

Messaging Design and Beyond: Learning from a User Study on Holiday Greeting Messages

Yanqing Cui

Nokia Research Center
Ruoholahti, 11-13 Itämerenkatu
Helsinki 00180, Finland
+358 71 8008000

yanqing.cui@nokia.com

ABSTRACT

The design of text messaging keeps the same ever since invented. However, the relevant user practice has already diverted from its intended use. The latest example is that through it people send holiday greetings to friends or acquaintances. In this study, we gathered and analyzed the message logs of twenty-two participants during a holiday week. The user data demonstrated that holiday greeting messages were different from everyday messages in terms of message size, character content, and contact circles. Greeting messages were likely to be “*singles*” - the messages that did not solicit a response. Based on the findings, we propose a message classification framework and discuss design implications for messaging, and mobile interaction design in general.

Categories and Subject Descriptors

H.5.2 [User Interfaces]: User-Centered Design

Keywords

Messaging, Greeting, Singles, Mobile Interaction Design

1. INTRODUCTION

Text messaging was created 15 years ago, when British engineer Neil Papworth sent out the first short text message, “Merry Christmas”, on Dec 3, 1992 to a colleague. Ever since, messaging gradually becomes one of the most important functions and revenue generators for mobile phones [2,3,26,28,29].

User to user messaging has been so different from its intended use case that everyone might be surprised in reading that originally messaging was designed for use as voicemail alert broadcasting. The recent use case of messaging is that people send holiday wishes to friends, acquaintance, and loved ones, which we name as holiday greeting messages. It is a common sight that people send a “merry Xmas” over Christmas Eve, which and the like are witnessed all over the world, from a remote village in Uganda to

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

MC'07 (Mobility'07), September 10-12, 2007, Singapore.
Copyright 2007 ACM 978-1-59593-819-0.....\$5.00

the downtown of London [2,23].

User practices greatly divert from its intended use case. But messaging design has largely stayed the same ever since it was invented other than a few research trails [1,12,16,21]. Messaging over holidays makes a unique opportunity to gather the requirements for new designs. The high messaging density can highlight the design problems important but invisible in every day uses.

In this study, we aimed to identify the relevant design requirements for messaging design while exploring the user practice of holiday greeting messages. The design implications were generalized to overall mobile interaction design as some problems could and should be solved by holistic approach.

2. RELEVANT RESEARCH

2.1 Why Everyone Loves Messaging

Text messaging is adopted as a communication medium by mobile phone users, especially for some user groups, such as teenagers, and a few specific geographic regions, such as most parts of Asia, Europe, Australia and New Zealand [2, 18, 19, 23].

Earlier research on text messaging suggests that affordable pricing is the main driver that leads to the popularity of this form of communication [10]. However, recent researches have shown that messaging is not necessarily cheaper than other medium such as voice call. Texts messages are often threaded and messages can also lead to voice calls. Both of them substantially increase the cost. By examining existing publications, we summarize a number of reasons that may be able to explain the success of text messaging [3,14,15,19,22,26].

- Messaging is a fast and inexpensive communication channel
- As a type of asynchronous communication, messaging supports careful wording and turn taking.
- It supports the creativity of each individual user. Carefully composed messages can be highly expressive and convey significant meanings
- Messaging protects privacy by allowing the user to create and read messages without the activity being excessively conspicuous to those around
- Messaging poses relatively low intrusion to the receiver. It can convey the considerate concerns for the convenience of the receiver conf119a102-r133.pdf

The abovementioned factors fill in the usability gap of messaging, such as limited display size and slow text entry mechanism. Consequently, it invites the user to turn the hard-to-use technology into a successful service.

2.2 Every Day Messages

Text messaging has been adapted as a way of coordinating events, practical arrangements and maintaining social relationships [7,8,18,19]. The popularity of text messaging also enables new social dynamics such as a “*smart mob*”, a form of self-structuring social organization through technology-mediated, intelligent “emergent behavior” [23].

In Thurlow’s study of the text messages of undergraduate students, about one-third of messages accomplished functional or practical goals, such as “*hyper-coordination*”, which is when people coordinate an appointment by mobile phone instead of at a pre-arranged fixed time and fixed place. It is termed as “*Micro-coordination*” in a few other publications [11]. The remainder of this group’s text messages had no information-oriented goal, but instead intended to maintain social relationship with friends, relations or loved ones [28]. This behavior is termed “*social grooming*” by Ling and others [18,19].

In ethnographic research conducted with teenagers in the U.K., Taylor and others associated general phone adoption, especially text messaging, with the established social practice of gift-giving and gift-taking, or “*gifting*”. The social etiquettes in gifting, such as the obligation of reciprocation, apply to messaging etiquettes as well [27].

