dialects in China that differ greatly, but Mandarin (the official spoken language of China) is based only on one type of dialect: The Northern dialect. Many southern Chinese have strong accents, causing them to have problems pronouncing Mandarin properly. Third, sound-based input usually requires more keystrokes per character than shape-based input. However, in shape-based input

[3] Shape-based input usually locates the same character quicker than sound-based input locates it.

(Figure 3.1) various phone models map basic strokes differently on phone keypads. Furthermore, shape-based input requires a user to enter each character stroke by stroke in a specific stroke order strictly as it is taught in elementary schools; however, many people often deviate from the correct stroke order in daily writing. In the end, it takes time to be a proficient typist on a particular phone model. So, sometimes, switching to a new phone means not only adjusting to a new interface and special functions but also learning a new input method.

Dimensions of Culture

From the perspective of international communication (Honald, 1999), American culture and Chinese culture differs in the cultural dimensions illustrated in Table 3.5.

Features	***American Culture***	***Chinese Culture***
Communication Style	Low-context communication	High-context communication
Power Distance	Low	High
Collectivism vs. Individualism	Individualist	Collectivist
Long-term vs. Short-term Orientation	Short-term orientation	Long-term orientation
Objective of Learning	Idealism	Pragmatism
Traditions of Learning	Understanding	Rote learning

Table 3.5 Comparisons of Cultural Dimensions between Two Sites

Case Study Approach

In this study, I use a case study approach to examine mobile text messaging use in context. As Yin (1994) suggests, a case study methodology helps to investigate a contemporary phenomenon within its real-life context especially when "the boundaries between phenomenon and context are not clearly evident" (p.13). In this project, each individual participant poses an interesting and meaningful case. Clearly, the case study approach is useful here to catch "the particularity and complexity of a single case" and to "understand its activity within important circumstances" (Stake, 1995) as it can disclose how a particular participant localizes the messaging technology to fit within his/her particular life spheres to make his/her life easier and more meaningful.

There are two features to this project's case study approach. First, this approach is an "instrumental case study" (Stake, p.3). This project began with an intriguing issue rather than with a particular case. I sought to investigate how frequent users localize a hard-to-use technology to fit their lifestyles and how localization work occurs at the user's site within the framework of cultural usability.

Second, it is a "collective case study" (Stake, p.4). To study this intriguing issue, I selected multiple cases to describe ways of localization. I chose cases based on the criteria of variety and diversity, which can help me understand localization practices from different angles and maximize my learning. More specifically, I use measures to compare across cases and to interpret information in depth for some of the cases. The comparison I

use here is to see what kinds of patterns are common across cases and across sites. Thus I chose a broad group which is stratified as varied as possible by age, gender, profession, and wireless carrier for the first stage of study (questionnaire and text messaging diary). The collected data about patterns of use include cell phone information, SMS use history, other IT use, and detailed SMS use patterns such as when and where participants texted, who they texted to, and what they texted about. At the second stage, cases with interesting patterns of use were selected to bear further exploration using methods of qualitative interviewing and/or shadowing observation to see how the users use text messaging technology in context and to hear how they interpret this use.

I employed the theoretical framework of cultural usability to guide my case study research. At the same time, I was open to other theories that might help me better understand cases. For example, theoretical constructs such as structuration theory and innovation diffusion were brought to help examine cases at the later stage.

Pilot Studies

To better design this study, I conducted two types of pilot studies: Surveys to get a preliminary understanding of the fieldwork sites and a full set of pilot fieldwork studies to test and refine research methods.

A preliminary survey was carried out at each of the two sites. I conducted a computer-based survey at the American site in November 2002. That survey consisted of

25 questions about demographic characteristics, phone features, phone plans, IT literacy, and messaging use. A total of 65 freshmen that were participating in the Communication and Information Technology course at Rensselaer Polytechnic Institute participated in that survey. This group was comprised of 55 males and 10 females, ranging in age from 18-20 years-old. Among this group, 37 had wireless phones and 33 of these phones were text messaging-enabled, but only 14 participants used their text messaging service (38%). The average user received 7 messages and sent 7.9 messages weekly, while the high-end user received 50 messages and sent 50 messages per week. The median values were eight messages received and three messages sent weekly. The survey participants appreciated SMS because it is fast, convenient, short, direct, and reliable. They were not satisfied with SMS due to cost, typing difficulty, message length, and the non-interoperability problem between the networks. They used the messaging service mostly for staying connected with friends (79%), sending a stealth message (71%), and arranging appointments (50%).

A paper-based survey was conducted at the Chinese site in April 2003. That version of the survey was a revised one based on the feedback obtained from the previous survey study, and the same one as that was employed in the pilot fieldwork (described as below). It consisted of 29 questions. Fourteen students from Zhejiang University participated, consisting of 10 females and four males ranging from 21-24 years-old. The median number of daily text messages exchanged was 10 messages.

A full set of pilot fieldwork was conducted from March to April of 2003. A 30-year old female retail manager (V20[4]) at the American site was selected as the participant. I employed a case study methodology with data collection methods including a survey, a text message diary, a shadowing observation, and a qualitative interview. The pilot case study shows that the participant sent 40 and received 27 messages during the four-day period of diary study and half-day of shadowing observation. Most of the text messages were exchanged in her workplace, but only a small percentage of messages were work-related. I found that the participant was using mobile text messaging to mediate between work and life, between business tasks and emotional needs. Technologically, the pilot case study helped me refine my research instruments through real fieldwork. Methodologically, it helped me see a new use case: Text messaging use of young professionals. Based on this, I expanded the fieldwork participant pool from college students to young professionals.

Participants

Criterion-based sampling is employed in this project. Participants were selected based on the following criteria:

- Participants must be frequent users of text messaging who send and receive at least five text messages per day (the more, the better). The number five came from pilot surveys and previous research (Q. Zhou, 2003; Y. Zhou, 2003). A large

[4] A participant ID.

number of participants exchanged more than 10 messages each day, and some even reached 20 to 30 a day. The highest daily volume from the Chinese site was 68 while that from the American site was 47. By choosing frequent users as participants, I am able to study successful adoption cases of mobile messaging technology, which can help me understand what factors would improve and sustain localization practices.

- Participants are young adults ranging from 18 to 30 years-old. They are either college students or young professionals. They are likely to be more technology savvy compared to other groups of people, and they are more likely to purchase trendy gadgets as they can afford them. Most of them live by themselves or maintain a living arrangement independent of their parents. Some of them support themselves. A few of the participants are married, but none of them have kids. Furthermore, work, leisure, entertainment, and fashion are all important life issues for them at this age. The balanced interests in different life arenas offer me a good chance to explore what mobile messaging means to the users' whole life rather than just the leisure sector. This distinction distinguishes this study from previous research of mobile messaging, which primarily focused on the entertainment use of the teenager group. Meanwhile, this user group has its own distinctive culture, which makes it convenient to study both general cultural factors and ethnic cultural factors at the same time.

- Participants have various use patterns. I regard this project as an exploratory study of mobile text messaging in contexts, and I want to use multiple cases to describe ways of localization with a collective case study approach. Therefore, I chose a broad group of people from different ages and from two cultures, trying to stratify the participant pool as much as possible by profession, age, gender, and wireless carrier. For example, since each wireless carrier has its own service packages and special plans, I made sure that research participants were comprised of users from all the wireless carriers available in the fieldwork sites. I do not claim that all of my cases are representative ones, though some of them are.

I recruited American participants via two channels. For college students, I recruited at local colleges by posting flyers on campus, posting temporary job request messages through the career center email list or departmental lists, or posting the ad in college newspapers. For young professionals, I contracted the job to a local recruitment agency, Manpower. They posted the job ad on job information websites such as Monster.com, the job section of a local newspaper (Times Union) and their own website. It was easier to recruit college students than young professionals. The number of usable students who responded to my ad was two times the number of student participants. I contacted the respondents by phone first to know about their general use patterns before inviting them to participate. All young professionals who matched with the selection criteria and agreed

to participate were chosen for the study. In all, among the 26[5] people who agreed to participate, seven of them dropped out in the middle of the first stage of the study after six of them returned the completed survey questionnaires[6]. The final number of American participants was 19.

Chinese participants were recruited primarily by referrals from friends. In this method, friends, colleagues, and classmates who matched with selection criteria were located and invited to participate. As was the case at the American site, college students were easier to recruit. Twenty-four people participated in the study. Two participants' data were removed during the stage of data analysis because their text messages were not logged properly. The final number of Chinese participants was 22.

Participants were offered payment for their work based on the local hourly rate. A few participants declined payment.

At both sites, a few participants contributed to the study together. Here group participants refer to people who are close friends, roommates, or lovers. The messages they sent to each other counted for most of the messages they logged in their diaries. There were two groups of participants at the American site: One group was a couple and another group was comprised of four close girlfriends. There were three groups of participants at the Chinese site, and they were all couples.

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[5] This number includes the participant of the pilot fieldwork, V20.

[6] Their questionnaires were not included in the survey data.

Table 3.6 describes participants' demographic characteristics and their wireless carriers. Seven of 19 American participants and 10 of 22 Chinese participants were selected for an in-depth study and participated in two stages of the study. Their information is listed in bold in the table.

Three patterns deserve our attention. First, two thirds of the participants are female. I did not arrange gender constraints for participant recruitment. As long as people met criteria and showed distinctive use patterns, they were accepted for research. Second, two thirds of the participants are college students. I was trying to find more young professionals who use mobile messaging frequently, but this group of people were either difficult to locate or unwilling to participate in research. Third, the number of participants from some wireless carriers (e.g., Sprint PCS, Nextel) is much smaller than the number of those from other carriers (e.g., Verizon Wireless, T-Mobile) at the American site. This situation was either caused by the size of the customer base in the Albany area or by their not-so-easy-to-use texting service. In all, these participant patterns illustrate a general user scenario of mobile messaging use at the two fieldwork sites.

American site					**Chinese site**				
ID	***Age***	***Gender***	***Occupation***	***Wireless Carrier***	***ID***	***Age***	***Gender***	***Occupation***	***Wireless Carrier***
V20	**30**	**F**	**retail manager**	**Verizon**	**Y27**	**19**	**F**	**sophomore**	**Mobile**
C15	**22**	**M**	**graduate student**	**Cingular**	**Y41**	**21**	**F**	**translator**	**Mobile**
N44	**20**	**F**	**college junior**	**Nextel**	**L43**	**26**	**F**	**college teacher**	**Unicom**

C42	**19**	**F**	**college junior**	**Cingular**	**Y44**	**23**	**F**	**graduate student**	**Mobile**
V27	**18**	**F**	**freshman**	**Verizon**	**L45**	**20**	**F**	**sophomore**	**Unicom**
S28	**18**	**F**	**freshman**	**Sprint**	**Y46**	**21**	**F**	**sophomore**	**Mobile**
V29	**18**	**F**	**freshman**	**Verizon**	**L14**	**22**	**M**	**sophomore**	**Unicom**
T21	23	F	admin assistant	T-Mobile	**Y47**	**20**	**F**	**sophomore**	**Mobile**
V11	22	M	audio engineer	Verizon	**L17**	**23**	**M**	**sales and planning staff**	**Unicom**
T22	20	F	college junior	T-Mobile	**L48**	**29**	**F**	**copywriter**	**Unicom**
T23	19	F	freshman	T-Mobile	Y11	23	M	college senior	Mobile
V25	23	F	admin assistant	Verizon	L12	21	M	college junior	Unicom
V13	19	M	freshman	Verizon	L21	21	F	college junior	Unicom
T12	20	M	college senior	T-Mobile	Y22	23	F	college senior	Mobile
V26	18	F	freshman	Verizon	Y25	21	F	college junior	Mobile
T41	18	F	college junior	T-Mobile	L13	22	M	college junior	Unicom
V43	20	F	sophomore	Verizon	L26	21	F	college junior	Unicom
V46	28	F	legislative coordinator	Verizon	Y42	20	F	sophomore	Mobile
V48	21	F	college senior	Verizon	Y28	19	F	sophomore	Mobile
					L29	19	F	sophomore	Unicom
					L15	20	M	sophomore	Unicom
					Y16	21	M	sophomore	Mobile

Table 3.6 Participant Description

Data Collection

My exploration focuses on two areas: Use patterns and mediation practices. I think these two areas provide us a way to illustrate a more complete story of the complexity and dynamics of usability in context from different angles. Use patterns present a snapshot view to us by indicating how a technology is actually used in real life, while mediation practices illustrate the dynamic process of how users interact with a specific technology in their lives and how usability diffuses across the network.

I designed this study into two stages. In the first stage, I focused on use patterns across cases and across sites to gather a general overview of how mobile text messaging is used at these two sites. In the second stage, I selected interesting cases emerging from the first stage and examined their mediation practices in depth.

Stage One: Studying Use Patterns

I conducted the first stage of this study at the American site from late August to early November in 2003. The same set of Chinese data was collected from October through November in 2003. At this stage, I employed questionnaire surveys and text message diaries to study patterns of mobile messaging use at these two sites.

Questionnaire Survey

Surveys gather demographic information, use details, as well as views and feedback from a large number of users. They are a popular method to investigate the use trends of a specific

technology in usability studies. One of the famous examples is GVU's WWW online user survey. Even for a small sample of participants, surveys help to collect measures that are independent of the system, users, or tasks to which questionnaires are applied and can serve as a reliable basis for comparison across sites (Kirakowski, 2001).

Two forms of questionnaire-based surveys were implemented at the first stage. The first questionnaire is a stand-alone study entitled "Mobile Messaging User Survey" (see Appendix A). It was developed based on Geisler's PDA user survey (personal communication, December 5, 2002) and pilot study. Participants were asked to fill out this survey on the spot when they were given their workbooks for the diary study at our first meeting. The survey has a total of 25 questions which are divided into four sections: background, phone information, SMS use, and use of other IT. Most of the questions are multiple-choice, and a few open-ended questions are informational questions. The Chinese version of the survey differs slightly from the American version to accommodate the local technological context.

The second questionnaire is embedded in the last two pages of the diary study workbook (see Appendix B). I asked participants to complete this survey during their diary study. A total of eight open-ended questions asked participants how they feel about and their expectations for mobile messaging.

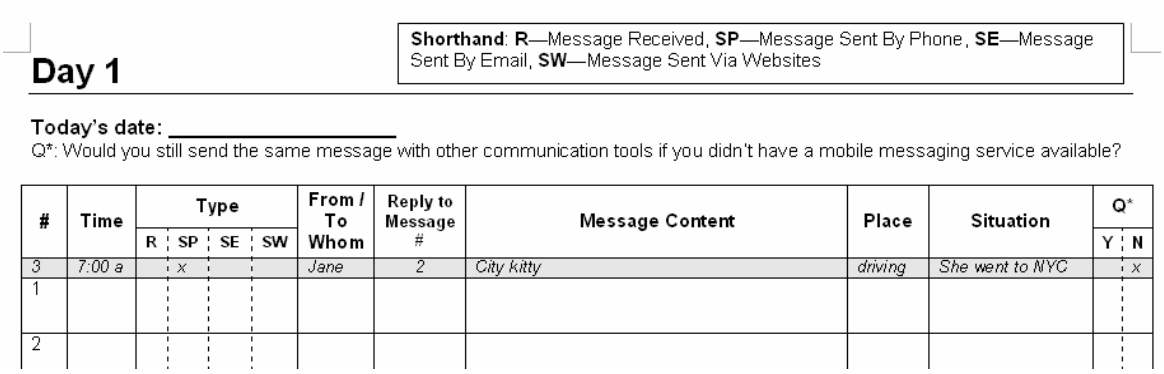
Text Message Diary

Diary studies are often used in HCI and CSCW research as "a middle-ground solution to the opposing limitations of laboratory studies and field studies" to capture "activities that occur in real environments vis-à-vis some kind of technology currently under investigation" (Palen & Salzman, 2002b). Furthermore, in this project, mobile text messaging is an ad-hoc activity occurring in any context, sometimes in very private contexts, where the researcher is unable to study directly. A text message diary logged by the participant is used to record the mediation practices and sample the participant's typical messaging use patterns within a window of four consecutive days, including workdays and non-work days. In this case, a personal schedule is prioritized above the calendar weekday and weekend schedule. This setup is also based on the phone plans at the American site where phone minutes are charged differently on weekdays and weekends[7].

I developed 16 pages of the "Experiences with Mobile Messaging" workbook (see Appendix B) for participants to log their text messages based on existing field research (Conifer Research, 2002; Grinter & Eldrige, 2001). The workbook is divided into three sections. The first section asks participants to map their social network and daily IT use in charts. The second section allows the participants to log the time, locations, situations, message recipients, and message content (see Figure 3.2). The third section is an

[7] Due to some implementation issues, message logs from eight Chinese participants only have the workday patterns.

open-ended questionnaire. For private messages, participants do not need to log the message content, but they are asked to log the place, time and situation for that message. At the American site, I sent a mobile text message to each participant's cell phone to remind him/her to log messages every day during the diary study. In addition to the standard log form allowing participants to log 22 messages a day, I also gave some participants extra pages to log additional messages (these users claimed that they were high-volume message senders during our initial meeting). However, by reviewing the collected text messages it is clear that the participants did not log all of their text messages during that period. The reasons are complex. In some situations, participants ran out of extra log forms and did not ask for more. In others, some cell phones can only hold dozens of text messages and the oldest text messages were automatically purged before the participants had a chance to log them at night on the same day.



Day 1

Shorthand: **R**—Message Received, **SP**—Message Sent By Phone, **SE**—Message Sent By Email, **SW**—Message Sent Via Websites

Today's date: _____

Q*: Would you still send the same message with other communication tools if you didn't have a mobile messaging service available?

#	Time	Type				From / To Whom	Reply to Message #	Message Content	Place	Situation	Q*	
		R	SP	SE	SW						Y	N
3	*7:00 a*		*x*			*Jane*	*2*	*City kitty*	*driving*	*She went to NYC*		*x*
1												
2												

Figure 3.2 Text Message Log Form

A total of 2474 text messages were collected from the fieldwork, including 813 messages from the American site and 1661 from the Chinese site. Data obtained from the text

message diary study provide a vivid picture of how participants used messaging technology in context by illustrating patterns of when and where text messaging occurred, who participants texted, and what they texted about. These use patterns helped me understand the on-going messaging practices from both the perspective of genre and the angle of activity theory.

Stage Two: Investigating Mediation Practices

I conducted the second stage of fieldwork from October 2003 to May 2004. This stage was a rather long period, as I worked on transcribing paper-based workbooks into computer databases and conducting analyses of messaging patterns across the sites to select participants for the second round. Also, it took time to retrieve all of the surveys and workbooks from the Chinese site.

Forty percent of the participants were selected for the second stage. They were not randomly chosen. Special attention was taken to keep a balanced variety of subjects, based on their messaging patterns from the first stage. For the sake of variety, I chose people who came from different wireless carriers, age groups, and genders. I then selected people who had distinctive patterns. They were chosen either because they exchanged the highest volumes of messages at their sites, because they texted at a specific time period (e.g., after work), because they texted to specific people (e.g., to a sister), because they texted for specific purposes (e.g., texting to exchange reviews about

sports games late at night), or because they had interesting interpretations (e.g., regarding text messaging as “a beautiful form of implicit communication”).

At this stage, I used methods of qualitative interviewing and/or shadowing observation to conduct an in-depth study the mediation practices of selected cases.

Qualitative Interview

Rooted in the philosophy of qualitative research, the qualitative interview is a field interviewing method to find out what participants feel and think about their worlds (Rubin & Rubin, 1995) by allowing the researcher to avoid imposing their worldview on the participants. A qualitative interview is usually built up from three types of questions: main questions, probes, and follow-up questions.

In my fieldwork, I used different forms of qualitative interviews to collect life stories about cell phone use and SMS use from selected participants to understand how they think of and interpret their messaging life. I usually started a semi-structured interview with questions emerging from the previous stage of fieldwork. For example, I showed the participant a chart of her messaging activity based on her text message log for one day (for sample, please see Figure 5.6) and asked her what she thought of her messaging pattern. Sometimes I asked a participant why he sent text messages at a specific time period or in a certain place. After the participant’s memory was refreshed, I asked him questions about his phone’s features, his personal adoption process, any usability

problems and solutions he encountered, learning artifacts, and his personal interpretations (for a sample of the interview protocols, see Appendix C).

An interview usually lasted 45 to 75 minutes, all of which was audio-recorded. At the American site, most of the interviews were conducted with the individual on campus, in their dorm, or at home. For a group of three girls who are close friends and classmates, I chose the format of a focus group. A total of seven American participants participated in the interview. The interviews at the Chinese site were individual interviews conducted on the phone. Ten Chinese participants were interviewed in this manner.

As the second stage lasted for a period of time, most participants were interviewed five or six months after they first participated in the diary study. The people interviewed had clear memories of what happened during the initial study. With this timeframe, I was able to see how their messaging patterns evolved throughout that period. After the first stage, most people did change their use patterns. To make the data comparable across cases, I interviewed two participants who were interviewed earlier than most of the other people (one in April 2003 and one in December 2003) again about their new patterns in May 2004.

Interviews allow me to access the rich data of individual user experiences that are not exposed in questionnaire surveys or text message diaries. These detailed accounts

provided me with a solid foundation to build explanations for the mediation practices of mobile messaging.

Shadowing Observation

Shadowing observation is a way of observing users by walking in their shoes. The benefits of shadowing in this project are obvious: I will be able to gain deep insights into a participant's messaging activity and his/her use contexts. However, text messaging can be personal and not many participants are willing to be shadowed. Another problem is time. To obtain participants' consent for observing, I had to propose to follow them for only half a day at a time convenient for them. This timing arrangement works best for participants who have a peak messaging time in the daytime but not for odd hours. For example, one of the participants told me her peak time was right before bedtime when she usually had leisure time to chat with friends in bed and then fell in sleep. And some of the other participants claimed that they did not have a peak time for messaging, and thus it was not feasible for me to capture a couple of message-sending moments spanning across the whole day. Neither was it feasible for me to have an overseas trip to observe Chinese participants with the current difficult situation of visa application.

Among the seven American participants in the second stage, I found three people who were willing to be shadowed. For each of the participants, I followed them for one or two half-days as they went about their tasks in their cars, offices, stores, classrooms, gyms, and dorms — popular places for messaging from their diary studies — and saw how

they texted in context. I found some eye-opening discoveries during some observation sessions, although I did not find anything exciting in one of the cases.

During the shadowing session, I used field note forms to guide my observation and make notes. To save time for transcribing, I developed a field note database on my PDA for the last two cases (for screenshots, see Figure 3.3)

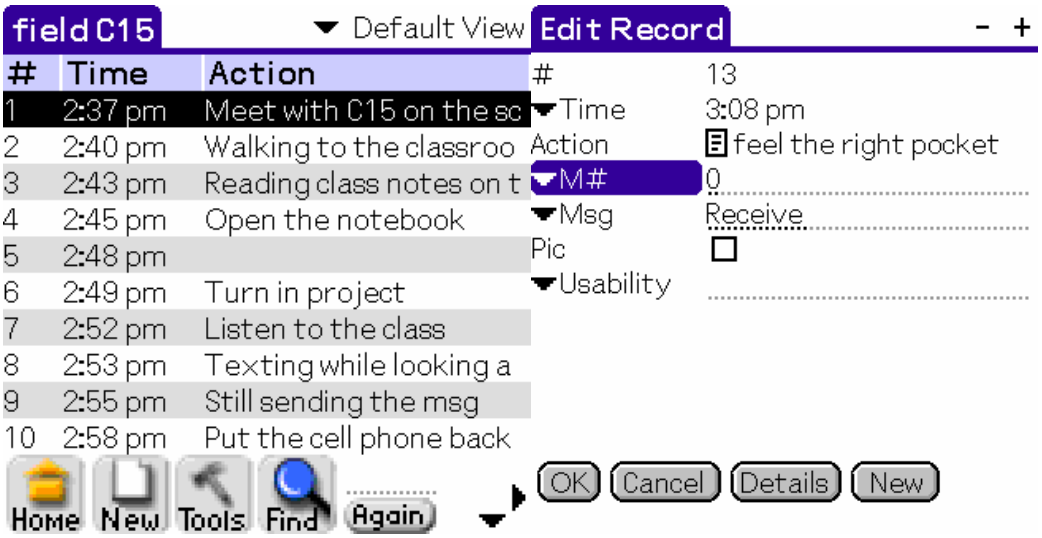


Figure 3.3 PDA-based Field Note Database

Data Analysis

Research Questions

The primary goal of this project is to study the localization process at the user's site by exploring the dynamic interactions between cultural contexts and situated uses surrounding mobile messaging technology. The framework of cultural usability is employed to probe the articulation moment when different levels of contexts interact with each other and when activities and meanings are interwoven.

Other goals include:

- Fully develop the model of cultural usability in fieldwork
- Search for workable localization heuristics to improve current localization practices

Questions that explore the phenomenon of mobile text messaging are developed within the framework of cultural usability by pulling together perspectives from localization and usability studies, activity theory, genre theory, and British cultural studies.

Two driving questions for this project were formed through fieldwork. One is about the phenomenon of mobile text messaging; another is about the localization process at the user's site:

- Why is mobile text messaging so popular even though mobile phones are not a good tool for writing?
- How are cultural factors articulated through use to localize a technology?

In addition, the following particularizing questions were posed during the fieldwork:

- Are there different use patterns and mediation practices between Chinese users and American users? If so, what are they?
- How do different levels of affordances work during use?
- In the case of mobile text messaging, how did frequent users (successfully)

localize a hard-to-use technology to fit their lifestyles?

- What do these localization practices at the user's sites suggest for future localization work?

To answer these questions, I analyzed the data through two stages, pattern-comparison and explanation-building, to understand how contextual and cultural factors are articulated during the localization process to help achieve usability goals in users' contexts.

Pattern Comparison

At this stage, data concerning use patterns and mediation practices were coded into different pattern categories by following the theoretical framework of cultural usability. I am interested in locating factors from the immediate context and the broad cultural context and exploring how these factors shaped and informed the messaging activity. Also, in this collective case study, I am looking for both individual patterns and general trends across cases.

Pattern Coding

To study the complexity of individual messaging activity embedded in context, I coded the individual case data collected from the diaries into patterns of use activity with a simple 5W structure: *When* and *where* did text messaging occur? *Who* did participants text to? *How* were messages exchanged? *What* did participants text about? Coding for the first four questions is pretty straightforward from diary logs. To better see patterns, I

typically convert the coding results into pie charts and activity charts (see the charts in Chapter 5-7). To code for the *What* question, I employed the verbal data analysis method (Geisler, 2004) to analyze text messages into two dimensions: Rhetorical purposes and life spheres. Details of the verbal data analysis method are discussed in the next section.

The 5W structure was also applied to study the general use trends across cases. For example, the average number of people a participant texted to in a four-day period. For a detailed discussion on this topic, please see Chapter 4.

Data collected from questionnaires, interviews, and observations were coded for two purposes. One is to explore mediation practices of individual cases included in the following categories:

- *Immediate contextual factors* originating from the immediate context that motivated a participant to adopt mobile text messaging or change their use of text messaging, e.g., friend's suggestions, unable to access email at work, the cost, and so on.
- *Broad cultural factors* originating from the broad cultural context that motivated a participant to adopt mobile text messaging or change the use of text messaging, e.g., advertisement impact, peer pressure, and the desire to stay connected.
- *Affordances* including instrumental affordances and social affordances of the mobile messaging technology found during fieldwork.

- *Uses for instrumental needs and social needs* including uses for instrumental (task-related) purposes and social purposes.
- *Usability problems* consist of two parts: instrumental aspect and social aspect. The instrumental aspects of usability problems include any issues related to the design of the phone, service plan, and the network. The social aspect refers to any problems related to the user's interpretations of the task and the service.

The second purpose is to examine the general trends across the sites. This category includes measures of use histories such as cell phone use history and SMS use history, measures of phone cost, monthly bill, learning methods of SMS, text entry methods, and so on.

Verbal Data Analysis

The development of the coding scheme for rhetorical purposes was informed by activity theory, genre theory, and my observations through fieldwork.

On the individual level as in the immediate context, I argue that users are not just texting for the experience of texting but texting to accomplish higher-level tasks. Texting is the action embedded in an upper-level use activity which originates from a goal. To better support user activity with a well-designed IT product, we need to understand what use actions users are engaged in and what kinds of goals users are developing through this use.

At the same time, the examination of use goals should inform UI design. Thus the categories of use goals should be able to be translated into design functionality.

On the social level, as in the broader cultural context, these use goals are related to a new writing practice for mobile devices. A closer look at the text messages shows that those exchanges are different from exchanges via email, letters, faxes, and instant messaging programs. For example, my fieldwork found that participants primarily used mobile messaging to communicate to close friends in the same age group (see Chapter 4). The emergence and popularity of this writing practice signals the birth of a new genre. As Miller (1984) suggests, genres are social actions as they are typified rhetorical responses to situations that are socially interpreted or constructed as recurrent or similar. Swales (1990) also characterizes a genre as “a class of communicative events” having “a shared set of communicative purposes” and similar structures, stylistic features, content and intended audiences. So what are those “shared communicative purposes” that find various representations via millions of messages exchanged on cell phones? What social motives contribute to this writing practice and bring to the birth of this new genre? Twelve years ago the genre of text messaging did not exist, but in the interviews some heavy users claimed they could not live without text messaging.

Based on these rationales, text messages were segmented by a single rhetorical purpose. There are a total of 2866 message segments with 942 from the American site and 1924 from the Chinese site. As we can see from the table below, most messages are

single-purpose ones. It should be noted that a single-purpose message might have two or more sentences sharing the same purpose.

	# of segments	# of messages	ratio of segments/ messages
US	942	813	1.16
CN	1924	1661	1.16
Total	2866	2474	1.16

Table 3.7 Overview of Text Messages

I developed coding categories based on speech act theory (Cutting, 2002), conversation analysis (McLaughlin, 1984), and previous research on instant and mobile text messaging use (Issacs et al, 2002). The rhetorical goals of text messages (see Appendix D for the coding schemes) were coded into seven categories:

- **Informing**: Code any message or reply that is sent to inform about something going on and to share information that one or both of the parties might be interested in.
- **Co-experiencing:** Code any message or reply that is sent to share the current status or experience with the other party.
- **Instructing:** Code any message or reply where the recipient is asked to help or propose something in order to accomplish a task.
- **Coordinating**: Code any message or reply that is sent to coordinate tasks, events, and schedules.

- **Expressing:** Code any message or reply that is used to express feelings or views.
- **Switching:** Code any message or reply that suggests having a follow-up phone or text conversation shortly.
- **Other:** Code any message or reply that does not fit one of the above categories.

Within the dimension of life spheres, I want to understand how participants used mobile text messaging to augment their work and life. For example, I wanted to explore in which life spheres they used mobile text messaging the most, which types of activities and relationships mobile text messaging supported best, and in what types of cultural contexts mobile text messaging fit best.

The coding scheme of life spheres was also informed by previous literature and other findings from fieldwork. Wheeler (1999) describes life spheres as "psychosocial settings within which a person functions" and which are "held together by common interests, purposes, visions, or goals" (p.45). It has three components: relationships, activities, and cultural context. Here, "[t]he relationships build the interpersonal and social network in which a person acts and interacts with other people [in a specific life sphere]... The activities are initiated and done within the confine of the life sphere… The cultural context provides the rules, regulations, and supporting framework for the life sphere" (ibid). This structure fits nicely with the framework of cultural usability that examines user activities by considering various factors in different levels of contexts: Different life

spheres maintain different relationships and initiate assorted activities within different types of cultural contexts.

Wheeler developed seven life spheres: work, family, personal leisure other than with family, professional affiliations, community activities, spiritual participation, and education. I adapted her categories to accommodate the feature of this study and coded the life spheres of mobile text messages into the following five categories:

- **Work**: Code any message or reply that is about the life sphere of work related to the sender or the recipient.
- **School**: Code any message or reply that is about the life sphere of the school or the educational institution related to the sender or the recipient.
- **Family**: Code any message or reply that is about the life sphere of the family related to the sender or the recipient.
- **Personal leisure other than with family**: Code any message or reply that is about the life sphere of personal leisure other than with family related to the sender or the recipient.
- **Other:** Code any message or reply that doesn't fit into any other categories or is a system message from phone carriers or advertisers.

In this dimension, I also used a single purpose message segment as the coding unit. In this regard, a purpose is an embodiment of an activity that is a component in a specific life sphere.

After two rounds of second coding, the simple agreement for the dimension of rhetorical purposes is .90 or .87 corrected by Cohen's Kappa, and the simple agreement for the dimension of life spheres is .98 or .96 corrected by Cohen's Kappa. The second coder tested 12.7% of message segments, including both American and Chinese.

Explanation-Building

At the second stage, coded patterns along with collected textual artifacts, text messages, interview transcripts, and observation notes were contextualized within the framework of cultural usability. This interpretive framework employs the activity system and the circuit of culture to map contextual factors. Previous research suggests that the usability of wireless phones lies beyond the handset (Palen & Salzman, 2002a). When a user is sending a text message, he is not just interacting with the interface of the wireless phone but with the service and the network. The physical touch of the phone, the interactivity of the phone interface, the service provided by the carrier, the speed of the network, his own interpretation of text messaging based on friends use and advertisements, will all affect his perception of usability.

The activity system and the circuit of culture map contextual factors to two perspectives: Immediate contextual factors and broad contextual factors.

- On the lower level, with the analysis of immediate contextual factors, the activity system examines individual user experiences with a focus on the *instrumental* aspect. It explores the situated mediation process of mobile text messaging influenced by immediate contextual factors such as workplace rules and network service.
- On the upper level, broad user patterns and social shaping are explored on the cultural circuit with a focus on the *social* aspect. To provide a rich description of cultural factors influencing user experiences, I supplemented the interactional view of culture—the circuit of culture— with the dimensional view of culture that includes general cultural factors describing the culture of this user group and ethnic cultural factors describing two local cultures.

Moreover, I believe that these two perspectives are overlapped. Genres are used here mainly to investigate how the genre of mobile messages provides affordances that other exiting genres lack and how the genre of wireless phones mediates and remediates use goals in context.

Validity Issues

A variety of procedures were followed to validate findings through fieldwork. At the data collection stage, the plan of data collection is shaped by theoretical propositions. Pilot studies were conducted to test the sites, examine research methodologies, and refine the research plan. Multiple sources of data were used to achieve triangulation of data sources.

