Adopt, adapt, abandon: Understanding why some young adults start, and then stop, using instant messaging

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ABSTRACT

Instant messaging (IM) has become a popular and important mode of staying in touch for teens and young adults. It allows for easy, frequent and lightweight interaction that contributes to building and sustaining friendships, as well as coordinating social activities. Despite the initial appeal of IM, however, some have found it too distracting and have changed their usage or abandoned it. I interviewed 21 former users of IM about their adoption, usage and eventual abandonment of the technology. Results show that participants were initially attracted to features of IM that enabled them to maximize their use of leisure time via easy and frequent interaction with their friends, but that, in a different usage context, these same features became distracting and annoying. Participants adapted their behavior to avoid these drawbacks, but IM did not support these adaptations effectively. In particular, IM did not allow for control over interruptions, which became more important as their contact lists grew and social time became scarce; and they ultimately abandoned the technology. These results point to a need for understanding use beyond adoption, and a theoretical and practical focus on understanding the adaptation and changing utility that accompany long-term usage of technologies.

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1. Introduction and background

Over the past several years, instant messaging (IM) has emerged as a popular way to stay in touch (e.g., Quan-Haase, 2008; Shiu & Lenhart, 2004). IM provides ready access to contacts around the globe for real-time interaction and information exchange, and is particularly well suited to young adults thanks to easy awareness of what friends are online, as well as an inexpensive, lightweight and reasonably private interface for interacting (Boneva, Quinn, Kraut, Kiesler, & Shlovski, 2006; Grinter & Palen, 2002).

Despite the widespread attention that IM adoption and usage have received, however, there is evidence that IM is not young adults' preferred mode of interaction (Boneva et al., 2006; Mesch, 2009), and that the multi-tasking enabled by IM may be distracting and inhibit the performance of certain tasks (Czerwinski, Horvitz, & Wilhite, 2004). Moreover, I have informally observed several current and recent university students who have recently decided to abandon IM, despite once being frequent users. This observation highlights an open question in the literature. Numerous theoretical models explain technology adoption (e.g., Ajzen, 1991; Davis, Bagozzi, & Warshaw, 1989; Lu, Zhou, & Wang, 2009) in terms of perceived utility at the time of adoption. As I will show below, however, the utility of technology may change over time as users

move to new contexts, meet new friends and their priorities change. Nonetheless, there are far fewer studies of how users adapt their behavior in the face of changing utility over time, and why some eventually choose to abandon technologies they once found useful.

1.1. Adoption and continuance

Theoretically, several models of adoption and continued usage have been proposed. The theory of planned behavior, for example, suggests that adoption is an individual decision resulting from intent to use a technology. Intent, in turn, is influenced by attitudes toward the technology, perceived norms about usage of the technology, as well as perceived control over the technology (Ajzen, 1991). Adoption tends to occur when perceptions are positive, perceived control is high, and others seem to be using the system. Social norms are particularly important for communications technologies because the value to any individual depends on whether others they wish to talk to are using it or not (a phenomenon economists refer to as network effects, see e.g., Shapiro and Varian (1999)).

The Technology Acceptance Model builds on similar principles, though it does not include perceptions of subjective norms or behavioral control, and has been used in several studies of IM adoption (e.g., Chung & Nam, 2007; Lu et al., 2009). It suggests that technology adoption is a function of perceived utility and ease of

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use of the technology, as well as individual attitude toward the technology and the intent to use it. This model has been supported in prior studies, where people who perceived IM as both useful and easy to use were more likely to adopt and use IM (e.g., Chung & Nam, 2007; Lu et al., 2009).

Models of adoption have also been extended to understand the continued use of information technology (reviewed in DeGuinea and Markus (2009)), though these studies have focused more on organizational or consumer information systems than on communication technologies like IM. The Expectation Confirmation Model, for example, suggests that continued use depends largely on whether one is satisfied with the technology and whether or not the expected utility is realized (Bhattacherjee, 2001). Sharafi, Hedman, and Montgomery (2006) build on these ideas by suggesting the importance of engagement with the system in predicting positive evaluation and continued use of a system.

Considering the specific case of IM adoption and continuance, others have explored why and how teens and young adults use IM. One key question in these studies was whether teens were motivated to use IM to meet and interact with new friends and contacts, or to maintain existing social networks and relations. Results suggest that most teens and young adults use IM to talk to their friends either for coordination of face-to-face meetings or to interact when they cannot talk face-to-face (Bryant, Sanders-Jackson, & Smallwood, 2006; Haythornthwaite, 2002; Mesch, 2009).

Moreover, IM is particularly well suited to the lives of teens. They typically live in their parents' home and have restrictions on when they can leave to spend time with friends. IM allows easy interaction with friends who are similarly restricted (Grinter & Palen, 2002; Mesch, 2009). Frequent IM conversations allow teens to exchange the mundane information important for building and sustaining relationships (Duck, 1994; Rabby & Walther, 2003), and increase closeness in some friendships (Valkenberg & Jochen, 2009).

