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y do tngrs luv 2 txt msg?[1]

Rebecca E. Grinter and Margery A. Eldridge
Xerox PARC, USA and Xerox Research Centre Europe, Cambridge, UK
grinter@parc.xerox.com, eldridge@xrce.xerox.com

Abstract: "Text messaging" — using a mobile phone to send a message — has changed how teenagers use wireless phones to communicate and coordinate. While the media reports rapid growth in text messaging, less is known about why teenagers have adopted it. In this paper, we report findings from a study of teenagers' text messaging practices. Specifically, we show that teenagers use text messages to: arrange and adjust times to talk, coordinate with friends and family, and chat. Moreover, we argue that the reasons teenagers find text messaging quick, cheap, and easy to use, are grounded in their social context. Finally, we show that teenagers encounter three problems when text messaging: understanding evolving language, determining intent from content, and addressing messages.

Introduction

In the UK, many people call friends and family on Christmas Day to wish them seasonal greetings. Typically, this leads to heavier than normal call volumes. Last year something different happened on December 25th: mobile phone networks experienced heavy loads. It was not voice calls that congested mobile networks but rather text messages creating the heavy volume (Verkaik, 2000).

To many this will not come as a surprise, because "text messaging" is a recent communications phenomenon. Text messaging — using a mobile phone to send a message — has changed mobile phone usage. Originally expensive voice-calling devices, mobiles have become mini-terminals for text-based communications, and

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1 Why do teenagers love to text message?

now something that was originally designed as "spare" bandwidth has become a popular way to interact with others.

In Europe, teenagers have been among the quickest to adopt text messaging. It is a common sight to see teenagers typing away furiously on their mobiles. One type of service plan, known as "pay-as-you-go," has fueled the growth of mobile ownership among teens. Pay-as-you-go plans have three advantages for teenagers: first, they do not require credit checks; second, they help the teenagers manage their expenses because costs are managed up-front through the purchase of vouchers; and third, those vouchers are available everywhere, making it easy for teenagers to get them. As pay-as-you-go plans made mobile phone ownership possible for teenagers, so these teenagers began using text messages to communicate.

The Rise of Text Messaging among Teenagers

Text messaging uses the Short Message Service (SMS) capacity built into the Groupe Spéciale Mobile (GSM) wireless standard (Newton, 2000). Text messages can be up to 160 characters in length and sent from any mobile to any other wireless phone on the GSM network. It is also possible to send text messages from the Internet to mobile phones.

SMS was deployed with the first GSM networks, and the first text messages were sent in the early 1990s. Initially SMS capacity was used infrequently. The explosion in usage came later, as Rautiainen and Kasesniemi (2000) describe in their own study of mobile practices:

> A significant change took place in the spring of 1998. Suddenly, instead of talking about calling and changing color covers on their mobiles, all the teenagers wanted to give their views on text messaging. In a few months the number (of) text messages sent attained the number of calls made and surpassed it. (Rautiainen & Kasesniemi, 2000).

Groups who track SMS usage rates support Rautiainen and Kasesniemi's observation. For example, the Mobile Data Association (2000) — which tracks SMS usage in the United Kingdom (UK) — reports that UK residents sent 90 million text messages in August 1999. One year later, in August 2000, UK residents sent 560 million text messages; by November 2000, it was 680 million. What makes these numbers more significant is that UK residents do not use SMS as frequently as residents of other countries including the Philippines, Finland and Germany.

In Europe, teenagers were among the earliest and biggest users of text messaging. Reports from Scandinavia show that teenagers have adopted text messaging, despite the potential limitations of the system itself, for example, the poor user interface (Ling, 2000; Rautiainen & Kasesniemi, 2000). Media reports confirm this rise in usage, but offer little systematic examination of why teenagers use text messages. Moreover, other than Ling's (2000) usage analysis, research

studies of text messaging are currently in progress, so we only have limited knowledge of why teenagers use text messages.[2]

In addition to being interested in understanding why teenagers have adopted text messaging, we believe that this study can inform some broader CSCW concerns. First, although teenagers do differ from adults because of their circumstances, some of our findings do extrapolate to the work practices of adults. Second, these teenagers will soon enter the workplace themselves and they will bring their already well-developed text messaging practices with them. This study reveals what those practices are and may offer insight for how they fit into future workplaces. Third, we believe that CSCW has taken a broader concept of the notion of what "work" constitutes. Specifically, this study focuses on the coordination teenagers engage in as part of the work of being a teenager. Our findings help deepen our understanding of how they are managing and coordinating their interactions with others.