At the data analysis stage, three theoretical frameworks were brought in to triangulate analysis. At the same, since my study is a combination of qualitative and quantitative methods, the analysis is triangulated by different methods. I checked for alternative explanations and negative evidences emerging from the study by discussing these findings with participants, my advisor, my committee members, and colleagues at school and at academic conferences.

Chapter 4

General Patterns of Use: Texting in Context

This chapter reports findings from the fieldwork and describes general patterns of use across cases. Narratives of selected cases will be given in the next three chapters.

Use Scenario Overview

Participant Profile

Table 3.6 in Chapter 3 describes a general demographic pattern among participants. They are frequent users who claimed to exchange more than five text messages daily.

To recap, the average age of the American participants is 20.8 years-old, while the average for Chinese participants is 21.6 years-old. Most of them were either pursuing or have earned their college degrees. Two thirds of participants were female. Twenty-two percent of the participants were working professionals in various industries. Most of them lived in rented apartments by themselves, with friends, or their partner, or in a dorm. A small number of participants lived with their parents. The usual place of work (including school work) for most of the participants was either in a location away from home or a mixture of home and away from home. By all standards, they were not mobile professionals, as none of the participants selected the “on the road” in the survey.

General Use of Mobile Telephony

Table 4.1 describes the participant's phone information between two sites on phone features, adoption history, and the cost.

Categories	US Participants	CN Participants
Average Phone Cost	$ 75.00	1498.15 yuan[1]
Popular Phone Functions	Text messaging (100%) Web browsing (83%) Downloadable ringtones (58%) Downloadable games (54%)	Text messaging (100%) Downloadable ringtones (77%) Web browsing (55%) Downloadable games (55%)
Popular Phone Brands	Motorola (5) LG (4) Kyocera (2)	Nokia (11) Motorola (3) Samsung (2)
Average Use History of Phone (Months)	30.89	19.50
Average Use History of SMS (Months)	14.42	18.09
Average Monthly Phone Cost	$ 66.94	56.14 yuan
Average Monthly	$ 6.63	32.05 yuan

[1] The current currency exchange rate is 8.3 yuan per US dollar. The average wages, costs of the baskets for food, and price for domestically made products in China are similar to the US on the values of numbers.

Text Cost		

Table 4.1 Phone Information

Phone Features: Participants at both sites used phone models which had similar phone functions such as text messaging, Web browsing, downloadable ringtones, and games (see Figure 4.1). However, Chinese participants paid more to purchase their phones, as Chinese wireless carriers seldom offer discounted cell phones with yearly contracts. The fieldwork did not find dominant phone brands among American participants. The most popular brand was Motorola, owned by five of the users. At the Chinese site, 11 out of 22 participants owned Nokia phones.

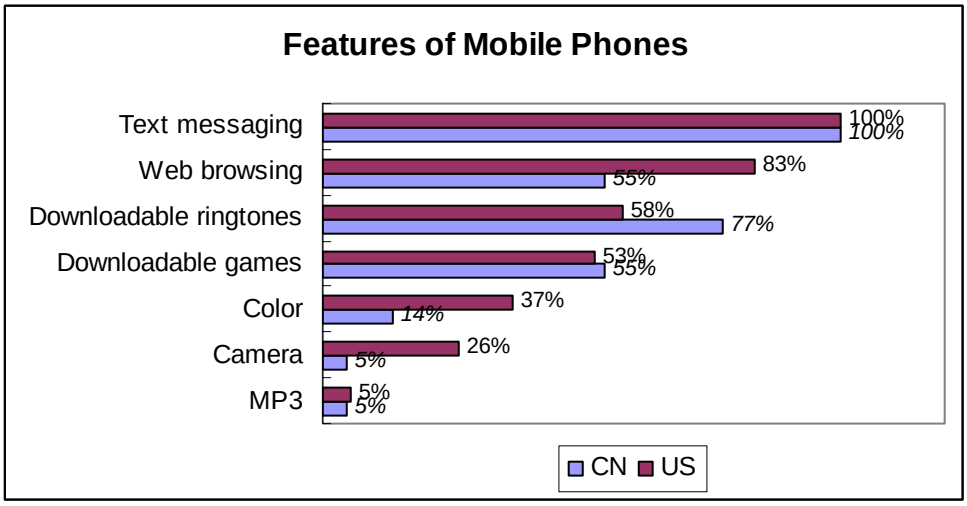


Figure 4.1 Features of Mobile Phones

Adoption History: American participants had a longer adoption history of cell phones than their Chinese counterparts. The average American participant had been using a cell phone for more than 2.5 years, and the average Chinese participant used a cell phone for

1.5 years before this study was conducted. It is interesting to note that the average Chinese participant had been using text messaging for 4-months longer than the average American participant. Moreover, for most Chinese participants, they started using text messaging at the same time they adopted their cell phones, while American participants usually adopted text messaging 16 months after they purchased their cell phones.

This trend can be explained by the local development of mobile telephony and IT infrastructure in the two countries. This was also validated by findings from participant interviews during the second stage. Most American participants stated that they experienced an adoption moment triggered either by a television commercial, a friend's suggestion, or a change in their life. The Chinese participants who were interviewed were not aware of such a moment of adoption: For most of them, texting is taken for granted. One participant said, "When I got my new phone, I texted to all my friends announcing that I got a phone and here is my phone number, blah blah…."

Wireless Cost: It is hard to compare the monthly costs of mobile telephony between two countries. However, the average ratio of call cost vs. text cost for American participants was 10:1, while the average ratio for Chinese participants was 1.75:1. Chinese participants were willing to pay more for text messaging than American ones.

Use of Text Messaging

Learning SMS: The most popular method to learn text messaging at both sites was "figuring it out by myself with trial and error," selected by 94.7% of American participants and all Chinese. The second most popular method differed for the two sites. American participants tended to ask friends to show them (55.6%) or watch how other people do it (52.9%). Chinese participants preferred to consult manuals or tutorials (81.8%), while only 23.5% American participants did.

This finding suggests that we might need to revisit the findings from a previous comparative study of German and Chinese cell phone users (Honold, 1999). In that study the researcher claims that Chinese users from a high-context culture preferred to learn by imitation and relied more on informal and oral information, while German users from a low-context culture like to consult manuals. Similar to the German culture, American culture leans towards the low-context communication end (Hoft, 1995). Further research should be done to explore this area.

The survey also found that it took a much longer time for American participants to learn how to use text messaging, which might be due to the fact that they were not as motivated as Chinese users. All Chinese participants stated that it took less than one day to learn this task, among which 54.6% of them took less than 5 minutes and another 36.4% took half an hour. Only 15.8% of American participants reported using less than 5 minutes to learn this task, 21.1% spent half an hour, 15.8% a few hours, 15.8% one day, 26.3% one week,

and one participant needed a month. Of course, that participant did not spend the entire month learning this simple task. She tried it off and on, and she finally could use it after a month. The difference in time suggests that Chinese participants were motivated to learn text messaging, and thus they liked to consult manuals or tutorials to accomplish this task in a short amount of time.

Text Entry Methods: To most people's surprise, the survey found that participants, as frequent users of text messaging, did not use faster-inputting methods as we thought. At the American site, 68.4% of participants typically used multi-tap and only 44.4% used predictive typing[2]. Various factors contributed to this phenomenon. Some participants had an older phone model that did not support predictive typing. Some people just did not like it. One participant said in her interview that she was so used to the rhythm of multi-tap that she could type without looking at the phone, but if she used T9, she had to keep checking the screen to see whether she typed the correct word came up. Another participant also thought that T9 messed up words occasionally, and she preferred to type words out.

At the Chinese site, 90.9% of participants usually used Pinyin input, and 10% did stroke input even though stroke input is faster than Pinyin input. Fifteen percent of participants sometimes used predictive English input to enter English[3]. Participants preferred Pinyin

[2] Some people consistently use both methods.

[3] A few English messages were logged during the diary study at the Chinese site.

inputting to stroke inputting because the Pinyin method is easier to learn and more intuitive to use. People need practice to become good at stroke inputting. One user of five-stroke inputting stated that she adopted stroke inputting because she also used the Wubizixing ("five-stroke character-shape") method to enter Chinese into the computer. Therefore, she was good at dividing characters into character roots because of her daily practice.

Ways of Sending Messages: Participants usually sent text messages by phone. Fifty percent of American participants and 18.4% of Chinese participants had sent text messages via websites, and only 6.2% of American participants and 13.6% of Chinese participants said that they used websites to send text messages very often. American users can also send text messages via email. Of these users, 37.5% of them had used this service and 6.2% used it occasionally.

In the diary study only a small percentage of text messages had been sent via websites or email, and most of these messages had been sent by people who either did not have cell phones or did not have a text messaging feature on their phones. This might have been due to the current design of the diary log. Messages sent via websites by participants were not saved in the participants' phones. It is very possible that a participant forgot a text message he sent via a website when he was logging the messages late at night.

Types of Messaging Services: Two-way, basic text messaging was the most used service for participants at both sites. The second most popular service was Instant Messaging (IM) services on mobile phones such as American Online's Instant Messenger (AIM) at the American site and QQ[4] at the Chinese site. More than half of the participants (55.6% in the US and 54.5% in China) had used this service, and 22.2% of American participants and 13.6% Chinese participants used this service very often. The third service was multimedia / picture messaging: 27.8% of American participants had tried it and 16.7% used it from time to time; 9.1% of Chinese participants had tried this service but none of them used it more than that.

Very few participants subscribed to informational alerts via wireless carriers or Web portals. Three American participants subscribed to alerts including sports scores (three users), weather forecasts (three users), music news (one user), and world news (one user). Four Chinese participants subscribed to alerts about daily phone cost (two users), sports (one user), and daily English words (one user).

Messaging Purposes: Americans said that the top two purposes for sending messages were for fun or passing the time (see Table 4.2). The former was ranked as No.4 (86.4% agree) at the Chinese site, and the latter was as No.9 (only 40.9% agree). In comparison, Chinese participants named staying in contact with friends or loved ones their number one reason for messaging. American participants ranked this as the seventh purpose, with

[4] QQ is a popular IM system in China.

84.2%. Aside from this major difference, participants at the two sites shared some similar reasons for using text messaging. Of the top six reasons, more than 85% of the participants from both sites agreed on five of these six purposes, with only slightly different rankings between sites.

One important finding from this research is that the top purpose for messaging at both sites falls in the social life arena: Participants either wanted to have fun with friends or stayed in contact with them. This suggests that participants, at least in their opinions, texted more for social needs than for instrumental needs such as coordinating schedules or exchanging information.

Rank	US Participants	CN Participants
1	To have fun conversations with friends (100% agree; 84.2% strongly agree; mean=1.16)	To stay in contact with friends or loved ones at every moment (100% agree; mean=1.48)
2	To kill time (100% agree; 57.9% strongly agree; mean=1.42)	To send a stealth message in the place where I can't talk (95.2% agree; mean=1.76)
3	To connect with people without disturbing them (94.7% agree; mean=1.58)	To connect with people without disturbing them (90.9% agree; mean=1.64)
4	To send a stealth message in the place where I can't talk (89.5% agree; 52.6% strongly agree; mean=1.58)	To have fun conversations with friends (86.4% agree; mean=1.86)
5	To arrange or adjust appointments (89.5% agree; 47.4% strongly agree;	To get or exchange information instantly (86.4% agree; mean=1.91)

	mean=1.68)	
6	To get or exchange information instantly (89.5% agree; 36.8% strongly agree; mean=1.74)	To arrange or adjust appointments (85% agree; mean=1.85)
7	To stay in contact with friends or loved ones at every moment (84.2% agree; 63.2% strongly agree; mean=1.58)	To save phone cost (54.5% agree; mean=2.50)
8	To avoid lengthy phone conversations (84.2% agree; 47.4% strongly agree; mean=1.74)	To avoid lengthy phone conversations (40.9% agree; 13.6% strongly agree; mean=2.59)
9	To save phone cost (57.9% agree; mean=2.53)	To kill time (40.9% agree; 9.1% strongly agree; mean=2.64)
10	To email people when computers are not around (52.6% agree; mean=2.63)	To email people when computers are not around (40.9% agree; 9.1% strongly agree; mean=2.77)
11	To show people I'm cool (22.2% agree; mean=3.56)	To show people I'm cool (4.5% agree; mean=4.05)

(Notes: Purposes in lighter shading areas are those ones that more than 85% of participants chose, and purposes in darker shading areas are ones that more than 50% but less than 85% participants chose.)

Table 4.2 Comparison of Messaging Purposes

It is interesting to note that though a common assumption about text messaging users is that they want to save phone costs, this was not the case for both of these sites. At the Chinese site, only 54.5% of participants cited phone costs, even though phone calls cost

more there, and 57.9% of American participants chose this even though they had a larger minute allowance. At both sites, this purpose was not ranked as high as it was assumed.

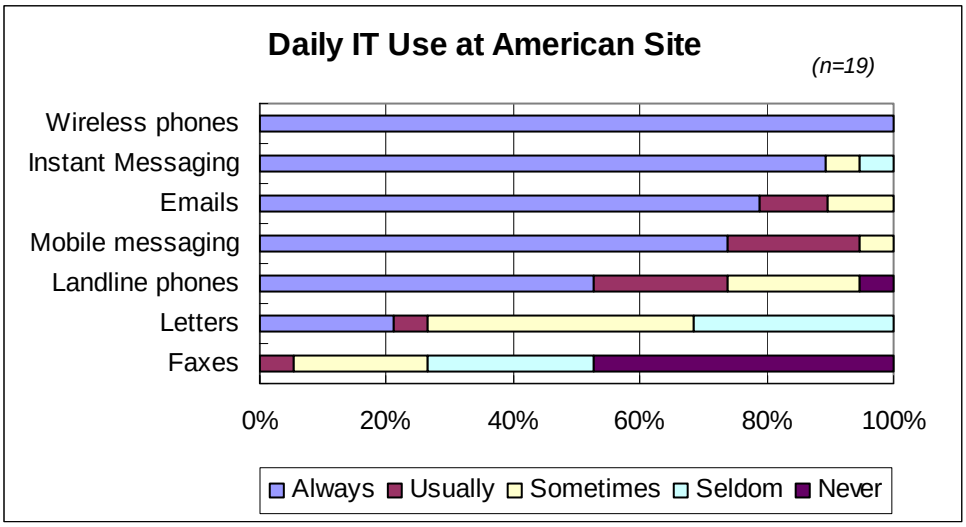
Uses of Other IT

Daily IT Use: Table 4.3 describes the daily communication tools available to participants at the two sites (also see Figure 4.2). It is obvious that American participants had more communication tools available to them than Chinese ones. For 89.5% of American participants, their favorite daily communication methods included wireless phone calls, mobile messaging, instant messaging, and emails. 95.5% of Chinese participants stated that they used mobile messaging "usually," and only 68.2% of participants used cell phones "usually." The percentages of those "usually" using instant messaging and emails were much lower, 59.1% and 54.5% respectively. This scenario matches with the current development of IT infrastructure in these two countries, which is another reason for the high volume of text messages at the Chinese site.

Percentage Using IT	US Participants	CN Participants
90.0-100%	Wireless phones (100%) Mobile messaging (94.7%)	Mobile messaging (95.5%)
80.0-89.9%	Instant Messaging (89.5% also always using) Emails (89.5%)	…
70.0-79.9%	Landline phones (73.7%)	…
60.0-69.9%	…	Wireless phones (68.2%)

50.0-59.9%	…	Instant Messaging (59.1%) Landline phones (57.1%) Emails (54.5%)
<50.0%	Letters (26.3%) Faxes (5.3%)	Letters (9.5%) Faxes (4.8%)

Table 4.3 Comparison of Daily IT Use



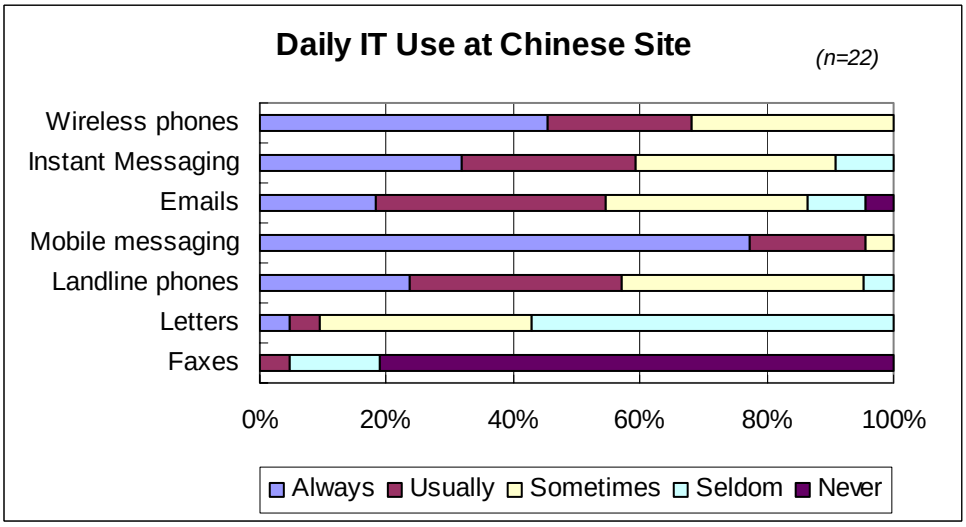


Figure 4.2 Comparison of Daily IT Use

User Level: Based on their daily use of various IT, it is understandable that the percentages of intermediate users for computer and email applications at the American site were much higher than those at the Chinese site (see Table 4.4). Chinese participants were more proficient in messaging, as such technologies were more available to them due to the development of the technical infrastructure there.

Percentage of Intermediate Users	US Participants	CN Participants
95-100%	Computer (100%) Email application (100%)	Mobile messaging (100%) Instant messaging (95.5%)
90-95%	Instant messaging (94.7%) Mobile messaging (94.7%)	…
<90%	…	Email application (77.3%) Computer (72.7%)

Table 4.4 Comparison of User Level

Affordances and Expectations

This section describes the participants' perceived affordances of text messaging and their expectations for text messaging improvements. This information is taken from data collected from the open-end question section of the diary workbook (see Appendix B).

Instrumental Affordances

Here, instrumental affordances refer to affordances on both the operation and action levels. I will not differentiate between these two levels of affordances in this section due

to two reasons: First, I describe affordances for the whole group of participants in a general fashion. Second, the structured affordances are in flux depending on the users' motives. It is arbitrary to map affordances into different levels without discussing an actual use activity.

Generally, text messaging affords the following:

Silent communication: Text messaging is a silent communication. Therefore, it works best when a user is in a setting where a conversation is not appropriate or convenient because s/he does not want to bother other people in the same room (e.g., in classes, meetings, churches, cinemas, or the dorm).

Convenient use: Phone technology is transportable, and users typically keep their phone at hand. They do not need to start up their computers and go online to text to people[5] to do this, either. One participant thought text messaging is handier than voicemail: She preferred to text to her friends when their phones were busy. In this way, they could see text messages right away without checking their voicemail.

Quick and direct communication: Text messaging helps people exchange information instantly. This is especially true when a user wants to send a short message or needs a quick response (e.g. coordinating a lunch meeting). In addition, it is more direct than

[5] Some mobile phone users (e.g., Sprint users) will still have to go online to send text messages.

Instant Messaging when someone does not have time to chat over IM. People can get straight to the point without wasting time with small talk.

Discrete action: The action of texting is more unnoticeable than calling, emailing, or IMing people, which allows for stealth communication (e.g., chatting on the phone with texts in the classroom or in the workplace).

Inexpensive communication[6]: With its low rates, text messaging allows users to save minutes on their phone plans. At the Chinese site, this rate afforded frequent distance communication without making phone calls or frequent local communication for people who were not in the same network.

Multi-tasking: Text messaging does not require the user's full attention. Users can text to people when they are preoccupied by something else (e.g., playing online games).

More stable communication: Text messaging technology is more stable than wireless phone calls. Users can continue to communicate via texting even when the reception in their areas is poor or when their phone battery is low. One participant said the phone signal was very poor in her house, and thus when she wanted to chat with friends on a landline phone, she often texted to her friends first to ask them to call her house phone.

[6] This doesn't look like an affordance at first sight, but this is a feature designed into the technology system which is not built into the mobile phone but into the service network.

Seeing rather than hearing: In one case, a participant who worked in night clubs said that he could not hear well enough to talk to people on the phone in his working environment, and text messaging helped.

Delayed response: Similar to emails, text messaging did not require an immediate response.

Social Affordances

In Chapter 2, I discussed how social affordances are affordances on the activity level, related to user motives. They arise out of lower-level affordances and support social practices in context.

Staying in contact: Text messaging allows people to stay in contact in various ways: Some participants felt that they could stay in contact with their friends, relatives, and lovers in a low-key way, i.e., without interrupting the current activity of the other party. One user said that text messaging allowed her to send greetings to people who she had not contacted for a while without being abrupt. Some users commented on how it was good for maintaining relationships when the one you communicated to was not located nearby.

Having fun: A big part of texting is having fun. People exchange jokes on the phone, tease each other with slang, and kill time when they are bored. One participant said that

texting allowed her to think of new ways to use humor in her life. For other people, it was just a lot of fun to press buttons on the keypad and text!

Expressing feelings and sharing support: Text messaging is good for emotional communication such as just saying “hi” or “I love you.” Also at some unhappy (emotional) moments, a user can just text their friends “I’m sad or unhappy” without actually having to pick up the phone to talk to someone. In this way, friends can also share emotional support at a down time.

Sending holiday greetings: Similar to saying “hi” or “I love you,” text messaging is also good for sending birthday wishes and holiday greetings. On those occasions, people just want to send well wishes, and they do not need a fuller communication encounter that a voice call or e-mail would allow.

Saying something implicitly: A few Chinese participants mentioned that texting helped them convey what they would otherwise feel shy or embarrassed to say face to face or have a voice call. One participant said that texting helped her and her boyfriend move forward in their relationship. Another participant disclosed that he sent sexual explicit jokes to friends, though he would not have told the same jokes to friends face to face.

Avoiding confrontation: Text messaging allows one user to tell another user that she is mad without a face-to-face confrontation.

Avoiding lengthy phone conversation: Phone conversation always takes time, even for a quick information exchange. One has to start with “hello,” “hi,” or “how are you” and end with “have a nice day” and “bye-bye.” A few participants claimed that they would text when they just did not want to talk on the phone.

Showing considerate concerns: Text messaging is unobtrusive. It will not interrupt the other party when they might be sleeping, busy, or at work.

Protecting privacy: Texting is a good way to protect privacy in a crowded setting. People text when they do not want other people in the same room (e.g., in the dorm) to hear what they are saying on the phone.

Serving as an ice-breaker: Some participants said they felt comfortable with texting when they needed to contact people who they were not familiar with or people they were introduced to by friends. Texting helps close the communication gap.

Presenting creativity: Text messages are multi-modal. In most cases, it follows a simple text format; but a clever user can create graphics with various text-based symbols. With picture messaging and multimedia messaging, the possibilities are limitless. A few participants said that texting gave them more opportunity to communicate with people in creative ways. They began to think about tone, word choice, and even the difference of orality and literacy.

As I review affordances of text messaging emerging from the participants' diaries, I saw some site differences (e.g., Chinese participants thought text messaging affords implicit communication), but most affordances are found at the both sites.

Media Choices

Based on the above affordances, participants at both sites made their media choices by considering the communication situations, message content and size, communication styles, cost, and other considerations.

Texting over Calling

Participants selected text messaging instead of voice calling for four major reasons. First, they texted in the following communication situations:

- "when I'm in a setting (e.g., in a class, office, or church) that is inappropriate for phone conversations" (from 14 AP[7]s, and 10 CP[8]s)

- "when I don't want to interrupt people who might be busy, sleeping, or at work" (from 3 APs and 2 CPs)

- "when I don't want other people to hear what I am saying on the phone." (from 1 AP and 2 CPs)

[7] AP: American Participant.

[8] CP: Chinese participant.

Second, message content decides the media. Participants texted when the message was a short one and when they needed a quick response (from 8 APs and 3 CPs). Some people said they would text when the topic was not important (from 3 CPs).

Third, the implicit communication style was one of the big reasons that people texted instead of calling. Participants listed the following social reasons for texting: avoiding lengthy phone conversation (from 6 APs), saying something implicitly (from 4 CPs), sharing feelings and showing care (from 2 APs), avoiding confrontation (from 2 APs), using text messages as an ice-breaker (from 2 CPs), and staying in contact without being abrupt (from 1 CP).

Fourth, people texted for cost consideration: to save minutes or save the cost of long distance phone calls (from 4 APs and 2 CPs).

Texting over Emailing

Participants chose text messaging over emailing depending on communication situations and message content.

Participants at both sites listed the following situations where they would text:

- "when I'm not around a computer" (from 11 APs and 11 CPs)
- "when I want them to get the message immediately or need an instant response" (from 6 APs and 6 CPs)

- “when I’m mobile” (from 2 APs and 1 CP)

- “too busy to start up the computer” (from 1 AP)

The second consideration was message size and content. They texted when the message was short (from 4 APs and 4 CPs) or when the topic was about everyday life (from 1 CP).

It is interesting to note that 3 APs said that they always chose texting over emailing as long as they had the other party’s cell phone numbers. In contrast, 4 CPs said they only texted as they did not own computers, did not use email, or were not used to emailing people.

Texting over IMing

The decision of choosing texting over IMing was primarily based on communication situations. Participants went for texting in the following situations:

- “when I’m not around a computer” (from 17 APs and 6 CPs)

- “when my friends and / or I am not online” (from 4 APs and 10 CPs)

- “when I want them to get the message immediately or need an instant response” (from 2 APs and 2 CPs)

- “when I don’t have time to go online” (from 1 AP and 1 CP)

Three Chinese participants said that they did not use instant messaging because they did not own computers or because they did not like instant messaging.

Comparing three use scenarios, communication situations seemed to be the most important factor for participants who chose text messaging over other communication means.

Considering the affordances of text messaging and daily media choices, 14 of 19 American participants and 14 of 22 Chinese participants thought mobile text messaging was important for their daily lives. To further explain the importance of this issue, some of the users stated the following:

"*I use it all the time." (from 4 APs)*

"*It's my form of communication." (from 4 APs)*

"*My No.2 means of communication, after AIM." (from 1 AP)*

"*It is part of my life." (from 2 CPs)*

"*It is an indispensable means of communication in my life." (from 2 CPs)*

"*It helps me accomplish many important things in my life." (from 1 CP)*

5 American participants and 7 Chinese participants felt that mobile text messaging was ok to them. They commented as below:

"*I do it just for fun." (from 1 AP and 2 CPs)*

"I have other means of communication such as QQ, MSN messenger, and email in addition to SMS."(from 1 CP)

"Typing takes very long." (from 1 AP)

"I can live without it." (from 1 AP)

"Making a phone call is more convenient." (from 1 CP)

Expectations

Participants expected to see improvements for messaging technologies in the following areas: the application, hardware, service network, and market penetration.

Most of the suggestions concerned the messaging application (53%, n=57) from the American site and 37% (n=90) from the Chinese site. People wanted easier inputting methods. Other suggestions included increasing the text size of messages, using voice-activated inputting, allowing easy access to most used punctuations and smileys, or generally improving these interfaces. They would also like to see the incorporation of email functions such as auto reply, auto save, and spell check. A final suggestion was to include functions such as scroll bars or popups to view longer messages,

Chinese participants wanted more improvements made to the service network, accounting for 58% of their total suggestions. First, participants wanted text messaging to get

cheaper. Second, they wanted smooth text communication across networks including the same pricing structure. In addition, they wanted voice messaging, better reception, and fewer spam messages. For Americans, 25% of them made suggestions regarding the service network. They also wanted a cheaper pricing structure and better reception.

A few expectations concerned the hardware. Participants wanted phones to have greater memory stores to hold more messages. Some wanted their phones' keypads to be sturdier for frequent texting tasks.

The penetration rate of text messaging was a concern for some participants (14% of suggestions from the American site). They said they wanted more people to know how to use their text messaging features on their phones, they wanted their friends to have this feature in their cell phone packages, and they wanted more people to have cell phones (as did 3% of the Chinese participants).

Site Comparison

At first glance, there is not much site difference in the participants' perceptions of text messaging technology. Participants agreed on the instrumental affordances and social affordances of the technology across sites; they made their media choices in a similar way; and they shared interpretations of what this technology meant to their lives.

A closer look shows that there are still slight site differences in regards to how participants at the two sites considered the social affordances and how they interpreted this technology.

In the case of choosing texting over calling, American participants mentioned social affordances such as avoiding lengthy phone conversations and avoiding confrontation. They chose this technology because it afforded them *not to do* something in specific communication situations. On the contrary, a few Chinese participants stated explicitly that they just liked the implicit communication style of text messaging, and they chose texting because it afforded them *to do* something in specific communication situations. One Chinese participant said it this way: “I feel it is more effective to convey some meanings by texting than by speaking directly.” This difference can be interpreted by the collectivist culture and high-context communication style of China, which will be discussed in detail in later sections.

When discussing the importance of text messaging in their lives, some American participants said that it was important as they used it all the time, while a few Chinese participants further claimed that text messaging was part of their lives. Clearly, we see a stronger emotional attachment to text messaging from Chinese participants, which might be related to both the wide use of texting technology and the underdevelopment situation of other communication technologies (e.g., emails and instant messaging) in China.

Texting in Action

Now the most intriguing questions are: What was happening when participants texted at the field sites? When and where did this messaging practice occur? Who did they text to? What did they text about?

How many? Where? Who? When?

Table 4.5 provides an overview of messages logged in the diary study[9]. Over a period of four days, the Chinese participants sent more text messages and texted to more people than American participants did, but the number of different texting contexts were similar across sites.

Sites	# of segments	# of messages	average daily messages per person	logged places per person	logged people per person
US	942	813	10.48	5.79	5.47
CN	1924	1661	18.79	6.59	10.05

Table 4.5 Overview of Logged Messages

How Many? American participants logged six to 110 messages in their workbooks for the whole period of the diary study. The median value was 39. The person with the highest volume of exchanged messages had 47 messages on his peak day. The participant

[9] Not all participants logged and recorded messages for 4 days. 2 APs and 1 CP logged 5 days of messages. One AP lost the first two days of messages because they were purged before she recorded the messages due to the limited size of her phone's memory.

[10] In all the chats examples, names and places are modified.

with the smallest number of messages logged only six messages, falling in two days. He explained that one of the other two days he did not text was a weekend day and thus he called people instead of texting with his plan of free weekend minutes. At the Chinese site, participants logged 34 to 199 messages. The median value was 63. The participant who sent the most messages exchanged 63 on her peak day.

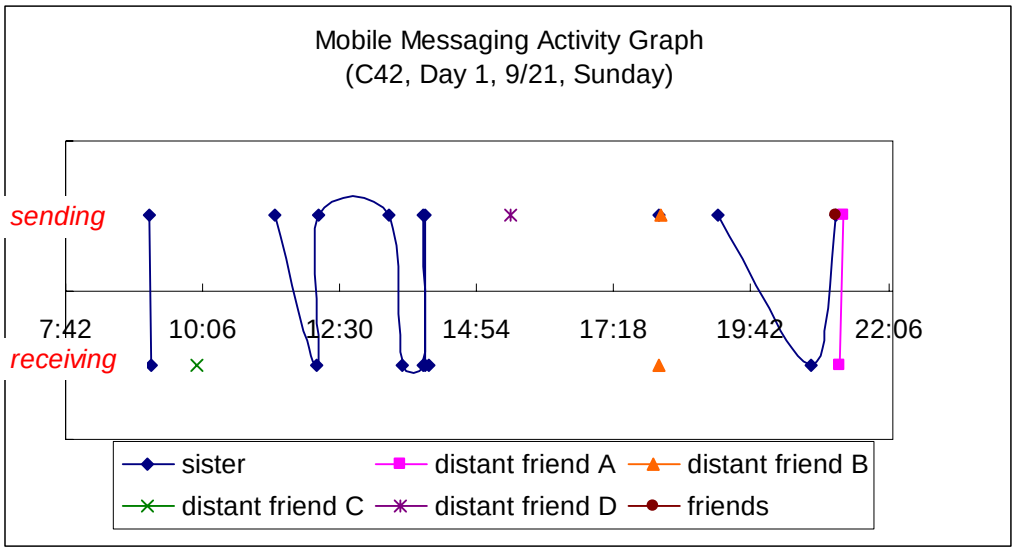
Where? Participants texted in various environments: in a class, at their home, in their dorm, in the gym, in the car, on the bus, at the bus stop, in a bar, at a restaurant, on the streets and so on. The largest percentage of text messages was sent in places like classrooms and dorms, not while the participants were on the go. So mobile text messaging is not really mobile for those participants. Participants chose text messaging more because it was available any time and anywhere, but not because it was mobile. The participants validated this when so few of them mentioned the affordance of being mobile.

Both American and Chinese participants texted in a similar number of places during the four-day period. This shows that for this user group, text messaging was used in a similar way at both sites in terms of localities.

Who? Participants texted to friends, lovers, classmates, colleagues, coworkers, and relatives. Most messages were sent to friends and lovers. As the penetration rate of text messaging is very high in China, it was not surprising to see that the number of people

that Chinese participants texted to was double the number for the American site. At the same time, this result relates to the survey finding showing that Chinese participants ranked staying in contact with friends or loved ones as their top texting purpose, while this purpose was ranked only 7th at the American site.

When? Participants texted as communication needs arised. Figure 4.3 illustrates a typical temporal pattern among participants: they might text to different people throughout the day, and then they might have only two or three quick exchanges on the second day. These two charts also show that a large percentage of text messages were two-way communication, a text conversation between two people.