In contrast with the phone, IM allows easier multi-tasking (i.e., chatting while doing homework or multiple simultaneous conversations), and is more private in that parents or siblings cannot easily eavesdrop (Boneva et al., 2006; Grinter & Palen, 2002). Boneva et al. (2006) also reported that teens like the IM contact list in that it reifies their friendships.

These results suggest strongly that there are attributes of usage context that substantially impact the perceived utility of technology. In this case, restrictions on mobility and a desire for interaction while at home made IM attractive. When these contextual factors change, however, perceived utility may also change.

1.2. Adaptation

Studies of adoption and continuance discussed so far are highly contextualized as they focus on utility and usage in a particular context. That is, theories of continuance focus on whether or not an adopted technology lived up to contextual expectations that are assumed to be unchanged. They do not, however, explore how continued usage changes in the face of contextual change. This results in an implicit assumption that the factors that made IM seem useful at the time of adoption will continue to seem useful, and that people will continue to use it. As I will show below, however, this is not always the case. Constraints on mobility and access to individuals can change, as can relationships and the people that one wishes to interact with regularly. There have been few studies, however, of how people adapt their use of technology to a dynamic usage context.

Where adaptation does factor into the literature, it is typically in reference to adaptive relationships between users and technology, as it develops and stabilizes. Adaptive structuration theory (DeSanctis & Poole, 1994), for example, suggests that social systems appropriate technologies and create structures that cause the technologies to be used in ways that differ from their creators' intent. Another theory, the Social Construction of Technology (Bijker, Hughes, & Pinch, 1987) describes how technologies come to be the way they are, and how they adapt to reflect their embedding social systems. It does not discuss evolution of the technological system over time, however, or how usage and users may change. I raise these theoretical perspectives here not to criticize them, but to illustrate that they are distinct from the present discussion, which looks instead at how people adapt their technology usage to changing contextual conditions.

One extreme form of behavioral adaptation is abandonment of a technology altogether. Again, there have been few studies of technology abandonment, though there has been some study of non-users and dropouts. Chung and Nam (2007), for example, compared users and non-users in validating their study of factors that influence IM usage. Wyatt (2005) argues for paying attention to non-users of technologies, as they can reveal factors that may make technology seem undesirable or unuseful to certain users or populations. Non-users, however, are different from former users. Non-users never perceived a technology to be useful enough to adopt it, whereas former users did; but then changed their minds. Understanding this change can help us refine models of adoption and usage to better understand how technologies and users both respond to adaptation and change, as in Wyatt, Thomas, and Terranova (2002) study of Internet dropouts.

2. The present study: research questions, context and methods

One context in which we might expect to observe abandonment and adaptation in IM usage is on university campuses, where adoption rates exceed 90% (Quan-Haase, 2008). There are several reasons why we might expect to observe adaptation here.

First, there is typically some change in students' social circles when they make the transition from high school to university. As they spend more time on campus, they report less contact with distant friends (i.e., those at home) and that local friends become more important (Cummings, Lee, & Kraut, 2006; Handel, 2004). Some relationships may also become less important over time, as interests change or people must focus more on careers, school, and/or romantic partners (Rose, 1984). Moreover, these changes in relationships may not be reflected in IM contact lists, which continually grow as users add new friends. This has become salient recently as people with hundreds or thousands of "friends" on social network sites have prompted discussion of just how many relationships any one person can sustain (Dunbar, 1992; Primates on Facebook, 2009). The same is arguably true for IM, as people generally have regular contact with a much smaller number of people than the capacity of a contact list (Marsden, 1987).

Second, many have reported that, even though IM is used widely by teens, it is not their preferred mode of interaction. Rather, it is one that is particularly well suited to the circumstances of their life. Boneva et al. (2006) reported that teens prefer face-to-face or phone contact, but use IM because it is often more convenient or feasible. Mesch (2009) reports that teens had a preference for face-to-face interaction when they lived close to their interaction partners. And Grinter and Palen's (2002) ethnographic study of IM usage reported that teens use IM for the ability to talk to people when they would not otherwise be able to do so. Thus, there is some reason to believe that moving to a university context, where friends are often nearby, would result in changed use of IM.

Third, this study is motivated by my own informal observation of formerly frequent IM users who have abandoned or reduced their usage of IM. Given the high rates of IM usage reported by

those cited above, combined with some theoretical and pragmatic reasons why we should expect to see IM usage change over time in this context, this observation seemed worthy of further exploration.

There are three research questions under investigation here:

RQ1: *Adopt.* What made participants adopt IM initially? How did their IM usage patterns and the perceived utility of IM change as the circumstances of their social context evolved and changed?

