"You've Got IMs!" How People Manage Concurrent Instant Messages

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Abstract. Instant Messaging (IM) clients allow users to conduct multiple simultaneous conversations, which we term "concurrent IMs." In this study we investigate how adults manage concurrent IMs both in the workplace and within the context of a goal-directed, time-bounded recreational task. We discuss differences in behavior between engaging in a single IM conversation and engaging in concurrent IMs. We document the errors that arise as a consequence of concurrent IMs and identify four main strategies users employ to manage them: controlling the pace of conversations, limiting the number of simultaneous conversations, window management, and using tabbed IM windows. Finally, we explore the pros and cons of these strategies and examine design tradeoffs to enable effective space and attention management while minimizing disruption to the user.

Keywords: Instant messaging, concurrent IMs, multitasking, informal communication, notifications, tabs.

1 Introduction

As instant messaging (IM) has become enormously popular over the last decade, researchers have noted the advantages of IM as a tool for lightweight interaction in the workplace. Nardi et al., for example, documented that IM supports tasks such as quick questions and clarifications, coordination and scheduling, organizing impromptu social meetings, and keeping in touch with friends and family [9]. The use of instant messaging as a means of socializing, coordination and collaboration has also been reported in recreational contexts [5]. These studies show that IM supports lightweight communication by providing users with a channel of communication that allows for the immediacy of face-to-face and over-the-phone interaction but without the overhead of maintaining these types of interactions. As a result, IM interactions can often be characterized as opportunistic, brief and spontaneous [5,6,7,9]. These characteristics of IM interactions have facilitated the ability to multitask while engaging in IM conversations. For example, teenagers regularly use IM while completing schoolwork, surfing the web, checking email, and engaging in multiple simultaneous IM conversations while doing so [5]. Isaacs et al. [6] also reported that multitasking

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while using IM frequently occurs in the workplace and observed users participating in multiple simultaneous one-to-one IM conversations, which we term *concurrent IMs.* Although previous work has studied the management of multitasking – that is, the engagement of multiple activities [8], the phenomenon of engaging in concurrent IM conversations introduces several meta-issues to the already complex nature of multitasking. Although studies such as [5] and [6] have recognized the occurrence of concurrent IM conversations, we examine this behavior in depth and explore the issues that arise as a consequence of engaging in multiple IM conversations simultaneously. How does one decide on the degree of attention to give to a particular conversation? What are the challenges people encounter when managing multiple simultaneous conversations? What strategies are useful in dealing with those challenges? What design tradeoffs follow from engaging in concurrent IMs while multitasking?

2 Method

Because users' goals and context influence how they communicate over IM, we chose two real world settings to observe and learn about how people manage and negotiate multiple conversations. The first was an investigation of IM usage in the workplace, where users at a technology company communicate with co-workers as well as outside friends and family. In the second phase we explored IM usage in an online Fantasy Football draft, where participants chat with multiple people during a goal-directed, time-bounded task. In total, the collected observational data consisted of 29 hours (14 hours of IM in the workplace and 15 hours of Fantasy Football drafts). In addition, we performed 25 hours of interviews (20 with the workers and 5 with the Fantasy Football managers).

2.1 Phase I: IM in the Workplace

In the first phase of the study, we investigated the IM usage of 20 employees at a large technology company. All of the participants were experienced IM users (1+ years of usage.) The participants in our workplace sample included a receptionist, an administrative assistant, an internal communications specialist, customer support representatives, software engineers, facilities coordinators, and several interns. We conducted a 1-hour long, semi-structured interview with each participant to understand their typical IM usage. We asked participants about their recent experiences with concurrent IMs and group chats, as well as how they prioritized conversations. After the initial interview, we asked the participants to provide us with an hour-long screen-capture of their IM activity. In a follow-up interview, we reviewed the screen-capture with each participant and asked them to provide us with context, informing us of the tasks they were working on while using IM, with whom they were chatting, and whether or not their conversations were related to the other tasks in which they were engaged. We compensated the participants for the initial interview with reward packages valued at $50. Participants received an additional $25 after they submitted a screen-capture of their IM activity and participated in a follow-up interview. We received screen-captures from 14 participants.