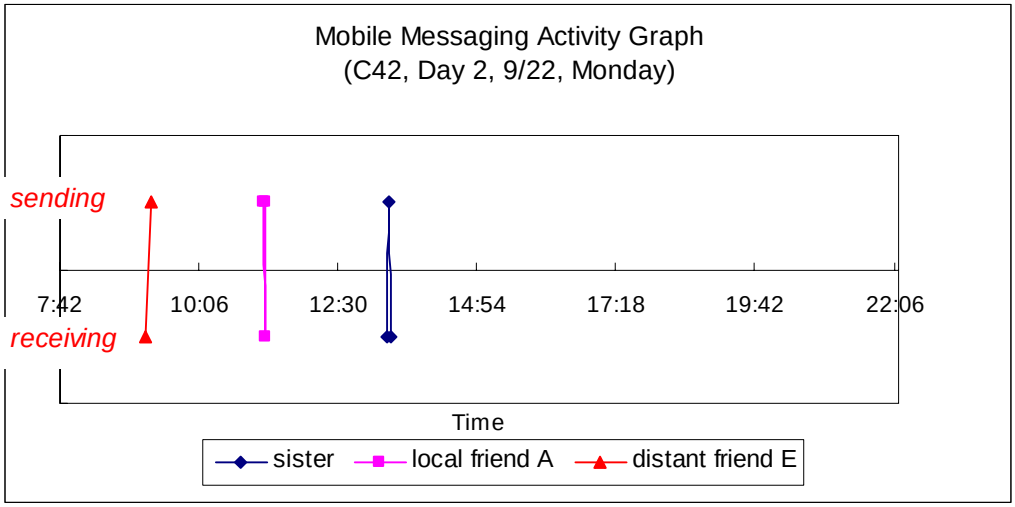


Figure 4.3 Typical Temporal Pattern

Sometimes temporal patterns of messaging activities were affected by the participants' wireless plans. Some participants had unlimited weekend minutes for phone calls. Under this condition, they might not text at all. Two American participants did not text on the weekend during the diary study.

Temporal patterns of messaging activities were also influenced by the participants' work schedules. In the case of L17, he only texted at night; he was so busy with work in the daytime that he had no time for texting (see Figure 4.4), but it looks like he was texting about his work at night on Day 3. In contrast, V20 (see Chapter 6) only texted during working hours because she felt that text messaging is a way for her to balance her work

and life.

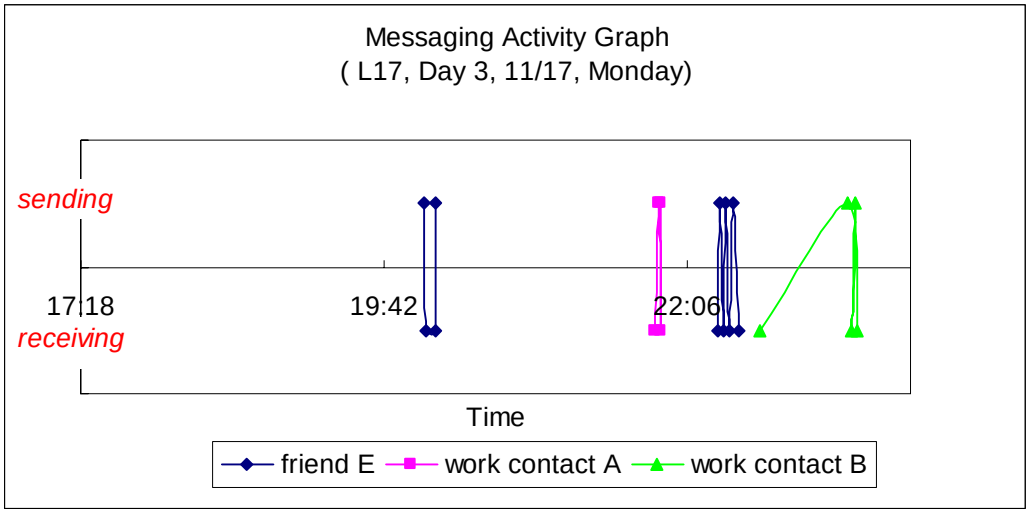


Figure 4.4 Temporal Pattern: Texting at a specific time period

What about?

To understand socially-situated digital literacy practices, the text messages were coded into two dimensions: rhetorical purposes and life spheres (see Chapter 3). I want to investigate what rhetorical purposes participants wanted to accomplish with text messaging and in what life spheres text messaging was situated.

Overall, a verbal data analysis of 2866 message segments suggested that there were different patterns of use between American and Chinese participants concerning the content areas and purposes of these messages. The data distributed at the sites over the two coding schemes (life spheres and rhetorical purposes) were significantly different from one another as measured by the Chi-square analyses. For life spheres, the sum of the

Chi-squares was 19 with 4 degrees of freedom and p at < 0.001. For rhetorical purposes, the sum of the Chi-squares was 38.33 with 6 degrees of freedom and p at < 0.001.

Notably, the numbers of categories for the life spheres differed in the illustrations of the overall pattern and individual case patterns. In the following description of overall patterns across sites, I aggregated the categories of work and school into a single category (work/school). Without aggregation, the overall pattern of life spheres shows that there were 2.5% more Chinese messages in the school life sphere and 2.4% more American messages in the work life sphere. However, the overall messaging patterns conflict with individual case patterns as there are actually more work-related messages in Chinese individual cases. Mainly the different proportions of students and professionals caused this contradiction. There were 26.3% professionals in the American sample and only 18.2% in the Chinese sample, and therefore there were a higher percentage of work-related messages from the American sample at the site level. To eliminate the proportion's skew, I combined those two categories, as my purpose here is mainly to distinguish work, leisure, and family relationships across groups of students and professionals. On the other hand, it is necessary to keep two separate categories at the individual case level because many student participants had distinctive life spheres of work and school. For the aggregated categories on the site level, the Chi-square analysis indicates a significance at the p< 0.05 level with 8.47.

The coding dimensions of life spheres and rhetorical purposes draw a big picture of messaging use from two angles:

- Text messaging was primarily used to augment the participants' activities and relationships in their personal life spheres across sites. Using messaging for business-related discussions accounted for only a very small percentage.
- American and Chinese participants employed text messaging to accomplish different rhetorical purposes. American messages were sent primarily for expressing feelings and sharing current experiences. Chinese messages were sent to exchange information and initiate actions such as instructing and coordinating.

Table 4.6 and Figure 4.5 shows that the use of messaging technology was not balanced across the different life spheres. The majority of American (76.2%) and Chinese (76.6%) messages fell into the life sphere of "personal leisure other than with family." Messages of this life sphere were about relationship work with friends or lovers, activities that occurred in circles of friends or lovers, and social rules within these circles. About one fifth of text messages from both sites occurred in the life sphere of work/school. A smaller portion of messages was devoted to the family life sphere. Overall, text messaging was used primarily for private life issues (including personal and family life spheres) rather than for business activities.

It is striking that there is a close resemblance across sites. Concerning the personal life sphere and the work/school life sphere, the percentages were very close at both sites. The major difference seems to come from the family dimension, where American participants exchanged a higher percentage of messages, in contrast to our cultural perceptions. We tend to think people in Asian cultures have closer family bonds than those in Western cultures. It is uncertain to what level this pattern is representative of the general trend at the American site, as this high percentage might be indicative of the texting practices of one American participant who primarily used text messaging as a way of maintaining contact with her sister.

	personal	work/school	family	other	Total
US	76.2%	17.9%	5.1%	0.7%	100.0%
CN	76.6%	18.1%	3.5%	1.8%	100.0%

Table 4.6 Comparison of Life Spheres across Sites

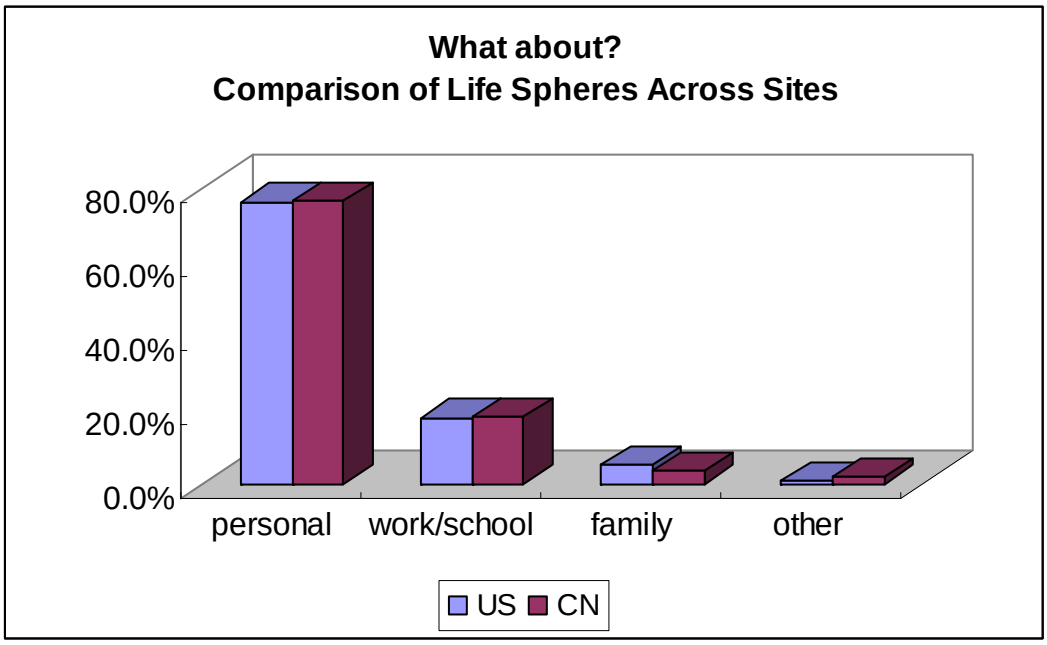


Figure 4.5 What About: Life Spheres

Though text messaging was incorporated in frequent user's lives in a similar way with a close resemblance on the life spheres across sites, participants used the same technology to achieve different communicative goals in their local contexts (see Table 4.7 and Figure 4.6).

	expressing	informing	co-experiencing	instructing	coordinating	switching	other	Total
US	33.1%	26.2%	19.3%	11.9%	7.2%	1.8%	0.4%	100.0%
CN	25.6%	31.6%	16.8%	16.5%	8.4%	0.7%	0.4%	100.0%

Table 4.7 Comparison of Rhetorical Purposes across Sites

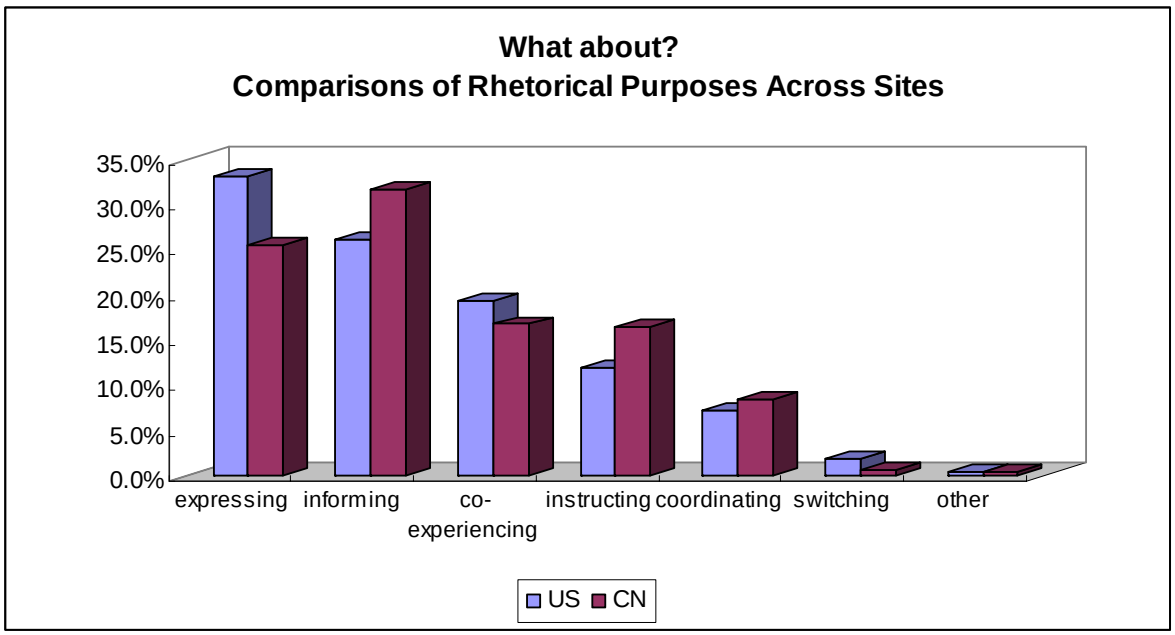


Figure 4.6 What About: Rhetorical Purposes

At the American site, a higher percentage of text messages were exchanged for emotion-related purposes such as expressing (33.1% vs. 25.6% at the Chinese site) and co-experiencing (19.3% vs. 16.8% at the Chinese site). For detail, please go to Chapter 6 for a detailed discussion of a representative case in which an American participant sent a lot of messages with emotion-related purposes. Messages for expressing purposes include greetings, compliments, love messages, wishes, encouragement, joking around, complaints, expression of neutral feelings and agreement, and onomatopoeias. For example:

- "Hey!" (Greetings)
- "THAT GRADE IS AWSOME!" (A compliment)
- "LUV YA ANNA! :O)" (Showing love and care to a close friend)

- “awesome opportunity for you..take it...i believe in you” (Encouragement.)
- “Arrrgh” (A complaint)
- “NOther (Another)?...who is the coolest m-cat in the world? :-[” (Funny chat)
- “cool good things.” (Agreement)
- “mmfff.” (Conveying unhappiness)

Messages concerning the co-experiencing purpose are intended to share the current status or experiences with another party. These messages describe what is happening in a real or mediated environment (e.g., TV). They can also be used to ask the other party what s/he is doing:

- “On my way home!”
- “I just bought more really cute clothes.”
- “There is a guy here dressed like Reno 911, the guy w (with) the short shorts.” (a short report from the Halloween party)
- “What u (you) doin (doing)”

American participants (1.8%) sent more text messages for the switching purpose than Chinese participants did (0.7%). Messages with a switching purpose include those

messages suggesting switching the current conversation to another medium, as well as messages ending the current conversation in favor of another one in the future. This is typically done when it is no longer convenient to conduct the conversation using the current medium. For example:

- “Wil (will) cal (call) u (you) in 2”
- “TTYL (Talk to you later)”

At the Chinese site, a higher percentage of text messages were exchanged for the informing purpose (31.6% vs. 26.2% at the American site) and action-related purposes (such as instructing 16.5% vs. 11.9% at the American site and coordinating 8.4% vs. 7.2% at the American site). Chapter 7 discusses a representative case in which a Chinese participant sent a lot of messages with informing purpose.

Messages in the informing purpose category are meant to inform the parties about an event and to share such information that the two parties or just the receiver would find interesting. For example, messages inquiring about a person, an object, a plan or an event that is not related to coordinating tasks, messages informing the receiver about follow-up actions, those making an announcement, those keeping the other party apprised of a current situation; and ads, subscribed-to information alerts, and system messages from carriers. For example:

- “Why he needs surgery?” (Inquiring)

- “Zhe ge xing qi wo yao hui qu, dao shi zai da dian hua gei ni. (I’m going home this week, and I will call you then.)” (Informing about follow-up actions)

- “Gao su ni wo ke neng qu bei jing shi xi. (Telling you that I might go to Beijing for an internship.)” (Announcement)

- “Lao da zai jiao shi. (The instructor is in the classroom).”

- “Mei guo IPM dian nao ji tuan gong si , wei ji nian lian he guo ri , te yi zai zhong guo da lu ju hang SIM ka chou jiang huo dong , gong xi nin zhong er deng jiang . qing yu jiang xiao jie lian xi, 131758***. (To celebrate the United Nation Day, the American IPM Corporations had a lottery for SIM cards. You won the second prize. Congratulations! Please contact Miss Jiang, 131758***.)” (Ad)

- “V. FORECAST: AUBURN SUN: 74/56 M SUNNY *MON: 73/60 PM SHOWERS *TUE 67/50 FEW SHOWERS (by TWC).” (Subscribed info alerts)

- “Nin dang qian yi chan sheng hua fei 29.90, dang qian yi you hui hua fei 24.20, dang qian ying jiao fei yong he ji 5.70, yu e 27.37. (Your current phone cost is 29.90, you have saved 24.20, and you need to pay 5.70. Your balance is 27.37.) ” (System message)

Messages with instructing purposes are used to ask the recipient to help accomplish a task as follows:

- “If i cant get to the office for my check next week, could you get it for me?” (Asking for a favor)

- “Chu qu zou zou o? (How about having a walk outside?)” (Proposing an agenda)

- “Xi hao lian xi hao jiao, jiu yao shang chuang shui jiao le. (Wash your face and feet, and it’s time for bed.)” (Reminding the recipient to do something)

- “Yao shi huo bu xia qu, wo zhe xia ge yue ke yi jie ni qian. (If you are broke, I could lend you some money.)” (Offering help)

- “Ming tian wo nv peng you sheng ri, zui hao jiu shi zhe ge xing qi san guo lai, da jia yi qi chi fan. (It will be my girlfriend’s birthday tomorrow. You’d better come over this Wednesday. Let’s have dinner together.)” (Inviting)

Messages with coordinating purposes are used to coordinate an activity, including the time, location, and people, as well as the follow-up activities concerning the tasks and events:

- “Dinner?”

- “Where do ya wanna go?”

- “I think we are going at 715.”

- “Can my mom go with me?”

- “Xian deng wo guo lai ba. (Wait for me there first.)”

Discussion

Affordances and Various Personal Uses

Findings across the sites suggest that the current use of mobile messaging technology arose out of the structured affordances—instrumental and social—of this technology.

The fieldwork shows that text messaging was a technology used for personal communication rather than business communication across sites. Most text messages occurred in the personal and family life spheres, and only less than one fifth of all messages were in the work/school sphere. This use scenario is a result of the combined affordances of the technology perceived by participants. As users interacted with instrumental affordances (e.g., silent, quick, and direct communication; discrete action; delayed responses) built into the mobile messaging technology through design to accomplish daily communication activities situated in context, social affordances (e.g., staying in contact in an unobtrusive way and expressing feelings and sharing support any time and anywhere) emerged through use and afforded particular social-cultural practices surrounding the activities. From these patterns of use, the instrumental affordances of mobile messaging technology support personal communication tasks in particular

situations very well. The social affordances of mobile text messaging fill personal communication gaps other technologies are unable to complete. Thus, various uses of this technology in the personal life sphere were found in fieldwork. Participants used the technology to stay in touch with old friends at a distance, to connect with family members, to socialize with new acquaintances introduced to them by friends, to coordinate schedules, to exchange sports reviews late at night, to look for people in the library, to amuse and cheer up friends, and so on.

Participants adopted text messaging as it fit within their lifestyles and their local IT ecology. They constantly made media choices from a range of communication technologies selecting the one they felt fits best for a particular communication situation and their audience. Text messaging was never the only communication technology participants used to augment their life and work. The patterns of mobile messaging use should be understood and interpreted in a web of different technologies situated in local contexts. The fieldwork found that participants had developed sophisticated strategies to use different technologies for different audiences. Some participants mapped different people into an imaginary “communication matrix.” For others, they did this without being aware of. Text messaging was just a particular way for participants to communicate to a particular group of people in their lives.

The adoption of text messaging can be also understood with the approach of uses and gratification (Wei & Lo, 2003). This approach assumes that the audience actively selects

and uses its media, and that how individual audience members employ these media depends on their social and psychological needs as well as gratification-seeking motives. Here, the social and psychological needs are similar to affordances discussed in this project. However, this approach explores user motives mostly via questionnaire-based surveys, and thus the rich contextual data are often filtered out in this format of data collection.

Participants acknowledged the social affordances of mobile text messaging technology. In the survey, they ranked social-related purposes as their top reasons to participate in text messaging and mentioned how they loved the social affordance of the technology:

- *"It's like you get a little greeting card in the mail every day. It's nice to know you thought of someone that made you laugh."*
- *"It's fun to get a message. Like the movie, 'You've got mail.' It is always a surprise."*
- *"It's a very beautiful thing to communicate with people using text messaging."*

The affordances of this technology not only afforded uses but also constrained uses. For example, the affordance of being convenient comes from the small size of the cell phone, which usually only has a keypad for inputting, a small screen for reading, and a limited memory for holding messages. For some participants, it was fun and challenging to

compose and input interesting texts on a small keypad. For others, the inputting process was tedious and even annoying after a while.

The participants' patterns of use evolved through time. Some participants increased their use by becoming more proficient at thumb typing. Some high-volume participants reduced their uses after the novelty wore off. Cost is another reason that participants reduced their use of this technology. In some cases, when the affordance of low cost disappeared as carriers discontinued their promotional text plans, participants changed their patterns. In other situations, when another technology was introduced into the local IT ecology, the old balance would be tipped and changes of use occurred. One Chinese participant said she sent fewer messages to her coworkers as she started to communicate with them via email. For all participants who reduced their use during the study, they said they would keep text messaging as long as they had cell phones.

The various personal uses of mobile messaging actually depart from the intended use of the original design. Chapter 1 describes how mobile text messaging was designed, introduced, and marketed as a business technology. There is a large gap between the intended use and the actual uses, as most of the actual uses fell within the private life sphere. This might be beyond the designer's thoughts, but it is a logical assumption considering the affordances of the technology. We might want to ask: What kinds of business tasks do the affordances of mobile text messaging best support in context? How do these affordances work for situated activities in context? Do people have to rely on

affordances such as quick and direct communication of mobile messaging to accomplish business tasks when they can use other available communication technologies? Affordances emerge from these contexts and are realized within these contexts. We cannot just focus on affordances and forget the users' contexts when designing a technology.

Unfortunately, some manufacturers and wireless carriers still seem to stick to the intended use of this technology and ignore other possibilities. The gap between intended use and real use causes usability problems. For example, the input for emotional-related messages is not supported well. This caused one participant to have a hard time entering an exclamation mark to show her emotions in text messages.

Gender Differences

The social affordances of the messaging technology seemed more aligned with female communication styles and were in fact more appealing to female participants. Female participants used text messaging more than males, and they loved text messaging more. Some female participants claimed "text messaging is my form of communication." One male participant commented this way: "If you see a boy pressing phone keys all the time, he must be playing games. If a girl is doing the same thing, she must be sending messages."

Even though two thirds of participants are female users, clearly there were gender differences of mobile text messaging technology across sites. Figure 4.7 shows that female participants tend to send more text messages with emotion-related purposes (expressing and co-experiencing) than their male peers. Male participants tend to send more text messages for task-related communication (as shown from the higher percentage of messages for purposes of informing, instructing, coordinating, and switching). This pattern corresponds to Tannen's findings: Women communicate for "rapport talk," and men communicate for "report talk" (1990).

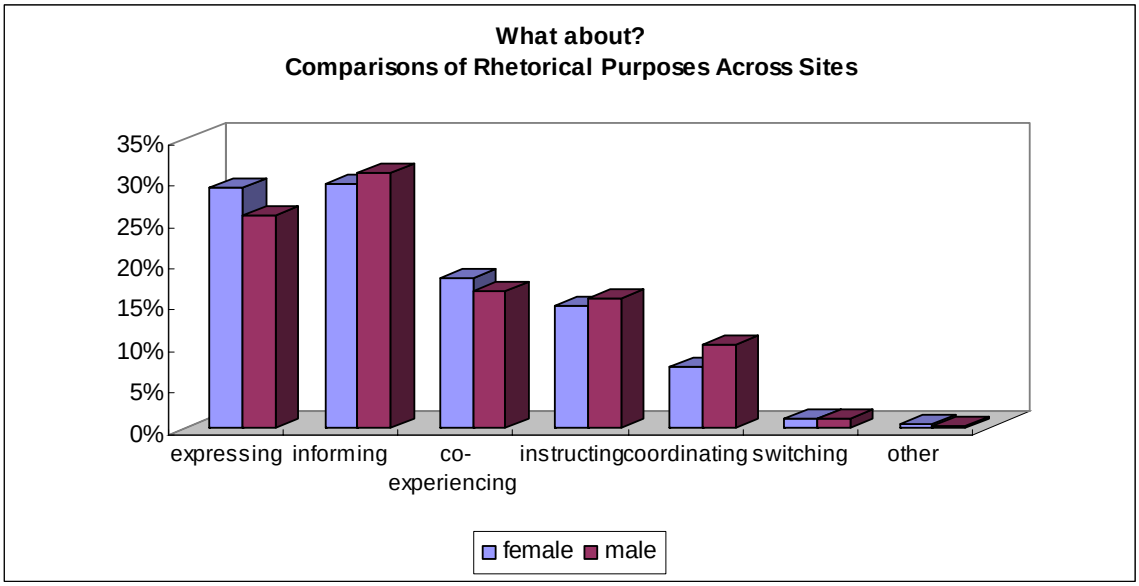


Figure 4.7 Gender Difference of Messaging Purposes

The emotional attachment that female participants had for mobile text messaging should be understood in a historical context. At the time when cell phones were still regarded as "a status symbol," a Gallup report (Gallup Organization, 1991) found that more women

(82%) agreed that cell phones helped their personal lives than men (72%). Researchers noticed that cell phones helped middle-class women creatively manage their responsibilities for home and children by providing "remote mothering" assistance and facilitating "parallel shift" between job and home (Rakow & Navarro, 1993). The emergence of short text messaging service provides more possibilities for female users. The survey commissioned by an American wireless carrier announces that 87% of 30-40 year-old women said that text messaging would help them improve their personal and business communications (m-Travel, 2002). In Europe, where mobile text messaging is more popular, a recent study shows that female users in the age group of 12 to 25 are apparently more enthusiastic about using SMS as a means of communication than male users (Peters et al, 2003).

Emerging Genres: Generic Patterns of Mobile Text Messages

The various uses of mobile messaging take on different genre patterns as they interact with local contexts. Below are some genre differences between the sites.

Social Motive: Having Fun vs. Staying in Contact

American participants used this technology mostly to have fun conversations with friends. Participants were interested in sending fun messages to show that they cared for the recipient. Some participants even utilized popular slang to create humor in messages. In contrast, Chinese participants liked to stay in contact with new, old, local, distant, offline,

and online friends. They valued this social affordance and ranked it as their top purpose for text messaging.

Rhetorical Purpose: Expressing vs. Informing and Instructing

A bigger percentage of American text messages have emotion-related purposes. Participants sent higher percentages of text messages to express their feelings and shared moment-by-moment experiences. In comparison, Chinese participants sent more messages to inform and to instruct about a variety of daily tasks.

Chat Pattern: Small Talk vs. In-Depth Conversation

American chats were usually short. A majority of messages can be regarded as small talk (as used during voice calls) in which participants had quick exchanges updating each other about their life (e.g., “watching TV”) and other minute life details. In comparison, long chats exchanged between friends were very common in Chinese message logs. Participants usually had more in-depth conversations over various topics, and thus a greater percentage of Chinese messages had informing purposes than American messages did.

Text Feature: Shorthand vs. No Shorthand

A distinctive linguistic pattern for Latin language-based text messages is its wide use of shorthand. To reduce text entry load, users developed a shorthand system to represent different words with numbers and abbreviations based on sounds. For example, “l8er”

means “later,” “n” means “and,” “b4” is “before,” “k” means “OK,” etc. This shorthand is so popular that almost every person who texts uses shorthand in his/her messages; nearly all American participants employed shorthand in their text messages. In comparison, Chinese, as a script language, does not have such an affordance, and so the use of shorthand in Chinese messages was very rare. One user typed “88” in her message logs (which stands for bye-bye, a Latin word).

Communication Style: Casual vs. a Hybrid of Casual and Formal

Text messaging was a casual means of communication at the American site. It was used mostly for small talk between peers and close friends, primarily for having fun, coordinating plans, and connecting to each other. In comparison, text messaging at the Chinese site was used for more than just a casual conversation. It was a hybrid genre for both casual and formal communication. Participants would send messages for fun, but they also texted more for formal tasks and texted to people other than their peers. For example, students texted their teachers for sick leave, and a bride texted to her friends for wedding invitations.

Genre theory suggests a new genre usually evolves from an old genre, or its predecessor. The use difference at two sites is related to different predecessors in two local contexts. At the American site, the predecessor for mobile text messaging was instant messaging. With the user model of instant messaging in mind, participants regarded mobile text messaging as casual conversation which was not appropriate for formal communication.

At the Chinese site, instant messaging was not the predecessor of mobile text messaging as many participants adopted these two technologies almost at the same time. With a strong written tradition in China, Chinese participants interpreted text messaging as a written genre which has a formal status.

Interactions between Uses and Contexts

These genre differences record the dynamic interactions between various use activities and local cultural and technological contexts. Combined with the data from the survey, open-ended questionnaire, interview, and observation, they illustrate how mobile messaging technology mediates different social practices in different contexts. In the following section, I will discuss interactions and mediations from the angle of immediate contexts and broad socio-cultural contexts within the framework of cultural usability in a general and overarching fashion. More detailed explorations on these interactions based on individual cases can be found in Chapters 5-7.

Factors from Immediate Contexts

To compare and contrast across cases, here I approach immediate contextual factors primarily on the aspect of the local technological systems. In some ways, my discussion here is detached from the concrete use activities as it is impossible to generalize 41 individual cases. The discussion below should be regarded as a backdrop for understanding various use activities in their local contexts.

The local IT infrastructure affected the use of mobile messaging. First, as illustrated in Figure 4.2, most American participants have had a wide range of communication technologies available to them. Because of a higher penetration rate, American participants had more access to computers, the Internet, email, and instant messaging. For quick communication, American participants had a choice of which media to select, accomplishing the same purpose without having to bang away on a phone keypad. In contrast, the technologies that were available to most Chinese participants were mobile messaging and wireless phones. In that situation, participants often chose mobile messaging to initiate actions and inform other people to coordinate and manage their daily tasks. Since text messaging has a high penetration rate at the Chinese site, it was more convenient for participants to use text messaging to contact people for various work and personal activities.

The following conversation[10] illustrates how a Chinese user tried various communication technologies to contact friends and accomplish tasks. Friend A wants the participant to help her find Ling to borrow a large sum of money. She emailed Ling before, but did not receive a response. So she texted the participant for help. Fortunately the participant caught Ling on MSN messenger right away.

Time	Sender	Message Text	Place[11]

[11] "Place" refers to where the participant received a message.

9:43 AM	friend A	bang wo lian xi Ling, wo you ji shi zhao ta (Please help me contact Ling. I have something urgent.)	office
9:44 AM	participant	wo ye zhi you ta de MSN, ni hen ji ma? Gei ta fa Email hao le (I only have her MSN account, are you urgent? Just send her an email.)	office
9:45 AM	friend A	wo gei ta fa you jian ta dou bu hui. wo you ji shi zhao ta, ni zai MSN shang kan dao ta, jiao ta gen wo lian xi (She never replies to my email. I have something urgent, if you see her on MSN, please ask her to contact me.)	office
9:49 AM	participant	hao de. ta gang shang xian, wo ba ni de shou ji gei ta le (Sure. She just came online, and I gave her your cell phone number.)	office
10:02 AM	friend A	wo que qian, fang zi yi shi mai bu diao, ni bang wo zhuan gao kan kan ta na li neng fou jie wo 5wan, 4wan ye hang, ming nian kai chun huan ta. (I need money. My condo can't be sold right away. Please ask her whether she could lend me 50K, 40K is also ok, I will return it to her the coming spring.)	office
10:02 AM	participant	wo gen ta shuo le, ta jiao ni bie ji, ta wan xie shi hou chu qu mai dian hua ka gei ni dian hua.	office

		(I just forwarded this to her. She wanted you not to be anxious, and she will go to buy the phone card later and call you.)	
10:04 AM	friend A	ni jiao ta ba you xiang qing kong, wo jia dian hua ******, wo zai jia li deng ta. (Please ask her to empty her email box. My home phone number is ******, and I'll be waiting for her call at home.)	office
10:05 AM	participant	hao le, ni qu shen qing le MSN ba. ta zai shang mian, wo zuo shi le, 88. (Well, you should apply for an MSN account. She is there online, and I need to go back to my work, bye-bye.)	office
10:06 AM	friend A	en, hao de, ma fan ni le. (En, well, thank you.)	office

Other than the issue of trial and error of various communication channels between friends, this text conversation also shows how deeply the texting technology is embedded into ordinary people's lives. Chinese participants chatted about such varied topics as borrowing money, buying a house, reviewing sports games, sending gifts, and so on.

On the other hand, most of the chats found in the American data were "small talk" — as some of the American participants defined it — in which people had quick exchanges about what was going on. Text messaging was used more for conveying these users' care

and feelings as in the following two examples, where there is a higher percentage of messages involving purposes of expressing and co-experiencing.

Time	Sender	Message Text	Place
8:10 PM	friend	Hey, What are you up to?	dorm
9:10 PM	participant	Watchin (watching) friends u (you)?	dorm
9:12 PM	friend	Just got out of work and getting something to eat	dorm
9:15 PM	participant	Liz n i [and I] made piza [pizza] on english mufins	dorm
9:15 PM	friend	sound's good	dorm

Time	Sender	Message Text	Place
5:53 PM	participant	Rise and shine sweetheart	driving
6:31 PM	boyfriend	Evenin (evening) hun (honey)	work
7:12 PM	participant	Iam at my aunts party--where are you this evening	party

It is interesting to see how participants' experiences with instant messaging influenced their experiences with mobile messaging. Most American participants had used Instant Messaging for a few years before they adopted text messaging. During the interviews, I found the conceptual model of instant messaging was so deeply rooted in some of them that they kept comparing mobile messaging to instant messaging. The frequent comparison often leads to one conclusion: Mobile messaging is just instant messaging

without computers but not as easy to use. During their daily use, they tended to reserve longer conversations for instant messenger. In contrast, most Chinese participants started using mobile messaging and instant messaging at the same time (some of them had never used IM before the study), and they did not have a conceptual model of instant messaging when they started using text messaging. Furthermore, for most of them, the Internet was not as easy to access as the cell phone was. Participants tended to regard them as two parallel technologies and seldom combined them during these interviews.

Second, the structure of cell phone plans affected the use of text messaging. This is part of the affordances from the service network. As described in Chapter 3, phone minutes and text rates were calculated differently at the two sites. At the American site, participants usually had phone plans with free night and weekend minutes along with monthly minute allowances, making it sometimes cheaper to call than to text. At the Chinese site, participant's phone plans usually did not include free phone minutes but had discounted text packages. Therefore, some people thought texting saves money.

Third, the stage of adoption affected use. According to Rogers (1995), technology adoption usually goes through five stages: innovators, early adopters, early majority, late majority, and laggards. The American site was still at the stage of early adopters, so it had not reached a critical mass for text messaging. However, the Chinese site was at the stage of early majority, and it had already reached the critical mass. Participants at the American site usually went through an adoption moment triggered by a series of events.

Even after they adopted the technology, they found themselves in a situation where they did not have many people to text to. Chinese participants usually took the adoption of this technology for granted, and it was exciting for them to join in such a large circle of texters.

