Exploring the Design of Availability Status in Mobile IM Messaging with User Enactments

Yu-Ling Chien

National Chiao Tung University

Hsinchu, Taiwan

moneychien.nl06g@nctu.edu.tw

Ting-Wei Wu

National Chiao Tung University

Hsinchu, Taiwan

tingwei0501.cs02@g2.nctu.edu.tw

Yung-Ju Chang

National Chiao Tung University

Hsinchu, Taiwan

armuro@cs.nctu.edu.tw

Abstract

Current mobile instant messaging (IM) applications offer limited information on the availability status of IM users, particularly, their availability for reading and responding to IM messages. Research suggests a gap between what IM recipients want to disclose and what IM senders want to see to determine when to initiate a conversation. The advancement of IM users' receptivity prediction makes it possible to present IM users' *predicted availability status*. In this research, we conducted user enactment, a design approach for researchers to let participants experience and reflect on possible designs of future technologies, to explore designs of IM availability status in 72 IM conversation scenarios. We explore how IM users interpret different presentations of an *uncertain IM status* from both the senders' and recipients' perspectives, and what they need and will act upon these presentations.

Author Keywords

Status Presentation; User Enactments; Availability Status

ACM Classification Keywords

H.5.m. Information interfaces and presentation: Miscellaneous

Introduction

With the increasing popularity of smartphones, many IM applications are also prospering. However, we often have such questions in our mind as being a sender: When will the receiver read and reply to my message? Why has the receiver not responded yet? We have these questions in mind because today's mobile messaging applications only show limited information about the availability of IM users. Lacking such information, however, may cause inappropriate expectation of IM senders, unnecessary interruption to the recipient, and intermittent communication between the sender and the recipient. In contrast, having such information may help people decide when to initiate communication [5]. While such information was available in the past on some commercial desktop messaging services, one reason for its absence on mobile IM services is the gap between what users want to see from the others' status and what users are willing to disclose about their status. Several studies investigated information users are willing to share. Khalil et al. [4] used experience sampling to determine context information users would disclose, which are 74% for "in the company" and 69% for "in conversation." Knittel et al. [5] conducted an online survey and found out that "has appointments?" "abstract location", and "ringer profile" have higher disclosure rate. Lederer et al. [7] suggest that who is requesting the information is the primary factor in choosing whether to disclose information. Consolvo et al. [1] show that important factors regarding disclosures are who is requesting one's location, why that person is making the request, and what level of detail would be most useful to the requestor.

The second reason, on the other hand, is an ongoing challenge of detecting mobile users' availability because mobile users are rapidly changing their target of attention compared to a relatively static desktop environment. This challenge makes such information, even if available, unstable, or inaccurate about the users' actual availability status.

In recent years, the advancement and prevalence of sensors and machine learning have made receptivity prediction, i.e., predicting whether users would be available and willing to respond to a notification/IM message, increasingly accurate and reliable [3,8]. This technical and technological progress has made presenting users' availability status possible and promising on mobile IM services. However, one well-known characteristic of prediction is its uncertainty. Instead of saying "the user is available to respond," a prediction outcome might say "the user has a 70% probability of responding", or "the user is likely to read your message in 5 minutes." While users are found to like some vagueness and ambiguity in their status sharing [4], IM senders may not find such information as helpful as the recipients do. IM senders and recipients' interpretation of such ambiguity and uncertainty and what they would act upon it becomes new questions to address to prepare for this upcoming IM feature.

As a first step, we undertook user enactment, a design approach for researchers to let participants experience and reflect on possible designs of future technologies, to explore possible designs of *predicted availability status* on mobile IM. In particular, we hope to gain insights into how IM senders and IM recipients interpret these designs of predicted status, what they want to

know from the status, and what actions they will take upon the status, from both the senders' and recipients' perspectives. There are three research questions we want to explore.

- How do IM senders and recipients interpret different designs of predicted availability status in different conversation scenarios, respectively?
- What actions would they take these predicted availability statuses?
- What kind of gaps exists between the senders' and the recipients' interpretation and the needs for the predicted availability status?