We begin by describing the teenagers who participated in the study, and the methods we used to study them. We then present data about teenagers' text messaging practices, including how often they sent and received text messages, and their physical location. We then turn to a more detailed analysis of what teenagers use text messages to accomplish. Specifically, we show that they use text messages to: arrange and adjust times to talk, coordinate with friends and family, and chat. We also show that they send text messages because they are quick, cheap, and easy to use. We argue that the teenagers have overcome potential technical limitations of SMS, such as poor input device and limited message length, and even turned them into advantages within their social context. Finally, we show that teenagers encounter three problems when text messaging: understanding evolving language, determining intent from content, and addressing messages.

Participants in the Study

Five girls and five boys participated in the study; seven of the teenagers were recruited through their participation in an earlier study carried out by the second author; the other three were friends of the earlier participants. They were paid for their participation, and consent forms were obtained from each teenager and one parent.

The teenagers were 15 to 16 years of age and attended full-time secondary school in south Cambridgeshire, an area of England that reports higher than the national average affluence. Many high-technology companies have offices and headquarters in the Cambridge area, and, in line with a recent study in the UK, all

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[2] See http://www.info.uta.fi/winsoc/projekti/mobileco.htm for details. At the time of writing this paper, results had not been fully published.

the teenagers had computers at home with Internet access (BBC, 2000). Three of the boys had their own computers, while the rest shared one with other members of their families. The following information about the teenagers was obtained from a questionnaire that was distributed prior to beginning the study.

The teenagers reported using the Internet regularly: six reported being connected to the Internet less than one hour per day, and four more than one hour per day. Only two of the teenagers (both boys) paid for any part of their Internet use. Three of the teenagers had their own website. All of the teenagers reported regular use of e-mail, giving estimates of sending and receiving from 5-10 e-mail messages per day.[3] In addition to using e-mail, eight used instant messaging and five used chat rooms.

Having a mobile phone was a requirement for participating in the study. Three of the teenagers shared a phone with other members of the family; the others had their own phones. Two of the teenagers, one boy and one girl, had phones with monthly contracts; the rest all had pay-as-you-go phones.

Three of the teenagers, the two on contracts and one using a shared pay-as-you-go phone, paid no part of their mobile phone costs. All others paid for all of their phone costs, although one girl said her parents sometimes bought her phone vouchers. Most of the teenagers reported making less than 5 voice calls per day and receiving less than 5 voice calls per day on their mobile phones. In contrast, most reported sending 5-10 text messages per day and receiving 5-10 text messages per day. Most teenagers reported sending and receiving the bulk of their text messages from mobile phones, but many also sent and received text messages from the Internet using a variety of applications.

Not surprisingly, all teenagers had use of landline telephones from home, with a few having an additional landline dedicated to Internet use. Most teenagers estimated making 5-10 landline phone calls per day, and receiving about the same number. One boy estimated making and receiving more than 20 landline phone calls per day.

In summary, then, the teenagers participating in this study had a number of different technologies available to them to support communication with others. Their options included: Internet-based communication methods including e-mail, instant messaging and chat rooms; making and receiving landline phone calls; making and receiving mobile phone calls; and sending and receiving text messages.

Data Collection

Ideally, we would have liked to directly observe teenagers' text messaging practices. However, we knew that text messages were sent from many locations,

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[3] We used e-mail to coordinate with the teenagers and found that all but one read and replied regularly.

including from school and late at night from home, making direct observation highly impractical. In addition, in some of our earlier discussions with teenagers, several reported that direct observation would inhibit their normal text messaging behaviour. For these reasons, we were forced to adopt more indirect approaches to capturing data.

In addition to the questionnaire distributed prior to the study, we collected quantitative data in a logging study and qualitative data in discussion groups held later. Each of these data collections methods will be discussed in turn.

The Logging Study

Two log forms were designed, one to record text messages sent, and one to record messages received. The teenagers were given written and verbal instructions before beginning the study. They were asked to enter details of all sent and received messages for seven consecutive days. Figure 1 shows an example of two logged entries from one girl's log form for sent messages. The headings at the top of the figure illustrate the information logged for each message. The log form for received messages was very similar.