RQ2: *Adapt.* What changed about the social context of IM usage as participants continued using the technology? How did they change their behavior? How did they use IM to manage changing relationships?

RQ3: *Abandon.* Why did participants ultimately decide to abandon IM?

2.1. Research context

I interviewed current and recent university students who self-identified as former users of instant messaging. This was defined in recruitment materials as having used IM regularly in the past, but not for at least three months preceding the study.

2.2. Participants & procedure

Participants were recruited in May and June, 2008 via email lists and posted flyers at two large universities in North America. Participants received $10 cash compensation. Twenty-one participants were interviewed, ranging in age from 20 to 37; 11 were male and 10 were female. Participants were graduate or undergraduate students, except two who were recent graduates. As this was an exploratory study, participants were recruited and interviewed until some clear common themes began to emerge. While recruitment was not exhaustive, there were enough clear themes to allow for the analyses and discussion presented here, and to serve as a foundation for future work.

I conducted the interviews myself, they lasted 25–60 min, and were semi-structured. All took place in a private setting. The interview protocol was iteratively refined during the first 3–4 interviews, but was relatively stable after that. The order of items was occasionally changed to adapt to the flow of conversation and particular circumstances of certain participants. Questions focused on stages of IM usage in the participants' lives: when and why they adopted IM in the first place, the characteristics of their IM usage, why they decided to stop using IM, and how they stay in touch with their friends now that they no longer use IM. These particular topics were selected in order to gauge differences and similarities in how participants used IM, why they decided to stop, and how they keep in touch with people now. I also focused on transitions and changes, and on specific changes as they moved through different life phases, and how these affected their usage of IM.

2.3. Coding and analysis

Drawing on grounded theory (Glaser & Strauss, 1967), inductive qualitative techniques were used to analyse the interview data. Analysis first consisted of reading and re-reading the transcripts for common themes and categories that could be used in more rigorous coding. While the major research questions for the study were used as a guide in this process, a more detailed coding scheme was developed based on themes and ideas that emerged in the preliminary analysis process (Miles & Huberman, 1994). Interview transcripts were coded using the open source WEFT Qualitative Data Analysis tool. Responses were coded according to the themes observed in the initial analysis, and new themes were added to the coding scheme as necessary. Major themes used in coding are used to organize the presentation of the data below. Note that pseudonyms are used in presenting quotes.

3. Results

The results section is divided according to the three main research themes: (1) why did participants adopt IM, (2) how did usage context and behavior change over time, and (3) why did they decide to abandon IM?

3.1. Adopt: why did participants adopt IM?

Most participants adopted in high school (14–18 years old), and their reasons for doing so were in accordance with prior work cited earlier. Thus, the discussion of adoption will be brief.

Participants said they appreciated the presence information provided by the contact list, which let them easily see which of their friends were online and available for conversation. They also appreciated being able to have ongoing conversations with multiple individuals, and to maintain their relationships through information exchange and self-disclosure. For example, Greg and Erika said:

> I liked the sort of comforting feeling of being able to get in touch with somebody, and IM is a really nice technology for that because it just says, 'this person is here and available and you could, in principle, talk to them right now.' (Greg)

In other words, the contact list gave them social opportunities in situations where previously there were few. All participants but one reported that they used IM primarily to have more interaction with their existing friends and relations, rather than to meet new people online.

At this time in their lives, virtually all participants used IM several hours per day, usually while doing homework or other online activities. They typically had 2–3 conversations open at a time, talked with 5–15 people once per week or more, and had 20–50 people on their contact lists. Given the amount of time they spent online and at home, it is not surprising that they appreciated the social opportunities afforded by IM in this context. The perceived utility of IM stemmed from allowing them to maximize the use of this time by socializing with their friends online.

3.2. Adapt: changing context and behavior

All participants used IM through two phases of a life transition (i.e., high school to undergraduate). While most found IM helpful in the new context at first, they ultimately felt it was a liability due to contextual changes and attributes of IM itself.

3.3. Changing usage context

Changes reported by participants largely fell into two categories. First, participants moved from an environment where their primary interaction partners were geographically distributed and their access to face-to-face interaction opportunities was constrained, to one where their primary interaction partners were nearby (i.e., in a university residence) and face-to-face conversation was easy. This meant that many felt it was silly to use IM to talk to local friends who were often as close as down the hall, despite the fact that it was still common for participants to add new friends to their contact list when they met at social events. As Matt said, "It seemed a little ridiculous to go on MSN to talk to people when you could just go knock on their door." When they did use IM, participants said it was less about having casual, ongoing con-

versations as it had been in high school, and more for easy coordination. As Greg said:

> You could kind of like message everyone on your list. And you were like, "What are you up to? What are you up to?" And then you at least have one or two people that would answer you. (Greg)

Second, most participants still had their old friends (i.e., from high school) on their contact lists, but also reported they talked less to these friends than to new friends. Their contact lists, however, continued to grow – several said they had 200 or more contacts on their list when they stopped using IM – as they met new friends. Many still reported relatively frequent (once per week or more) contact with old friends via IM, but that the nature of the conversations changed. Where they used to gossip about mutual friends and discuss what happened that day in school, their conversations changed to updates about life events and higher-level descriptions of activities.