Factors from Cultural Contexts

Local cultural differences defined technology use in another way. First, the social affordance of implicit communication from text messaging is more appealing to people in a high-context culture than to people in a low-context culture. In a high-context culture, people do not state everything explicitly; a large amount of information is conveyed by the context in which it is stated. Quite a few Chinese participants stated in questionnaires and interviews that they liked this affordance of implicit and reserved communication. One participant said she felt this affordance was particularly good for Asian people to express their feelings in a reserved way. “Without text messaging, I would not have been able to come closer to my husband and marry him.” They started dating after texting on their cell phones and exchanged a hundred text messages per day during their heaviest period. Another participant said text messaging reminded her of an old Chinese saying: “The friendship between gentlemen appears indifferent but is pure like water (Jun zi zhi jiao dan ru shui).” Text messaging was mild and enduring for her. In contrast, I did not see the same appreciation for the implicit style from American participants in the interviews or questionnaires.

On the other hand, as a high amount of American text messages were exchanged for expressing feelings, American participants had their actual use value as the implicit affordance. It is also interesting to see how feelings were expressed differently at the two sites. In the example below, two American female participants sent messages to their girl friends. Care and feelings were conveyed in a direct and effusive way, which Asian people would seldom do this way. This cultural difference is another angle to explain why we see a higher percentage of emotion-related messages at the American site.

"HOW R THINGS @ THE APT? MISS U ALL! SAY HI 2 THE GIRLS! MUAH!"

"me and nancy love you"

Second, mobile messaging technology takes on new meanings for identity issues as various use activities unfold and interact with local cultural values. As the study found out, the top texting purpose for Chinese participants was to stay in contact with friends or loved ones. There were a lot of chats between participants and their local, distant, and online friends in the message logs. In those conversations, participants were often engaged in informing-oriented communication. These frequent conversations done to stay in contact were part of the collectivist culture at the Chinese site. In a collectivist culture, relationships are relatively long lasting and individuals feel a deep personal involvement with each other. This long-term relationship orientation is mediated nicely with mobile messaging that allows people to stay in touch in an unobtrusive way.

In contrast, American culture is an individualist culture that does not have a strong orientation towards long-term relationships. The cultural value of individualism shapes the use in another direction. Mobile messaging was primarily regarded as a means for quick exchanges between peers and close friends where fun and amusement for individuals was emphasized.

Below is a typical chat between friends at the Chinese site.

Time	Sender	Message Text	Place
1:17 PM	friend	Yuanyuan ni hao a. Wo shi Zhang Xia. Huai ji de ma? You mei you ba wo wang ji a? (Hey Yuanyuan. I'm Zhang Xia. Do you still remember me? Or have you forgot me?)	Dorm
1:23 PM	participant	Hao jiu mei ni xiao xi le ai. Xian zai hao ma? (I haven't heard from you for a while. How are you doing?)	Dorm
5:27 PM	friend	Yuanyuan, wo shi Zhang Xia ji de ma? Ni gao zhong tong zhuo tong xue, wo zhong wu gei ni fa le xin xi. Ni shou dao mei you ne (Yuanyuan, I'm Zhang Xia. Remember me? I'm your high school classmate who shared a desk with you. I sent you a message at noon. Did you get it)	Dorm
5:46	participant	Wo zhong wu yi jing hui ni le ya. Gang cai zai da dian hua	Dorm

PM		(I replied to you at noon. I was talking on the phone a moment ago)	
5:51 PM	friend	Shi wo mei you shou dao a ni xian zai zen yang a zai na li shang xue a. Wo men hao jiu mei you lian xi la ni de dian hua wo huan shi xiang Ling Gang wen de ne (I didn't get it How are you doing Where are you going to school We haven't contacted each other for quite a long time I got your phone number from Ling Gang)	Dorm
5:54 PM	participant	Wo zai hang zhou . ri zi ma huan hao . wo QQ shi 2*******8, ni zai nan jing o. (I'm in Hangzhou. I'm doing well. My QQ is 2*******8, you are in Nanjing, right?)	Dorm
6:02 PM	friend	Ni zen me zhi dao de , wo shi zai Nanjing. qu nian wo zai Tianjin du le yi nian xian zai you hui dao nan jing du le. wo de qqshi 2*******. (How did you know that? I'm in Nanjing. I went to Tianjin for school for a year, and now I'm back in Nanjin. My qq is 2*******.)	Class
6:12 PM	participant	Deng Lan gao su wo de. Wo xian zai zai shang ke, xia ci liao o. (Deng Lan told me about that. I'm in class, talk to you later.)	Class
6:30	friend	Ni you mei you Wu Dong de dian hua a ni you he ta lian xi ma.	Class

PM		(Do you have Wu Dong's phone number Do you stay in touch with him)	
6:32 PM	participant	Mei you. wo dou mei he ta men lian xi guo. (No. I didn't stay in contact with them.)	Class

In the above example, a participant named Yuanyuan was reconnecting with her old school friend, and they exchanged several messages with an informing purpose. The implicit affordance of text messaging makes this contact less abrupt. The whole conversation took ten turns. The example below is of an American participant who was also reconnecting with her former school friend. After a quick exchange, they decided to switch to a phone conversation.

Time	**Sender**	**Message Text**	**Place**
11:57 AM	friend	Hey! Hows (How's) Albany?	Class
12:00 PM	participant	Urgh – 2 (too) much to type. I'll call U (you)	Class

Third, different representations of mobile messaging technology within local cultures played an important role for its local uses. Mobile text messaging has been regarded as a pushing force for Internet economy in China. A few major Chinese Web portals began to turn a profit after they provided text messaging services three years ago. This huge market success makes text messaging an eye-catching cultural phenomenon celebrated by

the mass media, wireless carriers, phone manufacturers, and even the government. A few Chinese participants mentioned during their interview that at the time they adopted text messaging, text messaging was promoted as a new technology, a new means of communication, and even a new cultural practice that everyone should not miss. It represents the direction of an advanced culture within the Chinese discourse context of "Three Representations[12]."

In comparison, besides TV commercials, the biggest marketing campaign for text messaging at the American site was the texting-to-vote for *American Idol*, a popular talent show on the Fox TV network. Text messaging is primarily seen as a fun and entertaining means of communication.

Fourth, local cultural preferences of literacy or orality furthered the use of mobile text messaging in different directions. With a script-based language and 4000 years of written history, literacy culture is highly valued in China. Text messaging is interpreted as writing rather than as conversation. Participants spoke about how they were attracted to the power of the written communication of text messaging during their interviews. One participant said, "The presentation is totally different when you say the same thing in the written form. You could use more effective words to describe what you experienced, and

[12] Three representations was developed by the former president of the Communist Party of China, Jiang Zenmin. This policy claims that the Party must always represent the requirements of the development of China's advanced productive forces, the orientation of the development of China's advanced culture, and the fundamental interests of the overwhelming majority of the people in China.

the receiver will be impressed by what you wrote. The verbal conversation is blander." Another participant mentioned how she was impressed by the poetic presentation of one text message her friend sent to her. Indeed, the short form of text messages with a 70-character limit has a close resemblance to a classic poetic genre, *ci*, which is used for expressing feelings of the common people and portraying mundane life details. *Ci* reached its peak 1000 years ago, but people continue writing in this genre. As text messaging is recognized as a popular genre, the career of the SMS writer emerged. Some SMS writers even have their own columns on the bigger Web portals. People enjoy circulating good text messages among friends, and dozens of these messages were logged at the Chinese site.

In contrast, at the American site, text messaging was regarded first as orality instead of literacy. Some participant defined it as "a conversation carried out with my hands." All logged text messages had conversational styles, and many colloquial words and slang can be found there. There were no circulated messages.

Case Preview

The above discussion suggests that the local use of mobile text messaging technology is a very complex process. The instrumental affordances of a technology only provide a blueprint for local use. Users engaged in concrete activities will look for both instrumental and social affordances that best fit their immediate and cultural contexts to accomplish their goals. Users are actively participating in the localization process and

have been developing various uses for the technology beyond its intended use. Moreover, localization practices seem more intriguing with the emergence of mobile technologies. Since the technological artifact is accessible to users at any time and any place, users are looking for an artifact to be more embedded into their life spheres than previous artifacts.

In the following chapters, I will describe how participants used affordances to create their own technologies and how local uses were developed within three individual cases. I will start with a case involving subjectivity and locality, in which we will see how a hypermediated self managed her communication needs with an ensemble of ITs at a critical moment. The second case shows how mobile messaging was used to balance work and life by a young manager in her work setting. The third case describes how a user selected a technology that fit her personality and identity to stay in contact with people she cared for and to coordinate her daily tasks.

Chapter 5

Emma's Story: Nice Gesture in a Technology-Mediated Life

"For me, text messaging is a quick and easy way to contact people. It is fun, and it's a nice gesture to let people know that you care."

Profile

"Emma"[1] (N44) is a 21-year-old American college junior majoring in business. Besides a heavy load of schoolwork, she is also a full-time retail manager at a local golf club on the weekends. She has worked there for the past three years. During her leisure time, she likes to watch baseball games—her boyfriend "Dirk" is a professional baseball player in Alabama.

Emma values her family and is very close to them. Emma's parents emigrated from Greece before she was born, and they have a big extended family in the US. Emma is very proud of her Greek heritage. In her dorm room, various sizes of Greek flags stand out in a messy environment. A big curtain-sized Greek flag is hung in front of her window, a small Greek flag is pinned to the wall near her bed, and a mini-sized flag is pasted to the mirror. Even her Nextel i730 has a flag as its wallpaper!

[1] All the names and places in this dissertation are pseudonyms.

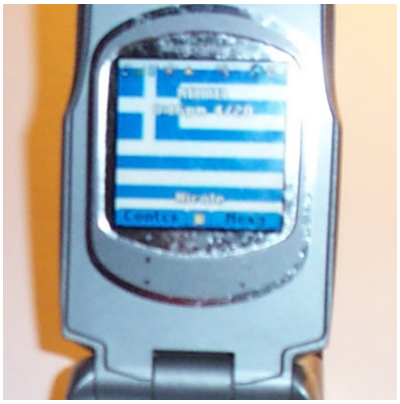


Figure 5.1 Emma's Phone Wallpaper

Emma has an ensemble of technologies to provide for her daily communication needs: wireless phone, landline phone, AIM, text messaging, walkie-talkie[2], email, and letter. She explains how she chooses a technology for communication by stating the following: "Basically I use the technologies people have and that are convenient to them." Wireless phone calls, AIMs, and emails are the technologies she always uses. She uses wireless phone calls for conversations she thinks are important for family members, friends, and special people. The walkie-talkie is used for "quick and stupid" (her words) conversations when the other party is also a Nextel subscriber, saving money during peak hours. She chooses AIM to "shoot the breeze" with friends online and switches to text messaging for quick, easy, and fun conversation when she or the other person is not on a computer. She chooses emails for school communication or to transfer files. The landline phone is only used for calls from the school or from home during peak hours. Occasionally she writes letters to Dirk in Alabama.

[2] Here, walkie-talkie refers to a feature that the wireless carrier (Nextel) provides. The full name of this service is Walkie-talkie (Direct Connect ®).

Emma got her first cell phone as a sophomore in high school, and she started using text messaging in January of 2003. At that time, text messaging became popular. She sent her first text message from the Nextel website, and she found it to be fun. As text messaging became more popular, she also texts to people in other network and increased her use of this technology.

Patterns of Daily Use

In the four-day period of diary study, Emma sent 15 messages and received 48 pieces with a total of 58. She texted in a variety of places such as her dorm, workplace, cars, restaurants, sporting events, and class (see Figure 5.2). The total number of different places in which she sent messages is 10. Most text messages were sent in the dorm or in the workplace. One fifth of her messaging practice occurred in vehicles. A small amount of messages were sent in restaurants, at sporting events, and in class. This distribution pattern matches her description of the places she stays most, which she drew on the chart of “where I go and stay” on page 3 of her diary workbook.

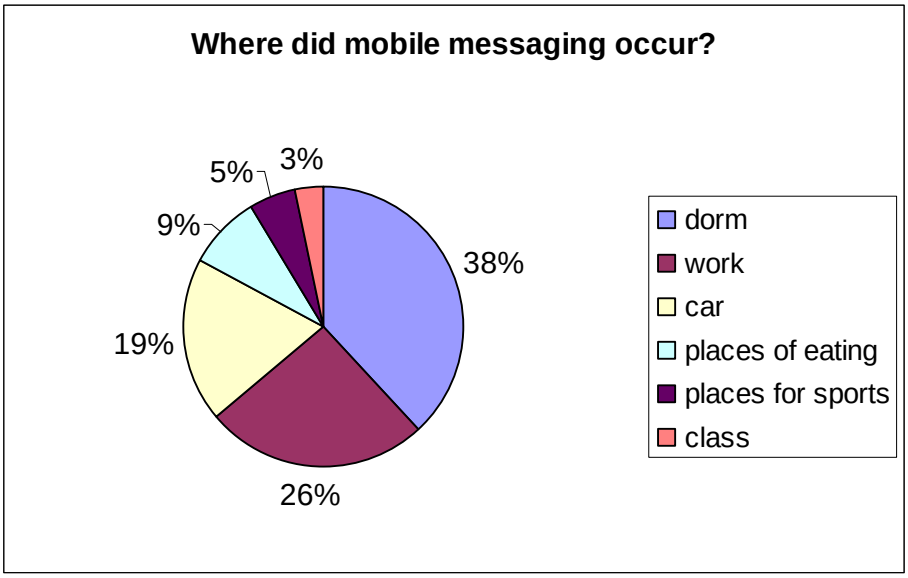


Figure 5.2 Emma: Where did mobile message occur?

Similar to the overall distribution pattern of rhetorical purposes at the American site (see Chapter 4), as shown in Figure 5.3, 34% of Emma's messages were exchanged for the purpose of expressing (33.1% at the American site), 19% were for the purpose of co-experiencing (19.3% at the American site), and 25% were for the purpose of informing (26.2% at the American site). However, she sent more text messages for the purpose of instructing (18% vs.11.9% overall) and that of switching (4% vs. 1.8% overall), and she did not send any text messages for the purpose of coordinating during the diary study.

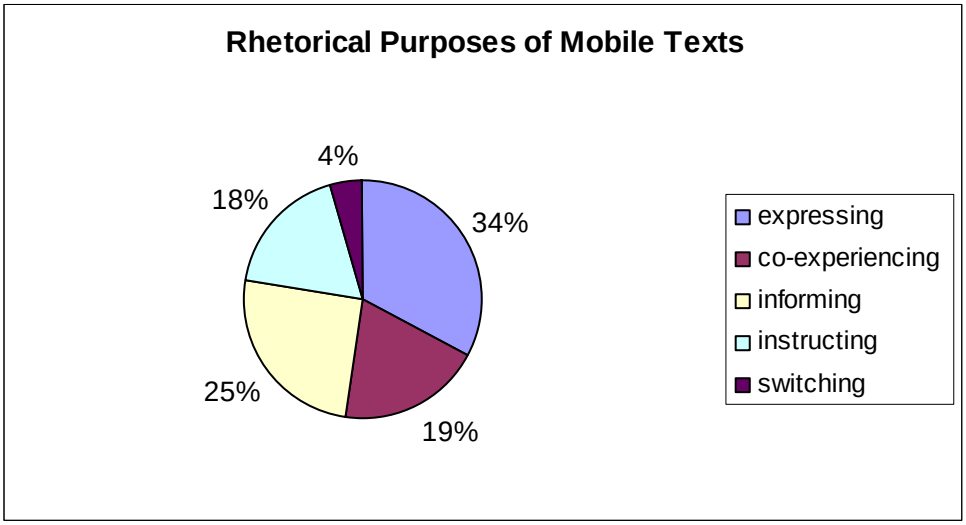


Figure 5.3 What about: Rhetorical Purposes of Mobile Texts (Emma)

Two thirds of text messages fall into her personal life sphere (see Figure 5.4). Another third of messages are about her school sphere and work sphere.

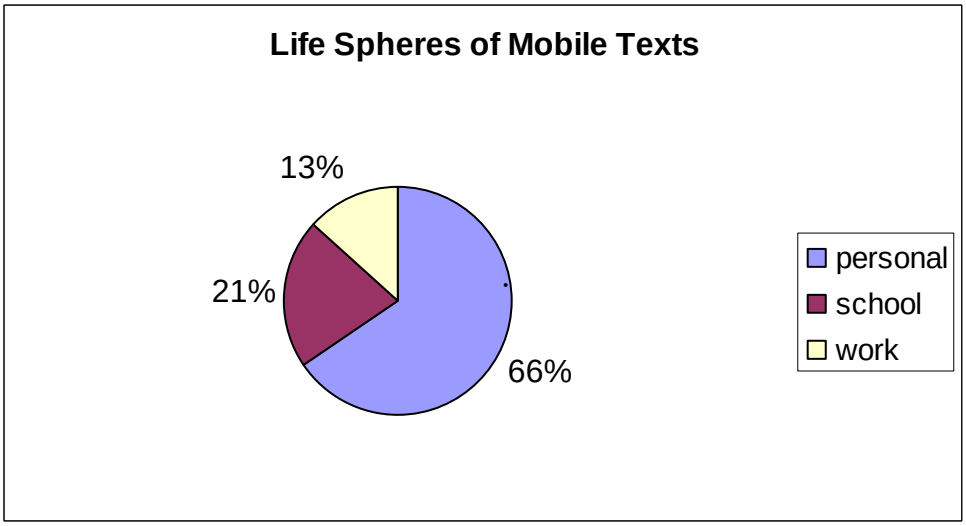


Figure 5.4 What about: Life Spheres of Mobile Texts (Emma)

During that period, the people that Emma texted were her roommate (a good friend), old boyfriend, and coworkers (see Figure 5.5).

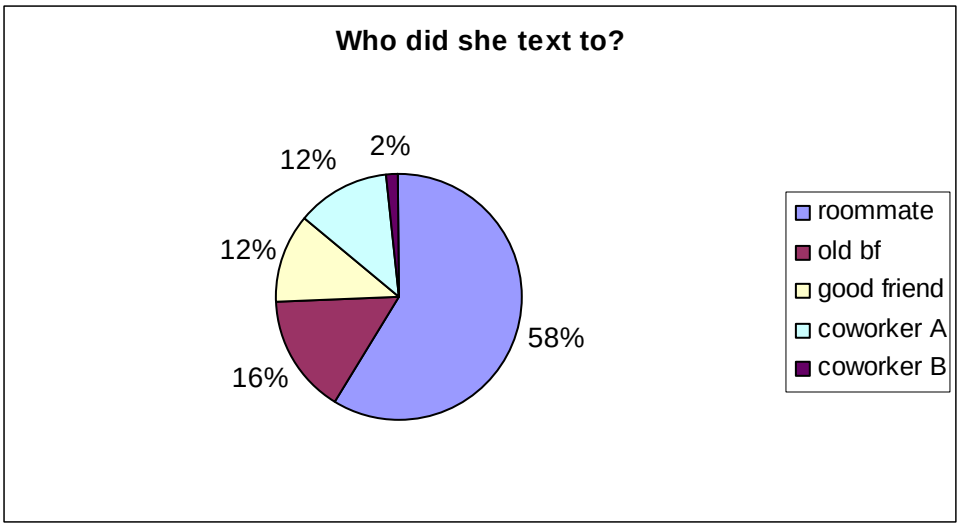


Figure 5.5 Emma: Who did she text to?

Half of the text conversations occurred between Emma and her roommate "Paula." Those conversations are about daily life activities such as getting up in the morning, taking workout classes together in the afternoon, downloading music, or chatting about a guy they met in a bar. Text Snippet 1 below is a typical conversation between Emma and her roommate, in which there are messages with a co-experiencing purpose and an instructing purpose. In that morning, Paula got up early and went to the gym. She texted Emma to get up and not to miss that day's work.

Text Snippet 1

Time	Sender	Message Text	Place
9:24 AM	roommate	Wake up!	in bed
9:51 AM	Emma	I'm uppp	in bed
10:15 AM	roommate	Did you leave?	dorm

10:19 AM	roommate	Bfast (breakfast)?	dorm
10:19 AM	Emma	no, where are you?	dorm
10:19 AM	roommate	Gym	dorm

Her ex-boyfriend sent 16% of her incoming messages. He did not have a cell phone. He sent Emma one-way text messages from the Nextel website with the expressing purpose of showing his love and care:

"xoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxoxo[3] luv (love) ya (you)."

"Just wanted to say hi! I'll TTYL (talk to you later)."

The text messages Emma exchanged with her coworkers included personal messages and work-related ones. In Text Snippet 2, Coworker A was comforting her about her recent life situation. In Text Snippet 3, this coworker texted to find out when he needed to come into work.

Text Snippet 2

Time	**Sender**	**Message Text**	**Place**
4:54 PM	coworker A	maybe a smile?	work
4:59 PM	Emma	I just feel inadequate	work

[3] Xo means "love and kiss."

5:08 PM	coworker A	so do I, but we still have a choice if we want to or not so just fing (f**king) smile	car
5:18 PM	coworker A	Smile no one can take that away from you	car

Text Snippet 3

Time	**Sender**	**Message Text**	**Place**
12:39 PM	coworker A	What time am I in?	work
12:42 PM	Emma	2:00 PM	work

Figure 5.6 illustrates a typical one-day messaging activity chart from Emma's diary log. Text snippet 1 and 2 are mapped on the chart. As seen in the chart, Emma seldom initiated conversations; she often responded to people who initiated conversations with her. During the interview, she explained that she did not like typing on the phone keypad. Sometimes she would just call back to respond to the sender. Most of the times she would reply to her roommate, as they have more social bond than other people do. Thus, they would text each other a lot.

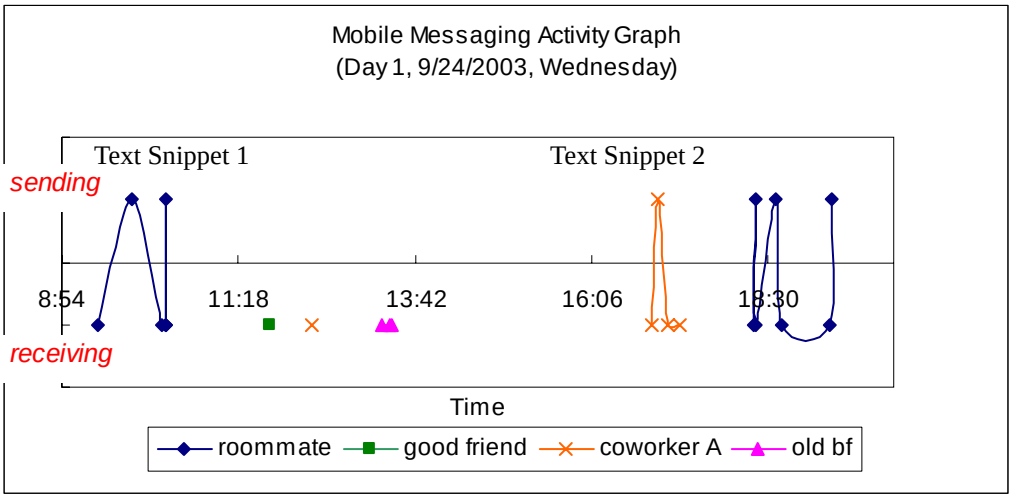


Figure 5.6 Emma: When did she text?

Text Messaging in a Technology-Mediated Life

Emma thinks text messaging is important to her because "it's a quick, easy and fun way" to contact people. "It's a little surprise when you get a text on your phone, just like the movie 'You've Got a Mail.'" However, she does not like typing on the phone. She feels it is so annoying to do that even she can type very fast on a small keypad with T9 while driving. Text messaging is the fourth technology she uses in her daily life after wireless phone calls, AIM, and emails. It has its own niche in Emma's ensemble of technologies with its instrumental and social affordances.

Figure 5.7 provides a snapshot view of how technologies are deeply embedded in Emma's life during a four-hour period on a typical Tuesday evening. It also shows how mobile text messaging practices are situated in Emma's technology-mediated life. Emma had a language tutorial class from 5 to 6 pm. After the class, she stayed in her dorm room

for the rest of evening, working on homework, watching TV, and chatting. Except for the hour she was in class, her communication technologies were always on. Emma was engaged in different modes of communication the whole time, either in wireless phone conversations, walkie-talkie chats, text messaging chats, or in AIM conversations. She was communicating to different people about different aspects of her life: with her boyfriend Dirk about a recent relationship crisis, with a classmate about school work, with a friend about leisure activities, with her aunt about a family relationship, and with her roommate Paula for day-to-day relationship and friendship.

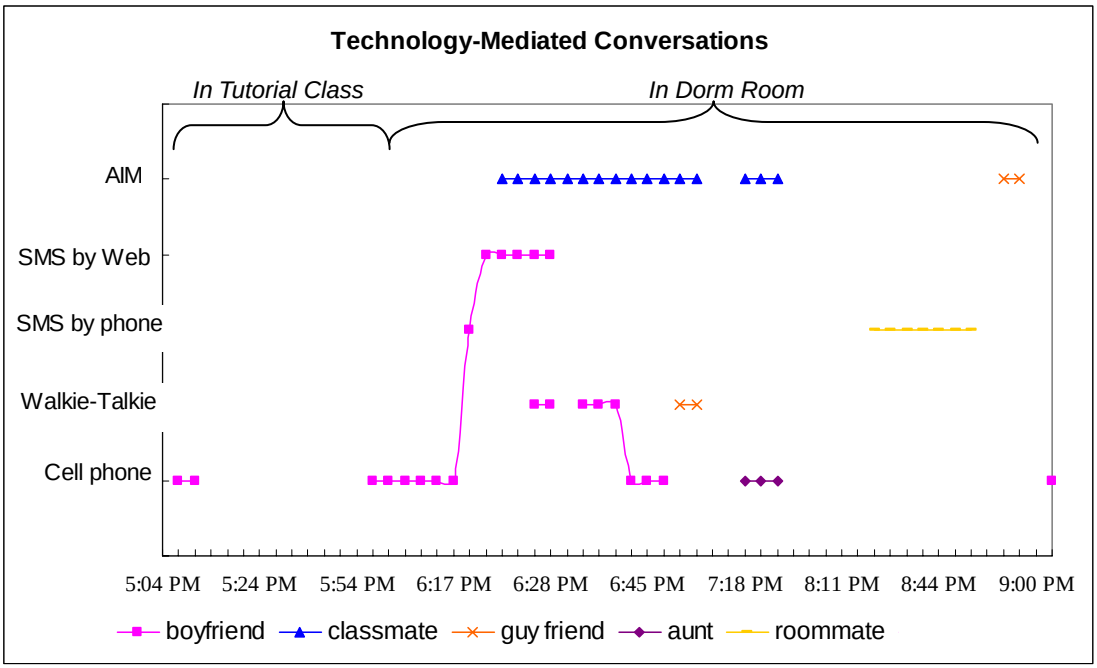


Figure 5.7 Technology-Mediated Conversations

I selected her dorm as the main observation site because, according to her log, Emma tends to text a lot in the dorm. Also the dorm is the place she stays at the most, as she

described in the place chart on page two of her workbook. Her dorm room is typical for two college girls: Two beds are on one side of the room. Beside each bed is a desk with a computer on it. Three TV sets are in different corners. Various sizes of posters of celebrities and models cover every inch of the four walls in the room.

We had been in the class for one hour before we returned to Emma's dorm room. Emma received a phone call from her boyfriend Dirk before the class, and she called him back right after the class (about 5:54 pm). Dirk is a baseball player in Alabama; Emma met him two years ago. They moved into their relationship very slowly, and Emma visited him four times last year. That day they were in the middle of a recent relationship crisis. Emma had a night out with a guy friend from the work the Friday before, and she told Dirk about it right away. As Dirk had some bad experiences with his previous girlfriends, he was very upset about this and wondered if Emma was cheating on him or something else. Emma told him she was not one of his previous girlfriends and wanted him to get over it. So they were arguing about this on the phone.

Emma communicates to Dirk primarily via wireless phone calls and walkie-talkie. Dirk does not turn on his text messaging service, so although he never sends text messages to Emma he can receive them. He also has a computer at home, but it does not have Internet access.

When we entered the room after the class, Emma was still arguing with Dirk on the phone. The TV beside her bed had the volume on high. The electric fan was on to cool down the room from the sunshine. Her computer was on, with the AIM window layered on the top of all other programs on the desktop. The 22-minute phone conversation did not seem to go anywhere. Frustrated and disappointed, Emma started to compose a break-up text message to Dirk at 6:18 pm. She did two keypresses on her phone keypad first and then stopped. She sat at the computer and went to the Nextel website since it would be quicker to type on the keyboard for a long and difficult message:

> As much as it kills me to do this, I am deleting your number from my phone. I care about you too much for you to be treating me this way. I hope you find whatever it is that makes you happy in life. I will always be 823[4].

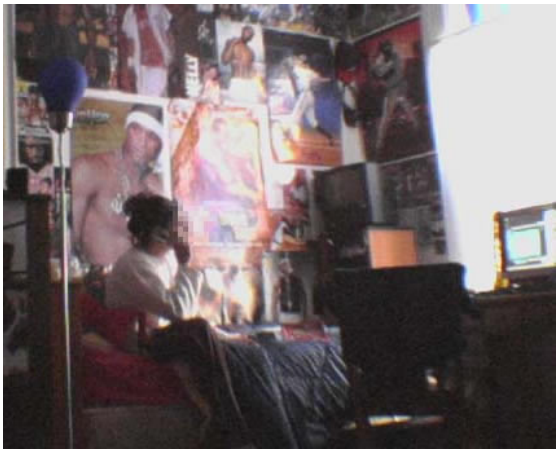
A silent and immediate text message seemed to be the best way to convey her emotions and avoid confrontation, since Emma did not want to talk to Dirk.

As Emma was composing the message and was hesitating to send it, a classmate greeted to her on AIM (6:22 pm). She exchanged some quick messages with him while reading the break-up text again and again. Then Dirk beeped her using the walkie-talkie at 6:24 pm. The walkie-talkie feature was free on both of their plans. When Emma was pressing the walkie-talkie button, by accident she clicked the send button on the Nextel website,

[4] 823 are "thinking of you." Each digit corresponds to the number of letters of the words.

sending the break-up message! “No, I don't want to send this one!” she exclaimed. “I wouldn’t have made this mistake if I didn't talk to him... He is receiving this message now...” She hid her face with hands, and the beeping walkie-talkie suddenly became silent.

Two minutes later, Emma decided to walk away from this awkward situation. Finals week was just two weeks away, and she had a few projects due soon. Emma logged on to the Blackboard website to work on an online quiz. It was nice that her classmate on AIM was also working on the same quiz. So they started to chat about quiz questions on AIM.



Talking to Dirk on the phone

Working with a classmate on an online quiz via AIM

Dirk’s response finally came with a beep of walkie-talkie at 6:36 pm. Emma did not have the courage to face him and decided to ignore the call. The beeping continued, and it got so annoying that she turned it off. At 6:43 pm, the ringtone of her cell phone invited her to take the phone call—it was Dirk calling. Emma answered the phone call and spoke

with him over the phone, calmly, this time. She ended the phone conversation five minutes later and started to work on her timed online quiz.

She was distracted once more two minutes later, when a guy friend name Kerry, who is also a baseball player, beeped her with the walkie-talkie about baseball games this weekend. Emma loves to watch baseball games, and she asked Kerry to keep her posted on game schedules.

Emma returned to her online quiz, reading the textbook carefully to find the answers. Around 7:18 pm, she got a cell phone call from her aunt. As she had not talked to her aunt for a while, she was excited about receiving this phone call. She told her Aunt about what was happening recently, being very open about her family situations: “I hate my family right now, and I don’t want to talk to them.” She complained about her mother’s gossiping habit, “I called her the other day about Dirk and wanted her to give me some support. She didn’t give me any support, but commented on me, and told my dad about this...” Emma walked around in the room, unpacking stuff from her backpack as she talked on the phone. Realizing that the online quiz was timed, she returned to the desk to work on the quiz while continuing talking to her aunt.

Talking with her aunt on the phone

The phone call ended 16 minutes later, but Emma did not have much time to work on the quiz, and her classmate already completed his quiz and went offline. Emma did not get a good score. She was so disappointed that she comforted herself by saying that “I’m not going to care this…” Feeling bored, she played with her cell phone a bit and changed the ringtone. Then she leaned on her bed and started watching TV — first a baseball game and then her favorite, *American Idol*.

In the middle of watching TV, Emma thought of her roommate Paula who was having a softball game in Vermont and texted to her:

Time	**Sender**	**Message Text**
8:39 PM	Emma	Are you on your way back yet?
8:40 PM	roommate	Yeah 2 Hours to go
8:41 PM	Emma	How'd the games go?

8:43 PM	roommate	Split lost one in the 7 Typical huh
8:44 PM	Emma	yeahhh
8:51 PM	roommate	Are you gonna be in the room or do you have work to do?
8:51 PM	Emma	No, I'll be here.

Paula is also Emma's best friend. They have a close social bond and share many daily activities together. Paula is not in the Nextel network and does not have walkie-talkie service. The women tend to text a lot about daily life experiences. Text messaging is good for these daily life exchanges as such details are not very important in the sense of their meanings but important in maintaining close friendship. The informal format of text messaging helps express caring in a discreet way. The mobile form affords constant contact everywhere.

At 8:54 pm, Emma heard an IM sound from the computer and jumped from the bed. Kerry IMed her about the baseball schedule this time. Emma brought out her schedule book and wrote down the schedule in her book. Emma likes to do scheduling via AIM or text messaging because she can keep the schedule on the computer or in the phone for later reference.

Texting to her roommate Paula

Checking the baseball game schedule via AIM

I left Emma's room at 9 pm as scheduled. While showing me the way out of her dorm building, she began to dial Dirk's phone number in Alabama. She told me that she was going to have a fight with Dirk for the rest of the night, since now it was off-peak hours for unlimited conversations[5].

Discussion

Technology Affordances and Rhetorical Arrangement

The patterns of daily messaging use and this use scenario show us how mobile messaging is situated in Emma's technology-mediated life.

Within the immediate context of the dorm room, we see technology affordances are closely connected to the rhetorical arrangement of Emma's daily communication practices. These affordances (including both instrumental and social aspects) are an

[5] It is possible that Emma waited till 9 pm to call Dirk because she didn't want to argue with Dirk before me.

important factor when Emma unconsciously designs rhetoric to accomplish her daily communication goals. As shown in Figure 5.7, in every communication situation, Emma skillfully chose the best technology that was available, easy, and convenient for both parties to better communicate her points based on the instrumental and social affordances of the technology. In two out of the five situations, she even employed more than one technology to communicate and mediate practices, and switching between technologies enhanced her communication.