Most of the text messages that are part of “*social grooming*” and “*hyper-coordination*” are more likely to happen within intimate relationships. Reid and others created the notion of “*text circle*”, that is, “social contacts within one or a few fairly well defined and close knit groups of text-mates, within which they regularly, perhaps even continuously, exchange messages.” [22]. After analyzing messages from 10 teenagers within one week’s time, Grinter and others found that each participant exchanged messages with four to thirteen people and 50% of the messages were exchanged with four to six regular contacts [11].

The messages tend to form threads as the result of reciprocation, which are important to maintain the well-being of a social network [20,27]. Single messages (i.e. messages that do not solicit a response) were documented in message studies, commonly used for the purpose of “*sticky notes*” or “*awareness information*”. Greeting messages such as “happy birthday” and “good luck” were assumed that did not require a response, but many of them did solicit response [11].

2.3 Holiday Greetings

Text messaging extends its use to include more established holiday greetings. For example, people may send “Merry Christmas” on Christmas Eve. In this paper, we define *holiday greeting messages* as the messages that are exchanged during the public holidays and for the purpose of seasonal greetings.

The greeting messages in 2007 new year season were reported to rich all-time high around the world. All individual main market was expected to reach 200 million message milestone each such as the UK, Poland, and the city of Beijing and Shanghai, where the main celebration is Chinese New Year [2].

A holiday greeting message is the evolution of a mediated holiday greetings. The practice started as cards sent to relations that are distant and now includes digital artifacts sent over the internet. After studying holiday greeting cards from 395 people, Dindia and others argued that sending holiday greetings function as a hygienic factor in a relationship. Sending a greeting does not give positive feedback on relation maintenance, but not sending one has a negative effect on the relationship [6].

Messaging is able to bridge physical absence by establishing contacts between individuals in an efficient way. A piece of seasonal greetings can be easily composed and delivered to the receipts no matter how far they are away from each other. As greeting tool, messaging also has obvious limitations, for example, it does not support embodiment mechanisms that remains or reminds individuals of the existence of their relationships, which was partially supported by other holiday greeting tools. Traditional greeting cards are a physical object together with writing and even smell remaindering of the senders [6]. Instant Messaging tools partially support “presence in absence” by the avatars [1,4,13].

The popularity of holiday greeting messages poses a challenge for the design of messaging functions. In the holiday seasons, the message boxes are full of messages from people familiar or even unknown, with critical notices or without anything important, properly handled or completely neglected. These full message inboxes also offer us the unique opportunity to explore future mobile interaction design. To certain extent, it highlights design problems invisible for the moment but may emerge in the future when user handles more messages on their mobile phone.

3. USER STUDY

The aim of the user study was to observe the messaging behavior of users during a holiday, explore the design requirements for messaging functions, and mobile interaction design in general. We created limited number of hypotheses and allow instead for observations of the participants to reveal their usage pattern and design requirements.

3.1 Participants

China was selected as the location of this study because the country has strong messaging culture, both for every-day messages and greeting messages. During the week of Chinese New Year 2007, Chinese users sent 15 billion messages, an average of 33 short messages from each number, double the average of other weeks in the year before [29].

Ten female and twelve male mobile phone users were recruited to keep their messages during the week of Chinese New Year in 2006. We did not restrict the age of users during our recruitment because a review of previous studies did not suggest greeting messages were limited to teenagers. The existing researches also indicated that messaging practice of adult users deserves more research [25].

Twelve of the participants were recruited internally from the same company. The other ten participants were recruited through an Internet forum. Six participants were university students, sixteen participants were working. Twelve participants were in technological positions, and four from non-technical functions.

The age of the participants ranges from 22 to 34 years old. The mean age was 27.4, with a standard deviation of 0.7.

3.2 Logging and Interview

During the user study, we asked the recruits to retain their messages, and after a period of time we conducted an interview with each person. We downloaded the message of the user at the end of the study period in order to analyze the content.

Message logging was selected as the methodology, instead of a messaging diary where the users must transcribe their messages into a book, as used in many previous studies [8,10,26,27]. The large number of messages received and sent by the user did not make a diary feasible for this research because many users would not have the time to transcribe the messages accurately. One concern of using message logging was the high risk that some participants would erase messages for privacy reasons. To reduce the bias, we encouraged participants to erase these sensitive messages right before we downloaded the messages so that the deleted messages can still be recalled in the following interviews.

Before starting the study, each participant was instructed to ensure that we could collect the entirety of the inbox and the sent folder. But as a result of incorrect settings or memory size limitations on the phone, only twelve participants kept all the inbox and sent messages. Nine participants only kept the entire inbox and one participant only kept the entire send folder (see table 1).