ID No.	Date	Time	Sent by phone (P) or Internet (I)	Reply to other rec'd msg? If yes, give ID	Sent to?	Your physical location	Briefly describe content	Why did you send a Text Message instead of phoning, emailing, etc.?	Length (letters or lines of text)	List any abbreviations, shorthands, etc. in message	Did it lead to a phone conversation, meeting, etc? If yes, explain.
S5	22	20:05	P	R7	Nicki	Still eating a meal at dining table.	I said I'd meet her at the pub soon.	Because she sent me a text message from the pub, so I couldn't phone or email her!	2 lines	V. = very	Meeting - I met her at the pub, like she wanted.
S6	23	10:55	P	R8	Lizzie	Sitting up in bed at home.	I said I wasn't going shopping, I had homework to do etc...	I was in bed - so I didn't want her to know that, !	4 lines	2day = Today :) = Smiley face. Gr8 = Great	No.

Figure 1. An example of two entries from one teenage girl's log form for sent messages.

The Discussion Groups

Once the teenagers had completed the logging part of the study, we looked through the data to help us formulate questions and topics for further discussion. About three weeks after the logging study, we held two discussion groups of five people each. Based on our previous experience, we felt that one group with ten people would not provide each person with opportunities to contribute to the discussion. Each session lasted about two hours, including time out for a pizza dinner.

We used the discussion groups as opportunities to address weaknesses of relying exclusively on the logs and questionnaires, and to get deeper explanations about patterns of text messaging. During each session, the following topics were discussed: reasons for getting a phone; initial experiences with the phones (most embarassing, most pleasant, most unpleasant); phone customisation; actual recorded versus reported frequencies of text messaging; and reasons for choosing text messaging over other methods of communication. We designed the questions so that the teenagers could discuss their answers with each other. One of us led

the discussion, while the other identified opportunities to follow unexpected and interesting conversational topics. Each of the sessions was audio and video taped, and the tapes were then transcribed.

Text Messaging in Practice

We will begin our discussion of text messaging by focusing on the results from the logging study. Specifically, we describe how often the teenagers sent and received text messages; what media they chose for text messaging and why; and where text messaging occurs.

Frequencies of Text Messaging

A total of 236 sent messages and 241 received messages were logged. Not all participants logged for seven days. Table I presents the number of days each participant kept logs, and the average number of text messages sent and received by each participant.

Participant	Number of Days Logged	Mean Number of Messages Sent per Day	Mean Number of Messages Received per Day
G1	8	3.0	3.8
G2	15	2.8	1.9
G3	7	4.0	3.3
G4	7	3.7	4.3
G5	8	3.4	4.0
B1	7	3.0	2.4
B2	8	0.9	1.8
B3	7	4.1	2.3
B4	6	3.3	4.7
B5	7	1.7	3.2
Overall		3.0	3.0

Table I. Number of days logged and mean number of text messages sent and received by each participant (G1-5 are girls; B1-5 are boys).

Although the overall averages for both messages sent and received were 3.0 messages per day, these averages differed slightly for the boys and girls. The girls tended to send and receive more messages than the boys; the average messages sent were 3.3 for girls and 2.5 for boys, and the average messages received were 3.2 for girls and 2.8 for boys. This follows Rautiainen and Kaseniemi's (2000) observations that while boys and girls are equally as likely to own phones, the girls tend to send and receive more text messages. Two girls (G2 and G3) and two boys (B1 and B3) sent more messages than they received.

The logged frequencies of sending and receiving text messages are quite a bit lower than the estimated frequencies reported by the participants in the questionnaire distributed before the study. Most estimated sending from 5-10 messages per day, but no one logged this many. It is quite possible that the teenagers over-estimated their text messaging frequencies, as these types of self-report frequency measures are somewhat unreliable. We had asked for these estimates to get some idea of their use of text messaging relative to their use of other communication methods; hence the absolute numbers were not of such interest.

Nevertheless, we brought this discrepancy up at the discussion groups. One person (B5) said he was short of money that week and couldn't afford to buy another voucher; one other person (B2) who shared his phone said his step-mother was using it for most of the week. Two others (G2 and G4) mentioned that logging the calls made them aware of how much they were spending on text messages; for these girls, the logging method itself may have inhibited them from sending more text messages. Although the teenagers reported being very careful about logging all of their messages, it is possible that actual frequencies were higher than those logged.

