

# Characterizing Instant Messaging from Recorded Logs

Ellen Isaacs, Candace Kamm, Diane J. Schiano, Alan Walendowski, & Steve Whittaker  
AT&T Labs, 75 Willow Road, Menlo Park, CA 94025  
{ellen, cak, schiano, walendo, stevew}@research.att.com

## ABSTRACT

Most studies about instant messaging (IM) are based on self-report data. We logged thousands of IM conversations and examined actual behavior to find characteristic patterns of IM use in the workplace. Frequent IMers have longer, faster-paced interactions than do infrequent users, with shorter turns, more threading, and more multitasking. Pairs who IM with each other often have longer interactions with more threading than do rare partners. In contrast to previous characterizations, IM is used only occasionally to set up interactions in other media.

## Keywords

Instant messaging, switch media, threading, multitasking.

## INTRODUCTION

Instant messaging has become a popular tool for informal communication for both personal and business purposes. Although there has been much media attention to IM, there are few hard facts about how it is used in practice. Early studies were based primarily on interviews and surveys, both self-report methods [2, 3, 4]. A Forrester survey, for example, claimed that there are two types of users, “intense” (frequent) and “mainstream” (infrequent), and that intense users will drive adoption of new IM features. But it did not say how these types of users’ IM behavior differed other than just in frequency [4]. Both [2] and [3] highlighted IM’s role in arranging interactions in other media, such as face-to-face (FTF) or phone. Nardi et al. [3] observed that people often switch from IM to other media to discuss complex issues or collaborate on work.

We collected 23 weeks of IM conversations via an advanced development application called Hubbub [1]. Hubbub was used in a work context by 32 professionals associated with AT&T Labs who were based at 4 sites: two in New Jersey 50 miles apart, one in California, and one in Texas. Nearly 1/3 regularly worked from home or the road.

Given the paucity of quantitative IM data in the literature, we first wanted to determine the general properties of IM conversations, e.g. duration, number of turns, words per turn. Next we considered whether and how different types of users treat IM differently, and in particular whether that difference is attributable to frequency of IM use and/or the IM partners’ relationship with each other. Finally, we conducted qualitative analyses to see how often IM is used to arrange conversations in other media and why it occurs.

## METHOD

We logged 61,833 messages making up 3,096 conversations between 138 pairs of users. A conversation was defined as a sequence of messages in which no two messages are separated by more than 5 minutes. We then identified *Frequent* (Freq) and *Infrequent* (Infreq) users, defining Freq users as those averaging at least three conversations (with anyone) per day, and Infreq as averaging fewer than three conversations per day (cpd). We also divided *pairs* into *High* and *Low*, where High pairs had more than one conversation *with each other* per day, and Low pairs IM’d with each other less than once per day.

For the quantitative analysis, we included all 3,096 conversations. For the qualitative analysis, we sampled 500 conversations, randomly choosing 100 conversations from all combinations of Freq and Infreq users in High and Low pairs, although there were no cases of two Infreq users in a High pair. We did a content analysis to determine whether the participants switched media during the conversation, and if so, to what other medium. All conversations were coded for switch media by two coders, who agreed 96.7% of the time; disagreements were resolved jointly.

## RESULTS

**General characteristics of IM conversations.** Across all conversations, participants averaged 3.4 conversations per day, with a median of 1.1. Conversations lasted an average of 3 min 51 secs with an exchange of 20.0 messages (turns). Each turn consisted of an average of 7.6 words with an average gap of 18.7 secs between turns. Each user moved out of the message window an average of 3.7 times per conversation (which we call *multitasking*).

**Two styles of use.** IM use differed greatly for Freq vs. Infreq IM users and to some extent for High vs. Low pairs. Overall, 19% of the users qualified as Freq, and they averaged 7.7 cpd; the other 81% Infreq users averaged 1.2 cpd. Also, 14% of pairs were High, and they averaged 2.8 cpd; the other 86% Low pairs averaged 0.3 cpd.