The follow-up interviews were conducted one by one and the questions were generated when browsing through their messages. The questions focused on greetings but also how, when, where and why they used text messaging in general.

Table 1. Participants and message overview

| Type | Messaging Counting in inbox and sent folders |
|---------|---|
| Group A | 12 participants: entire inbox (1457) and sent folder (1332) |
| Group B | 9 participants: entire inbox (930) but NOT sent folder |
| Group C | 1 participants: entire sender folder (105) but NOT inbox |
| Total | 21 entire inbox (2387), 13 entire sent folders (1437) |

3.3 Data Analysis

We collected both the original message content and the message meta-data, such as sent and received date, time, receiver, sender, etc. Under the permission of users, their contact lists were also downloaded for reference. The incomplete message boxes, sent folders for group B and inbox in C, were erased so we would have a more complete snapshot of the full week of messages. After the cleaning, 3824 messages were used for the study.

The collected messages contained both messages for every-day use and messages specifically for holiday greetings. Two researchers worked in pair to manually tag these messages. 1420 messages were tagged as greeting messages because they explicitly or implicitly contained greetings. 208 messages were marked as spam either for promotions, operator advertisements or other services. The other 2196 messages were categorized as every-day messages. The classification result was identical for more than 99% of all items within research team. All the rest

items were checked one by one, and sometimes even consulted the participants who shared messages with us.

4. FINDINGS AND ANALYSIS

4.1 Craft an Artifact

4.1.1 Characters and Layouts

Greeting messages contained 50.3 Chinese characters (including symbols and spaces), which was significantly more than every-day messages (17.5 character). $t_{21} = 11.01, p < 0.01$. All the messages still fell in the length of one message¹. In term of character type, 23.9% of the greeting messages used special characters. While the percentage for every-day messages was 13.1%, $t_{21} = 2.50, p < 0.05$.



Figure 1. Message examples with special characters

Table 2. Character types in text messages

| | Emoticon | Oldskool Art | Textual Graphic | Others |
|-----------|----------|--------------|-----------------|--------|
| Greeting | 58.2% | 5.1% | 18.2% | 18.5% |
| Every-day | 59.2% | - | - | 40.8% |
| Total | 58.7% | 2.7% | 9.8% | 28.8% |

The gathered messages contained many pictures drawn from textual characters, as shown in Figure 1. This type of picture are typically referred to as ASCII art in the digital medium. The terms from digital media were used in its categorization.

The most common one was “emoticons” such as smiley shown in Figure 1a, which expressed emotion in text by combinations of two or three characters. The emoticons, also called “smiley”, was used in every-day messages, but was more commonly seen in greeting messages. Figure 1b presents another group “oldskool art”. It used primarily the characters: ^-+=.()<> and looked more like outlined drawings of shapes than real pictures. Sometimes, the textual arts also involved language scripts and converted the entire, or a part of text message into a piece of graphics. Figure 1c gives any example. In this study, oldskool art and textual graphics were only observed in the greetings but not every-day messages. Usage of these different character sets has shown great individual difference. Two participants (F9, 75%; M4, 32%) used emotion extensively. One participant (M4) was observed in using a mark “~” in 14% of all messages his sent out.

¹ A Chinese message contains up to 70 characters because it uses the 16-bit Unicode system. Some other languages using same coding system are: Arabic, Korean, Japanese and Slavic languages (e.g. Russian). Messages using Latin character sets are 160 characters long.

4.1.2 Craft a Greeting

Gifting is one of the overriding themes uncovered in adapting the mobile phone in social practices, especially for teenagers [4,12,20,27]. To prepare the gift, the message sender made effort in selecting words and creating special effects in order to get the right message across. The special characters in this project reflect the practice of the gifting. These *crafted artifacts* were artfully created, reflecting much more effort than needed to create a simple message. The practice was also documented in every-day message by teenagers [12].

These carefully crafted messages are not only as a message, but also as a holiday gift. A university student in the study showed me a message from his classmate spontaneously in the interview. The message was formatted into a short rhyme using the names of their classmates. The receiver recalled that the sender composed a similar one the year before.

4.1.3 Artifact Crafting Features

New message editor should allow people to create and use more emoticons to the extent that enables some non-textual communication. We called this “*artifact crafting*” set of features, which may include: expanded character sets, alternative layouts, and improved retrieval mechanism. Collaboration with other platforms, such as a computer, should also be considered.

Artifact crafting features also include other explicit or implicit additions to make the messages more personal and fun. One example is automatic field, which would be replaced with other pre-defined data, such as the receiver’s name, when delivered. The feature is especially useful for group messages, presented in section 4.3.2.