Method
We leveraged User Enactments (UEs) [1] to explore the design opportunities of presenting user's availability status on mobile IM services. UE has been shown as an effective design approach that let users critically reflect on what future technology could do, should do, and why, via a form of embodied and short enactments with an array of design concepts with different attributes that illustrates various possible forms of future technology [1, 8]. Using this method, we not only hope to get insights into the pros and cons, and promise and pitfalls and of different presentations of predicted availability status on future mobile IM services, but also to extract users' values, expectations, concerns, and likes and dislikes about the designs. To answer our research questions, in creating the designs of predicted availability status, our aim was not to create designs that seemed to be a "right solution", but to create designs that can be provocative, inspiring, arousing, thereby extracting users' values, expectations, desires, concerns, frustrations, and likes and dislikes about the

designs. As a result, the research team created several dimensions of scenarios and interfaces that we considered the matter to users' interpretation of and actions upon predicted availability status.

Scenarios Design: Sender
We separated the role of sender and recipient when designing scenarios. In creating scenarios, we defined three dimensions, resulting in a total of 72 scenarios. While in real life, the range of scenarios of conversations would much wider than the scenarios in our study, considering to keep the length of UEs, we limited the number of dimensions to only three. The three dimensions were *conversation purpose*, *speculated availability*, and *sender-recipient relationship.*

We included three conversation purposes for which we expected that users have different needs for seeing a response from recipients: 1) *Notifying* the recipient without a need to receive a response (e.g. *"I got that email, thanks!"*), 2) *Getting a quick response* from the recipient (e.g. *"do you want me to buy you something on my way home?"*), and 3) Having continual conversation (e.g. *"Do you have some time for discussing the assignment?"*). Users may have developed some expectation, prior knowledge, or simply an assumption about the recipient's availability before the conversation. We think users' speculations about the recipient's availability might affect their reactions to an availability status. We included four conditions for this dimension, including uncertain with the recipient's availability, speculating that the recipient is available, speculating that the recipient is at somewhere inappropriate for responding, speculating that the recipient is not available. Finally, we included

Availability for reading IM messages	High	Low	Availability for responding to IM messages
Noticing IM messages	High	1	x	High
		2	3	Low
	Low	4	x	High
		5	6	Low

Table 2: Associating the variations of the three dimensions: noticing, reading, and responding resulted in a relationship result in 6 scenarios for the UE. Two were removed because they made less sense.

information Type	Pie chart + Text	Pie chart +Numeric
Attentiveness	Prototype 1	Prototype 4
Responsiveness	Prototype 2	Prototype 5
Interruptibility	Prototype 3	Prototype 6

Table 3: We created an array of designs demonstrating possible presentations of predicted availability status based on three dimensions: information type, the graphic style and predicted probability. Predicted probability is not shown in the table because it is randomly generated in UE.

Conversation Purpose		Speculated Availability		Relationship
Getting a quick response	x	uncertain with the recipient's availability	x	Partner / Couple
		recipient is available		Family member
Notifying				Friend / Classmate
		inappropriate for responding		Colleague
Having continual conversation				supervisor/advisor/teacher,
		recipient is not available		stranger/acquaintance

Table 1: Associating the variations of the three dimensions: conversation purpose, speculated availability, and relationship resulted in 72 scenarios for the UE.

six relationship types: partner/couple, family member, friend/classmate/colleague, supervisor/advisor/teacher, stranger/acquaintance. Associating the variations of these dimensions (Table 1.) result in 72 scenarios.

According to the 72 scenarios formed by the three dimensions, they will be divided into 6 groups, each having 12 stories.
In each group, all the participants will be assigned to three kinds of conversation purposes.
From the 6 relationships, each group will only use 4 different relationships due to the length of the experiment. For this reason, we will use the follow-up question to make up for the shortcomings.

Scenarios Design: Receiver.

In creating scenarios for recipients, we defined three dimensions: likelihood of noticing an IM message (high/low), availability for reading an IM message (high/low), availability for responding to an IM message (high/low). (Table 2.) In some situations, users may be able to read a message but not able to respond to it. Sometimes, users may be able to respond but the situation makes it hard to notice a phone notification. We eventually created 6 kinds of scenarios for recipients. Two were removed because these scenarios made less sense (e.g. unable to read but able to respond to a message).

Design Variations
We define three dimensions for the presentation of the predicted availability status:
information type (Attentiveness, Responsiveness, Interruptibility), the graphic style (pie chart, bar graph, trend chart, text, numeric), and predicted probability. Predicted probability is not shown in the table because it is randomly generated in UE. Examples of the designs created from these variations of dimensions are shown in Table 3 and Figure 1.