Table 1 summarizes the differences in IM behavior attributable to frequency of use and relationship of the partners. Conversations involving Freq IMers had more turns than those involving Infreq users (25.6 v 12.6 v 6.3 for Freq-Freq, Freq-Infreq, and Infreq-Infreq pairs), but the conversations weren’t longer in duration.<sup>1</sup> This is because Freq users overall typed fewer words per turn (6.4 v 10.6), and pairs including Freq users were more likely to *thread*

<sup>1</sup> All differences are based on ANOVAs with  $p < .01$

their conversations, i.e. both parties type at the same time and overlap messages (41% v 31% v 15% of convs for Freq-Freq, Freq-Infreq, and Infreq-Infreq pairs). As a result, interactions involving Freq users were faster paced (had a shorter turn gap) than those involving Infreq users (15.3 v 22.8 v 31.7 secs), despite the fact that Freq users moved out of the message window more than twice as often as Infreq users (4.2 vs. 1.9 per conv). Freq users also responded to the first message of a conversation faster than Infreq users did (29.0 vs. 46.6 secs). These last two findings may indicate that Freq users learn to interrupt activity more easily, or that people less willing to interrupt activity don't IM as much.

	Freq Users	Infreq Users	High Pair	Low Pair
<b>Duration</b>			Long	Short
<b>Turns</b>	Many	Few	Many	Few
<b>Words/turn*</b>	Few	Many		
<b>Turn gap</b>	Short	Long		
<b>Initial resp.</b>	Fast	Slow		
<b>Threading</b>	Much	Little	Much	Little
<b>Multitasking</b>	Much	Little		

**Table 1. Characteristics of IM conversations for Frequent vs Infrequent users and High vs Low pairs. Only significant differences mentioned; in all cases  $p < .01$ . \* indicates User x Pair interaction.**

Nardi et al. [3] noted that some people use IM to hold "intermittent conversations over longer periods of time," but they characterized these conversations as "slower paced." Our data show that some users (frequent IMers) have several bursts of fast-paced interactions throughout the day, rather than one slow-paced interaction.

High IM pairs also had longer conversations than Low pairs (4:29 with 25.3 turns vs. 2:27 with 11.1 turns), and they threaded their conversations more often (41% vs 26% of convs). Also, Freq IMers used fewer words per turn when talking to High IM partners (6.2), but typed more when talking to another Freq IMer with whom they interacted less (9.2). Infreq IMers typed longer turns overall (9.6), particularly when IM'ing with an Infreq partner (10.6). This suggests that shorter turns are related to both IM frequency and amount of interaction with the other person.

**Switch media.** In the 500 sampled conversations, people switched from IM to another synchronous medium 78 times (15.6%) and to an asynchronous one (email, Web, or fax) 11 times (2.2%), totaling 89 times (17.8%). So while IM is used regularly to arrange other interactions, it is not the primary use for IM. Most IM conversations stay in IM.

We saw three reasons for switching media: *arranging* impromptu FTF or phone conversations (39 times), *rounding up* people for prearranged meetings (36 times),

and *switching in mid-conversation* when IM became inappropriate (14 times). Although [2] and [3] focus on using IM to *arrange* synchronous discussions, this happened only 7.8% of the time, and people were about as likely to use IM to coordinate the start of pre-arranged meetings (7.2%). There was a suggestion ( $p < .05$ ) that pairs of Infreq IMers switched media to have impromptu meetings more than others did. Rarely did the notion of switching emerge during a conversation, and in only 9 of those 14 cases did the participants switch to FTF or phone (1.8% of all conversations).

Whether people switched media during IM was related to their distance from each other. Pairs in the same building were more likely to switch media (23.5%) than those in a nearby town (10.9%) or at another site (11.9%), apparently because co-located pairs could switch to FTF, which they did 98% of the time. If they were in different locations, they usually had to switch to phone (70%) or to an asynchronous medium (23%). In that case, two Infreq IM users were more likely to switch to phone (23.1%) than were two Freq users (9.8%) or a mixed pair (10.4%).

## DISCUSSION

We have provided information about IM characteristics based on recorded IM log data. There appear to be two styles of IM use. Frequent IMers have longer, faster-paced interactions with shorter turns, more threading, and more multitasking relative to infrequent users. Pairs who IM with each other often also have longer interactions than do pairs who interact rarely. Shorter turns and threading come with both experience with IM and comfort with the IM partner; multitasking comes mainly from experience.

Although people use IM to arrange interactions in other media, they do so only occasionally – either to set up impromptu meetings or to round up people for meetings. Rarely do they switch in mid-conversation. Mainly, people use IM to have discussions in IM. This result suggests that IM integration with voice or video connections may be less important than previously thought.

We have since made Hubhub freely available ([www.HubhubMe.com](http://www.HubhubMe.com)) and it has been used for about 10 months by 1,300+ people, for business and personal use. We are currently analyzing these conversations and we plan to compare them with the data in this study, which will tell us whether these findings reflect broader IM use.

## REFERENCES

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