The feature design should also consider cultural and language differences. The abbreviations (*textish*- English with vowels removed, or *acronyms* such as RUOK= Are your okay) are widely used and are an important sociability metrics in Latin languages. However, they do not exist in some other languages, such as Chinese. The text orientation is important for some languages, e.g. Chinese and Japanese, but not exists in Latin languages like English [26,27].

4.2 Circles of Contact

4.2.1 Unknown Numbers

On average, each participant exchanged greeting messages with about 40 contacts. During the same period, the participants only exchanged every-day messages with about 10 contacts. The circle of contact is much bigger for greeting messages (see table 3). [Inbox: $t_{20}=8.76, p<0.01$; Sent folders: $t_{12}=2.22, p<0.05$].

Table 3. The number of messages and the reached contacts

| | Inbox (21 participants) | | Sent folders (13 participants) | |
|-----------------------------|----------------------------|----------|-----------------------------------|----------|
| | Greeting | Personal | Greeting | Personal |
| With all numbers | | | | |
| Messages | 43.6 | 60.3 | 38.9 | 71.5 |
| Contacts | 38.9 | 10.4 | 34.1 | 12.1 |
| Msg. per contact | 1.1 | 5.8 | 1.1 | 5.9 |
| With unknown numbers | | | | |
| Message | 6.8 | 1.5 | 1.9 | 1.3 |
| Unknown numbers | 6.5 | 1.1 | 1.9 | 0.7 |
| Msg. per contact | 1.1 | 1.4 | 1.0 | 1.9 |

The expanded network increases the possibility that phone numbers would be absent from the user’s contact list. This meant, the receiver would only see the phone number but not the name of the sender, so it was possible they might not know who sent the message. On average, each participant received approximately 7 greeting messages from 6.5 unknown numbers. The percentage was significantly higher than for every-day messages. [Inbox $t_{20}=4.13, p<0.01$, sent folder: $t_{12}=2.48, p<0.05$].

The problem is especially severe for greeting messaging because of the social context. As one participant (F5) put, “*In the New Year holiday, I think it was not appropriate to ask who the sender was when a message came from a new number. I was not supposed to reply ‘the same wishes to you. BTW, who are you?’*”

4.2.2 Sender’s Name in Message

Of all the gathered greeting messages, we observed that a big portion of them contained the sender’s name as a signature (22.3%) or in body text (19.7%). The percentage was much higher than in every-day message (1.8%). Two examples are given in Figure 2. The left one contains sender’s name as signature. The right one embedded sender’s name in body text.

The senders were aware that their numbers may not be in the receiver’s contact book. The addition of their name was to make sure the number correctly recognize. As F5 put it: “*I received message from the numbers that I did not know. So someone may not know my number, either. That was why I added my name...*”

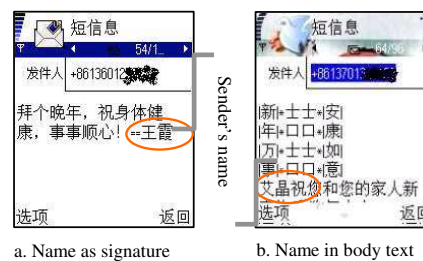


Figure 2. Message examples carrying sender’s name

The data on received message indirectly proved validity of the user strategy. Messages from unknown numbers were more likely to carry sender’s name than messages from known contacts. [$X^2_{(1)} = 34.79, p<0.01$].

Table 4. The senders’ strategy in carrying their name in message

| Inbox | Carrying sender's name | Without sender's name | Messages counting |
|-----------------------|------------------------|-----------------------|-------------------|
| From know contacts | 43.4% | 56.6% | 772 |
| From unknown contacts | 70.6% | 29.4% | 143 |

The addition of sender’s name also brings its own social risks. It implied that the sender was not confident about their relationship. After all, people do not add their name when send messages to their frequent contacts.

4.2.3 Greeting Circle

A holiday greeting is sent to people with whom the sender has intimate or non-intimate relationships. It is particularly important for the people who do not meet each other for a long period of time [6]. The rule stays true for greeting messages as well. Greeting messages reach a bigger network than every-day messages. It implies that people send greeting messages to many people they don't communicate with on an every basis.

We propose naming this extension of the users' social network for sending holiday greetings as the person's "greeting circle". This corresponds to the person's "text circle", which is the circle of people the user messages on an everyday basis. See Figure 3. Greeting circles cover both strong-tie relationships, such as close friends and family, as well as weak-tie relationships, such as occasional business contacts and acquaintances [9,22].

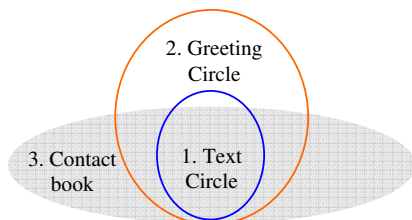


Figure 3. Messaging circles and contact book

4.3 Single Messages

4.3.1 Low Response

For everyday text messaging, etiquette suggests that most text messages solicit a response message. The same social norm was assumed to apply to greeting messages. But in this study, we found that greeting messages were likely to be "Singles", or messages that did not solicit a response.