Some participants reported that these conversations were often inopportune and/or distracting due to changes in workload or the nature of their time online. Where their computer was once a place where they engaged in both work and social activities, changes in the location of their friends meant less social (and more work) time at the keyboard. This meant that IM was less convenient for casual social conversation. They wanted to spend their scarce social time with others face-to-face:

> I lived sort of far away from school in high school, like 20 min away. So the only way to see my friends or, I guess, talk to my friends during the week was, like, after school once, I guess, either on the phone or on MSN. But because everyone was so close to me at [University], yeah, I didn't, I guess, need MSN. (Matt)

There were fewer times when Matt needed to know who was available, or was simply looking for interaction with whoever happened to be available. This experience was typical.

Others found that the information provided by IM was distracting, both because of the opportunities it presented for initiating conversations with others, as well as the interruptions from others. Even though they weren't using IM more than before, it was taking time away from more important pursuits such as schoolwork. They found their new environment more difficult or time consuming, and could not allocate as much time to IM usage. Mike, for example, said that this wasn't a problem when he first started using IM. "At that time I was looking for distractions, basically. It definitely was distracting. It didn't particularly bother me at that time" (Mike). Later, however, he found that IM interfered with his ability to get work done.

In this way, the presence information and ease of interaction that made IM initially desirable now made IM seem substantially less useful in an environment with different constraints. The same information was problematic because it was distracting and because participants found themselves vulnerable to interruptions from too many people. This raises the question of whether they adapted their behavior to reflect these new constraints, and manage the technology in ways that allowed them to retain its desirable properties.

3.4. Behavioral changes: managing the contact list

Participants used several strategies in adapting their behavior so that they could still interact with friends via IM. First, adapting to interruptions meant they had to either reduce the number of interruptions by somehow being less available, or reduce the number of contacts, thereby reducing the number of possible interrupters. Both strategies were attempted, but ultimately unsuccessful.

Reducing undesirable interruptions can be difficult in IM because the same availability information (i.e., "Available," "Away,"

"Busy," etc.) is sent to all contacts, regardless of the relationship type or if one wants to hear from that person. This was problematic because participants wanted to maintain relationships with their contacts – that is, they did not want to be rude or appear alienating – but also did not want to talk to or hear from some contacts as often as they did.

One common strategy to address this was to set their IM status in strategic, and often deceptive, ways. Many, for example, would set it to "away" or "busy," even when they were actually available. Some participants reported setting their status to "busy" at certain times, and then noticing that this reduced unwanted interruptions from others. After noticing this, some then set their status as "busy" all the time. This, they felt, forced their contacts to consider the "busy" indicator before interrupting. Many people also said that they were more careful in interrupting friends when the friends' status was set to busy:

> …People's status didn't really reflect their presence or absence at the computer or their busy-ness or not busy-ness. And I also would feel like if this person's away, but I know they're at their computer, so I just need to message them until they realize that it's something important enough. (Tom)

This was delicate, though – it was not just a matter of setting availability and assuming others would accept it at face value. Rather, participants reported some nuance. Sameer said, for example:

> Another thing that annoys me is like when some people are on MSN and they say 'do not disturb.' Like, what's the point of being on MSN when you don't want to be disturbed?

This implies that people, even when busy, may be open to interaction with *some* people and that they are using their status as a filter. Otherwise they wouldn't be on IM in the first place. In this vein, Andy said, "when I put myself onto busy, it's more of I don't want to talk to that many people at once, but I don't mind talking to a few people."

Indeed, setting one's status to "away" or "busy" was less about keeping *all* others from messaging them, and more about saving face via plausible deniability. Setting their status provided an excuse not to reply to others or, as one participant put it, to "ignore those who need to be ignored" (Irene). Matt said specifically that setting his status to away would "sort of like to ease the pressure to, if someone messaged me, I didn't feel like I had to message them back because they thought that maybe I just wasn't on my computer." Overall, however, there is an interesting double standard that emerges from these strategies in that people want to be able to reach others when they have something important to say, while still strategically managing their own availability to those others.

3.5. Contact list management

Another way that interruptions from certain contacts could be reduced or eliminated would be to simply delete those individuals from one's contact list or block them from seeing one's status. I therefore asked how participants managed their contacts and used the "block" and "delete" features.