We anticipated that participants would have privacy concerns about participating in a study in which the content of their IM conversations would be visible. This is an especially sensitive issue in the workplace, because participants may feel self-conscious about holding non-work-related conversations and could cause participants to depart from their normal IM behavior. We were also aware that we could potentially observe a participant for hours and not see any IM activity. As an alternative to observing the participants live, we asked them to use screen-capture software to record their activity. We wanted to reassure participants that the content of their IM conversations was not the focus of our study, so the screen-captures were deliberately of low quality, enabling us to see screen activity but not read any specific text on the screen. Participants were also given full control over the timing and content of their submissions; they decided when and what they wanted to capture.

2.2 Phase II: Fantasy Football Draft and IM

The second phase of our study examined IM use in Fantasy Football, in which participants play the role of a manager of a National Football League (NFL) team. Near the start of the season managers conduct a draft in which they forecast which NFL players will have the best statistics during the season and select players accordingly. After the draft, team managers earn points based on their players' performance in weekly NFL games [3]. An online Fantasy Football draft user interface typically supports a group chat and a timer. The group chat is seen by all league members in their draft window and is usually used for draft-related discussion and banter. The timer ensures that all managers have no more than a specified amount of time to select a player. In addition to the timed task of drafting a roster and using the group chat, managers can engage in IM conversations, phone calls, face-to-face conversations, and email, outside the draft interface. Draft participants can contact or be contacted by people in their league about content in the group chat, such as picks, trades, advice, as well as jokes via a private backchannel. They can also be contacted by people outside their league about things that are not related to the draft.

We chose to study an online Fantasy Football draft because it represents a setting in which both group chats and concurrent IMs can occur while people are multitasking. The draft is a unique environment because of its fast pace and massive inflow and outflow of communication, making it an interesting arena to study concurrent IM usage in the context of a goal-directed, time-bounded recreational task.

We observed seven managers from six different Fantasy Football leagues do their drafts and interviewed them afterwards. We recorded the Fantasy Football managers' computer screens with screen-capture software. After the draft, we interviewed each participant, following the same protocol we used in the first phase of the study. We reviewed the screen-capture with the participants and asked them to comment on their behavior, communication, and task management strategies. Because we were studying people in a recreational setting, some of the limitations that restricted us in the workplace setting did not apply. Live observation was appropriate because the content of Fantasy Football participants' conversations was less likely to be sensitive. The Fantasy Football managers were compensated with reward packages worth $50.

3 Results and Discussion

Table 1 summarizes the IM usage data from the participants in both phases of the study. We begin our discussion by examining how our participants across both phases behaved differently when managing an individual IM as opposed to concurrent IMs. Then, we document some of the common errors people made when engaged in concurrent IMs. We then identify four key strategies that people utilized to manage concurrent IMs, which emerged from our interviews and observations. Finally, we discuss key design tradeoffs that follow from our findings about concurrent IMs.

Table 1. A summary of the participants' IM usage for the Phase I participants (left) and the Phase II participants (right)

Participant	Gender	IM Usage Characterization	Reported Time Chatting/Day (Minutes)	Reported Comfortable # Concurrent IMs	Reported Max. # of Concurrent IMs	Observed Max. # of Concurrent IMs
P1	F	always on	30	1-2	3	3
P2	F	always on	30-60	1-2	3-4	2
P3	M	on when available	10-15	1	2-3	1
P4	F	always on	180-240	1-2	3-4	3
P5	M	always on	30	4-5	2	2
P6	F	always on	30-60	2	2	n/a
P7	F	always on	90-120	3	4	2
P8	F	always on	30	3	4	3
P9	M	always on	60-90	1-3	4	n/a
P10	M	always on	30	1	2-3	2
P11	F	always on	>90	3-4	4	3
P12	M	always on	15-60	<5	4	6
P13	F	always on	180-240	5	5	3
P14	F	always on; invisible when unavailable	60-120	2	6-7	1
P15	F	often on	90	1	2	n/a
P16	M	always on	<60	2	4	n/a
P17	F	always on	120-180	2	4-5	2
P18	F	always on	420-600	4-5	8-9	8
P19	M	on when available	20-30	2-3	4-5	n/a
P20	F	always on	15	2	3	n/a

Fantasy Football Participant	Gender	Observed Max.# Concurrent IMs
F1	M	5
F2	M	3
F3	M	9
F4	M	4
F5	M	0
F6	M	4
F7	M	3

3.1 Comparing Behavior between Individual and Concurrent IMs

Both the workplace IM and Fantasy Football participants reported engaging in different behavior when participating in concurrent IMs compared to chatting in a single conversation.