Based on data from participant group A, who retained the entire inboxes and sent folders, 47.9% of the received and 33.9% of the sent greeting messages were singles. See Figure 4. The percentage was significantly higher than every-day messages, which was 2.9% for received and 5.5% for sent messages. [$F_{(1,45)} = 22.61, p < 0.01$].

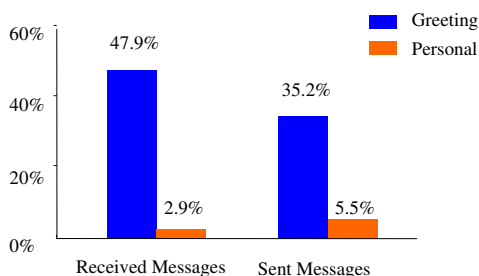


Figure 4. The percentage of message being singles

4.3.2 Group and Template Messaging

When analyze the reason of low response, we identified two factors that had significant influence: message to one (individual)

or more than one person (group), messages composed manually by the sender (manual) or making use of a template² (automated).

Table 5. The number of greeting message receivers

| Number of receivers | Manual | Automated | Subtotal |
|---------------------|--------|-----------|----------|
| 1 receivers | 66 | 12 | 78 |
| 2-10 receivers | 6 | 13 | 19 |
| 11-30 receivers | 3 | 3 | 6 |
| 31-70 receivers | 1 | 3 | 4 |
| Subtotal | 76 | 31 | 107 |

Holiday greeting messages were commonly sent to a group. Eleven of the thirteen participants with entire sent folders (group A and C) used group messages. These group messages were distributed to the groups of 2 to 67 recipients, 16.3 by average. See Table 5. It is also evident that the group messages were more likely to be based on templates.

Response rate of sent messages from Group A were further analyzed and its result was shown in Table 6. Generally, messaging to individual had higher response rate than to a group. Manually composed messages were more likely to solicit a response than automated ones.

Table 6. Messaging type and response rates

| | Individual | Group | Total |
|-----------|------------|-------|-------|
| Manual | 86.8% | 57.1% | 72.5% |
| Automated | 77.8% * | 63.0% | 63.4% |
| Total | 85.7% | 61.9% | 66.1% |

* The base was very small, only 8 messages.

4.3.3 Exceptional Contacts

"Exceptional contacts" were mentioned by all participants during interviews. The participants hand picked a few contacts and composed dedicated greetings for them, if messaging used first of all. For these contacts, the greeting messages typically contained a "catch-up", where the sender and receivers told of the experiences that occurred during a period of physical absence [6].



Figure 5. Example of message carrying receiver's titles

Message to exceptional contacts were likely to contain receiver's name or title. 19 out of 78 sent individual messages, which included all message to exceptional contacts, did so. Figure 5 lists

² Template messages were originally created by professional writers, circulated by downloading from Internet or message forwarding as chain messages. It is developed as a service on mobile or other Internet portals.

two examples of such messages. The left one was a message to a teacher, the right one to a classmate. Both of the messages started from the receiver's title.

4.3.4 Reasons behind Single Messages

The low response of greeting message was an unexpected finding from our study. It is contradictory to findings in previous studies that messages are seldom solitary and that reciprocation is common practice of greetings [11,20,22,26]. To explain the contradiction, we identified a number of possible sources and analyze them one by one below.

The participants may have been disoriented in the messaging task. By average, each user received 114 messages, and sent 111 messages respectively over the study week. The high density may have made it difficult for them to track the status of each message. One quotation from a participant (M4): "I have so many messages in my phone... How can I know which messages I did not reply?"

Our data analysis only considered the exchange within messaging. In practice, the participants may have switched to other media, such as voice call or Instant Messaging, and replied from there. The interview result showed that the reason existed but its impact was limited. It was seldom spontaneously mentioned in the interview.

The participants did not feel obliged to reply to all the greeting messages. The reason was indeed mentioned by 5 participants. As one participant (F1) put it: "greeting messages were fun, I kept forwarding and did not particularly care if I relied to everyone."

We argue that the single messages may have been caused by a mixture of the abovementioned reasons. For example, the users may feel not obliged to reply to all messages because technically it was difficult to do so.

5. DISCUSSION AND IMPLICATION FOR DESIGN

The findings from this study can be generalized into normal messaging, and even overall mobile interaction design. The following section starts from a message classification framework, followed by a discussion over personal information management in messaging and implications for mobile interaction in general.