To handle a relationship crisis with her boyfriend in Alabama, Emma used four forms of technologies: Cell phone conversation, walkie-talkie voice chat, text messaging by phone, and text messaging by Web. Affordances of each technology are used here to arrange a stronger rhetoric. Cell phone conversation allows her to argue with her boyfriend at a distance with the richest information exchange and with the highest level of flexibility: They were connected no matter where she was — in the classroom, on the way back to the dorm room, and in the dorm room. However, it costs money during peak hours, and the constant verbal flow might not be effective in a dramatic situation. Walkie-talkie conversations occurred to counteract the disadvantages of cell phone conversations. Discrete conversation flows with sentence pauses helped them focus on the content they wanted to convey without being extraordinarily emotional. It also saved money. However, it is not as clear as a phone conversation, and it is less formal and genuine, as shown at the moment when Emma refused to answer Dirk's walkie-talkie call. Text messaging

allows the user to avoid confrontation while contacting the other party right away, but this technology demands more efforts to type on the phone keypad, especially for a long and important message. Thus Emma switched from the phone to the computer. Unfortunately, a flawed design for sending text messages on the Nextel website (it did not incorporate the function of asking for a confirmation to send the message like other websites such as Verizon Wireless and Sprint PCS do) caused a communicative breakdown, complicating the situation.

The conversation about baseball games and its switching from walkie-talkie to AIM is simpler. According to Emma, schedules, date times, and work-related issues are not important enough to be discussed on a cell phone. The walkie-talkie is a nice way to handle this kind of “quick and stupid” conversations. However, walkie-talkie conversations cannot be saved for later reference. In addition, Kerry did not have the schedule available when he was using the walkie-talkie. When he had the schedule available, he instant-messaged Emma. An AIM conversation here helps mediate the scheduling practice by providing a reminder note on the top of the computer display.

In other communication situations, Emma communicated with her aunt using a cell phone conversation as a) that was an important and longer conversation for her, b) her aunt didn’t use walkie-talkie or text messaging as Emma’s generation does, and c) she was responding to a phone call which actually did not involve a rhetorical arrangement from her perspective. She chatted with a classmate about the online quiz via AIM, since AIM

allows for cutting and pasting questions and exchanging answers right away. In the last case, she texted to Paula because of its low cost and little overhead for exchanging mundane life experiences and maintaining friendships.

By examining text messaging practices in their immediate context, we see text messaging situated in Emma's life within its own niche. With its instrumental affordances (e.g., quick, direct, silent, and convenient) and social affordances (e.g., avoiding confrontation, staying in contact, and showing care), text messaging might not be the most important technology for Emma, but it plays a particular role in her technology-mediated life that other technologies cannot replace. Even though Emma does not like typing on the keypad and avoids it as much as she can, she keeps texting to her friends because text messaging fits her lifestyle.

Identities Mediated By Phone

The affordances of technologies not only help Emma create a stronger rhetoric for her daily communication needs, but they also help her present different identities for various life spheres in a broader socio-cultural context.

Emma maps different groups of people using different technologies unconsciously during her daily communication practices: For parents and relatives, she calls them; for friends, she calls, emails, instant-messages, texts to them, and uses the walkie-talkie; for her

boyfriend, she calls, texts to him, and uses the walkie-talkie; for work contacts, she calls and emails them.

In Emma's ensemble of technologies, each technology has its own role and works well together with the other ones. Each helps her mediate different identities and important relationships. In the case of mobile text messaging, it is "a nice gesture to let people know that you care" and "a fun surprise" for people who she cares about. Figure 5.5 shows that she often texted to her roommate, friends, and coworkers. In interviews, she said she occasionally texted to her parents to say "love you." They did not respond because they do not know how to, but they liked the fun surprise. It is also a persuasive rhetoric when she does not want to talk. By choosing a mobile messaging technology to communicate, she is positioning herself in a specific life sphere with a certain identity. Here the messaging technology is chosen as it fits within a particular identity of hers, because it helps her present an identity in relationship networks.

In a four-hour period indicative of her daily life experiences, we see Emma busy shifting her identities between a lover, a student, a niece, a common friend, and a close friend using a range of technologies. Various identities pop up in the place of her dorm room, a setting for action and interaction (Dourish, 2001). Technologies make the emergence and co-presence of these identities in one place possible, and they also interconnect the identities to form Emma's subjectivity experiences within the messy complexities of everyday life.

The mediation process of identities is also a process of fragmentation of the self. With so many identities to shift between, the real self might be lost. Emma commented on this topic during the interview: “Oh my God! There are so many ways to communicate with somebody! Unbelievable! You can always get hold of somebody, either by computer, by cell phone, or by work phone…” She disclosed that during the four hours with me, it was actually her least amount of time on the phone: “Everyone knows that I’m always on my phone.” The impulse to communicate and various identities coming with the impulse, makes her sometimes feel exhausted and consider “throwing my phone out of the window:”

> You just get stressed out, your phone always gets ringing, and you always get “can you do this for me?” “Sure.” Or “Oh, don’t forget to do blah blah…” You always talk on your phone, you would say, “Oh my God, I just want to be myself for five minutes. Not have to worry about…”

> Wherever I go, the first thing I say to myself is, “Do I have my phone? Did I forget my phone? Where is my phone? Did I leave it?”

However, even though these new technologies make her life “more complicated,” Emma does not want to stop using them:

> The world keeps coming with new technologies. They’re out there, and you might have to have them.

Usability Breakdown

Emma chose mobile text messaging as its affordance can help her develop a stronger rhetoric in some situations when she communicates and negotiates important relationships in her life. However, its affordance can cause critical breakdowns during use. In the observed study, text messaging affords her quick communication to Dirk without confrontation. However, it is clear that text messaging lacks an affordance for communicating complex ideas and feelings people usually want to achieve in such a circumstance (i.e., sending a quick message without a confrontation). Its text entry mode makes communicating long, complex, and ambiguous feelings more difficult. Therefore, Emma switched to using the website to compose this kind of message to Dirk. However, the design of the website did not include a confirmation check, and Emma sent a message she did not want to by accident. The breakdown here made an already awkward situation worse.

Reflection Notes

Emma's use case is a narrative mixed with success and frustration. Emma successfully forms an ensemble of technologies to fulfill her daily communication needs by selecting technologies that fit within her lifestyles and identities. In this process, she localizes text messaging technology to fit in her life and incorporate it into her ensemble. Though she still thinks text inputting on the phone keypad is "a pain, tedious, and annoying," she frequently uses it. Text messaging helps Emma better communicate, present her identities,

and mediate important relationships in her daily life. The cell phone is important to Emma as it is a hub for important relationships as well as a site for her various identities, just like the Greek flag on her phone screen displays her ethnic heritage.

At the same time, we also see a troubled self struggling with technology overload as various identities and life spheres collide in one place. The conflict of self and place actually shows a lack of coordination between mediation practices in the immediate and socio-cultural context and between the instrumental affordance of the technology and its social affordance. It begs the question for localization practices: How could a technology be localized to fit properly into different levels of contexts?

Chapter 6

Sophie's Story: New Chocolate at Work

"Mobile text messaging gives me more opportunity to communicate with people in creative ways."

Profile

"Sophie" (V20) is a retail manager and an owner of a home-based interior design company at the American site. She is 30 years old and married without children. With two jobs, she has "a hectic and erratic schedule."

Sophie's daily communication technologies include a wireless phone, mobile messaging, emails, walkie-talkie[1], landline phone, fax, instant messaging, and letters. She uses a wireless phone, mobile messaging, and emails the most, typically for personal communication. She uses her walkie-talkie, landline phone, and fax for business communication at work. She seldom uses instant messaging.

Sophie started using cell phones in 1997 and adopted text messaging technology in February 2002. She chose mobile text messaging to work out a communication constraint with her best friend Dana during working hours. Dana's boss does not allow employees to make phone calls to friends during work. As a store manager, Sophie's work schedule is

[1] In this case it refers to a common walkie-talkie, not a feature on mobile phones.

very busy. She is either in the retail office holding conferences, completing paperwork, or on the sales floor serving clients and arranging merchandise. She is typically unable to check email during work. Mobile text messaging solves this problem: Dana is able to use the computer in her office to send short emails to Sophie's cell phone, and Sophie's reply can be instantaneously sent via email. Using this method, they maintain constant contact with each other without being noticed by the boss or other people. Later Sophie found text messaging to be "a whole other dimension." She texts to her husband and coworkers to "have fun."

Perhaps because of her work nature, Sophie is very sensitive to new technologies and fashion, and she would happily embrace new things. She remembers the days when email was first invented and her home computer was in black and white. It is fascinating for her to watch her younger coworkers use the phone and other new technologies. In some ways, she feels texting helps her to stay young.

Sophie participated in the diary study in March 2003 and was interviewed in April 2003. She was interviewed again in May 2004 to make her data comparable to the other participants' data.

Patterns of Daily Use

In the four-day period of the diary study and the follow-up half day of shadowing observation, Sophie sent 40 messages and received 27 pieces with a total of 67.

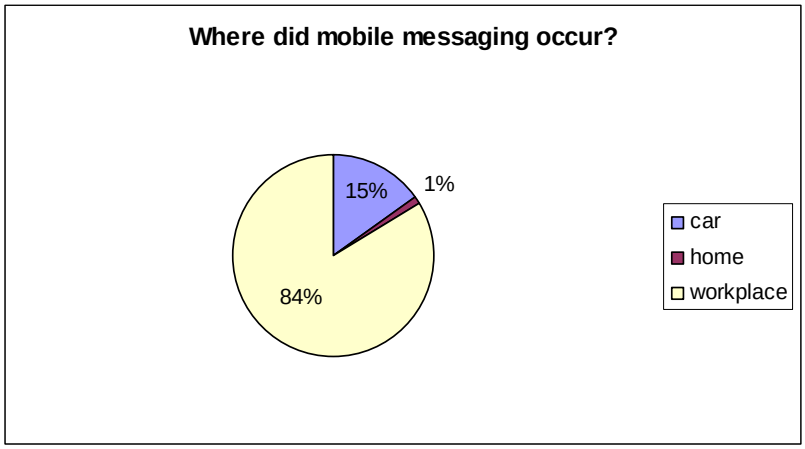


Figure 6.1 Sophie: Where did mobile messaging occur?

As Figure 6.1 shows, most of the messages were sent and received at her workplace where, according to her descriptions in the workbook, she stays the most. Figure 6.2 indicates that she actually only texted to a small number of people. In the interview she said she usually texts to four to five people. During the diary study and observational study, only three recipients were found. They were her best friend Dana, her close coworker Ida, and her husband.

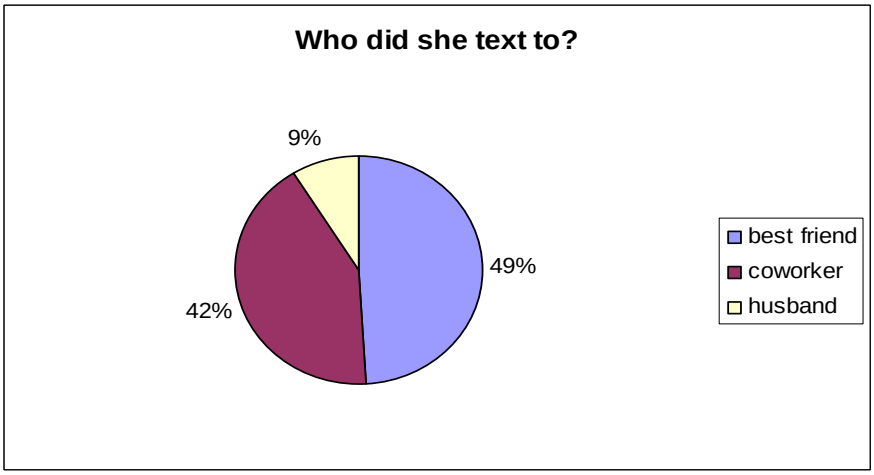


Figure 6.2 Sophie: Who did she text to?

It is striking that, though most messages were exchanged in the workplace, only 15% of these messages were work-related messages (see Figure 6.3). All of the other messages were about her personal life (80%) and family life (5%). Compared to the overall pattern at the American site—76.2% for personal, 17.9% for work/school, and 3.5% for family—Sophie's message distribution shows a stronger inclination towards her personal life.

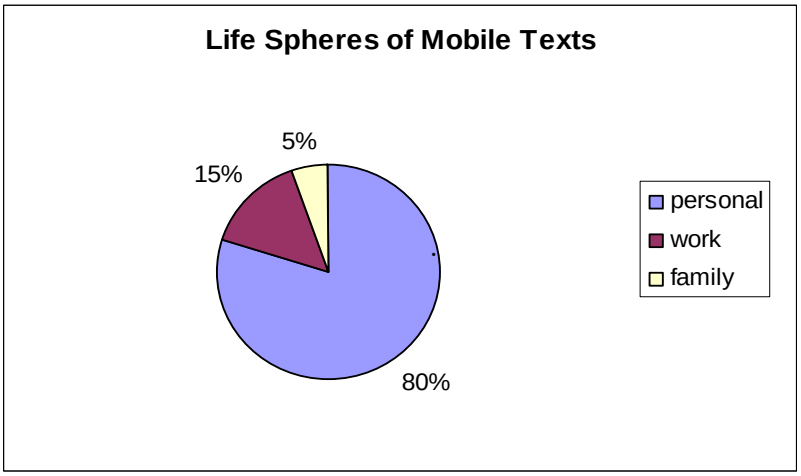


Figure 6.3 What about: Life Spheres of Mobile Texts (Sophie)

Compared to the overall distribution pattern of rhetorical purposes at the American site, as shown in Figure 6.4, 57% of Sophie's messages were exchanged for an expressing purpose (vs. 33.1% at the American site), 15% were for a co-experiencing purpose (19.3% at the American site), 15% were for an informing purpose (26.2% at the American site), 11% were for an instructing purpose (11.9% at the American site). The switching purpose and others each counted for 1% of the sent messages. She did not send text messages for coordinating during the diary study.

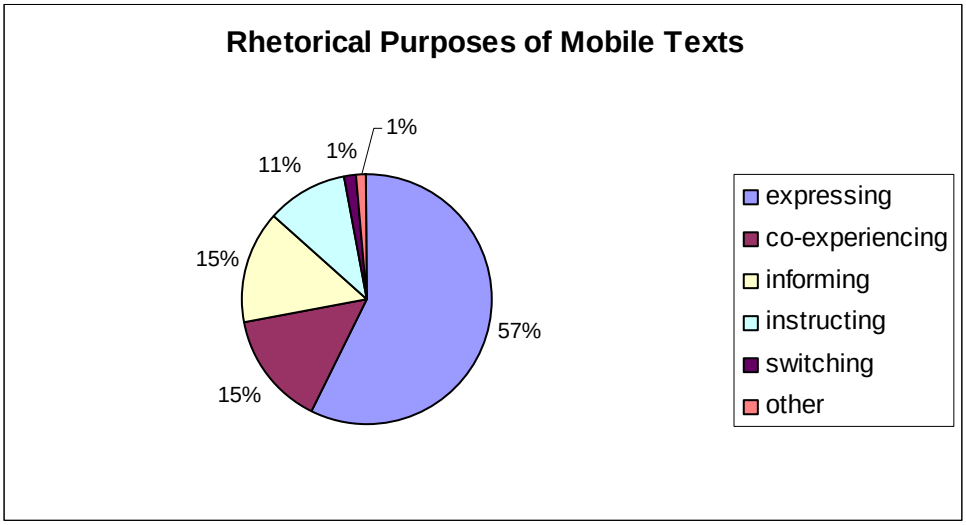


Figure 6.4 What about: Rhetorical Purposes of Mobile Texts (Sophie)

It deserves our attention that more than half of her messages were sent for an expressing purpose. This percentage is very high not only for the overall data but also considering that the American site where the average (33%) is 7% higher than the average at the Chinese site.

A closer look at those messages with an expressing purpose shows that Sophie employed different communication styles and vocabularies when she interacted with people of different ages. The messages sent to her best friend Dana and her husband (both of which are her age), have a common colloquial style as illustrated below:

"City kitty:-D" (Greeting to Dana who was having a trip to New York City that day.)

"Smart kitty...awesome opportunity for you..take it…i believe in you" (Encouraging Dana who decides to go back to school.)

"Arrrgh" (A complaint to Dana)

"Closer than my peeps u (you) r (are) to me..ba-be" (A love message to her husband.)

When communicating to Ida, a close friend and coworker in her early 20s, she uses a lot of slang and gang phrases from TV comedies and talk shows such as Saturday Night Live. In the text snippet below, we find slang in almost every message. As described by themselves, these text messages here present a "jive talking" style.

Text Snippet 1

Time	**Sender**	**Message Text**
2:30 PM	Ida	jive from the dialectizer :-[
2:35 PM	Sophie	Woo doggie *(good friend)*...u (you) all up n (and) everything
2:36 PM	Ida	Im all up in that s**t yo! how do you feel about "m-kitty" im (I'm) changing my name.
2:40 PM	Sophie	Jenna will have fun w (with) your new name
3:00 PM	Sophie	Do m-kitties roll on dubs *(roll on dubs: driving)*?
3:10 PM	Ida	Hells (*hell yes)* no g-funk (*a nonsense word used as a compliment to a friend who is particularly savvy)*
3:15 PM	Sophie	NOther (another)?...who is the coolest m-cat in the world? :-[

4:00 PM	Ida	Tonight on the M-Kitty Show: How to Fashizzle One's Nizzle with musical guest L-Doggie and The DawgPound[2]
4:10 PM	Sophie	Sounds like a fascinating dizzle ..i'll watch fojizzle *(for you)*
5:00 PM	Ida	Big pimpin' *(very cool)* and spendin' cheese *(very luxurious)*
5:15 PM	Sophie	That cheez (*Greatest thing in the world)* is na-chos *(what does NOT belong to you)*...lay off the toastah *(gun)* yo
6:45 PM	Sophie	Youre (You're) my favorite schizzle *(sure)* m-kitty
7:00 PM	Ida	talk to you later

Figure 6.5 provides a typical one-day interaction pattern of the text messaging practice emerging from Sophie's diary log with the above text snippet mapped. As shown from the graph, Sophie tended to send some greeting messages in the morning to Dana, her best friend. Dana was unable to reply to her that day due to her day trip to another city. In the afternoon, she sent two loving messages to her husband, realizing that he might not be able to answer her messages because of his busy schedule. Later she exchanged many fun messages with her close coworker Ida, who was off that day. Before she headed back home, Sophie sent another greeting message to Dana. She knew that they would be able to chat on the phone when she was home.

[2] -izzle: Coined from Snoop Dogg. Nizzle is the product of Snoop getting all crunched up and saying "izzle" on the end of everything during interviews/shows. It has no meaning.

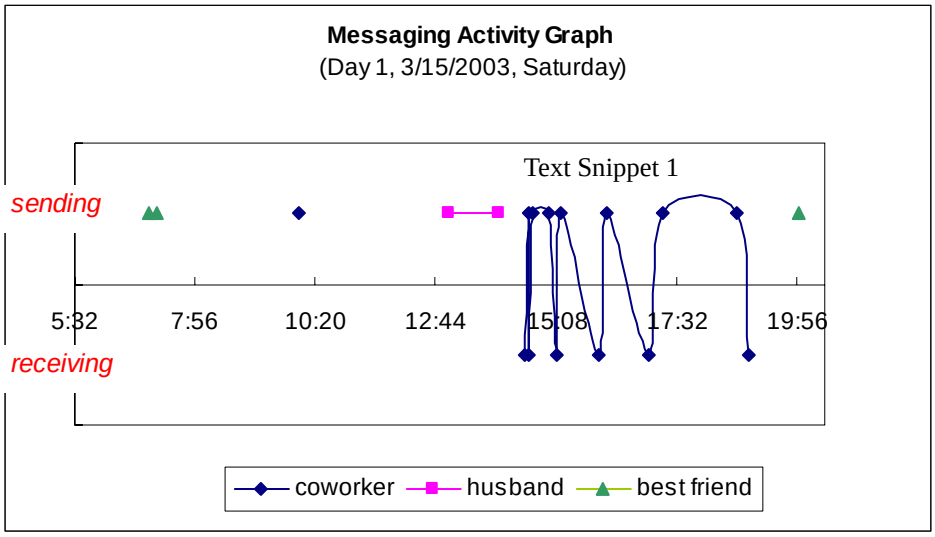


Figure 6.5 Sophie: When did she text?

Texting at Work

A five-hour observation on a Saturday morning allowed me to see how mobile text messaging meshed with Sophie's work life.

It was a warm and sunny Saturday. At 7:30 am, Sophie drove to work early, as she needed to do a routine blood test at the hospital that day. While driving to the hospital, she sent three messages. Two were morning greetings to her best friend Dana. Sending morning greetings to Dana is her daily ritual as shown in the message log:

Meow goodmorning

Meowkipp..owwyoudoowin?

Texting while driving

In addition, she also sent a grocery-shopping reminder to her husband, who was still asleep.

After completing the blood test, she found that she still had time, so she went to a grocery store to buy some chocolates, a bouquet of flowers, and a vase to cheer up a coworker who was passed over for a recent job promotion. She also made a phone call to Dana while waiting for another associate to open the store where she works. On the phone, they updated each other on what had happened over the past week.

At 9 am, she entered the store and started her busy day. She first worked on some paper work in the office, and then went to the bank in the mall to deposit yesterday's earnings. On the way to the bank branch, she got a text message from Dana. Dana had promised to take Sophie to a butterfly sanctuary in Massachusetts on her birthday, but she changed her mind and asked Sophie to go with her husband instead. Sophie was very disappointed, and Dana felt sorry about it. That message started their text conversations for the

morning. They exchanged 17 messages about this topic as Sophie was preparing to open the store, arranging new arrivals on the shelves, and serving customers during the early hours when many customers had not yet arrived at the store.

At light hours

Busy hours: no time for texting

After 11 am, many people came to the mall. Sophie was so busy with her clients that she did not have time for texting:

Text Snippet 2

Time	**Sender**	**Message Text**
9:36 AM	Dana	Sigh
9:36 AM	Sophie	Big sigh…was looking forward to butterflies
9:54 AM	Dana	Go with mr
9:55 AM	Sophie	ON way to hos (house, referring to the house of Dana's Mom)?
10:00 AM	Dana	Goin (Going) with mr (referring to Sophie's husband)

10:01 AM	Sophie	Dode (Dana's dog name) enjoying the yard?
10:13 AM	Dana	Small talk
10:15 AM	Sophie	Arrrgh
10:20 AM	Dana	What
10:20 AM	Sophie	Small talk ref
10:25 AM	Dana	Is yes Goin w mr ref
10:29 AM	Sophie	Goin w (with) mr ref
10:30 AM	Dana	Goin insane
10:57 AM	Dana	There
10:57 AM	Dana	Cancel B4 (before) U (you) do
10:58 AM	Sophie	Ok...thats (that's) fair bc (because) of other times...but im (I'm) looking forward to it...pbbbblt
11:10 AM	Dana	I suck

Figure 6.6 shows when and how often Sophie texted that morning. For example, she sent three messages while driving to work, exchanged a bunch of messages with Dana during the light hour. After 11 am, she had no time for texting.

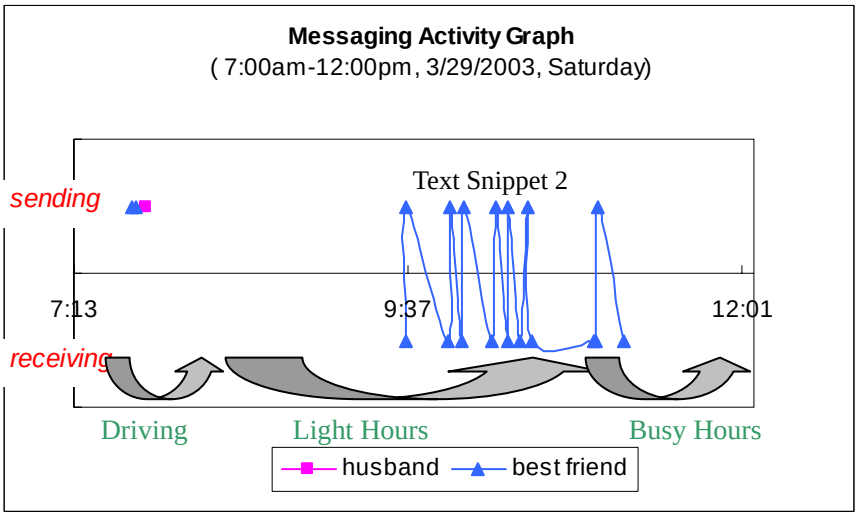


Figure 6.6 Texting at Work

Discussion

Patterns of use emerging from the diary log indicate how Sophie used mobile text messaging in her immediate context (e.g., her workplace). Both the half-day shadowing study at her workplace and the two qualitative interviews helped discover how her use patterns are influenced by broader cultural contexts. The dynamic interactions between these two levels of contexts show how well mobile messaging blended into her work life: She used mobile messaging, a form of unobtrusive communication, as an emotional support to stay in contact with her friends and loved ones during her downtime to help her get away from her stressful work environment.

Texting as Chocolate: Affordance in a Business Setting

As unobtrusive communication, mobile text messaging fulfills Sophie's emotional needs of staying in contact with friends and loved ones at work. It has important affordances in a

business setting for Sophie. On the instrumental level, text messaging affords silent communication, convenient use, and discrete action. The phone is not noticeable when tucked into a pants pocket. By setting it to vibrate, only Sophie would know when a message arrives. In addition, she can take the phone with her everywhere as she moves around in the store helping clients. On a social level, text messaging helps Sophie stay in contact with her friends in an unobtrusive way.

Sophie described the importance of mobile text messaging to her as below:

> "Mobile text messaging is important to me because it gives me more opportunity to communicate with people in creative ways."
>
> "Especially at work, some time I could get pretty frustrated. So I would sneak a minute to go back to the office and text something funny..."
>
> "It's nice to just have that little break (messaging break). It's like you get a little greeting card in the mail every day. It's nice to know you thought of someone that made you laugh..."

Indeed, text messaging is the "new chocolate" for Sophie (Lowe, 2003): "instead of dashing to the fridge in times of emotional fragility, girls are now grabbing their mobiles phones and texting a support team of female friends." Sophie likes chocolate: She usually has a big bucket of chocolates in her office that she eats during her breaks or for socializing with her coworkers. She also likes chocolate in the forms of text messages from friends, which lets her know that she is being thought of.

This new chocolate actually makes her daily communication with Dana easier. As shown in Text Snippet 2, Dana tends to change her plans with Sophie very frequently, causing a lot of frustration for Sophie. Thus, she prefers to talk to Dana about changing plans via text messaging: She could just type bits of vital information to Dana and avoid complicated conversations with her. In some ways, text messaging lets Sophie both stay in contact with her best friend Dana and get away from her during the more frustrating moments of their friendship.

Enhancing Work and Personal Life with Text Messaging

Mobile text messaging is blended well into Sophie's work life, since this technology fits with her identities in that setting.

From the aspect of her personal identity, Sophie is very consciously establishing and maintaining an image as a close and approachable friend to her girl friends. Friendship is such an important facet to her life that it constantly motivates her to stay in contact with close friends. We can see this point from her message log. She initiated conversations very often and sent more messages than she received.

In addition, texting helps her construct her identity within her social context. Being 30 is a very big deal to many young women, and Sophie refuses to fixate on her age and wants to stay younger. By identifying with younger people in her workplace, speaking their language, and using popular slang in her daily text messages, Sophie finds a way to cure

this anxiety over turning 30: “Whenever I can get my hand at any these types of new technologies, I will. That does keep me feeling younger possible.” As a new communication mode, text messaging makes her “reconsider (her) tone and think of new ways to use humor.”

From the perspective of her business identity, texting enhanced her leadership credibility. Text messaging is a popular practice in her workplace, and many people like texting during off hours. By keeping up with popular trends and speaking her coworkers’ language, Sophie developed a management style that encourages her younger coworkers to ignore the generation gap between them and enjoy working for her.

As a store manager, Sophie is fully aware of her different identities. She marks clear boundaries for her different information technologies and uses them differently. For example, the three most-used communication tools in her workplace are the office phone, a walkie-talkie, and a cell phone. The office phone is always placed on a noticeable area of her desk, and she would only use it for business communication with different stores. The walkie-talkie is clipped to her back, and she uses it for in-store communication. Compared to the visible status of these two tools, her cell phone is always tucked in her front pants pocket that is invisible to outsiders and is primarily used for personal communication.

In addition to the different visible status of these technologies, Sophie’s use of this messaging technology is actually regulated by two kinds of rules: rules for professional

communication and rules for personal communication. Professional communication rules and etiquette tell her that she could never text to clients because mobile messaging technology does not have a status of authority. She also knows that she can "*only text at the break or when the work is slow….*" At the same time, her use of mobile text messaging is affected by personal communication rules. In her small circle of friends, everyone loves to text to each other; it is impolite not to text friends. This peer pressure explains her high volume of messages from another angle.

Figure 6.7 illustrates how a wireless phone as a genre mediates between local goals and social motives across two levels of contexts. In the immediate workplace context, Sophie would like to exchange quick, invisible messages in a mobile setting with friends. Broadly speaking, from the social-cultural level, she wants to stay in contact with important people in a humorous and creative way. Overall, mobile text messaging provides a nice affordance to her different goals originating from different levels of contexts, allowing her to mediate between work and life and between business tasks and emotional needs. The fact that mobile phones are used as an emotional device to mediate social networks and emotional support in contexts explains why Sophie is enthusiastic about using mobile text messaging.

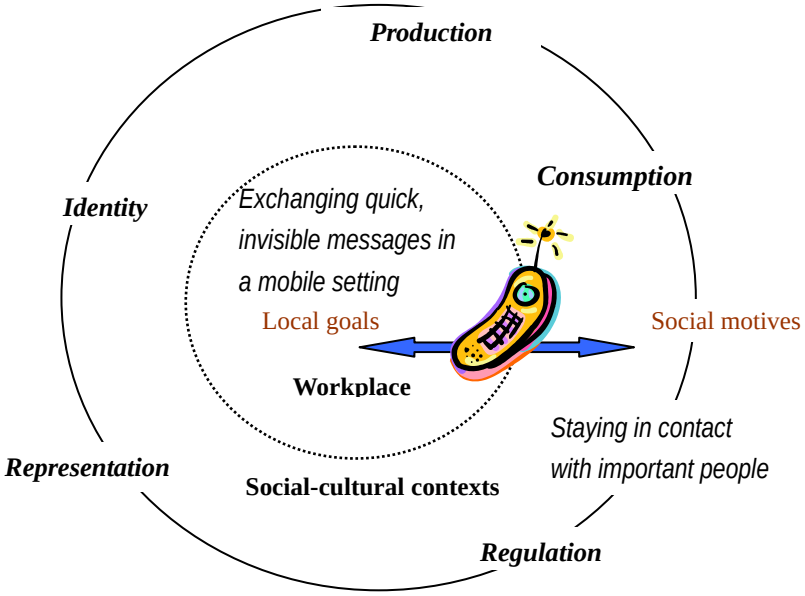


Figure 6.7 Cultural Usability

Usability Breakdown

It should be noted that the current patterns of use conflict with the original design of mobile text messaging. Mobile text messaging was originally designed as a business tool rather than an emotional device, which did not fully consider how to better afford emotional communication. For example, Sophie finds it difficult to input the exclamation mark "!" on her phone. There is no exclamation point on the first key for the punctuation. It is difficult to compose cute, funny, and emotional messages without an exclamation point at the end. To use such punctuation, she typically must press two keys to go several screens deep. It is extremely inconvenient.

Reflection Notes

In her "Feminist Rhetoric of Technology," Koerber (2000) urges us to move from a

research focus of the design and development phases of technology to the uses of the technology. She asks us to consider “what happens after new technologies are marketed to consumers and eventually incorporated into their daily lives” (p. 68). She is disappointed by the fact that too often a new technology seems to be liberating at the design phase but turns out to reinforce the old social system in the end. In this aspect, mobile text messaging technology distinguishes itself from other technologies.

Based on Haraway’s argument that “[feminist] objectivity is about limited location and situated knowledge” (1991), Suchman (2002) promotes “artful integration” in technology design, which we can also use to examine technology use. She claims that “[powerful] technical systems… comprise not hegemonies but artful integrations. Design success rests on the extent and efficacy of one’s analysis of specific environments of devices and work practices, finding a place for one’s own technology within them.” To put it another way, technology use is a process of “animating and finding subjectivity in technical artifacts.” Subjectivity is the essence of technology use. It defines whether a user can find part of herself in a technology and whether a user can envision how this technology is located in her life. When Sophie is actively integrating the mobile messaging technology into her work setting to enhance her work and personal life, she is challenging the homogeneity and dominance prescribed by the technology and participating in the practice of artful integration in a broader horizon.

Chapter 7

Lily's Story: Pure Water in Social Network

> "Sending text messages helps me realize 'the friendship between gentlemen appears indifferent but is pure like water'[1] in a deeper way. It makes me feel good by texting and greeting to friends occasionally... It is a very beautiful thing to convey feelings this way."

Profile

"Lily" (L43) is 26, a teacher and student advisor for a local technical college at the Chinese site. She married her long-time boyfriend who also works at the same college in May 2004, at the later stage of this study.

Lily moved to Hangzhou three years ago after she obtained her college degree in another city. Before that, she grew up in her hometown, two hours away from Hangzhou. While a student, Lily was enthusiastic about her school activities. She had been the anchor of the school radio station for three years and worked at the Student Union the entire time she was at college. Lily made many friends this way. Now her childhood and college friends are everywhere. At work, a big part of her job is advising students and organizing various student activities, and she communicates to quite a few students each day.

[1] A famous Chinese motto about friendship.

Lily's daily communication technologies are very simple. According to the survey, her most used technology is a wireless phone that she "always" uses. The second one is text messaging which she "usually" uses. She does not have a landline phone at home, and thus only uses the landline at work. Though her husband is an IT professional, she is not enthusiastic about online communication. She feels her real life is already very rich and colorful, and therefore she is not interested in making new friends by chatting with strangers online using QQ and MSN messengers (popular among young people in China). Thus she rarely uses instant messenger to communicate, even with old friends. When she participated in the first stage of this study, she said she rarely used email. During the second stage, when Lily got a better Internet connection, she reported checking emails daily.