There was a clear tension that reflected the difference between wanting to avoid a contact's undesirable interruptions, and wanting to sever one's relationship with that contact. The nature of the contact list, which is often perceived as a list of one's friends, can mean that managing how awareness/availability information are shared can become synonymous with managing relationships themselves. IM did not adequately provide ways to address this tension, as was evident in the way that the delete and block features were used.

Participants used the delete feature very infrequently for ongoing face-to-face relationships, but had no hesitation in deleting people they truly were never interested in talking to again because

they behaved in ways that were potentially threatening or "creepy" (e.g., unwanted sexual dialogue). This was particularly true for contacts they knew only online, where there was little probability that they would meet face-to-face. For most of their contacts, though, deleting was seen as an abrupt end to a relationship that may not be mutually acknowledged to be over.

People acknowledged this further in that there tended to be a small set of people on their contact list who they talked to regularly. They kept the larger set of contacts on the list, though, as a way of knowing that the relationship was there. Priya, for example, discussed some friends on her contact list but that she rarely communicated with via IM.

Others were on their contact list because of past friendship and the potential for future interaction. I asked Matt, for example, why he had over 200 contacts on his list if he did not actually talk to all of them often:

> Prestige of having a big contact list? No, I don't know. Maybe sometime in the future I would want to contact them again, right? And when you delete someone from your contact list it asks if you want to block them as well, right? So I figured I'd leave the option open if I ever wanted to talk to them again. But since right now I didn't want to talk, I just block them. (Matt)

Matt used the blocking feature liberally as he wanted to be available or unavailable to certain people, but this was not common. Blocking also could be discovered by the blocked party when contact lists overlapped. Suppose Abe blocks Beatrice, for example, and that both Abe and Beatrice are friends with Cate. Abe's blocking would mean that Beatrice could not see when he was online, but Cate still could. Cate might inadvertently mention Abe's status to Beatrice, and this could create an awkward moment if Abe and Beatrice still have an offline relationship. Greg, for example, said:

> I was always a little bit hesitant to block people just knowing somebody else might say, "I'm actually talking to him right now"... If I was 100% confident that I could have somebody blocked and they'd never find out, I'd just block people and I wouldn't care.

The critical point here is that blocking was clearly seen by Greg as something he wouldn't want his contacts to know about, for fear of seeming rude or disrupting the relationship.

As further evidence that blocking was a blunt instrument for relationship management, participants sometimes used blocking and unblocking as a way to draw attention to the status of relationships. Matt, for example, used blocking as a way to avoid confrontation, saying that "I would block them rather than just not talking to them on MSN, or, like, rather than confronting them and being like 'Yeah, I don't really like talking to you'" (Matt). He also sometimes referenced blocking in face-to-face conversation as a way to re-unite with a friend with whom there had been conflict:

> Like if we had a fight or something and then I block them on MSN, but then we reconciled and I would unblock them, and I would be like, 'Oh, yeah, I had you blocked for the last month.' And then we would possibly laugh about it. (Matt)

Nick said some people used block and unblock to draw attention to relationships, but he distanced himself from this practice, saying "I wasn't one of those people who when you had a fight with somebody you immediately go home and block them. And then it's just like you want them to see that they've been blocked" (Nick). He recognized the possible consequences of a block: "sometimes people think they're in an all digital world and it's not the same as basically ending your friendship... but people get really offended like if you know you were blocked by somebody on an instant messenger, that means a lot". (Nick)

3.6. Abandon: why participants stopped using IM

Despite enjoying interactions with their contacts, however, virtually all participants abandoned IM because it left them too available and vulnerable to interruption from these same people. There were two main reasons for this.

The first was that availability information was provided to people with whom participants did not have strong relationships. These were people with whom they may once have been closer, or with whom they may have exchanged IM contact information to get to know them better – and ultimately decided not to be close friends. Once a person is added to somebody's contact list on IM, however, presence information is provided to that person until the contact is deleted from the list.

The practical implication of this is that the longer one uses IM, the more people one can be interrupted by. As a result, participants found IM distracting, and that they were interrupted by people they did not want to talk to on a regular basis. As Tom describes:

> People you don't want to talk to, they message you, and there's kind of a limit to how much you can brush them off... I just wind up getting drawn into conversations that I didn't want to be having. And I was not able to multitask well enough that it was not distracting.

Others found it so difficult to end IM conversations that it interfered with their ability to get work done. Priya, for example, said it was sometimes just hard to pull herself away from a conversation, "it's really hard to just say, 'Hey, I've got to go work.'"

IM essentially removed control over who interrupted them and who they spent their limited social time interacting with. They did not feel that they could reasonably sustain contact with everybody on their contact lists. Some participants drew an interesting contrast between IM and social networking sites, like Facebook, that they felt made it easier to maintain contact with a larger group of people:

> In messenger I find is that you're always repeating the same stuff. When you talk to your friends you haven't spoken for several months, you keep telling the same stories about what you are dealing with occasions and where you're at in your research and with your list. So I find that there's something in Facebook people are more aware of what you're doing...the latest news in your life. (Scott)

In other words, the "broadcast" nature of Facebook allows for more efficient distribution of information that would otherwise be exchanged via one-on-one conversations.