Shorter Responses. Six workplace participants and two Fantasy Football participants reported that they gave shorter responses to their conversation partners when they were chatting with multiple people. One of the workplace participants said that he did

not mind giving terser responses since he felt people generally expect short and abrupt conversations over IM.

Less Attention per Each Concurrent IM. Five workplace participants reported that they paid less attention to each conversation when there were concurrent IMs. With concurrent IMs attention is divided across conversations. Such division is potentially unequal, depending on a user's context, their relationship to their chatting partners, and the content of each dialogue. Splitting attention across concurrent IMs is not easy. Four technology workers noted that they have a hard time keeping track of multiple IM conversations. As we expected, several participants recalled memory lapses where they had forgotten what had been said in certain conversations.

Multitasking Stress. Three workplace participants and one Fantasy Football manager explicitly noted that handling concurrent IMs can be stressful. One possible explanation for this stress is that distributing attention across multiple conversations increases the cognitive load. IM system notifications, specifically blinking windows, can also make it difficult for a user to focus on a particular IM conversation, let alone deal with other tasks and applications.

3.2 Errors with Concurrent IMs

Participants reported making the following errors with greater frequency when managing concurrent IMs as opposed to a single IM conversation: sending a message to the wrong person, forgetting about chat partners, accidentally closing an IM window, and sending a message in a language the partner did not understand.

Sending a Message to the Wrong Person. The most frequent error participants reported was sending a message to someone other than the intended recipient. Six of the tech workers and one of the Fantasy Football managers recalled making this error. We also observed one Fantasy Football manager commit this error during their draft. Several participants reported being worried about making this mistake whenever they engage in concurrent IMs. As Grinter and Palen pointed out, the consequences of making this mistake can vary drastically in severity [5]. Mistakenly sending one casual chat line to the wrong friend may be inconsequential. However, sending a message to the wrong person, particularly in the workplace, can have serious consequences. One of our participants from the tech company reported that she once accidentally told her boss to "hold on a freaking second" while she was chatting with several people simultaneously. Luckily, her boss was understanding when she later explained her mistake.

Forgetting about Chat Partners. Three work IM users and one Fantasy Football participant recalled instances where they forgot about chat partners when they had concurrent IMs. This is expected when a user is dividing their attention unevenly across IMs. It may arise as a consequence of chat windows being obscured by other windows or overlooking IM notifications.

Accidentally Closing Windows. We interviewed three workplace IM users who told us that they have accidentally closed IM windows by clicking the "x" on the window when they meant to click the minimize button. One Fantasy Football manager also

made this error during his draft. On many clients, concurrent IMs require multiple windows, which in turn can lead to window management errors. Recovering from this error can be as trivial as reopening the chat window or as difficult as recalling the topic and the conversation from scratch. This problem is exacerbated when IM users use clients that do not support conversation logging and history or when they have not enabled this feature.

Confusing Languages. Two of our work IM participants regularly spoke to people over IM in different languages and scripts. One of these participants reported sending something in the wrong language over IM. Unlike the error of sending a message to the wrong person, this mistake was not due to addressing the wrong conversation window, but instead missing a critical pragmatic cue.

3.3 Strategies for Managing Concurrent IMs

Our interviews and observations uncovered several key strategies participants used to manage concurrent IMs and deal with the aforementioned challenges.

Controlling the number of conversations. One of the ways people manage concurrent IMs is by reducing them to a number they feel comfortable managing. Grinter and Palen reported that some IM users felt that they had a personal threshold beyond which they were unable to monitor their conversations sufficiently [5]. This threshold depends on the individual and varies according to the nature of the conversations, the chat partners involved, and the deadlines of the other tasks they are managing. Common ways of controlling the number of conversations we observed included adjusting online status and visibility (e.g. available, idle, away) and using different screennames or IM services to divide up different groups of contacts and tasks. One workplace IM participant and one Fantasy Football manager reported that they frequently quit their IM programs when they reach their upper limit of concurrent IMs. Signing off or exiting the IM program altogether essentially reduces the number of IM conversations to zero. Another strategy for controlling the number of conversations was to merge them by creating a group chat. It was interesting to note that merging IMs into a group chat did not necessarily decrease the number of conversations. Some participants kept their individual IMs active to maintain private backchannels. This was common among the Fantasy Football managers. In this case, IM users are not decreasing the number of conversations, but rather establishing a shared space so that messages did not need to be repeated across individual conversations. With a group chat and private backchannels, chat participants are controlling both the amount and type of content in the concurrent IMs.