Lily received her first cell phone (a Nokia model) as a gift from her future husband when she started work in September 2001. Before the cell phone, beginning in her sophomore year she had used a numeric pager to assist in daily communication with friends and colleagues. After Lily received the cell phone, she sent text messages right away to her friends who had cell phones, notifying them of her new communication status and her phone number. It was a natural move for her to adopt texting and join her texting circle. As she got familiar with the phone features, she texted more and more. Now it is "an indispensable means of communication" in her life that she finds very useful.

Lily's current phone is the Amoi A80, nicknamed the "Dancing Queen." It is a phone model that is popular with women and was made by a local Chinese phone manufacturer. It has an elegant red color with a diamond-like flashing light on top. It also includes applications such as a menstrual cycle calendar and a biological clock, which she finds helpful in logging her periods. This phone was a replacement of the same phone, another gift from her fiancé early last year. It was stolen late last year, and she bought another one herself as she likes the chic design.

Figure 7.1 Lily's "Dancing Queen"

Patterns of Daily Use

In the four-day period of diary study, Lily sent 28 messages and received 24 pieces, totaling 52 messages. Seven distinct locations can be established from her message log including her home, office, meeting room, classroom, a park where she organized a student activity, the bus or simply on the go. These places are categorized in Figure 7.2. It shows that she texted primarily at two sites: at home and in the workplace. Messages exchanged at these two sites count for the majority of her messaging.

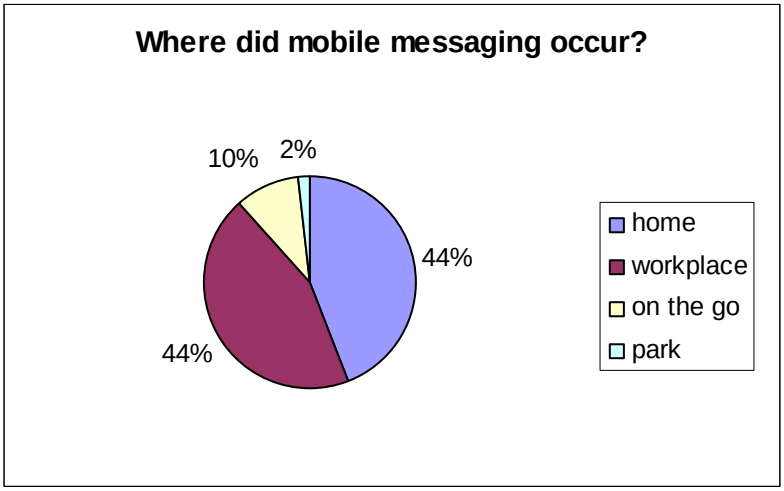


Figure 7.2 Where did mobile message occur?

Lily texted to a total of 15 people in that period, among whom there were four college friends, four colleagues, three childhood friends, and two students along with her fiancé and her cousin (see Figure 7.3). Additionally, she also exchanged messages with her wireless carrier to check on her phone usage.

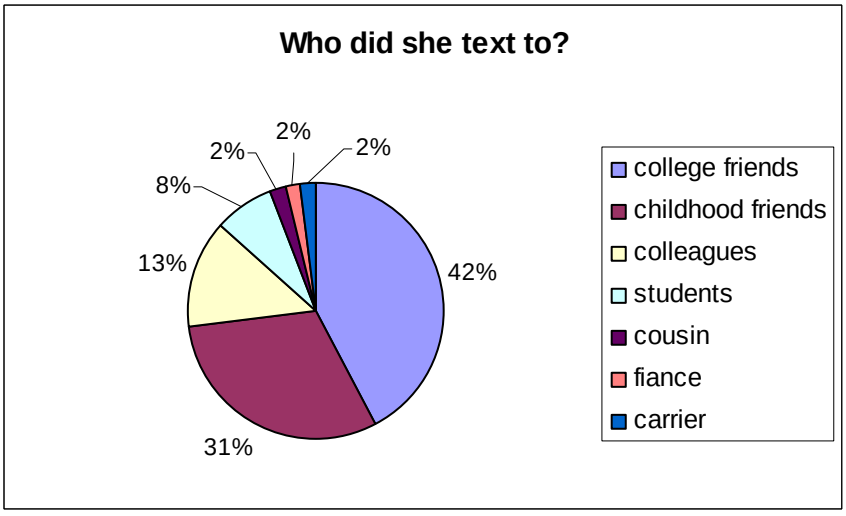


Figure 7.3 Lily: Who did she text to?

More than 70% of these messages were sent to her college and childhood friends. Most of these friends were not located in the same city where she lived. She initiated conversations most of the time, and sometimes her messages were not responded to, as the person she was contacting was not able to answer or due to some other technical difficulties. When she was able to connect to someone, they usually engaged in a conversation consisting of several message exchanges as in the example below.

Text Snippet 1

Time	**Sender**	**Message Text**
7:45 PM	Lily	Mei, zai wang shang kan dao ni ding hun de xiao xi, gong xi a! (Mei, I saw your news of engagement online, congratulations!)
7:50 PM	Mei	zai wang shang ma wo ye zai (Are you online me too[2])
7:51 PM	Mei	xie xie 2xxxx8 (Thanks 2xxxx8[3])
7:56 PM	Lily	wo mei zai wang shang, shi xia wu kan dao de. wo hen shao shang wang, jin tian wan shang you yong ren dan wei zai xue xiao zhao pin, wo zai zuo pei, hen wu liao a! (I'm not online, and I saw it in the afternoon. I seldom go online,

[2] Mei's text messages do not have punctuation marks.

[3] This number is Mei's QQ number, a popular instant messaging system in China.

		some company is on campus for recruiting, and I'm accompanying them, so boring!)
7:59 PM	Mei	o you kong lai Cixi Sandun de fang zi zen me yang wo ye xiang mai (Oh welcome to Cixi when you are free how is the real estate situation in Sandun)
8:02 PM	Lily	wo mei mai san dun de fang zi, suo yi qing kuang bu tai shu xi. wo mai le xue xiao fu jin de fang zi, huan zai shi qu mai le tao xiao fang zi, mu qian ya li hen da a! (I didn't buy the condo in Sandun, so I'm not familiar with the real estate situation there. I bought one near campus, and also bought a small one in downtown. A big burden for me now!)
8:06 PM	Mei	hao li hai wo ji cuo le you hao fang yuan tong zhi yi sheng da jia yi kuai zhu hang zhou (Wow you are so great my memory made a mistake please notify me of good real estates there let's live in Hangzhou together)
8:11 PM	Lily	ni da suan lai hang zhou fa zhan ma? huan ying a! yi ding yao dai ni de zhun lao gong guo lai a! (Do you want to move to Hangzhou for career development? Welcome! Please come to visit with your fiancé!)

8:18 PM	Mei	mei you zhi shi zhao ge luo jiao de di fang shun bian ji dian gu ding zi chan (No I only want to find a place to settle down and gain some fixed assets on the way)
8:35 PM	Lily	he he! ni de jing ji tou nao huan shi zhe me fa da! (Ha ha! You are still so money-wise!)

In this case, Lily was accompanying a company recruiter to a career event at school that evening. Feeling bored and because she heard great news about her college friend and roommate Mei, who was currently in Cixi, she texted to her. They exchanged news about recent life situations. As Lily does not like to use instant messaging programs and seldom uses email, here text messaging serves as a combined function of instant messaging and email.

Compared to her text conversation with friends, her work-related conversation was much shorter:

Text Snippet 2

Time	**Sender**	**Message Text**	**Place**
3:38 PM	colleague	zhu tou hui kai de ru he? (How is the stupid meeting?)	at the meeting

3:40 PM	Lily	huan zai jin hang dang zhong, ting shun li de! Chen chu zhang you wen qi ni a! (Still in the middle of the meeting, and making a progress smoothly! Director Chen asked about you again!)	at the meeting
3:41 PM	colleague	ni zen me shuo (What did you say about me)	at the meeting

Influenced by this use situation, two-thirds of her text messages fall in the personal sphere and one-third in work sphere (see Figure 7.4). It is important to note that Lily has the highest percentage of work-related messages among all participants. Text messaging is one of her most used communication technologies in her daily life, and it is highly embedded into her life. However, like *Text Snippet 2*, most of these work-related messages occurred in the context of friendly chats with old friends or colleagues. Such discussions are for keeping up-to-date about recent situations or reporting at-the-moment experiences, which do not refer to accomplishing work-related tasks in a working context.

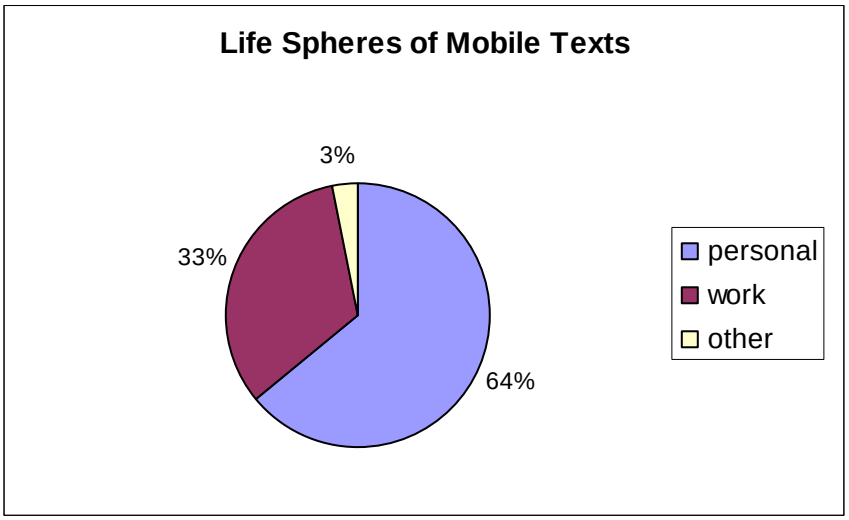


Figure 7.4 What about: Life Spheres of Mobile Texts (Lily)

Since Lily tends to chat with her friends about recent life situations, she employed a large percentage (47%) of text messages with informing purposes (see Figure 7.5). That percentage is much higher than the average at the Chinese site (32%), which is higher than at the American site (26%). Her percentage is actually at the high end in the category of informing purpose among all participants. In some way, hers is a parallel case to Sophie's at the American site. One of the major differences between the rhetorical purposes of American text messages and Chinese text messages is that American participants texted more for expressing purposes and Chinese participants texted more for informing purposes. Sophie and Lily are two representative cases with high percentages in these two distinctive categories. The distribution patterns of Lily's other purposes is similar to the overall pattern at the Chinese site: 23% of messages had the purpose of expressing (vs. 26% at the Chinese site), 13% for the purpose of co-experiencing (vs.

17%), 14% for the purpose of instructing (vs. 17%), and she had a smaller percentage of messages for the purpose of coordinating (3% vs. 8%).

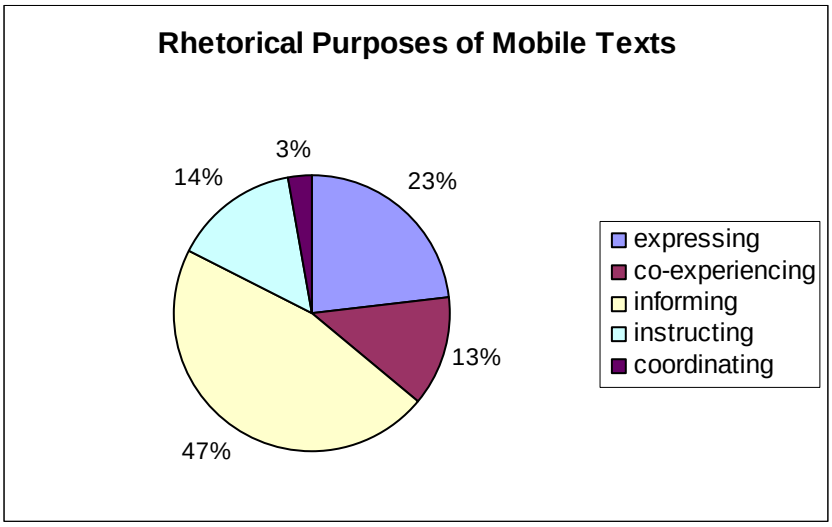


Figure 7.5 What about: Rhetorical Purposes of Mobile Texts (Lily)

Lily's text messaging practices presents a clear temporal pattern. She texted to different groups of people on different days. During the workdays, she texted to colleagues and a work contact to exchange information about work. In the rest days, she texted to local friends, distant friends, and her cousin to stay in contact.

Figure 7.6 illustrates a typical temporal pattern of Lily's text messaging activity found in her message log with *Text Snippet 1* mapped on it. Most of the text messages she exchanged were between her and her friends. She also texted two colleagues, as it was a workday.

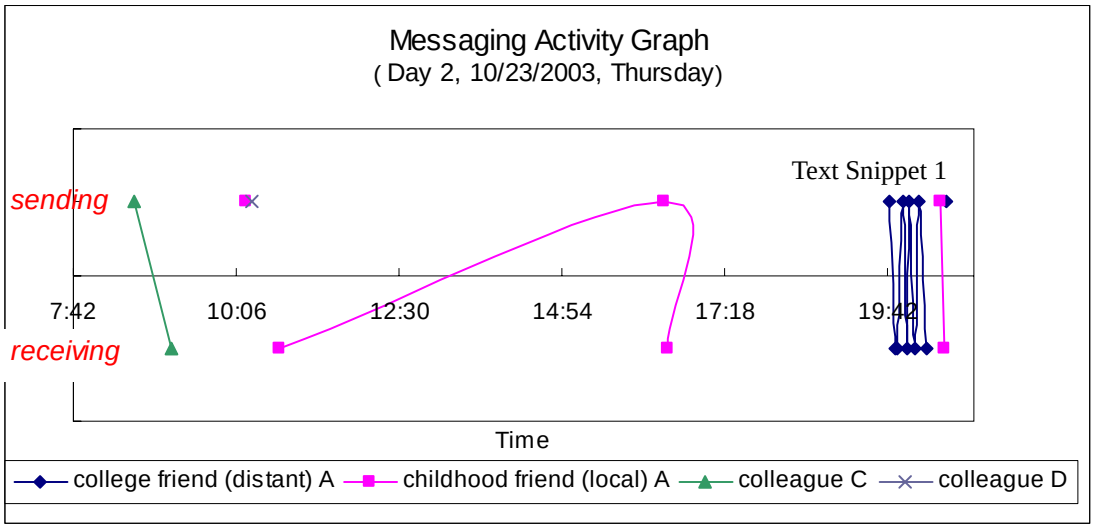


Figure 7.6 Temporal Pattern

Discussion

Indispensable Means of Communication in a Social Network

As shown in the patterns of daily use emerging from the diary study, text messaging is an important means of communication in Lily's daily social network. She uses text messaging to stay in contact with childhood friends, college friends, colleagues, and relatives. In fact, Lily defines text messaging as "an indispensable means of communication" in her life, and she thinks that most of her friendships and cousinship are maintained and enhanced by text messaging.

Lily usually communicates to important people in her social network in the following manner. She calls her parents in her hometown at a fixed time once a week and has longer conversations. With her fiancé, she usually has quick exchanges on phone since they live

together and see each other daily. For cousins, childhood friends, and college friends, she prefers to text to them to stay in contact.

Unlike the informal status of text messaging in American social life, text messaging is acknowledged as a formal genre for Chinese daily social activities. When I interviewed Lily, she was busy preparing for her wedding ceremony in May, and she had just sent out the first round of invitations for their wedding banquet to her friends via text messaging. She likes the affordance of getting quick feedback from text messaging. Friends typically texted her with congratulations, told her whether they would be able to come, and how many of them would make it. Especially for friends at a distance, it is more convenient to send text messages than to mail invitation cards. Lily also prepared a few paper-based invitations. These were primarily reserved out of respect for her work colleagues whom she was not very close with but still had a good relationship with.

The implicit communication style and format of text messaging sometimes helped iron out the wrinkles of her relationships due to years of no contact. There was an interesting episode involving Lily texting to her old college friends about her wedding. She forgot to notify of Lan, who was one year ahead of her at university. She had not seen her since Lan graduated, though they were once very close at school. Another friend reminded her, and Lily felt so sorry that she texted to Lan immediately with a short note about how she misses her and included the invitation. Lan was very moved by Lily's text message. She felt so happy that Lily still misses her even after years of not being in touch and invited

her to the wedding. Lily was happy to be reunited with an old friend. She commented on how text messaging helped her solve a communication problem and social problem where other technologies might not have been as effective. It is abrupt to call people to say that you miss them and invite them to a wedding party after years without contact. Text messaging bypasses this awkward feeling with its affordance of its written form and implicit style. She concluded: “It is a very beautiful thing to convey feelings this way.”

Indifferent but Pure Like Water

In the broad socio-cultural context, text messaging is indispensable for Lily as it suits her personality and enhances her role in the socio-cultural norms in which she is situated.

Lily is a very social type of person. She likes to make new friends and cherishes long-time relationships with old friends. However, she does not like to make phone calls with friends all the time, nor does she like to go online to chat via instant messaging, which she thinks does not agree with her personality. To her, it is abrupt to call people and ask about their recent situations after long time of no touch. She does not know what to say at those moments, though she cares for her friends. Moreover, she says it is not genuine to chat with different friends at the same time in the instant messaging. She values simple friendships and one-to-one communication. Text messaging, which affords one-to-one communication in an implicit way, satisfies her needs and fits with her personality, allowing her to use it comfortably and happily. On reflection, she said that

she would not have been able to stay in touch with old friends if they were not texting. A few years later, they might just turn into strangers.

By using text messaging for maintaining and enhancing her social network, Lily actually identifies herself strongly with the socio-cultural norms surrounding her.

Since Lily appreciates the instrumental and social affordances of text messaging more and more through daily use, she said: “Sending text messages helps me understand ‘the friendship between gentlemen appears indifferent but is pure like water’ in a deeper way. It makes me feel good by texting and greeting to friends occasionally.” The phrase “the friendship between gentlemen appears indifferent but is pure like water (Jun zi zhi jiao dan ru shui)” is a Confucian motto about how to socialize with friends. It has been told for thousands of years in China and is deeply rooted in Chinese people’s daily social practices. People are told that they should treat their friends genuinely with reserved warmth. The best friendship is like pure water, not tainted with personal interests and other things.

In Lily’s opinion, many of her friends are old friends. Their friendship is not maintained by constant contact but by years of care and trust. Texting is a good way to show care and consideration. She likes to text to a friend occasionally to ask how her or his life is and whether s/he is busy with work. In all, she savors her mild taste of friendship mediated by text messaging.

Usability Breakdown

While Lily enjoys the social affordance of this text messaging technology, she is also bothered by its instrumental limitations. As Lily tends to use text messaging to chat with friends by employing messages of informing purposes, she finds her care and consideration is confined to the size limit of a text message. She usually likes to describe things in a clear way with cause and effect, and thus her messages are a bit complex. This is particularly true for the first few turns with her friends when she tells them about what has happened recently in her life. About 70% of the time she is composing text messages, she would receive a prompt telling her that she reached the size limit. Then, she has to go back and delete some words that will not ruin the understanding of her message. It is annoying to go through this process daily, but she has no other way.

Reflection Notes

Lily's use story illustrates how the localization of a technology occurs on a deeper cultural level. Here, the meanings of culture are not just about the translated design of text messaging programs, nor just about places and identities, but also about the socio-cultural norms behind her. She chose text messaging and continues using it not only because text messaging fits with her lifestyle, but also because text messaging maintains her daily social network. It helps her be better situated in her socio-cultural context and connects her with thousands of years of social tradition.

As Lily has a different cultural context from Emma and Sophie, it is easier to see how her text messaging practice is influenced by her cultural context and her socio-cultural norms. However, in the previous section, I did not mention the popular terms concerning cultural dimensions in localization studies such as collectivist culture or high-context communication. This is because I want to illustrate these dimensions since they should be understood in their concrete contexts within concrete activities. We cannot use abstract terms to label localization features without considering the real use activities that they need to support and afford.

Chapter 8

Expanding the Scope of Localization

> “The best designs are the ones we create for ourselves…. It is design that's in harmony with our individual lifestyles.”
>
> “We are all designers — because we must be.”
>
> — Donald Norman: *Emotional Design: Why we love (or hate) everyday things* (2004)

Localization is a valuable concept that could suggest a study of the whole cycle of product design and use, involving a rhetoric of designing and evaluating IT products at user’s site. Its assumptions on cultural differences and globalization offer us a broader view to examine technology use issues. However, the concept is only theorized half way. Based on findings from the fieldwork, this chapter theorizes local uses within the cultural usability framework and urges the field to reconsider the process of localization. It ends with the implications of this study.

Theorizing User Localization with Cultural Usability

A Cultural Usability Perspective on Local Uses

With the framework of cultural usability, this study illustrates how local uses occur on two different levels of local contexts and how various cultural factors are articulated through use to localize a hard-to-use technology into participants’ personal lives as follows:

First, a local use of mobile messaging technology is situated at the intersection of the immediate context and the socio-cultural context. Each use has a local purpose and a social motive. On one hand, participants used this technology to accomplish tasks in their immediate contexts. For example, a Chinese participant chose text messaging for exchanging comments with friends about a sports game she was watching on TV late at night since she did not want to disturb other family members. On the other hand, these users texted to achieve social motives in the socio-cultural context. In the same case, that participant wanted to share her game-watching experience and excitement with her friends. Here, both activities and meanings are mediated by the technological artifact in the use process.

Second, frequent users adopted, used, and stayed with mobile text messaging based on both the instrumental affordances and social affordances of the technology. Sometimes social affordances were so important to users that they would ignore the poor usability of the technology. In Lily's case, she had a high tolerance to the inconvenience of the technology for the sake of its social affordances. She stuck to mobile text messaging technology even though she had to delete extra characters to fit her long messages into the size limit every day.

The fieldwork also sheds light on the complex relationships between instrumental affordances and social affordance in use. As discussed in Chapter 2, social affordances arise out of instrumental affordances through user's interactions in local contexts, and

thus the same instrumental affordance (quick, quiet, indiscreet) might lead to different social affordances and support different social uses (for fun or for staying in contact) when affordances are realized in different contexts.

Third, local uses of mobile text messaging were the outcome of the interactions of various cultural factors on different levels. Other than distinctive patterns of use between participants across sites (i.e., across two types of ethnic cultures), data from the fieldwork also presented distinctive patterns of use between participants of different genders. Two thirds of the participants turned out to be female because my criterion-based sampling procedures emphasized a high volume of daily messaging exchanges. During the study, I found female participants were more enthusiastic about this technology. Their enthusiasm for mobile text messaging can be understood by looking at the historical timeline. Female users localized landline phones, introduced in the early 20th century (Rakow, 1992; Tannen, 1990), for "rapport talk." Cell phones were localized by working mothers for domestic purposes such as remote mothering and parallel shifts in early 90s of last century (Rakow & Navarro, 1993). At this current moment, mobile text messaging is being localized by young female users to share emotional support as a "new chocolate" (Lowe, 2003).

Moreover, the gendered practices of mobile text messaging technology also serve as interesting examples of the local/global dynamic of practice. In Lily's case, her personal use of the technology was influenced both by her gendered identity on the local level and

ethnic cultural factors on the global level. The feminine “Dancing Queen” phone she used manifested how the technologies of wireless phone and mobile text messaging were localized for female social practices. These social practices were also her way to negotiate a form of “pure water” of social relationship between friends in her socio-cultural contexts.

Fourth, frequent users of mobile messaging have developed “localization strategies” to integrate the technology into their life styles. Emma’s case shows that a user can unconsciously employ communication strategies to manage an ensemble of technologies to accomplish different communication tasks in various life spheres.

Borrowed from Silverstone and Haddon (1996), the notion of “double articulation” helps us see the discursive practices from the process of localizing technology. In the case of mobile text messaging, the first articulation occurs as users adopt, use, and localize the technology to fit within their lifestyles. In the first articulation, strategies for the use of text messaging technology are developed, and the role of this technology is confirmed in the ensemble of IT technologies. The second articulation appears as the result of the first articulation, wherein the meanings of identities and social relationship emerge from the rhetorical and generic rules of the mobile text messaging technology. In the case of Lily, she used the messaging technology not only to represent and enhance her identity but to identify with a social tradition.

Fifth, the local use of text messaging presents the duality feature of the technology in both the personal context and the social context. Drawing from Gidden's structuration theory (1984), Orlikowski (1992) argues that technology use in an organizational context is not only socially constructed in human interpretive actions "through the different meanings they attach to it and the various features they emphasize and use" but also a "part of the objective, structural properties of the organization."

The local use of text messaging shares this similar duality. In the personal context, Emma was observed to be actively attaching meanings to the new technology (such as text messaging) in her life sphere and weaving them into her ensemble of communication technologies with agency. However, by doing this, she also confined herself to a structure and a system of technologies where she would get lost. In the socio-cultural context, Lily was observed to employ the implicit style of text messaging for her communication with friends as it fit her personality and identity. But at the same time, her use was actually reinforcing the structuring factors and the social norms surrounding her.

Finally, a local use is an articulation work of self and place, which involves concrete use activities surrounding the user's identity and self in a specific place. The cases of Emma, Sophie, and Lily illustrate how they chose text messaging to help them create, present, and maintain their identities as well as how they utilized this technology in their particular environments. Eriksén (2002) names this type of place as a "genius loci,"

which is “a place where the subjective and objective meet and define each other in and through action.”

Localization on the Circuit

The local use success of mobile text messaging technology asks us to consider one question: Is the mobile text messaging technology well localized or not?

As discussed in previous chapters, mobile text messaging technology was designed in the UK first as a voicemail alerting service rather than a writing technology for personal communication (Hill, 2004). It has inherent limitations such as a small display, inconvenient input methods, and a limited message size. When the technology took off in other parts of the world, only minimal localization work had been done at the developer’s site: Primarily the translation of the interface for operational affordances of the technology. Since then, the interface and the functions of the technology have remained the same except for the improved inputting methods. The localization work at the developer’s site is not satisfactory.

At the user’s site, the fieldwork shows that, even though mobile text messaging technology is hard to use and not well localized, participants successfully localized the technology into their daily lives: They used mobile text messaging to cope with emotional moments, enhance work and personal life, maintain social contact with old

friends, exchange funny jokes, coordinate friends' activities, and so on. Thus the user localization seems to be very successful.

Here we see two contrasting localization phenomena from the developer's site and from the user's site. What do the two contrasting localization phenomena suggest for our future localization practices? Does this mean that maybe localization professionals might not need to work so hard to address cultural issues in localization design since users will do that in their own contexts, as shown in the case of mobile text messaging? This is an unwarranted claim, one that is too optimistic and only counts on user localization for the overall localization performance. Actually the localization success of text messaging technology is an unqualified localization success because it only occurs at the user's site. This technology succeeds with its inherent use limitations because it offers social affordances that other technologies are unable to provide currently. When newer technologies are introduced with similar social affordances and better instrumental affordances, users would not bother to localize a hard-to-use technology any more. The fieldwork already shows this trend: Some participants reduced the use of text messaging during the second stage. Some American participants found that text messaging technology was too expensive after their service provider's promotion ended. Some Chinese participants found other technologies were available to them (for example, email). Moreover, so many technologies with minimal localization efforts at the

developer's site failed on the market, but only mobile text messaging succeeded. The use success of one technology cannot be applied to all technologies.

A cultural circuit view of the mobile text messaging will help us to better understand the localization process of this technology (see Figure 8.1). As discussed earlier, the cultural circuit provides a timeline and a developmental perspective for examining technology use in context. On this cultural circuit, five key process of artifact use — representation, identity, production, consumption, and regulation — *continually* overlap and intertwine with each other. The developer localization occurs during the process of production, designing the instrumental affordances of mobile text messaging for local users. Then the user localization pervades the process of consumption, regulation, representation, and identity. Through articulating various cultural factors into the user localization process, users realize the social affordances of the technology through practices. Clearly there is a stronger element of user localization rescuing the weaker developer localization in mobile text messaging, making the circulation of the technology on the circuit possible. However, this might not happen for other IT products. In worse situations, an IT product with poor localization work will not be able to move through this circuit if users refuse to use it and attach social and cultural meanings to it.

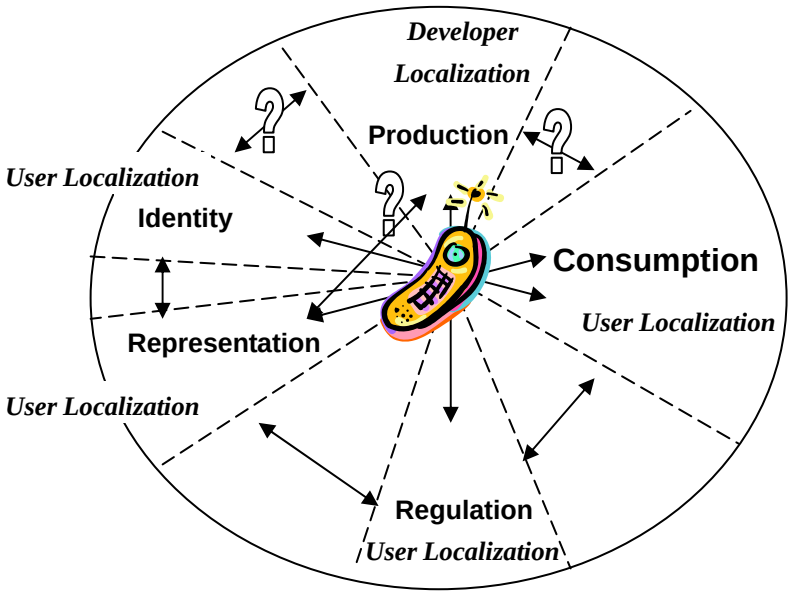


Figure 8.1 Localization on a Cultural Circuit

The circuit view also raises questions for the current developer localization. This view suggests that the mobile messaging technology traverses various processes on the circuit *continually* to accomplish user goals; however, there are problematic links between the production process and the processes of consumption, representation, and identity, which impede a smooth circulation. The links between these processes should be two-way transactions, but the fieldwork rarely found how the production process responded to the use patterns emerging from the processes of consumption, representation, and identity. For example, though mobile text messaging technology was used for different communication purposes (fun communication at the American site and relationship communication at the Chinese site), the fieldwork was unable to find how the localized messaging applications provide instrumental affordances for these different

communication functions. If this situation continues, the current successful user localization might not be able to be sustained as the momentum of circulation decreases.

Fortunately, some manufacturers noticed this trend. In Lily's case, her phone model ("Dancing Queen") exemplified how a local phone manufacturer responded to the enthusiasm of female users on wireless phones and modified the product to this group of users by adding female-oriented applications. As for the wireless applications, Ericsson and Point Forward developed a prototype PDA called "WuKong" for Chinese users (Yu & Tng, 2003). This prototype rejected the Western conceptual model for applications, documents, and folders, but built a design based on the concept of the *guanxiwang* (i.e, Chinese social network).

Overall, this circuit view illustrates these points for IT product localization: First, a successful localization case includes localization efforts spanning from the developer's site to the user's site. There is an ongoing interaction between the developer's localization and the user's localization. These two processes interact with each other in a way that developer localization provides instrumental affordances for user localization to realize social affordances in use. It also allows the social affordances emerging from the local uses to offer opportunities for developers to design better instrumental affordances and improve localization performance in the next round.

Second, user localization is very important in the whole localization process, because an IT product would not be fit into the user's lifestyle without user localization. As Norman (2004) maintains, designers can make easy-to-use products that fulfill our needs, but they cannot make something that we would bond to. In this sense, everyone is a designer who makes artifacts work for his/her life.

Third, it is possible for an IT product that is poorly localized at the developer's site to still enjoy use success, as long as there is successful user localization that helps close this gap. However, a truly successful localization process will always incorporate a dialogue between developers and users in which developers respond to user's needs in a timely fashion and improve instrumental affordances to support user's activity in context. If this dialogue is problematic or does not exist, the current use success might eventually disappear.

Reconsidering Localization Practices

An Expanded Vision of the Localization Process

Combined with findings from the fieldwork, the framework of cultural usability provides us with a fresh perspective to rethink of localization process. With a focus on the mediation of meanings and that of activities in context, this framework regards usability as a diffusing feature across the activity system, incorporates cultural factors from both the immediate context and socio-cultural context into the object of inquiry, and situates the cultural issue in the dynamic interactions and connects it with the instrumental and

social affordances of the technological artifact. Cultural usability links localization work to situated uses, which suggests that the localization of IT products and services is both a move from a generic system to local configurations of technology and an active process of "articulation work" in a local context (Hales, 1994). And localization work does not only belong to designers, but also to users. In this "enabling and empowering" system (ibid), users work with designers and producers as actors/constructors to co-construct the whole practice.

Thus an expanded vision of the localization process is proposed as below:

> Localization is the adaptation and customization of IT products and services to a locale with a distinctive culture. It includes localization efforts from design through use, i.e., developer localization and user localization. The whole localization process starts from the developer side where localization professionals modify a product to make it usable to the target users based on rich understandings of local use activities in context. It reaches a closure on the user side when users successfully develop use strategies from the perceived product affordances and concrete subjective experiences and integrate the product into their everyday life through use and consumption.

I do not want to suggest that this vision should be interpreted as a definition of localization, as this is beyond the scope of the project. What I want to claim with this vision is that localization does not stop at the product shipment stage, as we see from the

case of mobile messaging technology. It continues and reaches a closure at the user's site. Furthermore, design and use are asymmetrical here and use is actually more important in this process since user's efforts realize localization and complete the whole process.

This vision brings insights into localization work. Generally, designers face two challenges. First, many design resources are not in the designer's hands but "developed in use" (Brown & Duguid, 1994). Second, breakdowns are inevitable in human-machine communication (Suchman, 1987). Therefore, besides providing fully functional IT artifacts, designers need to develop means to initiate practices and fix breakdowns. Here, the job of designers is to incorporate better instrumental affordances into a technological artifact to help develop and realize social affordances that are echoed with social motives in local contexts emerging from the interactions. The core of this vision is founded on a deep understanding of concrete use activities in local contexts while considering cultural and structuring factors. It argues that the process of localization is an open system with built-in instrumental affordances to invite users to localize the technological artifact and realize its social affordances. It is an open system where many possible uses—local uses, actually— have been developed surrounding the intended use from the beginning.

With this understanding, process-oriented localization strategies will not seek to design fully-localized interfaces or products (because it is never possible) or regard the product shipment (or developer localization) as the end of localization. Instead, they will look for ways of initiating a communication channel and building a support network to enhance

user localization and help repair the possible breakdowns in contexts of use. They will also watch the use trends emerging from the user's site and design better instrumental affordances to respond to those trends.