IM also does not allow different awareness/availability information to be shared with different contacts. This, participants said, often meant that others would assume they were available for either the continuation of an existing conversation (however mindless or meaningless) or the initiation of new conversations. Once a conversation had started, it was difficult to end it without possibly appearing rude or abrupt, given that one's status would continue to be "available" even after the conversation had concluded.

Matt had a rather extreme approach to this that, while not at all representative or common, is illustrative of the extent to which some users were willing to go in order to preserve "face" with their contacts in ending conversations:

> I remember like as I was trying to say goodbye to people, I would like say goodbye and then block that person, and then say goodbye to the next person and block them. And then so, by the end, everyone that I was talking to was blocked. And then when I would sign back in I would unblock them all again because I had this irrational fear where I didn't want to say

goodbye to someone and then have them see that I was still online for like 15 min or something. (Matt)

4. Discussion

This study began with a series of questions about how people adapt their use of instant messaging and why they ultimately decided to abandon the technology. The results have several implications for both theory and design.

4.1. Theoretical implications

From a theoretical standpoint, these results suggest that, while researchers have paid substantial attention to why people adopt and continue to use particular technologies, we know less about how these technologies allow them to adapt to changing usage contexts and the dynamics of real-world social relationships; and how these changes affect the perceived utility of the technology. In this case changes were observed along both of these dimensions. Participants experienced significant changes in constraints on their mobility and available time for social and leisure activities. They also reported that their relationships were changing due both to social time constraints and the generally dynamic nature of human relationships.

The theory of planned behavior, as noted earlier, incorporates perceived control in predicting adoption of a technology (Ajzen, 1991). Perceived control, however, can vary substantially, as can its importance to a user. Results here highlight the importance of control, but suggest that it had a very different effect at different times. As a medium, IM provides little control over who can interrupt and when, beyond simple status settings that are advisory in nature; they suggest against but do not actually prohibit interruption. IM also provides minimal features for managing the contact list, beyond sorting contacts into categories and blocking or deleting them. When initially assessing the utility of IM, these control and management features were not likely important to participants. Prior to adoption, they had abundant time for interaction and a blank contact list. They were eager to interact, and to populate the contact list with the names of their friends. They were not looking ahead to, and likely would not have been able to predict, a future in which the lack of control resulting from these IM attributes would prove problematic. That is, perceived control here appears to vary inversely with available time and the number of contacts. More research is needed to tease apart the exact role of these factors, but it is clear that there was a dynamic relationship here between perceived control and utility of IM. Control may have been important at the time of adoption, but meant something quite different at the time of abandonment. This suggests that theories of adoption might consider a more dynamic notion of control where communication technologies are concerned.

As these changes occurred, participants did attempt to adapt their use of IM to reflect the new context. They set their status to "busy" all the time, and sometimes blocked or deleted contacts they did not wish to talk to. One participant even blocked and unblocked individual contacts based on whether or not he wanted them to see him online or not. Ultimately, though, IM proved poorly suited to these adaptations, and their efforts were not successful. IM proved too distracting and they decided to abandon the technology in favor of other modes of communication. These findings, in some respects, echo Vanden Abeele and Roe's (2008) focus group findings on deceptive status messages.

The key point here is that adoption and design often focus on the present, but communication technologies are necessarily embedded in a temporal and social network context. Technologies are used over time under conditions that may not be foreseen at the time of adoption, and to communicate with in many roles. In addition to understanding why people adopt technologies (Ajzen, 1991; Chung & Nam, 2007; Davis et al., 1989; Lu et al., 2009) and the mutual adaptation that occurs between social and technical attributes of sociotechnical systems, e.g., DeSanctis and Poole (1994), we should also seek to understand social adaptations and their relationship with perceived utility of technology. Studies of adaptation should not focus just on appropriation of new technologies to fit existing contexts, but also on how people adapt their usage of existing technologies to support their behavior in new contexts.

4.2. Design implications

There are two main findings from this work that have clear implications for the design of future messaging and awareness communication systems. First is that current IM systems are not well suited to the adaptation that occurs as people meet new friends and move between social contexts. IM was seen here to be well suited to frequent contact with a small group of people to whom the user has strong ties, as when participants were in high school. As the user's contact list grows and context changes, however, the number and nature of these ties change. People do not talk as frequently, do not necessarily view their relationships as equally strong, and do not necessarily want to be vulnerable to interruption by everyone on their contact list.

For these reasons, designers of future communication systems should consider supporting not just easy adoption, but easy adaptation as well. As examples, there were two failures of adaptation seen here that could be easily supported.