User Enactment Study

Until this point, we had recruited 4 participants ranging in age from 20 to 35 in Taiwan to participate in the user enactment study. Each participant was randomly assigned to ten scenarios as a sender and four scenarios as a recipient. Prior to user enactments study, we requested each participant to offer a photo of himself/herself and an IM contact to create a profile
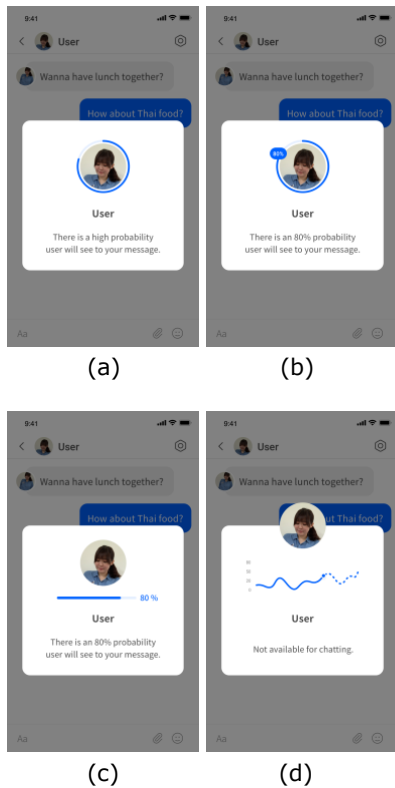
(a)   (b)

(c)   (d)

Figure 1. Examples of availability status that varied in three dimensions: ambiguity (percentage vs. text description vs. graphic), information type (Attentiveness, Responsiveness, Interruptibility), and predicted probability.

photo on the IM application they would see in the UE. We told them that the study would not be specific to the interactions with the chosen IM contact. We also asked them basic demographic information.

A UE study was conducted in two parts: sender and receiver. First, each participant experienced the 10 scenarios as a sender. Afterward, the participant experienced the four scenarios as a recipient. At the beginning of each scenario, we presented a story card to illustrate the scenario they should imagine if they were in. They were first presented a status design to explain what the status meant, how they interpreted the status, and what they would do in the scenario. The researcher then presented the rest of the five designs subsequently and asked them to reflect again respectively and compare them (Figure 2). Then they were asked to pick ones that they thought the most and the least informative design for them to make a communication decision and explain why. After completing the scenarios as a sender, participants took part in the scenarios as a recipient, with a small break between the two sessions. After the study, we conducted a short interview asking participants about their thought about disclosing availability status in a mobile IM.

Preliminary Result
Qualitative data from the four UE sessions reveal quite interesting insights. First of all, as a sender, participants' confidence in the system was affected by the ambiguity of the predicted status of the recipient. They felt more confident if the predicted status was presented in a precise way, i.e., in a numeric form. It was because they considered being precise meant that there was a clear metric for estimating the status. On the other hand, they considered that being online or not was a clear cut and there was no room for being vague about it. Interestingly, participants had quite diverse interpretations of the *probability of responding*, but they had similar interpretations of description. When being presented "*according to the history of the recipient…*", participants wondered more information about the "history," such as how long the system has collected the availability information from the recipient. They generally considered that history information could not represent the current status, regardless of how rich and detailed the history information was in the presentation.

Regarding actions upon the predicted status, we found that both relationship and the purpose of the communication mattered, as expected. Specifically, the participants were less concerned whether sending a message would disturb the recipient when the recipients were highly close to them or when they were acquaintance or stranger. For the latter, they thought it was harder to know the recipient's actual status and therefore would send a message anyway. For the former, even though they considered the situation might not be suitable for the recipient to read messages, they preferred sending messages anyway too. In contrast, participants cared more about the potential disturbance of the message to the recipient when there was a hierarchical relationship between them. As to conversation purpose, it mattered when the recipient's status was offline. When the purpose was to have a long conversation, participants preferred to wait until they became online. However, when the purpose was to notify the recipient, they preferred to send the message regardless of the status of the recipient.

Figure 2: Participants were shown six different designs of availability status in each scenario and asked to interpret them and explain what communicational actions they would do when seeing them.

Interestingly, as a recipient, participants considered that people would not send them a message when their status was taking a rest. This was contradicting to that they would send messages to close friends or strangers regardless of their status. Furthermore, some participants would like to directly present a relatively "long term" status next to a profile page (e.g. "preparing for the exam") to indicate their general availability, while keeping the short-term and predicted status stay in the contact list.

Conclusion and Future Work

We present the first investigation that aims to uncover insights into how mobile users, as an IM sender and recipient, respectively, interpret predicted availability status and act upon it in different scenarios. While we recruit more participants to take part in the UE, we believe that the results can advance the understanding of how to present predicted availability status on mobile IM services.

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