This view of localization strategies also has its own merit in further probing into contextual issues in usability studies. If we do not confine localization work to the arena of international technical communication, we will find that all the situated uses are local uses that need "localization strategies." Actually this view reverses the hierarchical relationship usually assumed to position "localization" as a subset of usability in the design process by making "usability" a subset of localizing a product within contexts of use.

Insights for Localization Practices

In the case of mobile text messaging, it is striking that this technology succeeds at being "localized" in its contexts of use without being easy to use. The contrasting use scenarios found from the fieldwork urge us to reconsider current localization practices.

First, the vision of localization needs to be shifted from a single product to the whole system. As this study shows, the localization of text messaging technology is accomplished with the collective efforts of the phone manufacturers, service carriers, and users. In this system, hardware, software, service, and network technology all contribute to the localization work. Clearly it is insufficient to localize only the phone or text messaging application. Usability breakdown will still occur if other components (e.g.,

network jam or the barrier of sending text messages across the network) fail in this system. As shown in Chapter 4, participants expected to see improvement of the mobile text messaging technology not only in the areas of the messaging application and the handset, but also in areas of carrier service and network technology. Their feedback suggests that we should think of localization practices as an open activity system: The product quality and usability do not settle only on the artifact but on the whole system.

Second, the scope of localization needs to be expanded. It should go beyond a stage in the software design and engineering cycle (e.g., translation and interface design) to the site of local use and consumption. The use success of mobile text messaging in local sites does not come from the work of localization professionals, but from users' participation and efforts. In this process, users are actively engaged in localization work and integrate the text messaging technology into their lives; they not only make a hard-to-use technology more usable and meaningful for them, but also localize the technology. For example, one American participant localized the text messaging technology into a "handy" tool to maintain daily conversations with her high-school sister back home. Both she and her sister were unable to find a block of time to chat everyday with busy school work, though they cared each other very much. Then they found text messaging, with which they could send each other quick texts for greetings and sharing right-at-that moment experiences.

Third, the cultural issue of localization needs to be situated into concrete use activities within concrete contexts, and the cultural issue of localization needs to be understood in a

dynamic fashion and in a broad way. The analysis of Lily's use of messaging technology indicates that her local uses were influenced by dimensional cultural factors such as high-context communication style and collectivist culture, but these dimensions are not abstract and isolated ones. They are also shaped by the local conditions in the immediate context and by Lily's own personality. This study illustrates how culture is situated in the localization process. It gives insights into how a specific local use is developed in a concrete activity situated at the intersection of the immediate context and social context and how this local use echoes with both the subjectivity of the user and the ethos of the surrounding culture. It calls for a move in localization practices from simply applying cultural conventions to localization work to designing local technology with rich understandings of use activities in context.

Moreover, the study suggests it is insufficient to tie cultural issues only to national cultural dimensions. Gender issues and generation issues clearly affect local uses of text messaging. The study finds male and female participants interpreted this technology differently and used it differently. As text messaging technology is used across school, work, home, and play, we need to develop a broader vision of culture beyond national and organizational culture in localization practices. The categories of life spheres provide a possibility to look into those local uses.

Fourth, the focus of localization work needs to move from localizing for operational affordances to localizing for social affordances. With detailed discussions on instrumental

affordances and social affordances, this study illustrates how social affordances arise out of instrumental affordances and how users value social affordance during their use. The translation of menus is an affordance on the operation level, but what users really want and value is an affordance on the activity level. Localization work should address this need. For example, Emma expected to be able to send emotional messages more easily on her phone, and Lily hoped that she would not have to delete words to fit in the message size limit most of the time when she texted to her old friends. Moreover, it is clear from the fieldwork that participants at two sites were engaged in two types of communication practices, fun communication and relationship communication. Thus a question arises: What kinds of design features could localization professionals incorporate in mobile messaging applications to support these two types of communication work?

Designing for Lifestyles

The interdisciplinary study of mobile messaging uses in context within the framework of cultural usability presents rich implications for research, practice, and pedagogy to fields of localization, usability studies, and technical communication.

Within the context of localization studies, this project situates the central issue of localization practices —culture — in concrete use activities by considering cultural factors on a broader scope. It expands the vision of localization and provides suggestions for future practices. By examining a localization case of mobile text messaging, this

project connects localization work and situated use, which indicates that every situated use is actually a local use that needs "localization strategies."

Methodologically, this study employs a framework of cultural usability and studies local uses from two levels of contexts: the immediate context and the socio-cultural context. This model is a new development of user-centered design approach with a cultural focus, which brings meanings into activities. It challenges our common sense of design and use that design is more important than use, and claims that use is more important and deserves more attention. As shown from the fieldwork, it is the user localization that turns a hard-to-use technology into a huge use success.

This framework of cultural usability investigates *an articulated moment* of mobile text messaging use in context by drawing from activity theory, genre theory, and British cultural studies. The integrated perspective allows me to see the dynamic interactions between practices and meanings, between factors in the immediate context and those in the broad socio-cultural context, and between dimensional cultural factors and subcultural factors. For example, if activity theory had not been used in this project, I would not have been able to see how a local use of a technology is shaped by the concrete use activity other than by dimensional and subcultural factors, and I would not have been able to see the relationship of instrumental affordances and social affordances in local uses. If genre theory had been neglected in this study, I would not have been able to link textual patterns of mobile messages to routinized use behaviors and examine recurrent

use situations for this emerging genre, I would not have been able to see how this genre evolved from other genres, and I would not have been able to observe the duality feature of the mobile messaging technology in the personal and social context. Last, if British cultural studies had been missing in this project, I would have lacked a perspective to interpret the mediation of meanings in everyday life practices, and I would not have been able to examine the localization process on a cultural circuit.

Instead of asking the general question: "How could we make a technology more usable?" —as we usually do in usability studies, the framework of cultural usability goes further by asking: "How could we make a technology fit in with user's lifestyles?" It suggests that IT product design and use is a complex and dynamic interaction with underlying contextual factors and asks us to create IT products that resonate with a user's lifestyle. The cases of Emma, Sophie, and Lily illustrate how participants fit the mobile messaging technology in their personal lives, but those "fitting" work mostly occurred at the user's site. IT products could be designed to accomplish the same goal to improve the localization performance at the developer's site. For example, different messaging applications can be developed to accommodate various lifestyles: for a college student who uses text messaging mostly for fun, for a working mother who texts for checking in with her children, and for a new graduate who just starts working life and wants to stay in touch with school friends.

With rich findings of mobile text messaging use in two distinctive cultural contexts, this project examines an emerging trend in IT design and use: Consumer culture plays an increasingly important role in our daily uses of technologies. Users adopt a technology more for its social affordances rather than for its instrumental affordances. By looking at uses in everyday life, this project expands IT research from the organizational context to the individual context and studies the duality issue of the technology. The categories of life spheres introduce a new angle on both activity theory and genre theory to examine mediation practices. For example, other than factors such as recurrence, this project suggests that personality and identity is also an important factor for genre formation.

As mobile text messaging is an emerging digital writing practice on the phone, this project provides insights for literacy studies and digital writing research with a detailed analysis of the emerging genre of mobile texts in two cultural contexts. At the same time, with a group of participants aged from 18 to 30 in two different cultures, this study enriches our current understanding of mobile text messaging use as previous studies usually focused on teenager users in a single culture.

The research methodology and findings of this project are also insightful for the research and pedagogy of technical communication. This project comes at a time when more people realize the importance of international technical communication, but there is not much research in this field (Lovitt et al, 1999; Thatcher, 2001). For general technical communication, this project expands our understandings of the role of contextual and

cultural factors in situated use and urges us to map these factors in our teaching and practices of document design, interface design, and instructional design. If introduced to classrooms, this new view of contextual issues and cultural factors will help students better understand cross-cultural communication at the age of globalization.

References

3GAmericas. (2004). *Short Messaging Services (SMS) for Success*, from http://www.3gamericas.org/English/Services/sms_for_success.cfm

Adler, P., & Winograd, T. (1992). *Usability: Turning technologies into tools*. NY: Oxford University Press.

Albrechtsen, H., Andersen, H. H. K., Bødker, S., & Pejtersen, A. M. (2001). *Affordances in Activity Theory and Cognitive Systems Engineering*: Riso National Laboratory, Roskilde.

Baerentsen, K., & Trettvik, J. (2002). An Activity Theory Approach to Affordance. In O.W. Bertelsen, S. Bodker & K. Kuuti (Eds.), *Proceedings of the Second Nordic Conference on Human-Computer Interaction* (pp. 51-60). New York: ACM Press.

Bannon, L. J., & Bødker, S. (1991). Beyond the Interface: Encountering Artifacts in Use. In J. Carroll (Ed.), *Designing Interaction: Psychology at the human-computer interface*. New York: Cambridge U.P.

Barber, W., & Badre, A. (June 1998). *Culturability: The Merging of culture and usability.* Paper presented at the Proceedings of the Fourth Conference on Human Factors and the Web, Basking Ridge, New Jersey. http://www.research.microsoft.com/users/marycz/hfweb98/barber/index.htm.

Bergman, E. (Ed.). (2000). *Information Appliances and Beyond: Interaction Design for Consumer Products*. San Francisco, CA: Morgan Kaufmann Publishers.

Beyer, H., Holtzblatt, K. (1998). *Contextual design: Defining customer-centered systems*. CA: Morgan Kaufman.

Bosley, B. S. (Ed.). (2001). *Global contexts: Case studies in international technical communication*. MA: Allyn & Bacon.

Bradner, E. (2001). *Social Factors in the Design and Use of Computer-Mediated Communication Technology*. Unpublished Dissertation, University of California, Irvine.

Brown, J., & Duguid, P. (1994). Borderline issues: Social and material aspects of design. *Human-Computer Interaction. Special Issue on Context in Design*, *9*(1), 4-36.

Brown, B. (Ed.). (2001). *Wireless world: Social and interactional aspects of wireless technology*. London, UK: Springer-Verlag.

Carroll, J., Howard, S., Vetere, F., Peck, J., & Murphy, J. (2002). Just what do the youth of today want? Technology appropriation by young people. In *Proceedings of the 35th Hawaii International Conference on System Sciences*.

Chen, K. (2002). *Yi dong duan xin zai zhong guo de fa zhan (The Development of SMS in*

China), from ttp://www.bjx.com.cn/files/wx%5Czlk%5C20030529%5C1.htm

Churchill, E., & Wakeford, W. (2001). Framing mobile collaborations and mobile technologies. In B. Brown (Ed.), *Wireless world: Social and interactional aspects of wireless technology*. London, UK: Springer-Verlag.

Clark, B., Drugan, J., Hartley, T., & Wu, D. (2003). *Training for localization (Replies to a questionnaire)*, from http://www.ice.urv.es/trans/future/localization2/leeds.html

Conifer Research. (2002). *Techniques & Approaches For User Research.*

Cutting, J. (2002). *Pragmatics and Discourse: A resource book for students.* Florence, KY: Routledge.

DeVoss, D., Jasken, J., & Hayden, D. (2002). Teaching intracultural and intercultural communication: A critique and suggested method. *Journal of Business and Technical Communication, 16*(1), 69-94.

Dias, P., Freedman, A., Medway, P., & Pare, A. (1999). Chapter 2, Situating writing. In *Worlds apart: Acting and writing in academic and workplace contexts* (pp. 17-46). Mahwah, NJ: Lawrence Erlbaum Associates.

Dourish, P. (2001). *Whre the Action Is*. Cambridge, MA: MIT Press.

Dray, S., & Mrazek, D. (1996). A Day in the life of a family: An International ethnographic

study. In D. Wixon & J. Ramey (Eds.), *Field methods casebook for software design* (pp. 145-157). NY: John Wiley & Sons.

Drouin, P. (2003). *Training for localization (Replies to a questionnaire),* from http://www.ice.urv.es/trans/future/localization2/drouin.html

du Gay, P., Hall, S., Janes, L., Mackay, H., & Negus, K. (1997). *Doing cultural studies: The Story of the Sony Walkman*. London: Sage.

Dumas, J. S., & Redish, J. (1993). *A practical guide to usability testing*. NJ: Ablex Publishing Corp.

Eldridge, M., & Grinter, R. E. (2001). *Studying text messaging in teenagers.* Paper presented at the CHI 2001 Workshop: Mobile Communications: Understanding Users, Adoption & Design. http://www.cs.colorado.edu/~palen/chi_workshop/.

Engeström, Y., & Escalante, V. (1996). Mundane tool or object of affection? The rise and fall of the Postal Buddy. In B. Nardi (Ed.), *Context and Consciousness: Activity Theory and Human-Computer Interaction* (pp. 325-373). Cambridge, MA: MIT Press.

Engeström, Y. (1999). Activity theory and individual and social transformation. In *Perspectives on activity theory*. UK: Cambridge Press.

Erickson, T. (1999). Rhyme and punishement: The creation and enforcement of conventions in an on-line participatory limerick genre. In *Proceedings of the 32nd Hawaii International Conference on System Sciences (HICSS '99).*

Eriksén, S. (2002). Localizing Self on the Internet: Designing for "Genius Loci" in a Global Context. In Y. Dittrich, C. Floyd & R. Klischewski (Eds.), *Social Thinking-Software Practice*. Cambridge, MA: The MIT Press.

Faiola, A. (2002). A visualization pilot study for hypermedia: Developing cross-cultural user profiles for new media interfaces. *The Journal of Educational Multimedia and Hypermedia, 11*(3).

Esselink, B. (2000). *A Practical guide to localization*. PA: John Benjamins Pub Co.

Fiske, J. (1987). British Cultural Studies and Television. In R. Allen (Ed.), *Channels of Discourse, Reassembled: Televison and contemporary criticism* (2nd ed., pp. 284-326). Chapel Hill, NC: University of North Carolina Press.

Forrester Research. (November 11, 2002). *3.3 million US services jobs to go offshore*.

Forrester Research. (October, 2002). *Mobile applications that drive revenue*.

Fujinuma, M., & Risden, K. (2002). It's a global economy out there: usability Innovation for global marketplaces. In *CHI '02 extended abstracts on Human factors in*

computing systems (pp. 930-930). New York: ACM Press.

Gallup Organization. (May 1991). *The Motorola cellular impact survey*. Princeton, NJ: Gallup Organization, Inc.

Gaver, W. (1991). Technology Affordances. In *Proceedings of Conference on Human Factors in Computing Systems (CHI '91)* (pp. 79-84).

Geertz, C. (1973). *The Interpretation of Cultures*. New York: Basic Books.

Geisler, C., Bazerman, C., & et al. (2001). IText: Future directions for research on the relationship between information technology and writing. *Journal of Business and Technical Communication, 15*(3), 269-308.

Geisler, C. (2004). *Analyzing steams of language: Twelve steps to the systematic coding of text, talk and other verbal data*. NY: Pearson/Longman.

Gibson, J. J. (1979). *The Ecological Approach to Visual Perception*. Boston: Houghton Mifflin.

Giddens, A. (1984). *The Constitution of Society*. Berkeley, CA: University of California Press.

Gribbons, W. M. (1997). Designing for the Global Community. In *Proceedings of IEEE International Professional Communication Conference* (pp. 261-273). Salt Lake

City, UT.

Grinter, R. E., & Eldridge, M. (2001). y do tngrs luv 2 txt msg? In W. Prinz, M. Jarke, Y. Rogers, K. Schmidt & V. Wulf (Eds.), *Proceedings of the Seventh European Conference on Computer-Supported Cooperative Work ECSCW '01* (pp. 219-238). Dordrecht, Netherlands: Kluwer Academic Publishers.

Grossberg, L. (1992). *We Gotta Get out of this Place: Popular conservatism and postmodern culture.* New York: Routledge.

Hackos, J., & Redish, J. (1998). *User and task analysis for interface design*. NY: John Wiley & Sons.

Haddon, L. (2003). Domestication and Mobile Telephony. In J. E. Katz (Ed.), *Machines That Become Us: The Social Context of Personal Communication Technology* (pp. 43-56). New Brunswich, NJ: Transaction Publisher.

Hales, M. (1994). Where are designers? Styles of design practices, objects of design and views of users in CSCW. In D. Rosenberg & C. Hutchison (Eds.), *Design issues in CSCW* (pp. 151-177). London: Springer Verlag.

Hall, E. (1976). *Beyond Culture*. New York: Anchor Books.

Hall, E. (1983). *The Dance of Life*. New York, NY: Anchor Books.

Hall, S. (Ed.). (1997). *Representation: Cultural representations and signifying practices*. London: Sage.

Hansen, K., & Damm, C. (2002). Instant collaboration: Using context-aware instant messaging for session management in distributed collaboration tools. In *Proceedings of the 2002 NordiCHI Conference* (pp. 279-282). Arhus, Denmark.

Haraway, D. (1991). Chapter 9, Situated knowledges: The science question in feminism and the privilege of partial perspective. In *Simians, Cyborgs, and Women: the Reinvention of Nature* (pp. 183-201). New York: Routledge.

Harvey, F. (1997). National cultural differences in theory and practice: Evaluating Hofstede's national cultural framework. *Information Technology & People, 10*(2), 132–146.

Herbsleb, J., Atkins, D., Boyer, D., Handel, M., & Finholt, T. (2002). Introducing instant messaging and chat in the workplace. In *Proceedings of the 2002 conference on Human factors in computing systems* (pp. 171-178). Minneapolis, MN.

Hill, T. (2004). New revenue alert from SMS. *Telecommunications International, 38,* 43-44.

Hofstede, G. (1991). *Culture and Organizations: Software of the Mind*. New York, NY: McGraw-Hill.

Honold, P. (1999). Learning how to use a cellular phone: Comparison between German and Chinese users. *Technical Communication, 46*(2), 196-205.

Hutchby, I. (2001). *Conversation and technology: From the telephone to the Internet*. Cambridge, UK: Polity Press.

Issacs, E., Walendowski, A., & Ranganthan, D. (2002). Hubbub: A sound-enhanced mobile instant messenger that supports awareness and opportunistic interactions. In *Proceedings of the 2002 conference on Human factors in computing systems* (pp. 179-186). Minneapolis, MN.

Issacs, E., Walendowski, A., Whittaker, S., Schiano, D., & Kamm, C. (2002). The Character, Functions, and Styles of Instant Messaging in the Workplace. In *Proceedings of the 2002 Conference on Computer Supported Cooperative Work* (pp. 11-20). New Orleans, Louisiana.

Johnson, R. R. (1998). *User-centered technology: A rhetorical theory for computers and other mundane artifacts*. NY: SUNY Press.

Johnson-Eilola, J. (1996). Relocating the value of work: Technical communication in a post-industrial age. *Technical Communication Quarterly, 5*(3), 245-270.

Jokinen, P. i., Karimäki, K., & Kangas, A.-M. (2003). *Demanding Needs for Mobile Phones: A Qualitative User Study on the Young Urban Lower Middle Class in*

China. Paper presented at the the 5th Annual International Workshop on Internationalisation of Products and Systems (IWIPS 2003).

Kahn, J. (2004, July 3). China Is Filtering Phone Text Messages to Regulate Criticism. *New York Times*.

Kano, N. (1995). *Developing International Software for Windows 95 and Windows NT: A Handbook for International Software Design*. Redmond, WA: Microsoft Press.

Kapelinin, V. (1996). Computer-mediated activity: Functional organs in social and developmental contexts. In B. Nardi (Ed.), *Context and Consciousness: Activity Theory and Human-Computer Interaction* (pp. 45-68). MA: MIT Press.

Kerne, A. (1998, Jan-Feb). Cultural representation in interface ecosystems: Amendments to the ACM/interactions design awards criteria. *Interaction,* 37-43.

Ketola, P., & Röykkee, M. (2001). *The three facets of usability in mobile handsets.* Paper presented at the CHI 2001 Workshop: Mobile Communications: Understanding Users, Adoption & Design. http://www.cs.colorado.edu/~palen/chi_workshop/.

Kirakowski, J. (2001). *Questionnaires in usability engineering*, from http://www.ucc.ie/hfrg/resources/qfaq1.html#Whataretheadvantages

Koerber, A. (2000). Feminist rhetoric of technology. *Journal of Business and Technical*

Communication, 14(1), 58-73.

Kuuti, K. (1999). Activity theory, transformation of work, and information systems design. In Y. Engeström (Ed.), *Perspectives on Activity Theory* (pp. 360-375). New York: Cambridge University Press.

Kuutti, K. (1996). Activity theory as a potential framework for human-computer interaction research. In B. Nardi (Ed.), *Context and Consciousness: Activity Theory and Human-Computer Interaction* (pp. 17-44). MA: MIT Press.

Lenhart, A., Rainie, L., & Lewis, O. (June, 2001). *Teenage life online: The Rise of the instant-message generation and the Internet's impact on friendships and family relationships*, from http://www.pewinternet.org

Leont'ev, A., N. (1978). *Activity. Consciousness. Personality.* NJ: Prentice-Hall.

Lingo Systems & LISA. (2000). *The guide to translation and localization: Preparing products for the global marketplace*. Portland, OR: Lingo Systems.

LISA. (2003). *The localization industry primer*. Switzerland: Localisation Industry Standards Association.

Lovitt, C., & Goswami, D. (Eds.). (1999). *Exploring the rhetoric of international professional communication: An agenda for teachers and researchers*. NY:

Baywood Publishing Company.

Lowe, S. (Mar.3, 2003). Mobile phones are new chocolates. *Sydney Morning Herald.*

Mallick, M. (2003). *Mobile and Wireless Design Essentials*: John Wiley & Sons.

Mante, E., & Heres, J. (2003). Face and Place: The Mobile Phone and Internet in the Netherlands. In J. E. Katz (Ed.), *Machines That Become Us: The Social Context of Personal Communication Technology* (pp. 127-146). New Brunswick, NJ: Transaction Publisher.

Marcus, G. E. (1995). Ethnography In/Of the World System: The Emergence of Multi-Sited Ethnography. *Annual Review Anthropology, 24*, 95-117.

Marcus, A., & Gould, E. (2000, June 19). *Cultural dimensions and global Web user-Interface design: What? So what? Now what?* Paper presented at the the 6th Conference on Human Factors and the Web, Austin, Texas. http://www.amanda.com/resources/hfweb2000/hfweb00.marcus.html.

McLaughlin, M. L. (1984). *Conversation: How talk is organized.* Beverly HIlls, CA: SAGE.

Meeker, M., Choi, L., & Motoyama, Y. (2004). *Chinese Internet Report*. New York: Morgan Stanley.

Miller, C. R. (1979). A humanistic rational for technical writing. *College English, 40,* 610-617.

Miller, C. R. (1984). Genre as social action. *Quarterly Journal of Speech, 70,* 151-167.

Miller, C. R. (1994). Rhetorical community: the cultural basis of genre. In A. Freedman & P. Medway (Eds.), *Genre and the new rhetoric* (pp. 67-78). London: Taylor & Francis.

m-Travel. (Aug.5, 2002). *Survey finds women like mobile text messaging,* from http://www.m-travel.com/20805.shtml

Musale, S. (2001). *Localizing for Mobile Devices: A Primer*: LISA.

Myers, M. D., & Tan, F. B. (2003). Beyond Models of National Culture in Information Systems Research. In F. B. Tan (Ed.), *Advanced Topics in Global Information Management* (Vol. 2): Idea Group Publishing.

Nardi, B. (1996). Studying context: A comparison of activity theory, situated action models, and distributed cognition. In B. Nardi (Ed.), *Context and Consciousness: Activity Theory and Human-Computer Interaction* (pp. 69-102). MA: MIT Press.

Nardi, B., Whittaker, S., & Bradner, E. (2000). Interaction and outeraction: Instant messaging in action. In *Proceedings of the 2000 Conference on Computer*

Supported Cooperative Work (pp. 79-88). Philadelphia, PA.

Nielsen, J. (1993). *Usability engineering*. London: AP Professional.

Norman, D. A. (1988). *The Psychology of everyday things*. New York: Basic Books.

Norman, D. (1999, May/June). Affordance, Conventions and Design. *Interactions,* 38-42.

Norman, D. (2000). Foreword. In E. Bergman (Ed.), *Information Appliances and Beyond: Interaction Design for Consumer Products*. San Francisco, CA: Morgan Kaufmann.

Norman, D. (2004). *Emotional Design: Why we love (or hate) everyday things*. New York: Basic Books.

Orlikowski, W. J. (1992). The Duality of Technology: Rethinking the Concept of Technology in Organizations. *Organization Science*, *3*(3), 398-427.

Palen, L., & Salzman, M. (2002). Beyond the handset: Designing for wireless communications usability. *ACM Transactions on Computer-Human Interaction, 9*(2), 125-151.

Palen, L., & Salzman, M. (2002). Voice-Mail diary studies for naturalistic data capture under mobile conditions. In *Proceedings of the 2002 Conference on Computer Supported Cooperative Work*. New Orleans, Louisiana.

Peters, O., Almekinders, J., R., V. B., Roy, S., & Wessels, J. (2003). *Motives for SMS use.* Paper presented at the 2003 International Communication Association Annual Convention, San Diego, California.

Rakow, L. F. (1992). *Gender on the Line: Women, the Telephone, & Community Life*. Urbana, IL: University of Illinois Press.

Rakow, L. F., & Navarro, V. (1993). Remote mothering and the parallel shift: Women meet the cellular phone. *Critical Studies in Mass Communication, 10*, 144-157.

Rheingold, H. (2002). *Smart Mobs: The Next Social Revolution*. Cambridge, MA: Perseus.

Richtel, M. (2004, June 26). For Liars and Loafers, Cellphones Offer an Alibi. *New York Times*.

Rogers, E. M. (1995). *Diffusion of Innovations* (5 ed.). New York, NY: Free Press.

Rubin, J. (1994). *Handbook of usability testing: How to plan, design, and conduct effective tests*. NY: John Wiley & Sons.

Rubin, H., & Rubin, I. (1995). *Qualitative interviewing: the art of hearing data*. San Diego: Sage Publications.

Salvo, M. (2001). Ethics of engagement: User-Centered design and rhetorical methodology. *Technical Communication Quarterly, 10*(3), 273-290.

Sassen, S. (1998). *Globalization and its discontents*. New York: New Press.

Schiano, D., Chen, C., Ginsberg, J., Gretarsdottir, U., Huddleston, M., & Issacs, E. (2002). *Teen use of messaging media.* Paper presented at the CHI 2002 Short Talk. http://home.attbi.com/~diane.schiano/CHI2002.short.ttalk.pdf.

Shneiderman, B. (1998). *Designing the user interface: Strategies for effective human-computer interaction*. MA: Addison-Wesley.

Silverstone, R., & Haddon, L. (1996). Design and the Domestication of Information and Communication Technologies: Technical Change and Everyday Life. In R. Mansell & R. Silverstone (Eds.), *Communication by Design: The Politics of Information and Communication Technologies* (pp. 44-74). Oxford: Oxford University Press.

SINA. (Dec.30, 2002). *The revenues of SMS exceed 9 billion yuan*, from http://tech.sina.com.cn/it/t/2002-12-30/1018158533.shtml

SJInfo. (2003). *An Overview of Chinese Input on Cell Phones*, from http://www.sjinfo.net/syzn/59.html

Slack, J., Miller, D., & Doak, J. (1993). The technical communicator as author: Meaning, power, authority. *Journal of Business and Technical Communication, 7*(1), 12-36.

Slack, J. D. (1996). The theory and method of articulation in cultural studies. In D. Morley & K.-H. Chen (Eds.), *Stuart Hall: Critical Dialogues in Cultural Studies* (pp. 112-127). NY: Routledge.

SMS History Zone. from http://www.mobilesms.com/history.asp

SMS definition. (2004). from http://encyclopedia.thefreedictionary.com/text%20message

Spinuzzi, C. (1999a). *Designing for lifeworlds: Genre and activity in information systems design and evaluation.* Unpublished PhD's dissertation, Iowa State University, Ames.

Spinuzzi, C. (1999b). Grappling with distributed usability: A cultural-historical examination of documentation genres over four decades. In *SIGDOC Proceedings* (pp. 16-21).

Stake, R. E. (1995). *The Art of Case Study Research*. Thousand Oaks, CA: Sage Publications.

Suchman, L. (1987). *Plans and situated actions: The problem of human-computer communication*. NY: Cambridge University Press.

Suchman, L., Blomberg, J., Orr, J. E., & Trigg, R. (1999). Reconstructing technologies as

social practice. *American Behavioral Scientist, 43*(3), 392-408.

Suchman, L. (2002). *Located accountabilities in technology production*, from http://www.comp.lancs.ac.uk/sociology/soc039ls.html

Sullivan, P. (1989). Beyond a narrow conception of usability testing. *IEEE Transactions on Professional Communication, 32*(4), 256-264.

Sullivan, P., & Porter, J. (1993). On theory, practice, and method: Toward a heuristic research methodology for professional writing. In R. Spilka (Ed.), *Writing in the workplace: New research perspectives* (pp. 220-237). IL: Southern Illinois University.

Sun, H. (2002). Why cultural contexts are missing: A rhetorical critique of localization practices. In *Proceedings of STC 49th Annual Conference, Nashville, TN*.

Swales, J. (1990). *Genre Analysis: English in Academic Settings*: Cambridge University Press.

Tannen, D. (1990). *You just don't understand: Women and men in conversation*. New York: Bellantine Books.

Tarkka, M., & Tikka, H. (2001). *Cultural usability: towards a design sensibility*, from http://mlab.uiah.fi/culturalusability/introduction.html

Taylor, A. S., & Harper, R. (2001). *Talking 'activity': Young people and mobile phones.* Paper presented at the CHI 2001 Workshop: Mobile Communications: Understanding

Users, Adoption & Design. http://www.cs.colorado.edu/~palen/chi_workshop/.

Texting: the (near) silent revolution. (2004). from http://www.science.ie/scopetv/content/content.asp?section_id=665#links

Thatcher, B. (2001). Issues of validity in intercultural professional communication research. *Journal of Business and Technical Communication, 15*, 458-489.

Trompernarrs, F. (1993). *Riding the Waves of Culture: Understanding Cultural Diversity in Business*. London: Nicole Brealey.

Vaananen-Vainio-Mattila, K., & Ruuska, S. (2000). Designing Mobile Phones and Communicators for Consumers' Needs at Nokia. In Bergman (Ed.), *Information Appliances and Beyond: Interaction Design for Consumer Products*: Academic Press.

Virkkunen, J., & Engestrom, Y. (2001). *Usability and the changing producer-user relationship*, from http://mlab.uiah.fi/culturalusability/papers/Virkkunen_Engestrom.pdf

Wei, R., & Lo, V.-h. (2003, May 25-28). *Staying Connected while on the Move: Cell Phone Use and Social Connectedness.* Paper presented at the 53rd annual conference of International Communication Association (ICA), San Diego,

California.

Weilenmann, A., & Larsson, C. (2001). Sharing the mobile: Mobile phones in local interactions. In B. Brown, N. Green & R. Harper (Eds.), *Wireless world: Social and interactional aspects of wireless technology* (pp. 92-107). London: Springer-Verlag.

Weiss, E. H. (1991). *How to write usable user documentation*. AZ: Oryx Press.

Wheeler, J. V. (1999). *The impact of social environments on self-directed change and learning.* Unpublished doctoral dissertation, Case Western Reserve University.

Xinhua News. (2002). *55 Million of Users Have Been Using SMS*, from http://it.sohu.com/03/10/article203961003.shtml

Yates, J., & Orlikowski, W. J. (1992). Genres of Organizational Communication: A Structurational Approach to Studying Communication and Media. *The Academy of Management Review, 17*(2), 299-326.

Yesky.com. (2003, June 17, 2003). *Text entry for SMS, which way is better?*, from http://www.yesky.com/Fashion/73753040967958528/20030617/1708453.shtml

Yin, R. K. (1994). *Case Study Research: Design and Methods* (2nd ed.). Newbury Park: Sage Publications.

Yli-Jokipii, H. (2001). The local and the global: An exploration into the Finnish and English Websites of a Finnish company. *IEEE Transactions on Professional Communication, 44*(2), 104-113.

Yu, L., & Tng, T. H. (2003). Culture and design for mobile phones for China. In J. E. Katz (Ed.), *Machines That Become Us: The Social Context of Personal Communication Technology* (pp. 187-198). New Brunswick, NJ: Transaction Publisher.

Zahedi, F., van Pelt, W., & Song, J. (2001). A conceptual framework for international Web design. *IEEE Transactions on Professional Communication, 44*(2), 83-103.

Zhou, Q. (2003). *A study on the purposes of SMS with a sample of Tsinghua University students*, from http://www.tsinghua.edu.cn/docsn/cbx/meiguan/zxcz/lunwen/zhoujing2.htm

Zhou, Y. (2003). The adoption and use of SMS: A comparative study of college students between Shenzhen and Hong Kong. *China Media Report, 2*(2), 110-122.