Sending Text Messages via the Internet

Sending text messages via the Internet is free, compared to a cost of about GB£0.10 per message sent from a phone.[4] However, fewer messages were sent via the Internet (22%) than via a mobile phone (78%). One girl (G2) sent nearly as many messages via the Internet as from her phone, and two boys (B1 and B5) sent more via the Internet. In the discussion groups, cost was given as the main reason for the heavy use of sending messages via the Internet. However, three boys never used the Internet to send messages; of these, two (B3 and B4) paid none of their phone expenses, and thus saving money may not have been such a motivation for them.

Messages sent via the Internet tended to be longer, on average, than messages sent via a mobile phone (123 characters versus 71 characters), though both were well within the 160-character limit. We have no explanation for this difference, but it could be due to the relative ease of typing using a keyboard and to the reduction in the number of abbrevations used when typing on the keyboard. It could also be that because messages sent via the Internet are necessarily composed when sitting at the computer, the sender is rarely engaged in other simultaneous activities and hence has more time and attention to devote to typing longer messages.

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[4] Approximately 0.15€.

Where Does Text Messaging Occur?

The participants logged their physical location for each text message they sent. We classified these locations for each of the 185 text messages sent by mobile phone (messages sent via the Internet were not included in this analysis, since we knew that the computers they used were at home). Table II shows the number and percentage of text messages sent from different physical locations.

Location	Number of Sent Messages	Percentage of Total*
At own home	116	63%
Unspecified	40	22%
In own bedroom	52	28%
In kitchen	12	6%
In lounge/study	9	5%
In bathroom	2	1%
On stairs	1	<1%
In transit	23	12%
On bus	8	4%
Waiting for bus	5	3%
In car	6	3%
While walking	3	2%
While bicycling	1	<1%
In town	19	10%
Unspecified	9	5%
In a shop	5	3%
In a pub	4	2%
In a restaurant	1	<1%
At other person's house	12	6%
At school	11	6%
At work	2	1%
Unspecified	2	1%
Total	185	99%

* Percentages do not always total due to rounding errors.

Table II. The number and percentage of text messages sent by mobile phone, classified by the sender's physical location.

More than half of the messages (63%) were sent from home, with most being sent from the teenager's own bedroom. One message (in reply to a received message) was sent from the bath (G5). Some messages were sent while in transit (12%), with one boy (B2) logging a message sent while bicycling. Interestingly, another boy (B4) during a discussion group also admitted to sending a text message while bicycling. Note that although the teenagers reported sending 11 messages while at school, only two explicitly said it was during classes. This is perhaps surprising given the amount of media attention devoted to how text messaging disrupts lessons.

What Do They Use Text Messaging For?

Teenagers use text messages for a variety of reasons. The percentages reported in these sections are percentages of all logged sent messages (236 in total; for some messages, multiple reasons were given). We illustrate the findings from the logs with explanations provided by the teenagers during the discussion sections.

Arranging Times to Chat and Adjusting Arrangements

Teenagers often used text messages to coordinate times and media for communicating. Communicating involves selecting among different technologies, such as e-mail or the phone, and then among specific instances of some media, such as what Internet instant messaging system to use. It is not surprising that they need to coordinate and clarify how, as well as when, they will communicate. Teenagers find text messaging useful for this coordination role.

The teenagers sent 35 messages (15%) arranging a time to phone each other. Specifically, the text messages were coordinating a time to talk on the home landline phone. Teenagers prefer to call a landline phone because the actual call cost is lower. During the discussion groups, the teenagers explained that they pre-arrange these calls because they prefer not to talk with the other family members who might answer the home phone.

The desire to avoid talking with other family members is sufficiently high that the teenagers are even willing to make voice calls to other mobiles — which is expensive — to ask their friends to prepare for a call on the landline, as these two quotes illustrate:

> B5: I phone mobiles because then you know that you're going to get them straight away, instead....
>
> G1: yeah.
>
> G2: yeah.
>
> B5: ....instead of having to go through all the family and things. You get straight to the person.

At another point during the discussion:

> B5: Even people I know sort of phone my mobile and then say oh, can I phone your house.
>
> G4: That's because it's cheaper
>
> G1: They're phoning to make sure that you're standing by the phone when it rings.