5.1 Message Classification Framework

This study identified two dimensions that influenced the response rate of received greeting messages: the perceived creation process and target audience. The creation process can be either manual or automated composition. The target audience can be an individual receiver or a group. The two dimensions split all the messages, including but not limited to greetings, into four categories. See Figure 6.

Quadrant I [Individual- Manual] contains the messages that were manually composed by the sender and sent to only one person. Most of the every-day messages belong to this group, which receive the highest response rate and are more likely to be valued by receivers [27].

Quadrant III [Group- Automated] are the messages that are automatically generated and addressed to a group. The common examples are spam or chain messages. They are likely to be singles.

The common example messages in Quadrant II [Group- Manual] are announcement messages, such as phone number update. The main example comes from forwarding in Quadrant IV [Individual- Automated]. The response rate for messages in these two quadrants fall between the abovementioned two other groups.

The greeting messages can fall into any of the four quadrants. The examples shown in Figure 5 were from Quadrant I, and Figure 1c from Quadrant III. Table 6 can be taken as a supporting data for the matrix. The messages in Quadrant I got the highest response, and Quadrant II and III got the lowest response.

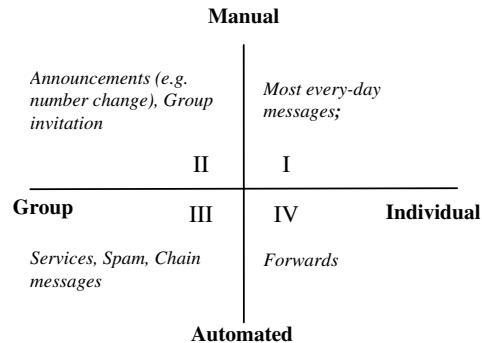


Figure 6. Message valuation framework

The classification is useful to explain response rate. It may be relevant to the perceived value of message as well. We reason that manual messages are likely to be perceived with high value than automated ones, the message to individual receiver more valued than to a group. But the assumption needs further verification.

5.2 Personal Information Management

Text Messaging was designed 15 years ago with the intended use case of voicemail alert broadcasting. It is easy to understand the messaging capability limitations such as restricted text length and limited meta-data support [26].

All the phone numbers are interpreted by using local contact book as reference. The approach is acceptable for every-day messaging within "text circle". But it does not work any more when contacts are expanded to "greeting circle". As a result, the users keep receiving messages from unknown numbers.

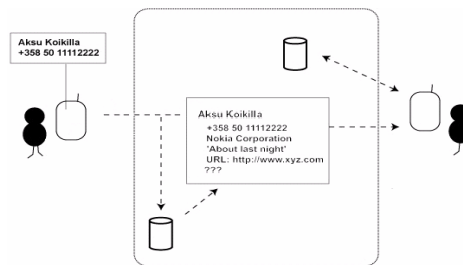


Figure 7. Extended Caller ID system diagram

Extended caller ID system is one of the solutions that address sender name problem. Figure 7 illustrates how the system works. The number interpretation is a process of message delivery. The

association of phone numbers and user names is maintained on the network, either by operator or third party service provider. The user name section is already interpreted when it arrives at receiver's phone.

Metadata is another approach to solving the problem. Together with phone numbers, the message sender's name is carried with message as metadata. Consequently, the receiver is always able to identify the originator of incoming messages. The solution may incubate new practices. In the same manner as an IM display name, the senders might constantly change names to communicate other messages, such as "sick of work", or "leaving for lunch" [24].

5.3 Implication for Interaction Design

Compared with always-threaded every-day message, a significant portion of greeting messages was single. Lists of reasons were explained in section 4.3.4. We continue the discussion track of interaction design below.

5.3.1 Information Fragmentation

Information fragmentation is a pervasive problem in personal information management. Even a seemingly simple decision may depend on information from a number of sources. The fragmentation may be caused by physical location and device, or applications when on a single device [17].

Consider the information we need to confirm whether a message being a single. The communication history is scattered in the long list of items in inbox, sent folder, and call log. The participant can only rely on their memory to unify the fragmented information. That may be reasonable for every-day message. However, it becomes a big challenge for greetings because of huge volume and complicated usage patterns.

The other example is shown in contact management. The user cannot check messaging history in contact list when they select people to send messages. Neither can they check temporary groups in messaging, which may be relevant to later communications such as follow-up, or assembling next groups.

5.3.2 Overview at a Glance

Messaging is used in micro breaks especially the short moments between activities. The context of use demands that people should be able to catch up the status quickly, as simple as a glance [5]. In the case of messaging, a tool will be helpful that track history of all the messages. It can enable people quickly monitor the status of all the messages and guarantee that all messages are properly handled if the user chose to.