4.2.1. Graceful degradation of social ties

We saw above that IM treated all contacts as essentially equal, even though some relationships were more important than others, and interaction with some was more desirable than interaction with others. The dynamic nature of these relationships could therefore be reflected in the contact list in ways that highlight close friends, but do not draw attention to weaker ties by deleting them or blocking them outright. The most prominent positions in one's contact list could be given to those interacted with most frequently. This could also be determined by looking at how often certain parties interrupt, and how often those interruptions result in longer conversations. Those who seem to interrupt usefully could be given priority.

Others would gradually fade from prominence as interactions became less frequent, and ultimately end up in an "infrequent contacts" cluster. These individuals would still be accessible, but require more effort to reach – thus rendering the weakening tie explicit. And more effort could be required to see interruptions from these individuals as well. They could, for example, be gathered for later response; or emailed to the user. Such design ideas reflect recent calls for incorporating more ambiguity in design, which can then be drawn on as a resource in the polite maintenance of relationships (Aoki & Woodruff, 2005; Boehner & Hancock, 2006; Hancock et al., 2009).

4.2.2. Relationship-based status management

Participants in this study appreciated being able to use IM to quickly answer questions or to chat socially with friends when they were available to do so. They did not like being equally available to *all* of their contacts. IM contact lists should therefore facilitate providing different status information and messages to different people, based on relationship groupings and strength of social ties (as identified, for example, by contact frequency). This is also consistent with prior work suggesting that people are will-

ing to share different information with different contacts (Davis & Gutwin, 2005).

4.3. Limitations and future work

These results must be interpreted in light of several limitations. First, I have relied on participants' retrospective recollection of past events, such as the reasons they adopted IM and how they used it over a period of several years. While retrospective data of this sort allows for understanding behavioral change over the life course of an individual, it is possible that some participant recollections were biased in light of their later decision to abandon IM. While precautions, such as asking participants to elaborate on specific example incidents, were taken to avoid such bias, the possibility should not be discounted. Future studies could overcome this limitation via longitudinal data gathering, seeking participants at different stages in the use of IM, or by using data sources that do not rely on participant recollection (e.g., chat transcripts and usage logs).

Second, this is a small study of a non-representative sample. Participants were graduate and undergraduate students at large universities in North America, so their experience does not reflect that of those who are less educated, less technologically savvy, or other possible factors. While the results are in many ways consistent with prior studies of IM, caution should be sued in applying these findings to other populations.

In terms of future work, some participants found that they could carry on the communication that sustained their relationships via other technologies such as Facebook and Twitter that provided asynchronous communication opportunities and ambient awareness information, such as Facebook status updates or Twitter messages (Markopoulos, 2007). Ambient awareness is of interest here because it automates the exchange of the mundane and banal information so fundamental to social relationships as described earlier. The extent to which such "broadcast" information can actually substitute for real, self-disclosive conversation, however, is very much an open question. Another set of questions revolves around designing and studying awareness technologies that do allow for more nuanced management of contacts, and for less distracting interruptions. More research is needed to understand how to provide this information, to integrate with existing social technologies, and how people respond to different modes of relationship management.

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References

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes, 50*(2), 179–211.

Aoki, P., & Woodruff, A. (2005). Making space for stories: Ambiguity in the design of personal communication systems. In *Proceedings of the ACM conference on computer-supported cooperative work, Portland, OR* (pp. 181–190).

Bhattacherjee, A. (2001). Understanding information systems continuance: An expectation–confirmation model. *MIS Quarterly, 25*(3), 351–370.

Bijker, W. E., Hughes, T. P., & Pinch, T. P. (1987). *The social construction of technological systems: New directions in the sociology and history of technology.* Cambridge, MA: MIT Press.

Boehner, K., & Hancock, J. (2006). Advancing ambiguity. In *Proceedings of the ACM conference on computer-supported cooperative work, Montreal, Canada* (pp. 103–107).

Boneva, B., Quinn, R., Kraut, R., Kiesler, S., & Shlovski, I. (2006). Teenage communication in the instant messaging era. In R. Kraut, M. Brynin, & S. Kiesler (Eds.), *Computers, phones and the Internet: Domesticating information technology* (pp. 201–218). Oxford, UK: Oxford University Press.

Bryant, J. A., Sanders-Jackson, A., & Smallwood, A. M. K. (2006). IMing, text messaging, and adolescent social networks. *Journal of Computer-Mediated Communication, 11*(2) [Article 10].

Chung, D., & Nam, C. S. (2007). An analysis of the variables predicting instant messenger use. *New Media and Society, 9*(2), 212–234.

Cummings, J., Lee, J. B., & Kraut, R. (2006). Communication technology and friendship during the transition from high school to college. In R. Kraut, M. Brynin, & S. Kiesler (Eds.), *Computers, phones and the Internet: Domesticating information technology* (pp. 265–278). Oxford, UK: Oxford University Press.