The teenagers sent 13 messages (6%) to coordinate a time and system with which to Instant Message each other. Finally, they sent 10 messages (4%) to arrange times to have face-to-face conversations. Strub (1997), in a study of teenagers at a rock concert, also found that two-way radios were frequently used to arrange subsequent face-to-face meetings.

In addition to making initial plans to communicate, the teenagers also used text messages to revise those arrangements. They sent 11 messages (5%) to say that events — often at home — would conflict with their ability to make the arranged

time. They had a number of reasons, some peculiar to being teenagers, which made it sometimes difficult to keep arrangements. One that rarely affects adults is being barred from using communications technologies; we found five instances where text messages were apologies for not using instant messaging or phoning, because they were not allowed on the computer or phone. However, other reasons could affect all users of shared resources. Specifically, we saw two messages rearranging commitments because someone else in their home was using the required resource. Another two messages were sent because the sender suspected the recipient of using the required resource.

Coordinating with Friends

Another activity that the teenagers often used text messaging for was coordinating an outing or activity with friends. They sent 61 messages (26%) arranging activities such as going to the pub, seeing a film, meeting at the cinema, and getting tickets for a club. We noticed that over half of these messages did not focus on making initial plans, but focused on coordinating the arrangements in real-time. In fact, many of the messages sent from town (see Table II) were these kinds of communication.

The logs showed that the teenagers were text messaging their friends to give them updates about the state of the plan. For example, they did not usually send messages asking "want 2 go c a film?"[5]; instead, they used text messages to reaffirm or adjust plans. In the case of seeing a film, we saw text messages saying that people had arrived at the cinema, or were running late.

We think that this is an example of Ling and Yttri's (1999) idea of hypercoordination. Simply put, hypercoordination is the practice of frequently revisiting and revising arrangements with others using a mobile. People make hypercoordination possible because they usually have their mobile wherever they go. This allows people to remain in almost continuous contact and consequently review and revise commitments as circumstances change. Our study suggests that teenagers use text messages to do precisely that.

Chatting and Gossiping

The teenagers also sent many conversational text messages. They sent 48 messages (20%) mainly to gossip or chat. Luckily, they also recorded more details of some of these chatting text messages, giving us some insights into their conversations.

Weekend plans were one topic that they often chatted about (11%). These messages included discussing the upcoming weekend as well as how the previous weekend had been. They also used text messages to talk about what they did that

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[5] "Want to go see a film?" We will return to abbreviations later.

day (2%). We even saw text messages used to have a more difficult kind of conversation: apologising to friends (2%). Other topics that they discussed included teachers, family rows and the next day's lessons.

During our analysis, we noticed that the teenagers frequently used text messaging to ask questions. For example, they recorded 20 instances (8%) of asking how someone was, which would lead to chatting. They also tended to ask their friends what they were doing (3%), how an event went (2%), what homework was due, and whether people had done their homework (6%). They also used text messages to ask their friends about how a previous evening went (3%), whether auditions (4%) and job interviews (6%) went well, and when someone did not show up at school, others sent text messages to that person to ask them whether they were feeling alright (1%).

Coordinating with Family

The teenagers also used text messages to coordinate with their families. We saw two different kinds of family coordination in the logs: updating and revising arrangements and coordinating with absent family members. The teenagers generated far fewer messages in this category when compared to the messages they sent coordinating with their friends. During the 80 days of logging, they only sent 23 messages (10%) to family members.

We saw a number of messages where the teenagers were hypercoordinating with family members. Teenagers sent their parents messages saying they did not need dinner, wanted to be collected from a friend's house, or that they would be late home. The logs also showed that siblings sent each other text messages. For example, one asked another to come downstairs, unlock the door, and let them in without waking up their parents!

The second use of text messaging with family members was sending messages to those absent from the home. Parents and siblings can be absent for a variety of reasons including divorce, siblings having left home to attend college, and parents working abroad. In these cases, the content was much closer to a conversational contact as opposed to any event-based coordination.

Why Do They Pick Text Messaging?

Teenagers often chose text messaging in surroundings when they could have used other communications media. Once again, we illustrate the findings from the logs with explanations given during the discussion groups.

Text Messaging is Quicker

The teenagers frequently (77 times; 33%) told us that they found text messaging quicker than using other media. Initially this surprised us, since we find typing on the phone keypad difficult ourselves. However, during the discussion groups, the teenagers explained that they found it quicker for two reasons: first, they have grown accustomed to the interface and have adapted it to their needs; and second, it avoided long conversations.