Controlling the pace. IM is inherently asynchronous since users can decide if and when they will respond to a message. While recent work has been done on predicting whether or not a user is likely to respond to an incoming message within a certain period of time [1], we explored responsiveness with respect to the way it was used to control the pace of IM conversations. Monitoring one's response speed and attending to conversational cues about one's conversation partner are some of the ways to achieve this. We often observed participants intentionally ignoring their chat partners while they were participating in a conversation with someone else or engaged in

another activity altogether. Participants often found themselves synchronizing their pace with their chat partners, which reduced the number of overlapping message transmissions and interleaved conversation threads.

IM Window Management. We observed two approaches to IM window management: grouping and closing. Participants typically kept all of their IM conversation windows in a specific area of the screen, leaving the rest of the screen available for other computer-related tasks. With respect to closing, there were three strategies to IM window management. Aggressive closers were users who closed a conversation window or tab before a conversation is over. These users typically closed an IM window or tab after each message interchange. Moderate closers tended to close IM windows or tabs after a conversation ends. The non-closer usually left all IM windows and tabs open indefinitely, or until they quit the IM client or turned off their computer. We observed participants employing a combination of different strategies depending on their context and their chat partners.

Using Tabbed IM Windows. Many participants employed tabbed IM window features to manage concurrent IMs. From our observations, it appeared the participants who used tabbed IM windows were more likely to maintain more IM conversations than the participants who did not use tabbed IM windows. The main advantage to tabbed IM windows is that they save screen real estate. Instead of several chat windows populating a user's computer screen, there is a single window dedicated to IM conversations (see Figure 1). Furthermore, the participant needs to engage in less window management. Tabbed IM windows were reported to be less disruptive, since new conversations pop up as unfocused tabs, rather than as new windows. They also do not capture keyboard input focus, reducing the likelihood of a participant unintentionally typing in the wrong IM window and sending a message to an unintended contact. However, tabbed IM windows have weaker visual cues than non-tabbed IMs. When a minimized IM window blinks, non-tab users can tell whom the message is from, since only one chat partner is associated with the window. However, with concurrent IMs tabbed IM users do not know who the new incoming IM message is from based only on the blinking notification. This is of particular concern for IM users who prioritize conversations based on person or content since there is no way to differentiate conversations based on window level notification schemes.

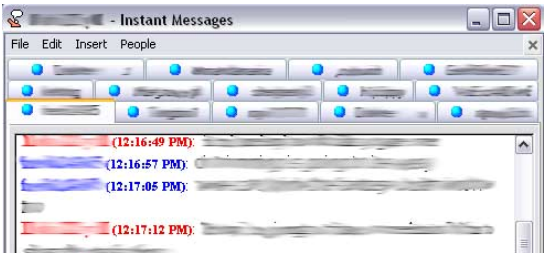

Fig. 1. A tabbed IM window

Other Strategies for Managing Concurrent IMs. Nearly half (9) of the workplace IM participants reported that they prioritize concurrent IMs based on either their chatting partner or the content of the conversation. This supports the intuition that some people pick particular conversations to pay attention to when handling more than a single IM. It can be a conscious decision in which concurrent IM users impose meaning on their chat windows, rather than let the window cues and placement always dictate their attention and response strategies.

It has been previously documented that a specialized language filled with abbreviations, acronyms, and contractions has evolved with text messaging, including IM and email [2,4]. Three of our participants reported they find themselves using abbreviations, shorthand, and acronyms more often when engaging in concurrent conversations than with an individual conversation as a way of responding to their chat partners more efficiently. Some examples of such abbreviations are "busy ttyl" for "I'm busy, I'll talk to you later", "brb" for "be right back", and one participant's shared convention of "222" for "In a Meeting". The text equivalent of "uh huh" and emoticons were employed so that users could quickly let their chatting partners know that they were paying attention.