Czerwinski, M., Horvitz, E., & Wilhite, S. (2004). A diary study of task switching and interruptions. In *Proceedings of the ACM conference on computer-supported cooperative work* (pp. 175–182).

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science, 35*, 982–1003.

Davis, S., & Gutwin, C. (2005). Using relationship to control disclosure in awareness servers. In *Proceedings of graphics interface '05, Victoria, BC* (pp. 75–84).

DeGuinea, A. O., & Markus, M. L. (2009). Why break the habit of a lifetime? Rethinking the roles of intention, habit, and emotion in continuing information technology use. *MIS Quarterly, 33*(3), 433–444.

DeSanctis, G., & Poole, M. S. (1994). Capturing the complexity in advanced technology use: Adaptive structuration theory. *Organization Science, 5*(2), 121–147.

Duck, S. (1994). Steady as (s)he goes: Relational maintenance as a shared meaning system. In D. Canary & L. Stafford (Eds.), *Communication and relational maintenance* (pp. 45–60). New York: Academic Press.

Dunbar, R. I. M. (1992). Neocortex size as a constraint on group size in primates. *Journal of Human Evolution, 22*, 469–493.

Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research.* Hawthorne, NY: Aldine de Gruyter.

Grinter, R., & Palen, L. (2002). Instant messaging in teen life. In *Proceedings of the ACM conference on human factors in computing systems, New Orleans, LA* (pp. 21–30).

Hancock, J. T., Birnholtz, J., Bazarova, N., Guillory, J., Perlin, J., & Amos, B. (2009). Butler lies: Awareness, deception and design. In *Proceedings of the ACM conference on computer-suppoted coopertative work* (pp. 517–526).

Handel, M. (2004). *Communication technologies and the freshman transition: Staying close with friends.* Unpublished doctoral dissertation. Ann Arbor, MI: University of Michigan.

Haythornthwaite, C. (2002). Strong, weak and latent ties and the impact of the new media. *The Information Society, 18*, 385–401.

Lu, Y., Zhou, T., & Wang, B. (2009). Exploring Chinese users' acceptance of instant messaging using the theory of planned behavior, the technology acceptance model and the flow theory. *Computers in Human Behavior, 25*, 29–39.

Markopoulos, P. (2007). *Awareness systems: Design and research issues.* Paper presented at the workshop on social intelligence design.

Marsden, P. V. (1987). Core discussion networks of Americans. *American Sociological Review, 52*(1), 122–131.

Mesch, G. S. (2009). Social context and communication channels choice among adolescents. *Computers in Human Behavior, 25*, 244–251.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook.* Thousand Oaks: Sage Publications.

Primates on Facebook (2009, February 26). *The economist.* Retrieved 25.04.09. <http://www.economist.com/science/displaystory.cfm?story_id=13176775>.

Quan-Haase, A. (2008). Instant messaging on campus: Use and integration in university students' everyday communication. *The Information Society, 24*, 105–115.

Rabby, M., & Walther, J. (2003). Computer-mediated communication effects on relationship formation and maintenance. In D. Canary & M. Dainton (Eds.), *Maintaining relationships through communication* (pp. 141–162). Mahwah, NJ: Lawrence Erlbaum.

Rose, S. (1984). How friendships end: Patterns among young adults. *Journal of Social and Personal Relationships, 1*(3), 267–277.

Shapiro, C., & Varian, H. (1999). *Information rules.* Boston, MA: Harvard Business School Press.

Sharafi, P., Hedman, L., & Montgomery, H. (2006). Using information technology: Engagement modes, flow experience and personality orientations. *Computers in Human Behavior, 22*, 899–916.

Shiu, E., & Lenhart, A. (2004). *How Americans use instant messaging.* Washington, DC: Pew Internet & American Life Project.

Valkenberg, P. M., & Jochen, P. I. (2009). The effects of instant messaging on the quality of adolescents' existing friendships: A longitudinal study. *Journal of Communication, 59*(1), 79–97.

Vanden Abeele, M., & Roe, K. (2008). *White cyberlies: The use of deceptive instant messaging statuses as a social norm.* Paper presented at the conference of the international communication association, Montreal, Canada.

Wyatt, S. (2005). Non-users also matter: The construction of users and non-users of the Internet. In N. Oudshoorn & T. Pinch (Eds.), *How users matter: The co-construction of users and technology* (pp. 67–79). Cambridge, MA: MIT Press.

Wyatt, S., Thomas, G., & Terranova, T. (2002). They came, they surfed, they went back to the beach: Conceptualising use and non-use of the Internet. In S. Woolgar (Ed.), *Virtual society? Technology, cyberpole, reality* (pp. 23–40). Oxford: Oxford University Press.