TNT: Exploring Pseudo Social Reminding for Effective Task Management

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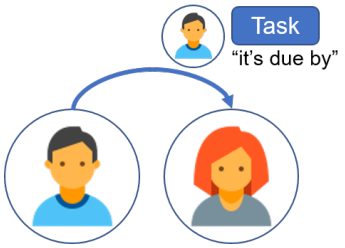
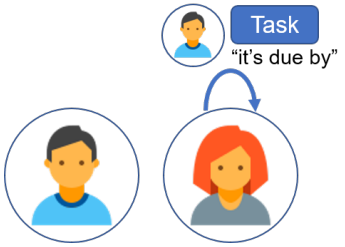
Abstract
Social reminders alert other people to do a task and are effective in promoting intended behaviors. To improve self-motivation of completing a task and produce similar effects of social reminders, we propose "pseudo social reminders", a personal task management system where users can set social reminders by themselves for their own social tasks. The goal of this research is to investigate how pseudo social reminders affect task management and how users perceive these message notifications. We built an Android app that uses notifications showing the sender's name and photo to increase awareness of what users need to do and conducted a one week field study. The results from the user study showed that when receiving a message from a group member related to the task, participants felt social influence. Most participants selected the reminding group that were related to the task and could remember the task with a greater impact through photos as visual aids.

Author Keywords
Reminder; Task management; Smartphone notification; Social interaction;

ACM Classification Keywords
H.5.m. [Information Interfaces and Presentation (e.g. HCI)]: Miscellaneous



(a) Social reminder model



(b) Pseudo social reminder model

Figure 1: Overview of social reminder and pseudo social reminder model.

Introduction

People send reminders to other people. For example, professors send emails to their students to remind them to finish their group work for the upcoming meetings. In a company setting, a team member sends out reminder messages to the team to encourage them to finish their work in a timely manner. This kind of social reminding is known to be effective in promoting intended behaviors as it provides a sense of care [7] as well as social influence for task completion [1].

In this work, we set out with this simple question: "Can we set a social reminder by ourselves for ourselves?" While this may sound a bit odd at first glance, we can easily realize that this "pseudo" social reminder could be useful in improving self-motivation to complete a task. For example, a student may want to improve self-motivation by setting a daily reminder that pretends to be sent by the student's advisor. In Figure 1, we differentiate how pseudo social reminders are different from traditional social reminders.

The goal of this paper is to investigate how pseudo social reminders affect task management and how users perceive social reminders. As a first step towards understanding social reminders, we developed a task management system in the Android platform, where we mimic a social reminder by displaying a sender's name and photo in task notifications. This design decision is based on the fact that email and messenger reminders typically include a sender's name and photo. Then we conducted a one-week field study in a naturalistic situation. By analyzing log data and interview data, we examined how our participants perceived the social reminders, including their effectiveness.

From the user study, we discovered the following results: (1) Photos in the notification message worked as visual aids helping the user to remember the task, (2) When receiving a message from a group member related to the task, users seemed to have felt social influence such that the group member's name and photo played a considerable role, and (3) Most participants preferred reminder messages sent from someone directly related to the tasks.

Related Work

There are a large number of reminder apps designed for various purposes such as time management and behavior change. While reminders are mostly used to remind one's own task, when it comes to group work, people share messages with or send messages to others (which are known as social reminders). Social reminders are commonly used in shared calendars by groups such as families [6] and in the workplace [5] for time management. They are also used for changing behaviors by groups with the same goal [9]. Prior studies showed that social reminders were effective for promoting healthy behavior [1] and improving intervention adherence with SMS [7].

Identifying the effectiveness of social influence in behavioral change has become an important theme within the HCI research field. Social influence occurs when the behavior of group members influences an individual to conform to the group's behavior patterns [10]. The concept of social influence is thus employed when designing systems intended to change behavior as in persuasive technology [4]. For example, Chiu et al. [1] designed a mobile social persuasive system to motivate drinking water including a social influence strategy.

These studies clearly showed that social reminders provide a sense of care and social influence to the recipient. In this work, we explore our novel concept of pseudo social reminders that are set by the users to improve their self-motivation to complete a task.