Two workplace participants and one Fantasy Football manager noted that they would avoid asking in-depth questions of their conversation partners when holding multiple simultaneous conversations. Their justification was that an in-depth question could result in a long, engaging conversation that requires increased attention and greater cognitive effort. Six workplace IM users and two Fantasy Football participants also reported that they often had to repeat themselves during concurrent IM conversations. One strategy to expedite constructing these repetitive messages was to copy and paste text between different IM conversations.

4 Design Tradeoffs

This study uncovered two sets of key tradeoffs with concurrent IMs while multitasking: managing multiple windows versus managing tabs and notifications versus disruptions.

4.1 Managing Multiple Windows versus Tabs

Tabs are one attempt to deal with the window management issues that arise with concurrent IMs. This approach brings a set of tradeoffs. Compared to separate non-tabbed windows, tabs require a different set of physical actions. Unlike non-tabbed windows, with tabs there is only one window to move and rearrange regardless of how many conversations are being managed. This can potentially make it easier for users handling concurrent IMs. Tabs can also cause more physical action and effort compared to non-tabbed windows. With tabs, if a window with concurrent IMs is minimized to the task bar, only the focused conversation's title will be visible. Adding to an ongoing conversation with someone other than the partner in the focused tab means opening the tabbed window and then selecting the appropriate tab. This is an increase in effort compared to selecting a single non-tabbed window.

Working with tabbed IMs can affect how users impose meaning on their conversation windows. Tabs make it easy to focus on one conversation at a time, which helps people who privilege one partner's chat over other ongoing IM conversations. Users can leave a conversation in the foreground of the tab set if they are awaiting a message that they deem important. Conversely, users can leave a conversation in an unfocused tab if they are trying to hide that content from people passing by (i.e. co-workers). Separate IM windows can help users who want to spread their attention across multiple conversations simultaneously. We observed one technology worker who purposely placed two conversation windows horizontally side by side. They reported that the conversations had equal importance to them, and this arrangement helped them attend to both equally. Tabs make only one conversation visible at a time, so this mechanism for assigning importance would not be possible.

4.2 Managing Alerts versus Disruptions

Our study has begun to uncover the tradeoffs between the alerts that notifications provide and the disruptions they may impose. This tradeoff is dependent on both a user's situation and their personal alert preferences. Designing an effective notification system is challenging and rests on many subtleties. The different types of notifications each tell us something different about alerts in IM. The visual cues of color, pop-ups, and blinking windows differ in intensity and effectiveness. Color, the weakest of the visual cues, does not attract attention as much as the other three. None of our users turned color off, suggesting that this notification did not by itself place excessive demands on attention in the context of IM. Pop-up notifications are stronger cues than color because the human visual system is sensitive to motion. All of our participants turned off the pop-up notifications for their contacts' status. There could be three reasons for this: 1) the contact status information is not useful, 2) the pop-up action itself is distracting, or 3) the utility of the information is does not require such a strong notification cue. Contact status updates don't seem to be needed since over 80% (22/27) of our users made a conscious effort to keep their contact lists visible all times. This suggests that notifications relying on motion need to be carefully considered and selected. Window blinking, the strongest visual notification, is not without its tradeoffs. It is attention grabbing and hard to ignore because of its constant motion. In some cases this alerts users appropriately, but in others it becomes a disruption rather than an alert. This suggests the need for window blinking IM notifications to be rethought. Our participants preferred to have sound turned off. Sound may not be as disruptive as other cues to the user, but unlike the visual cues it has the potential to disturb co-located people who are focused on their own tasks.

5 Conclusion

Although IM has been the focus of many studies, concurrent IM conversations have not yet been widely explored. Given the fragmented nature that is inherent of IM use, understanding the differences between one-to-one IM and concurrent IM use would enable designers to design for effective space and attention management while minimizing disruption. Although still in its exploratory stages, this study has uncovered

that concurrent IM use is highly situated, requiring the user to constantly make decisions regarding attention, window, and conversation management. The study has also allowed us to gain a better understanding of the behavioral differences between one-to-one and concurrent IM, highlighting some of the challenges users face when engaged in concurrent conversations.

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