It was clear from watching their demonstrations of text messaging that they knew their phone interface intuitively. Knowing instinctively how many key presses are required to generate a specific character gave them a familiarity with the interface that neither of us has.

Despite that, we wondered whether they used predictive typing technologies to help them type faster. Some mobile phones come with software that predicts and completes the word you want as you type.However, when we asked about predictive typing schemes, we did not find them in widespread use. Moreover, we found some of the teenagers had difficulties with them. As two teenagers explained:

> B5: I did have this thing on my phone that, I can't remember what they call it, but it sort of guesses the word you want to type.
>
> G1: Oh, predictive typing.
>
> B5: yeah.
>
> G1: that's annoying.
>
> B5: I deleted it off my SIM card somehow, thank god, because it was so annoying. You type like an 8 and it instantly comes up with hello and it's gets annoying because....
>
> G1: And you can't delete it.
>
> B5: I had the dictionary you could change, because I had like two other phones before, it was just easier, I got used to writing the words.

As they point out, predictive typing can interfere with an expert's knowledge of the interface. Most of the teenagers in this study knew the interface so well that they did not even look at the screen as they typed their messages. Predictive typing, by completing words and often making it difficult to rectify the changes, got in the way of typing rather than supporting it.

Another way that they made input quick was by using abbreviations. As they told us while one of them was demonstrating:

> B3: You're typing 'where are you', and it's bound to be quicker than dialling.
>
> G1: If I was to write 'where are you', ok, (she's typing on her phone)…
>
> B5: You use like an 'r' for are, and 'u' for you.
>
> G1: That's it. I've done it.

We counted 146 unique abbreviations used at least once during the course of the logging study. Many of these abbreviations use numbers (e.g., l8r for later) which some predictive typing systems do not support. A language of text

messaging, based on abbreviations, has evolved to help make typing faster; however, as we discuss later, it does not come without problems.

The second reason that the teenagers gave us for using text messages was that it avoided long conversations. We expected the teenagers to find the 160 character limit restrictive, but to our surprise it was used as a way to avoid social conventions. As they explained:

> G4: …say if you just want to say one little thing to someone, otherwise you'd have to ring them up and go through, you know a massive long conversation and it costs a lot more, and text messaging is just ten times easier.
>
> B5: You can't just sort of phone someone up and go where are you. You've got to say hi, are you alright, nnnh….
>
> G2: Like if you're phoning someone up you can't avoid that they might want to talk to you about something else, where as when I'm texting someone then it's just what you want to say, and you don't have to commit yourself to a whole other conversation or whatever.

In this discussion, the teenagers revealed two disadvantages of conversations on the phone that they can avoid by sending text messages. First, they can avoid the time, and cost, of all the various conversational protocols required before they can ask a question or get to the reason why they called. The character limit of the messages themselves makes this terse and otherwise rude behaviour completely acceptable. Second, they can avoid the other person going "off topic" and making the conversation even longer than planned. Again, the character limit forces both sender and respondent to stick to the topic. In summary, then, text messaging is quick because the teenagers know the interface and the terseness of the medium speeds up the exchange and focuses it.

Text Messaging is Cheaper

The teenagers often (63 times; 27%) told us that they chose text messaging over other media because it was cheaper. Cheaper meant two things to the teenagers: that the total cost was less than the cost using other media, and that they could control their expenditure. The general cost of calls, and communications generally, came up several times in the discussion groups. It was often associated with the ability to control costs, as the following quotes illustrate:

> B5: Well you know how much it's going to cost before you start.
>
> G4: You're more in control of it.
>
> B5: Yeah.
>
> G4: Otherwise you'd be broke within two minutes.
>
> B3: Say you're talking to an Orange phone and you're Vodafone, it's about 40p call time whereas text messages only cost 12p.

And in another discussion:

> G1: I went for the pay-as-you-go Vodafone first and just ‘cause it was like the idea of topping up and being in control of how much you spend was kinda good.

Managing expenses was particularly important for these teenagers, since their sources of income were restricted to their pocket money and, for a few, payments for after-school and weekend work. Another reason some teenagers mentioned was that in the past they had run up excessive bills with the home phone and their parents had made them pay those costs. They did not want that to happen again.