The agent can even take certain action to incoming messages when delegated by its user. For example, the user may want to forward a predefined greeting to the incoming messages that come from the contacts not present in the history.

5.3.3 Navigation Support

The users need to do operation to certain individual messages or contacts. For example, they may want to mark a new message for follow-up, or spot a message with certain content, from certain people later on. More discussion on exceptional contacts can be found in section 4.3.3.

People are likely to check the message immediately but postpone the reply when convenient [14]. But they may have already forgotten which message to reply when they want to do so. It is the case especially for greeting messages when people receive too many messages from various contacts in a short time.

Scrolling in a long list is both unproductive and tiring. But this is so far the only approach to spot a message in current designs. The problem can be more serious when users start to save all received messages [27]. We spotted four users who intended to keep all their messages in our study.

Annotation may be a solution to enable new navigation. The user is prompted to annotate a new arrival and later on the annotation can be used to spot the message by browsing, or searching. The design challenge is that people do not usually annotate their personal data [15]. Therefore, the entire annotation process must be easy enough that the users are willing to pick up.

6. CONCLUSION

In this study, we gathered and analyzed text messages that were exchanged from twenty-two participants during a national holiday. The aim was to understand how text messaging was used during holidays, to explore the design implications for next generation messaging, and mobile interaction design in general.

One of the unexpected findings was that most greeting messages did not solicit a response, *singles* for short. The single messages may be caused by a mixture of reasons, especially the flaws in interaction design. We argue the improvements in interaction design can partially solve the problem, such as unifying the fragmented information, enabling overview at a glance, and offering more navigation supports.

The single message was also relevant to the other observations. For example, greetings reached a larger group of people than personal messages did. We propose the term "*greeting circle*" as the name for the person's social network in greeting, as a counterpart of "*text circle*", which refers to the intimate social network for the recipients of every-day messages [22]. The large size of "*greeting circle*" demands an innovative design for personal information management. Extended Caller ID system and name as meta-data are proposed to solve the problem that messages came from unknown numbers.

The study confirmed our hypothesis that social greeting messages were different from every-day messages in term of size, character content, and circle of contacts. The special characters in messaging shows that the users require "*artifact crafting*" feature set that makes messaging more personal and fun. Together with extended Caller ID and name as meta-data, artifact crafting features can induce the users to respond to received messages at ease. All these solutions may be able to reduce the frequency of single messages.

7. ACKNOWLEDGMENTS

We thank James Reilly, Kaisa Väänänen-Vainio-Mattila, and Thomas Stovicek for their valuable comments to early paper draft; Fumiko Ichikawa, Xia Wang, and Tianding Zhang for data gathering and analysis helps; and all the study participants for their generosity in sharing their messages with us.