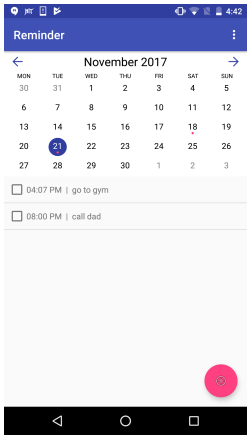


Figure 2: Screenshot of main activity for viewing tasks

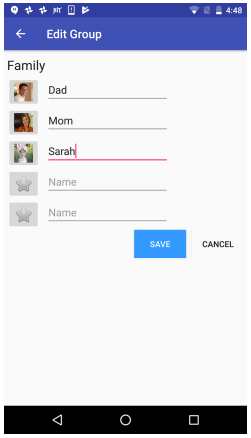


Figure 3: Screenshot of setting groups

Mobile Application Prototype

Design

We developed a Tidy Notification-based Task management service (TNT), a mobile application that allows users to manage tasks and receive notifications from others according to their choice. We first established our functionality features from previous research and as part of our iterative process of app design, performed a pilot study to review the features of our app. The resulting features that our app supports are shown in Table 1. It includes customizing options, tracking history, flexible scheduling, reminders with no connectivity, data security and visual aids [8].

Features	Description
Customizing options	Tasks can be customized with various options.
Tracking history	Missed and completed tasks are tracked.
Flexible scheduling	Reminders can be set on a nondaily basis.
No connectivity	The reminder app requires no Internet connection.
Data security	Data is only stored in the user's device for security.
Visual aids	The app provides visual clues by adding a picture.

Table 1: Features of our reminder app

Implementation

The TNT prototype is an Android app that consists of 4 main activities: main activity for viewing tasks, setting groups, setting reminders, and delivering reminders. The design is shown in Figure 2, 3, 4, and 5.

Main activity: As calendars are an important tool in time and task management [2], the main activity is a calendar-based view that displays the history of all the recorded reminders. This page shows for each day a list of items that consist of a task and a checkbox so that the users could check their task completion status. In order to improve usability [3], a click on a reminder lead to editing the reminder and a long click on a reminder lead to a warning dialog of deleting a reminder.

Setting groups: Users chose members for each group in this activity. The name was required but the photo was optional when selecting a person for the group.

Setting reminders: After reviewing reminder apps like the Apple Reminder app, we included the following information for reminders: the name, date and time, repeat option, reminder group and memo. The repeat option consisted of checkboxes for every day of the week where people could select multiple options. The reminder group option is to select whom the user wanted their reminder from. Besides the specific group options like family and friends, users were given the option to not set a specific group. Because our app gave a notification associated with a person, if users chose not to select a specific group, the message notification randomly displayed a person that was registered.

Reminder delivery: At the preset time, the reminder displays the task name, and the name and photo of the selected reminder group member through the notification bar and the pop-up dialog. We added a message in the notification bar in case the user was not able to focus on the message at the time the reminder was delivered. In order to examine how users perceived messages from themselves and from others, the system randomly chose 1 out of 3 tasks so that the generated messages were from users themselves and not the selected group. In other words, users sometimes received messages where they were the sender.

Example of Use

An example of using TNT is a situation where the user plans a family trip. The user has to first schedule the date of the trip with the father, then book plane tickets. Figure 2 shows tasks for the selected day that include calling the father. The family members can be set like in Figure 3. Figure 4 shows the user adding a reminder to book the flight, and Figure 5 displays the reminder to call the user's father.

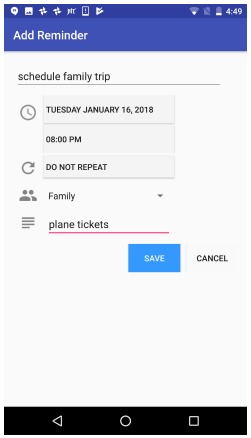


Figure 4: Screenshot of setting reminders

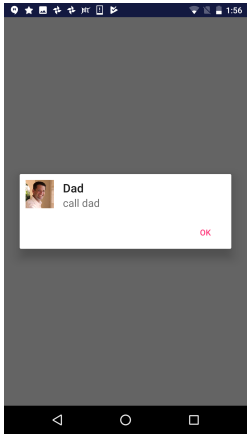


Figure 5: Screenshot of reminder delivery

Evaluation

Design and Procedure

We conducted a user study that included a pre-interview, one week of app usage, a post-interview, and post-survey. We recruited 10 campus students ($male : female = 8 : 2$) who used Android smartphones. Participants were asked to download TNT into their own smartphones and were presented guidelines for the experiment such as to insert at least one name for each group and insert at least one task daily. After one week of usage, we conducted a post-survey to check the usability of TNT and a post-interview. The results were interpreted using the affinity diagram based on post-interview transcripts. All participants were given a $7 gift voucher for participating.

Results

RQ1. What are the contexts of usage of our reminder app?

Task Creation and Group Assignment: Participants used our app when they wanted to be reminded of a social task. To create a reminder, users selected which group they wanted their reminder from for each task. Most participants (80%) used the app to receive reminders from a person related to the category of the task. For example, one participant said she "*matched school related tasks with* [. . .] *people from school, and family related tasks with family*" (P10). These participants stated the reason for their behavior was that they would find it strange if a notification were sent from someone not related to the task. In contrast, the remaining participants (20%) used the app without caring about who sent the message because they knew that the message was generated by the system. One of the participants even registered only one character to the names in the reminder groups and did not remember who it represented. He said, "*I would not care about who sent it to me because I knew so clearly that the person did not actually give the message to me*" (P9).