The teenagers also preferred to text message people who were abroad since that was considerably cheaper than placing a voice call. Both the data in the logs and the discussions revealed that the teenagers sent text messages to several countries. One teenager text messaged her friends in Spain regularly, another sent text messages to her father in Hong Kong, and others used their phones while abroad to send text messages to people at home. Text messages, unlike voice calls, do not change price when used internationally. Some providers do not allow international text messaging in certain plans, but when they do, the messages do not vary in cost from local text messages.

Text Messaging is Easier or More Convenient

The teenagers often (53 times; 22%) said that text messaging was easier or more convenient. If we also include some specific examples of what easier or more convenient meant, such as it being too late or early to call (18 times) and the sender being in a public place (14 times) it became the most common (36%) reason for sending a text message.

We asked the teenagers what they meant by text messaging being easier than dialling and talking. Two reasons are illustrated in the following discussions:

> B5: Because if it's like really late you're not going to sort of phone them up, because you could wake up the whole house. So I sort of text message and if they're still awake then I might phone them.

And:

> G4: I find I know who I want to talk to on the phone and who I don't. There are some— particularly males— that don't really talk back on the phone.
>
> G1: Yeah, yeah…
>
> G4: …just one syllable answers and it is so frustrating talking to them on the phone, it's so much easier just doing them a text message. Because you're only just talking to yourself. So, it's, that's why I normally text them.

As the first quote above illustrates, one reason that text messaging is more convenient is that it is quieter than calling. Although many mobiles have silent ways of alerting their owners to incoming communications, voice conversations still involve the noise of talking. Text messages give the teenagers a way of communicating silently that does not disturb others.

As the interaction between the two girls (G4 and G1) above illustrates, it takes work to have a conversation. As we mentioned earlier, voice exchanges have lengthy and costly protocols associated with them. While this can take time or be expensive with anyone, it can get more awkward with someone who finds

conversation difficult. As another girl commented, continuing the discussion above, the problem does not just apply to boys[6]:

> G2: I know girls as well, I mean at school I talk forever with them and as soon as I phone them up there are just these long silences on the other end of the phone and I realise I've been talking for the past five minutes. And it's really awkward when you know you've got friends like that and you want to contact them but you don't want the long awkward silences, cause that's really awful.

The teenagers find it easier to text message someone who finds phone conversation difficult. The teenagers also used text messages to avoid making conversation with people they did not know well (2%). One occasion where teenagers find it difficult to talk, and may be chatting with someone they do not know well, is when they flirt with each other. Flirting was also observed by Strub (1997) in his study of two-way radio use. Although flirting was not mentioned in the logs, we asked the teenagers about it during the discussion groups:

> Q: Have you ever used text messages to flirt with people?
>
> (All nod, say yes.)
>
> G4: It's also very handy, I mean say if you're meeting a bloke or something and you want to give them your number or get theirs, it is so much easier getting a mobile number than a home number and it's a lot less embarrassing if you want to meet up with them again just doing a text message.

A final, pragmatic reason the teenagers gave for text messaging someone was their physical location. Some physical locations require discretion. When they wanted to discuss something that they did not want other people to hear, they sent text messages. Many of the "in transit" messages (see Table II) were of this kind:

> G4: you could be on the bus, you don't really want to talk to them, because you know everyone's listening.

In fact, we noticed that many of the teenagers sent text messages from public places and spaces where telephone conversations would probably be unacceptable.[7] These places included cinemas, school dances, and the supermarket. Text messaging provides anytime, anywhere contact with other people, but in public settings, it is a way to be discrete.

New and Familiar Communications

Finally, we wanted to know whether text messaging made any new kinds of communications possible. The data from our logs suggest that the teenagers use text messages to have conversations about traditional topics. In theory, other media could allow them to have the same kinds of conversations. However, as we have shown in previous sections, text messaging changes how they communicate.

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[6] Interestingly both comments about the awkwardness of telephone conversations come from girls.

[7] It is interesting to compare this with Palen et al.'s (2000) study of wireless phone adoption in the United States where people with mobiles are getting less sensitive to conversations in public spaces.

For example, the terseness of the media makes it possible to have short, blunt conversations.

Text messaging also makes it possible to communicate from places from which they previously could not. For example, shortly after mobile phones became popular many cinemas started generating and enforcing rules about not using mobiles during the show. Text messaging has made mobile conversations possible again by turning them into more discrete interactions that do not disturb others watching the film.