8. REFERENCES

- [1] Amin, A. K., Kersten, B. T. A., Kulyk, O.A., Pelgrim, E., Wang, J., & Markopoulos. 2005. SenseMS: a User-Centred Approach to Enrich the Messaging Experience for Teens by Non-verbal Means. In *Proceedings of MobileHCI'05* (Salzburg, Austria, Sep 21-25, 2005) ACM Press, New York, NY, 2005, 161-166
- [2] Airwide Solutions, 2006, New Year Celebration SMS Messages to Hit All-time Highs the Word Over, Online available at <http://www.airwidesolutions.com>
- [3] Barkhuus, L. 2005. Why everyone loves to text message: social management with SMS. In *Proceedings ACM SIGGROUP' 05* (Sanibel Island, Florida, USA, November 06 - 09, 2005). ACM Press, New York, NY, 324-325
- [4] Berg, S., Taylor, A. S., & Harper, R. 2003. Mobile phones for the next generation: device designs for teenagers. In *Proceedings of ACM CHI'03*(Ft. Lauderdale, Florida, USA, April 05 - 10, 2003). ACM Press, New York, NY, 433-440
- [5] Cui, Y. Jung, Y. & Chipchase J. 2007. Personal TV: A Qualitative Study of Mobile TV Users. In: EuroITV ' 07, LNCS 4471, 195- 204. Springer-Verlag
- [6] Dindia, K., Timmerman, L., Gilbertson, J., Langan, E. J. & Sahlstein, E. 2004. The Function of Holiday Greetings in Maintaining Relationships. *Journal of Social and Personal Relationships*, 21(5), 577-594
- [7] Farnham, S.D., & Keyani, P. 2006. Party On: Hyper Awareness, Hyper Coordination, and Smart Convergence through Mobile Group Text Messaging. In *Proceeding of the HICSS'06* (Hawaii, Jan 4-7, 2006), IEEE
- [8] Faulkner, X. & Culwin, F. 2005. When fingers do the talking: a study of text messaging, *Interacting with Computers*, 17 (2), 167-185
- [9] Granovetter, M.S. 1973. "The Strength of Weak Ties", *Amer. J. of Sociology*, 78 (6), 1360-80
- [10] Grinter, R. & Eldridge, M. 2001. Do Tngrs Lv 2 Txt Msg? Why "Texting" Became Popular with Teenagers. In *Proceedings of ECSCW'01* (Bonn, Germany. September 18-20, 2001) Kluwer, 219-238
- [11] Grinter, R. & Eldridge, M. 2003. Wan2tlk?: everyday text messaging. In *Proceedings of ACM CHI'03*(Ft. Lauderdale, Florida, USA, April 05 - 10, 2003). ACM Press, New York, NY, 441-448
- [12] Harper, R. & Hodges, S. 2006. Beyond Talk, Beyond Sound: Emotional Expression and the Future of Mobile Connectivity. In Höflich JR, Hartmann M (Eds.) *Mobile Communication in Everyday Life: Ethnographic Views, Observations and Reflections*, Frank & Timme, Berlin
- [13] Howard, S., Kjeldskov, J., Skov, M. B., Garnæs, K., & Grünberger, O. 2006. Negotiating presence-in-absence: contact, content and context. In *Proceedings of ACM CHI'06* (Montréal, Québec, Canada, April 22 - 27, 2006). ACM Press, New York, NY, 909-912
- [14] Jenson, S. 2005. Default Thinking: Why consumer products fail. In *The inside Text: Social Perspectives on SMS in the Mobile Age* Eds. Harper, R., Palen, L. and Taylor A. Springer
- [15] Jones, M. & Marsden, G. 2006. *Mobile Interaction Design*. John Wiley & Sons: West Sussex, England
- [16] Jung, Y., Persson, P., & Blom, J. 2005. DeDe: design and evaluation of a context-enhanced mobile messaging system. In *Proceedings of ACM CHI'05* (Portland, Oregon, USA, April 02 - 07, 2005). ACM Press, New York, NY, 351-360
- [17] Karger, D. R. & Jones, W. 2006. Data unification in personal information management. *Commun. ACM* 49 (1) 77-82
- [18] Ling, R. & Yttri, B. 2002. Hyper-coordination via mobile phones in Norway. In J. E. Katz and M. A. Aakhus (Eds.) *Perpetual Contact: Mobile Communication, Private Talk, Public Performance*, Cambridge University Press, New York, NY, 139-169
- [19] Ling, R. 2004. *The Mobile Connection: the Cell Phone' s Impact on Society*. Morgan Kaufmann Publishers Inc
- [20] Longmate, E. & Baber, C. 2004. Integrated Digital Communities: Combining Web-based Interaction with Text Messaging to Develop a System for Encouraging Group Communication and Competition In *Interacting with Computers* 16 (1), 93-113
- [21] Persson, P. 2003. Exms: an animated and avatar-based messaging system for expressive peer communication. In *Proceedings of the 2003 international ACM SIGGROUP Conference on Supporting Group Work* (Sanibel Island, Florida, USA, November 09 - 12, 2003). GROUP ' 03. ACM Press, New York, NY, 31-39.
- [22] Reid, D.J. & Reid, F.J.M. 2003. Insights into the social and psychological effects of text messaging. Available online at: 160characters.org
- [23] Rheingold, H. 2002 *Smart Mobs: The Next Social Revolution*, Perseus Publishing
- [24] Smale, S. & Greenberg, S. 2005. Broadcasting information via display names in instant messaging. In *Proceedings of ACM SIGGROUP'05* (Sanibel Island, Florida, USA, November 06 - 09, 2005). ACM Press, New York, 89-98
- [25] Soriano, C., Raikundalia, G. K., & Szajman, J. 2006. Middle-aged users' experience of short message service. In *Proceedings of AUIC '06* (Hobart, Australia, January 16 - 19, 2006). Australian Computer Society, Darlinghurst, Australia, 109-112
- [26] Sun, H. 2004. Expanding the Scope of Localization: A Cultural Usability Perspective on Mobile Text Messaging Use in American and Chinese Contexts. PhD' s dissertation, Rensselaer Polytechnic Institute, Troy, NY
- [27] Taylor A. & Harper R. 2003. The Gift of the Gab?: a Design Orientated Sociology of Young People' s Use of "mobilZe!" In *Journal of Computer Supported Cooperative Work (CSCW)* 12(3), 267-296
- [28] Thurlow, C. 2003. Generation txt? The sociolinguistics of young people' s text-messaging. *Discourse Analysis Online* 1,1
- [29] Xinhua. 2007. Chinese send 15 billion messages during Spring Festival. In *China Daily* [www.chinadaily.com.cn/] 28 Feb, 2007