Task Completion and the Checkbox Function: Our app was also used to record the completion of tasks through the checkbox function. Participants used the checkbox when they wanted to check the progress of tasks and also for self-assessment. One participant said, "*The checkbox plays an important role somewhat like a diary in terms of achievement and checking the progress*" (P3).

RQ2. How do users perceive message notifications from themselves and from another group member?

The participants who noticed and reacted to the message notifications responded differently when it was from themselves and from others. When users were given the message with themselves as the sender, they quickly recognized the task was about themselves. One said, "*When I saw my photo, I instantly realized and knew that it was my work*" (P1). Overall, 60% of participants who reacted to messages from others stated that it created tension and made them feel social influence. This was mainly because the message looked realistic. One participant mostly selected his lab as a reminder group and commented that he "*felt pressure*" after receiving the message notification, implying a feeling of social influence, and it gave him a "*sense of reality*". He also said "*When I saw a notification that I had a 4 o'clock meeting from the professor himself, I became nervous.* [. . .] *I felt like I was getting a Kakaotalk (a popular Korean messenger app) message from that person so I got surprised*" (P6). However, there were participants who were not interested in the message notifications altogether because they knew the message was not sent from the actual person. For example, one participant said, "*I did not care because the reminder is not actually from the person even though it says so*" (P5).

RQ3. What are the effects of showing photos in the reminder notification?
Although selecting photos for profiles was optional, half of the participants used this function. When asked in what order participants perceived the notification message, those who used photo profiles said that they recognized the pseudo senders based on their photo profiles first, then the contents of the task. Users said that the photo contributed in making them think the notification was a message in real life. "*Since there is the photo and name I thought I had received a Kakaotalk message*" (P7). Furthermore, participants clearly saw the effect of visual aids for remembering the message, as photos allowed users to recognize and perceive the message with a greater impact. One participant stated, "*The message itself remained in my head intensely longer when there was a photo* [. . .] *and the photo helped me remember the task better*" (P1).

RQ4. How do users evaluate our app in terms of its usability?
We conducted a post-survey to assess the usability of TNT. The questions were based on the USE Questionnaire [3], designed as a 7-point Likert scale. The USE questionnaire has 4 usability dimensions and the results for each dimension are stated in Table 2, with moderate scores for usefulness and satisfaction, and high scores for ease of use and learning. One participant commented, "*I found the app easy and intuitive to use*" (P7). Another said, "*I liked that the app stuck to the basic functions* [. . .] *and that I could access the features I wanted right away*" (P2).

	Mean (SD)
Usefulness	4.45 (1.52)
Ease of use	5.35 (1.07)
Ease of learning	6.65 (0.55)
Satisfaction	4.57 (1.17)
Total	5.18 (0.81)

Table 2: Statistics of questionnaire scores about usability

Discussion and Future Work

Our study proposed a new concept called "pseudo social reminding" that supports individuals to better perform tasks including a social relationship. Whereas existing social reminders require more than one individual to be involved in managing tasks, our personal task management system enhances self-motivation and produces similar effects of social reminders, such as providing social influence. User studies were conducted to evaluate how users interacted with the proposed system, where users were given a message notification from a group member via emulation.

In this study, we discovered that photos in the pop-up notifications had positive effects on interpreting the messages. They worked as visual aids to remind the target person, the related group, and the task itself. Moreover, we found that message-type notifications could be helpful for accomplishing tasks. When receiving a message from themselves, participants quickly realized that the work was something they had to do whereas when receiving a message from someone related to the task, participants seemed to have felt social influence. This may have been because they felt the notification was real. And as photos made the message to be more realistic, photos may have contributed in making participants feel social influence. Lastly, most participants preferred the reminder messages from someone related to the tasks, although the messages were emulated.

Because this study was an exploratory study, future research will need to evaluate the presence of novelty effect and the effectiveness of long term use. Moreover, the participants of our study were all students which indicates that the experiment may have been limited to a specific domain. Therefore, large-scale and longitudinal tests are required for further studies.

We expect that pseudo social reminders can be applied in a wide variety of applications such as inducing health-promoting behaviors, taking medication, and exercising, similar to existing social reminders. The current prototype simply uses the photo and name as information of the reminding person. A future study might incorporate the feature of automatically generating the text message using the

person's style of speaking to enhance the prototype's realism. Notwithstanding the future improvements, the current study shows the significance of pseudo social reminding effect. The proposed system can be easily implemented as an intelligent agent in apps like Google Calendar.

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