Appendix A

Mobile Messaging User Survey

Background

1. Age _____

2. Gender _____

3. Occupation _____

4. Educational background _____

5. Who are other people in your house?

_____

6. How would you describe your daily schedule?

_____

7. Which of the following best describes your usual place of work? (Circle one)

a. Home
b. Location away from home
c. Mix of home and location away from home
d. On the road
e. Not working

Phone Info

8. Your phone model is _____

9. How much money did you pay for your current phone? _____

10. Please choose the functions your cell phone has (circle all those apply):

a. Text messaging
b. Web browsing
c. Downloadable games
d. Downloadable ringtones
e. Color
f. Camera
g. MP3
h. Other_____

11. When did you start to use your first cell phone (month, year)? _____

12. When did you start to use mobile messaging for the first time (month, year)? _____

13. What's your wireless service plan (plan name, services, and cost)?

14. How much money do you spend on your cell phone monthly?

15. How much money do you spend on text messaging monthly?

SMS Use

16. How did you learn to use text messaging? Please circle one number to best describe your situation.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
a. Figure it out by myself with trial and error	1	2	3	4	5
b. Watch people how they do it	1	2	3	4	5
c. Consult manuals or tutorials	1	2	3	4	5
d. Ask friends to show me	1	2	3	4	5
e. Other methods such as _____	1	2	3	4	5

17. How much time (in term of minutes, hours, or days) did it take you to learn the task of mobile messaging? _____

18. What text inputting method do you use? Please circle one number for each method to show how frequently you use it.

	Always...				Usually...		Sometimes...		Seldom...	Never
a. Multitap	1	2	3	4	5	6	7	8	9	10
b. T9 (predictive typing)	1	2	3	4	5	6	7	8	9	10
c. Other _____	1	2	3	4	5	6	7	8	9	10

19. How do you send text messages to other people? Please circle one number to best describe your situation.

	Always...				Usually...		Sometimes...		Seldom...	Never
a. By phone	1	2	3	4	5	6	7	8	9	10
b. By email	1	2	3	4	5	6	7	8	9	10
c. Via websites	1	2	3	4	5	6	7	8	9	10

20. What kinds of mobile messaging service do you use? Please circle one number to best describe your situation.

	Always...				Usually...		Sometimes...		Seldom...	Never
a. One-way text messaging	1	2	3	4	5	6	7	8	9	10
b. Two-way text messaging	1	2	3	4	5	6	7	8	9	10
c. Multimedia (or picture) messaging	1	2	3	4	5	6	7	8	9	10
d. Chat room	1	2	3	4	5	6	7	8	9	10
e. IM services on mobile phones (e.g., AIM, MSN messenger)	1	2	3	4	5	6	7	8	9	10

21. For what purpose do you communicate with mobile messaging usually? Please circle one number to best describe your situation.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
a. To arrange or adjust appointments	1	2	3	4	5
b. To have fun conversations with friends	1	2	3	4	5
c. To stay in contact with friends or loved ones at every moment	1	2	3	4	5
d. To send a stealth message in the place where I can't talk	1	2	3	4	5
e. To connect with people without disturbing them	1	2	3	4	5
f. To kill time	1	2	3	4	5
g. To avoid lengthy phone conversations	1	2	3	4	5
h. To save phone cost	1	2	3	4	5
i. To email people when computers are not around	1	2	3	4	5
j. To get or exchange information instantly	1	2	3	4	5
k. To show people I'm cool	1	2	3	4	5
l. Other _____	1	2	3	4	5

22. Do you subscribe to text alert services (e.g., weather forecasts, breaking news, etc.)? If yes, what kinds of alerts do you subscribe to?

Use of Other ITs

23. What communication tools do you use generally? Please circle one number for each tool to show how frequently you use it.

	Always...				Usually...		Sometimes...		Seldom...	Never
a. Emails	1	2	3	4	5	6	7	8	9	10
b. Letters	1	2	3	4	5	6	7	8	9	10
c. Faxes	1	2	3	4	5	6	7	8	9	10
d. IM (Instant Messaging)	1	2	3	4	5	6	7	8	9	10
e. Landline phones	1	2	3	4	5	6	7	8	9	10
f. Wireless phones	1	2	3	4	5	6	7	8	9	10
g. Mobile messaging	1	2	3	4	5	6	7	8	9	10
h. Other_____	1	2	3	4	5	6	7	8	9	10

24. How would rate your knowledge of these technologies below? Please circle one number to best describe your situation.

	Beginner User		Intermediate User		Expert User
a. Computer	1	2	3	4	5
b. Instant messaging	1	2	3	4	5
c. Email application	1	2	3	4	5
d. Mobile text messaging	1	2	3	4	5

25. Do you have a landline phone in the place where you live?

a. Yes
b. No

Thank you very much for your feedback and for taking the time to assist with this user study!

Appendix B

Workbook of "Experiences with Mobile Messaging"

Hello,

Thanks for agreeing to participate in this user study. In this diary study I am trying to understand your experiences with mobile messaging at home, at work, at play, or on the go. I want you to think about your experiences and aspirations around mobile text messaging technology, such as chatting with friends, sending a quick note, and etc. I am interested in knowing how you interact with your wireless phone and its messaging program and how mobile text messaging fits in with your life.

What you are asked to do in this study is:

1. Choose 4 consecutive days when you want to do this diary study. I prefer these 4 days are a combination of at least 2 workdays and at least 1 rest day according to your regular weekly schedule. So the days you chose are: _____--_____.

2. Please save all the messages you send and receive during these four days. Fill out logs (see page 7-14) of each text message you send and receive at the end of each day. When you do the logging, you could first have a self-check to see what messages are private and what are not. Both types of messages are logged in the same way except in the cell of **Message Content**:
   - For ***non-private*** messages, please copy the message exactly the same as it is including all the shorthand, smiley, typos, and the difference of the uppercase letter and the lowercase letter in the cell of Message Content.
   - For ***private*** messages you don't want me to read, please mark the cell of Message Content as "private."

   Note: If you know how to forward text messages to email programs, you could forward them to your email account to save some of your logging time. The suggested procedures are:
   a. ***CC*** the text messages you send and ***forward*** the messages you receive during this time period to your own email address. To save your time, you might want to create a new email folder (e.g., "sms") archiving these emails in your email program, thus you don't need to search for text-message emails in a flood of emails at the end of this period (see step b).
   b. At the end of this period, please check all the saved message emails and delete those private messages you don't want me to read (but you still need to log those messages), and then forward messages to my email account: ***@rpi.edu.
   c. The Subject line of text-message emails should include your ID, the date, and message number logged in the workbook. For example, "Subject: V15 8/20 No.3" is the 3rd message on Aug. 20 from Participant V15.

3. Complete other pages of this workbook during this period. You could choose to do this at the beginning or at the end.

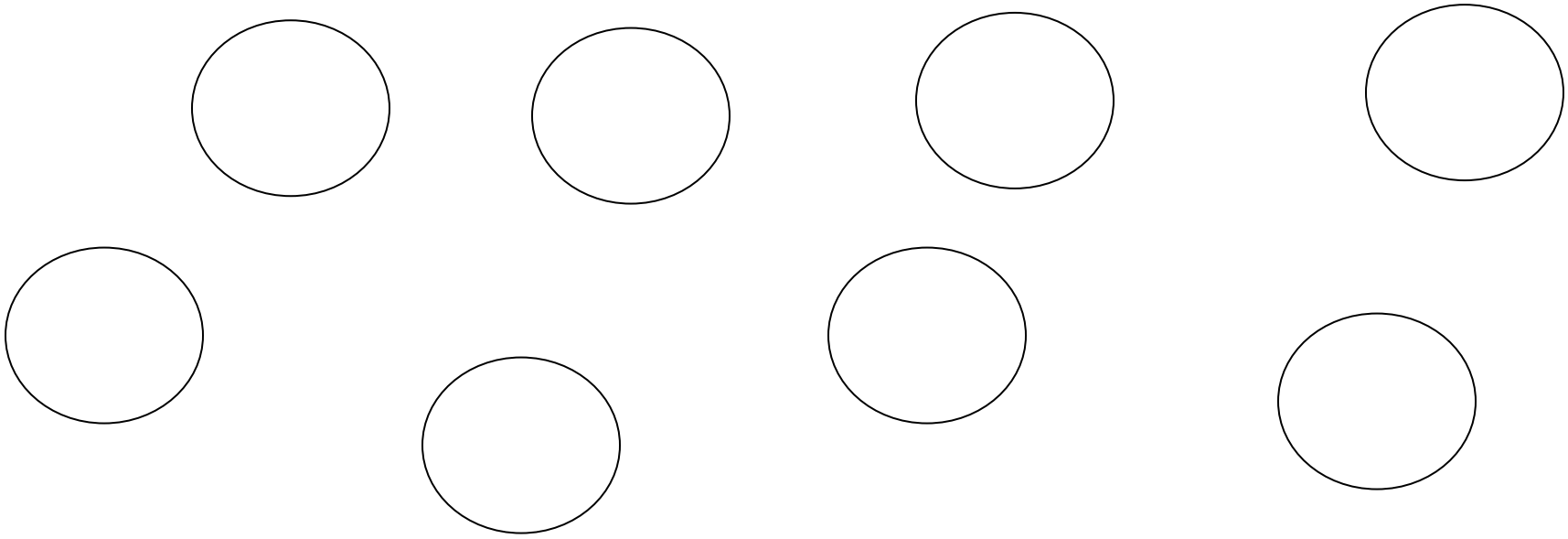
I hope you find this study is an interesting experience to reflect on your own mobile messaging use and you might learn to improve your use of mobile messages after this study. I also hope you will have fun with it.

If you have any questions, please feel free to call me at (518) ***-**** or email me at ***@rpi.edu. *--Huatong (Hannah) Sun*

Where I go and stay

1. Inside the circles, name the places where you stay a lot at work (e.g., offices, labs, and classrooms), at home (e.g., living-rooms, bedrooms), at play (e.g., theatres, bars), and on the go (e.g., cars, streets). You don't have to fill all the circles.
2. Around the circles write down words that describe what you do most in those places (e.g., create documents, watch movies).
3. In a circle for a specific place, mark "**M**" if you used mobile phones and mark "**T**" if you used mobile text messaging.
4. Rank all these places in an order from where you stay most to where you stay less on the line below:

_____



Who I spend time with

On this page you will create a diagram of what you do with others in your daily life.

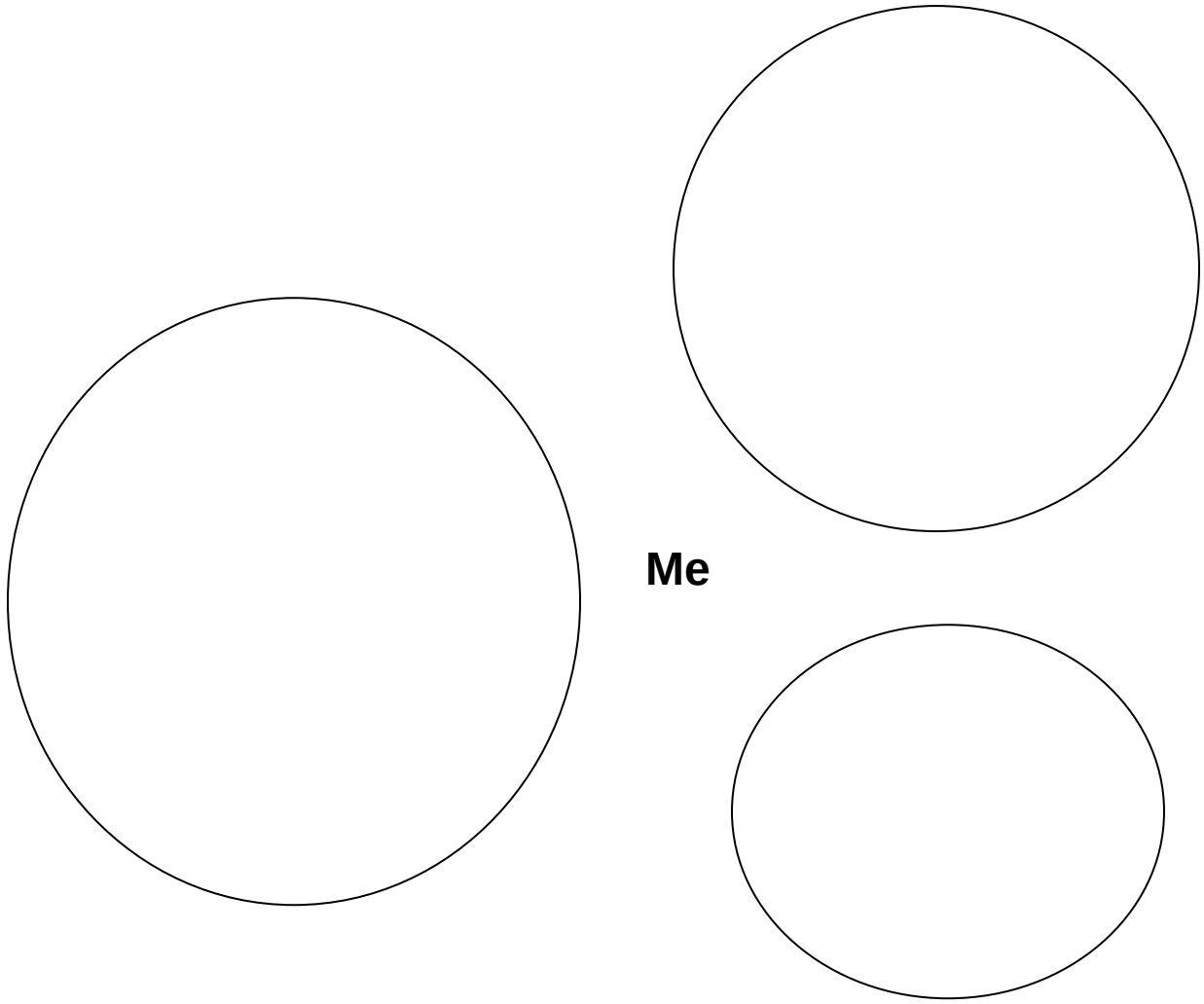
1. From the diagram you created on the previous page, **select three places that you spend most of time in** and write down the names of those places inside the three circles.

2. List people (e.g., your family, friends, and/or coworkers) you spend time with in those places in and around the circles:

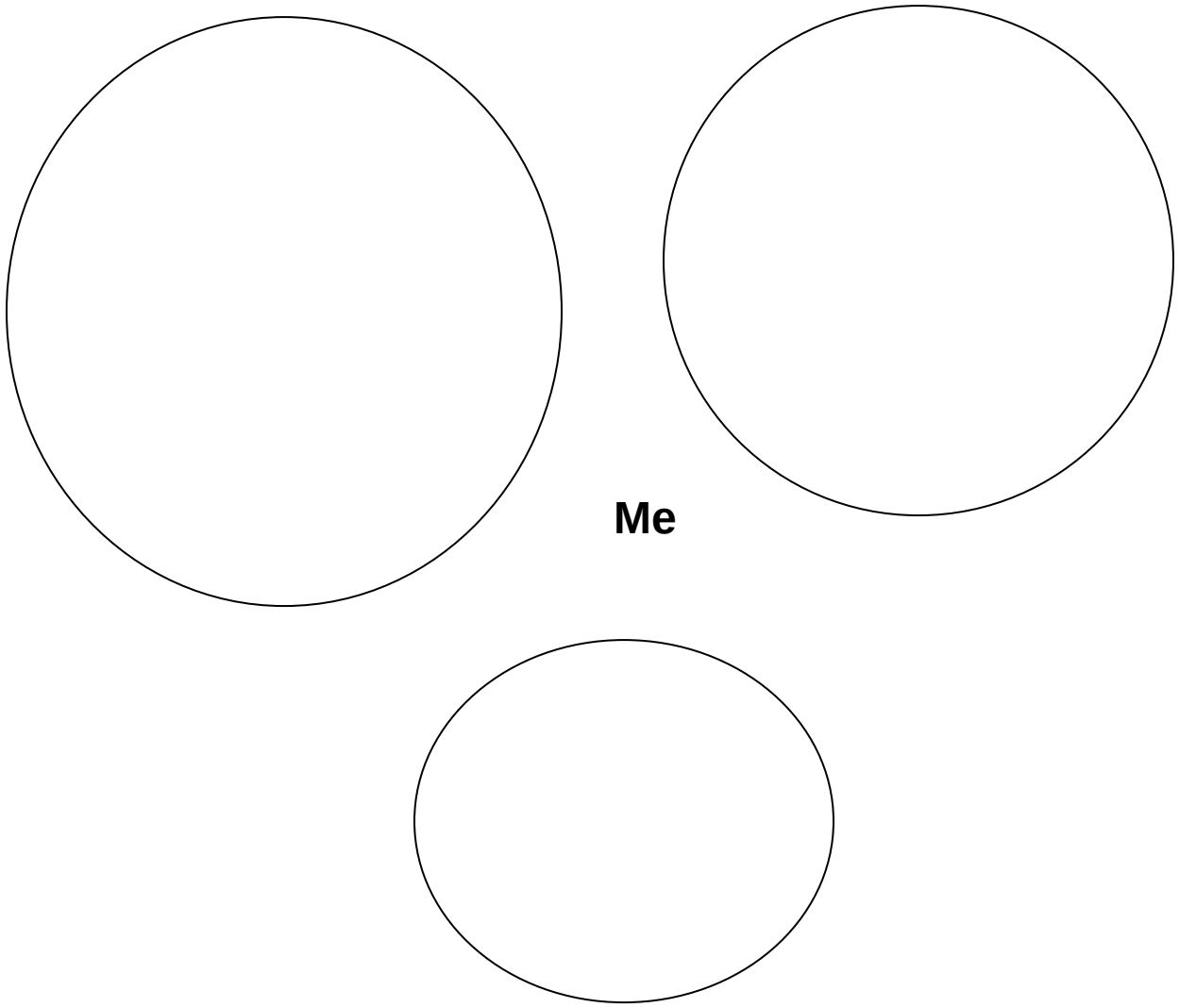
a. Draw *triangles* to represent people.

b. Write down who the person is next to or inside the triangle.

c. Draw *arrows* between "Me" and the triangles and explain along the arrows **what you do with them** (e.g., best friend / hang out).



How I use communication tools



On this page you will create a diagram of how you use communication tools in your daily life.

1. **Select the *same* three places that you used for the last diagram** and write down the names of those places inside the three circles.

2. List people (e.g., your family, friends, and/or coworkers) you spend time with in those places in and around the circles:

a. Draw *triangles* to represent people.

b. Write down who the person is next to or inside the triangle.

c. Draw *arrows* between "Me" and the triangles and indicate **what communication tools you use to communicate with them (**e.g., emails, letters, faxes, landline phones, wireless phones, Instant Messaging, and SMS).

Where I use mobile messaging

On this page you will create a diagram of how you use your mobile text messaging in your daily life.

1. Select **three places that you use mobile messaging most often** and write down the names of those places inside the three circles.

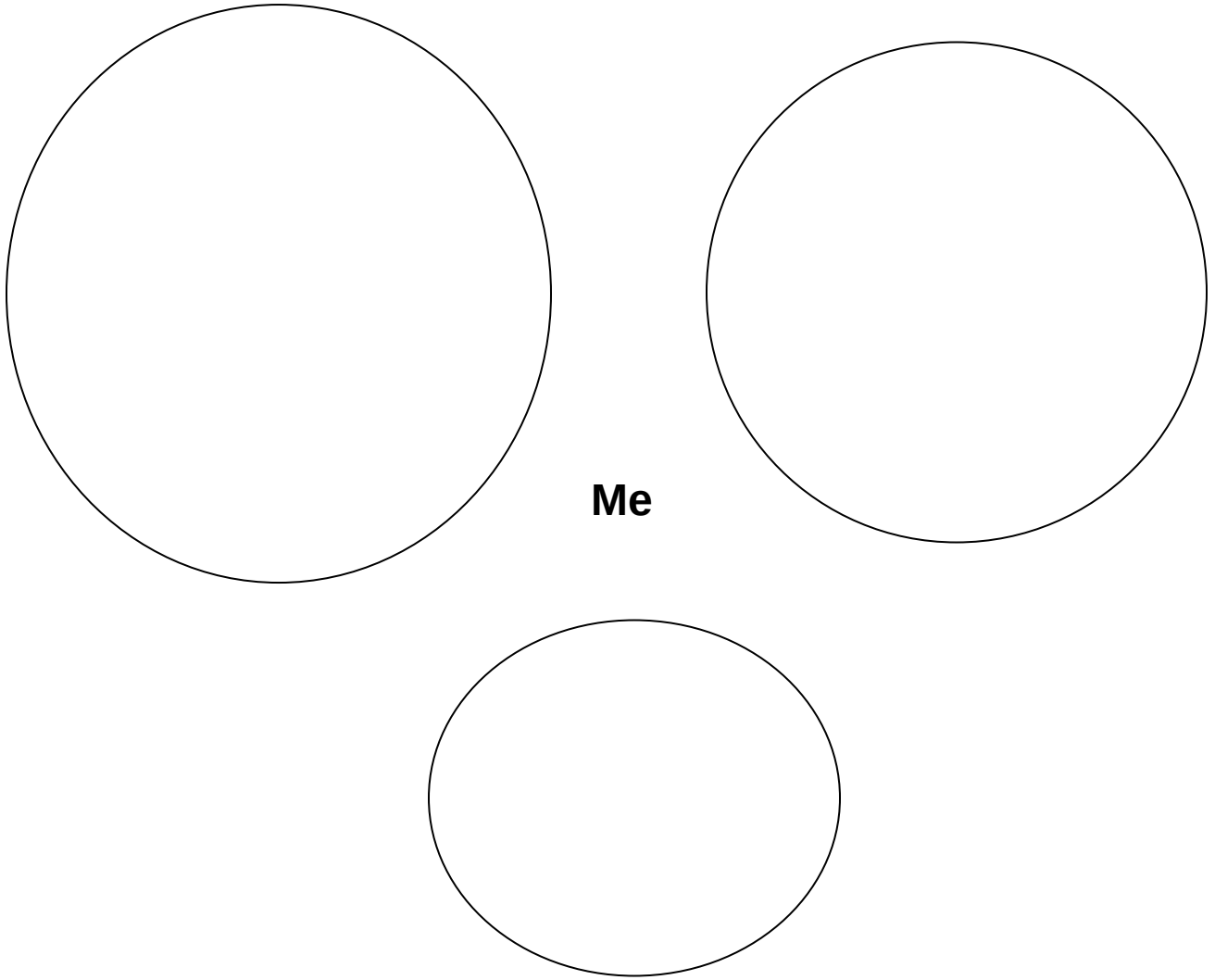
These three places can be **similar** to those on the previous two pages **or different** from them.

2. List people (e.g., your family, friends, and/or coworkers) you spend time with in those places in and around the circles:

a. Draw *triangles* to represent people.

b. Write down who the person is next to or inside the triangle.

c. Draw *arrows* between “Me” and the triangles.



Shorthand: **R**—Message Received, **SP**—Message Sent By Phone, **SE**—Message Sent By Email, **SW**—Message Sent Via Websites

Day 1

Today's date: _____

Q*: Would you still send the same message with other communication tools if you didn't have a mobile messaging service available?

#	Time	Type				From / To Whom	Reply to Message #	Message Content	Place	Situation	Q*	
		R	SP	SE	SW						Y	N
3	*7:00 a*		*x*			*Jane*	*2*	*City kitty*	*driving*	*She went to NYC*		*x*
1												
2												
3												
4												
5												
6												
7												

How I feel about mobile messaging

Please complete the following sentences:

I use mobile messaging instead of calling people directly when …

I use mobile messaging instead of emailing people when …

I use mobile messaging instead of IMing (Instant Messaging) people when …

I use mobile messaging because …

Mobile messaging is a) important, b) ok, c) not important (please circle one) to me because …

What I wish I could do with mobile messaging

Communicating with people with mobile messaging could be better if …

Mobile messaging could be easier to use if …

I would like to use mobile messaging more if …

Appendix C

Interview Protocols

Questions:

- *Fieldwork questions*

1. Here are some charts of your messaging patterns from the diary study. What do you want to comment on this?
2. You text to a lot of people, 10 from your diary book. Most people only text to 4 to 6 people during that period. How do you think about this?
3. You communicated with your sister a lot by SMS. Have you thought about texting to your parents or other family members (e.g., brother)?
4. Among groups of classmates, friends, boyfriend, and family members, what group do you think you text most to them?
5. Quite a few messages were exchanged at home or in your dorm, a not very mobile setting. I assume you are around your computer then. Why did you still use text messaging?
6. You have a camera phone. Why didn't you use it to send a picture message? You said you never do picture messaging in your survey. Why?
7. Your diary feedback suggests that you want "more characters to type in." Did you have problems with the message size limit before? What are they?
8. How do you feel about text inputting?
9. You use a lot of instant messaging (from your survey). Is there some relationship between your use of instant messaging and that of text messaging? If so, what are they?

10. Is there any other communication tool which will provide you with this kind of convenience to communicate to your friend any time?
    - *Adoption process*
11. Why did you start to use text messaging? What factors motivated you to do that?
12. How many messages did you send and receive a day or a week when you first started? From when did your message volume reach the current level? How did this happen over the time? Is there any change of patterns of use since last September you did the diary study to now? If so, what are they?
13. Do you text fast on your phone? How long did it take you to become a faster typist on your phone? How did you manage to do that?
    - *Usability problems and solutions through use*
14. Do you consider mobile messaging is easy to use?
15. What bothers you most when you use text-messaging function? How do you handle this situation?
16. If you have some problems related to your phone and SMS function, how do you handle it usually? (Call the carrier, look for information by yourself, or ask friends?)
17. Are you happy with the features and interface design your phone has for text messaging program? Why or why not?
18. Are you happy with the general services your carrier provides? I mean the quality of phone calls, the quality of text messaging programs, phone plans, your interactions with customer service people, anything related the service.
19. Are you thinking of switching to another carrier in the near future? Why or why not?

20. Which wireless phone feature is more important to you? The voice service or the messaging service? Why?

- *Learning artifacts*

21. Are there any promotional materials, user manual, online help, technical reviews, or other documents or artifacts that motivate you to use mobile messaging technology, help you learn to use it, or improve your use of it? What are they?

  - *Personal interpretation*

22. It looks like that mobile texting is an important part of your life (diary). How does it fit in with your life? Could you explain this in detail? And from when did you start to feel that mobile messaging is an integral part of your life? What made you think this way?
23. Do you think your life will change a lot without mobile messaging?

Appendix D

Coding Scheme: Mobile Text Messaging Use in Context

Dimension 1: Rhetorical Purposes of Mobile Text Messaging

Code text messages into the following categories:

- **Informing (I)**: Code any message or reply that is sent to inform about something going on and to share information that one or both of the parties might be interested in as below:
  - Inquiring about a person, an object, a plan or an event that is not related to coordinating tasks or not asking the current status of the other party: “Why he needs surgery?” “Did you get the email from Steve?” “R-U gonna come home soon?” “wo mei you a , zen me ban (I don’t have one, how should I do)”
  - Informing the other party of the plan of follow-up actions: “I will call her and let her know not to mail it!” “When i get home i ordering office space (video title).” “zhi dao, ni ba zhao pian ji guo lai hao le. zhe jiang ji shu xue yuan 23 hao xin xiang, you bian 3xxxxx2. (Sure, you could mail me the photos. PO. 23, Zhejiang Technical College, 3xxxxx2.)”
  - Sharing news about friends, colleagues and people they both know: “Anna got the bedding coor [coordinator] position @ kids,” “I didn't know John Ritter died!”
  - Making an announcement: “next week is sex information week.” “I broke up w/ Patrick.”
  - Describing what the sender experienced and what happened to the sender

recently: “I saw your hott bartender today”, “I danced last night”

- Making the other party aware of something that is not related to the sender’s feelings (serving as the sticky note): “I have a low Bat [battery]. Call my room if u need me” “lao da zai jiao shi (The teacher is in the classroom)”
- Ad: “Mei guo IPM dian nao ji tuan gong si , wei ji nian lian he guo ri , te yi zai zhong guo da lu ju hang SIM ka chou jiang huo dong , gong xi nin zhong er deng jiang . qing yu jiang xiao jie lian xi. (To celebrate the United Nation Day, the American IPM Corporations had a lottery for SIM cards. You won the second prize. Congratulations! Please contact Miss Jiang, 131758****.)”
- Subscribed info alerts: “V. FORECAST: AUBURN SUN: 74/56 M SUNNY *MON: 73/60 PM SHOWERS *TUE 67/50 FEW SHOWERS (by TWC).”
- System message sent from the carrier: “nin dang qian yi chan sheng hua fei 29.90, dang qian yi you hui hua fei 24.20, dang qian ying jiao fei yong he ji 5.70, yu e 27.37 (Your current phone cost is 29.90, you have saved 24.20, and you need to pay 5.70. Your balance is 27.37). ” “Reminder: Your T-Mobile bill is due.”

- **Co-experiencing (C):** Code any message or reply that is sent to share the current status or experience with the other party as below:
  - Reporting to the other party what I’m doing and how I’m feeling at this moment or just a moment ago: “On my way home!” “I just bought more really cute clothes.”
  - Describing what is happening in a real environment or mediated environment

(e.g., TV): “xiao fei jin tian da de tai gao xiao le , ma su gen ben wu neng wei li (Federo plays very well today, and Mazu will have no hope). ”

- Asking the other party what s/he is doing at this moment: “What u doin”

- **Instructing (R):** Code any message or reply where the recipient is asked to help or propose something in order to accomplish a task as below
  - Asking for a favor: “If i cant get to the office for my check next week, could you take it for me?” “Sure, just be sure to call marsha to tell her its ok.” (reply)
  - Proposing agenda: “wanna take a ride with me?” “Chu qu zou zou o? (How about having a walk outside?)”
  - Reminding the recipient of doing something: “almost time 2 reg 4 ur gre better tell ur dad u need 300” “xi hao lian xi hao jiao , jiu yao shang chuang shui jiao le (Wash your face and feet, and it’s time for bed.)”
  - Requesting for quick information and clarifications: “Hey can you give me tiao's Number.”
  - Offering help: “yao shi huo bu xia qu , wo zhe xia ge yue ke yi jie ni qian. (If you are broke, I could lend you some money.)”
  - Invitation: “ming tian wo nv peng you sheng ri , zui hao jiu shi zhe ge xing qi san guo lai , da jia yi qi chi fan (It’ll be my girlfriend’s birthday tomorrow; you’d better come over this Wednesday, and let’s have dinner together).”

- **Coordinating (D)**: Code any message or reply that is sent to coordinate tasks, events and schedules as below:

- Coordinating about an activity: “Dinner?”
- Coordinating about place: “Where do ya wanna go?”
- Coordinating about time: “I think we are going at 715”
- Coordinating about people who will be present: “Coming to GKS?” “Can my mom go with me?”
- Coordinating about and what to do next: “xian deng wo guo lai ba (wait for me there first)”

- **Expressing (E):** Code any message or reply that is used to express feelings or views as below:
  - Compliments or congratulations: “THAT GRADE IS AWSOME!”
  - Showing love or care: “Closer than my peeps u r to me..ba-be” “xiao lao shu yong yuan ai da lang gou! (Little rat loves the wolf forever!)” “LUV YA NIKKI! :O)”
  - Wishing the other party something good: “HOPE UR TEST GOES GREAT!” “jin tian shi ni de sheng ri , wo ai de yuanyuan (It’s your birthday, my dear yuanyuan).”
  - Encouragement: “Excellent opportunity. I believe in you.” “hei hei , jia you jia you (Hehe, work harder)”
  - Complaining: “DONT EVEN TELL ME U DONT KNOW WHEN YUR SISTERS B-DAY IS!!”
  - Flaming: “Liang ni ge zhu(Liang you are a pig!)”
  - Commenting on what is happening: “xi huan pi pi zai ren he chang ci jin qiu ,

dan bu yuan shi zhe chang , yin wei zhe chang qiu dui a bei tai te shu le(I love his kick every time, but not this one, because this game is too special for Beckham).” “xiao fei zui jin hen qiang a (Fedro has been doing very well lately)”

- Justifications such as “why I didn’t show up because something happened at that time”
- Comforting friends: “xi wang ni shi zhen de mei shi , gan jiao ni you shi hou shi zi ji xiang de tai duo (I hope you will are fine. I feel you think too much sometimes)”, “R U OK?”
- Expressing neutral feelings such as “Uh uhu”
- Teasing the other party with jokes or scary messages: “wo shi chang xiang hua yi fu ni de xiao xiang dai zai shen bian , yuan li ni de ri zi bian bu hui tai xiang nian . jing guo ji ge ri ri ye ye , wo zhong yu miao hui chu le ni de mo yang , [zhu tou] (I have been thinking of drawing your portrait with me, so I won’t miss you too much when away from you. After several sleepless nights, I finally drew a portrait of you, [an image of pig head]”
- Responding in a teasing way to make a joke and show humor: “Uh huh, sex ed week shoulda been shopping week. Btw wed is new wallet day”
- Agreement: “good to know”, “I bet”, “cool good things” Syllables of sounds: “haha” “mmfff”
- Greetings: “Hey!” “See you soon!”
- Asking a friend or closed one what s/he is doing recently to stay in touch: “Hows Albany?” “zui jin gong zuo zen me yang? (How’s your work recently?)”

- **Switching (S):** Code any message or reply that suggests having a follow-up phone or text conversation as below:
  - Suggesting switching to another medium for conversation shortly because it's not convenient at this moment: "ill call u later." "I cal you in a bit" "Wil cal u in 2"
  - Ending the current conversation with an offer of another one such as "TTYL"

- **Other (O):** Code any message or reply that does not fit one of the above categories or is unable to interpret due to missing contextual information in the log.

Dimension 2: Life Spheres of Mobile Text Messaging

Code any message or reply that fit in these follow categories.

- **Work (W)**: Code any message or reply that is about the life sphere of work organization related to the sender or the recipient as below:
  - Relationship work with people in the workplace such as exchanging news about coworkers and maintaining good relationship with the supervisor or the coworkers: "Anna got the bedding coor [coordinator] position @ kids"
  - About activities initiated or occurred in the workplace: "chen zong nin yao de zi liao yi E-Mail dao nin de xin xiang (President Chen, the documents you requested were emailed to you.)", "Thanks for closing the store for me Tuesday."
  - Messages implying rules and regulations in the workplace: "I CANT TALK

NOW BUT I'LL CALL U TONIGHT AFTER WORK."

- **School (S)**: Code any message or reply that is about the life sphere of the school or the educational institution related to the sender or the recipient as below:
  - Relationship work with people at school such as exchanging news about coworkers and maintaining good relationship with the supervisor or the coworkers: "my teacher just said not so much,"
  - About activities initiated or occurred at school: "Did U do the Comp. HW yet?" "almost time 2 reg 4 ur gre better tell ur dad u need 300." "Hows class 4 u"
  - Messages implying rules and regulations at school

- **Family (F)**: Code any message or reply that is about the life sphere of the family related to the sender or the recipient as below:
  - Relationship work with people at home: "Can't Stand My Dad Anymore - Need To Move Out!"
  - About activities initiated or occurred in the family: "Hey, make sure mom sends me that stuff from home ASAP!" "you mei you chi fan, ji dian hui jia. (Did you eat, when will you come home.)"
  - Messages implying rules and regulations at home

- **Personal leisure other than with family (P)**: Code any message or reply that is about the life sphere of personal leisure other than with family related to the sender or the recipient as below:

- Relationship work with friends or lovers.
- About activities initiated or occurred in circles of friends or lovers such as coordinating meals and meeting and doing sports activities or other leisure activities
- Messages implying social rules, rituals and regulations with friends or lovers
- Jokes and emotion-related messages exchanged with friends
- Subscribed information alerts in the areas that the subscriber is interested.

- **Other (O):** Code any message or reply that falls into the following categories:
  - System messages from phone carriers, ads
  - Other categories not listed in the above categories
  - Unable to interpret due to missing contextual information in the log.