We found several examples (10; 4%) of one type of message content that seemed novel and was made possible by the discrete nature of text messaging; we call this the goodnight message. The recipients of these messages were either boyfriend or girlfriend, or just a close friend. The goodnight message relies on quiet interactions in two ways. First, the sender can send the message quietly without disturbing his or her own household. Since these messages get sent late at night, this silence is necessary. Second, we noticed that this works because while the teenagers are awake, they keep a close eye on their mobile phones to watch for incoming messages. When they go to bed, they turn off or down the incoming alerts, so that it does not disturb the recipient's house.

Some Problems with Text Messaging

Although we did not begin this study searching for problems, the teenagers described three difficulties with text messaging. What struck us was that some of these problems seemed very familiar, because they were similar to problems that previous studies of e-mail uncovered (e.g., Dunlop & Kling, 1991; Sproull & Kiesler, 1991). In this section, we briefly review three problems.

Evolving Language

Text messaging, like e-mail, has a specialised language associated with it. Unlike e-mail, the language of text messaging is still evolving; consequently, it can be confusing. The teenagers mentioned finding it difficult to understand some of the messages people sent them:

> G4: It's annoying, though, if you get a text message and you don't know what the abbreviations stand for.
>
> G2: It is.
>
> G1: Yeah.

We found several reasons that made the text messaging language difficult to parse. First, the teenagers reported using several different abbreviations for the same words. For example, different messages shortened tomorrow to: "2moro," "2morra," "tomor," and "2morrow." Second, non-obvious long phrases were also shortened such as "dofe" which stands for the Duke of Edinburgh, "gal" meaning

get a life, and "bdtd" implying been there done that. Third, some abbreviations already have meanings, such as "lol." On the Internet, "LOL" typically means laugh out loud. However, we also found it in use in text messaging, sometimes meaning lots of love. Imagine confusing the two!

An additional problem for the evolving language of text messaging is that people have different levels of knowledge of the abbreviations in use. As the conversation above continued:

> G4: It is. I think my Nana (Grandmother) gets annoyed as well because obviously she doesn't know any of them and I'm writing them. See you don't actually realise you're doing them, you get into a habit of it.
>
> G1: You have to sit there thinking l-8-r, or oh, later…
>
> G4: It depends who you're writing to, you know, how many abbreviations you use.

The language of text messaging has not stabilised sufficiently to make all communications seamless. Indeed, we noted a few (3) instances of text messages being sent in response to previous messages asking people to explain their previous message. Over time, if text messaging shares similar properties to e-mailing, we could expect these abbreviations to stabilise and become more widely-known. Books which explain text messaging abbreviations have begun to appear, which may resolve some confusion as well as guide standardisation (Michael O'Mara Books, 2000, 2001).

Determining Intent from Content

Another difficulty with text messaging concerns the ability to determine the intent from the content. Specifically, the teenagers sometimes found it hard to figure out whether the message was serious or a joke, and consequently did not know how to react. As they explained:

> B5: Well it's difficult to get them into context because you don't know someone's being sarcastic or sort of jokey or really serious and so you might sort of misinterpret what they're trying to say and in your reply you get it completely wrong, and look a fool.
>
> G1: I've done that two or three times.

It also seems, unsurprisingly, that they are learning to adapt text to be more expressive, as happened with e-mail. I asked them whether they used things like capitals to emphasise words.

> G1, G2: Yeah.
>
> G1: If you're really good you go to special letters and you can kind of put accents and dots and little squiggles, and it's kind of fun.

It will be interesting to see how and whether teenagers find ways of adapting the media to make the intent behind their content easier for others to understand.

Mis-addressing Messages

The final problem we discussed with the teenagers was the ease of mis-addressing a message, and some of the resulting unintentional social consequences. E-mail addresses have the property of being text, and often people's names, or some part of their name. This makes them easier to remember and distinguish than telephone numbers, which are used as the addresses for text messages.

The United Kingdom has further complicated the problem of remembering numbers: unlike landline numbers, mobile numbers are not geographically locatable. The equivalent of the area code usually signifies the mobile service provider (or increasingly, as people swap service providers but keep their numbers, not even that anymore). This may be helpful in determining whether you are contacting a mobile, and whether it's on another network, but it also makes everyone's number very similar. As the teenagers explained:

> G4: And they're all very, very similar so you can easily call the wrong person.
>
> G1: 07780…

However, there are consequences of sending messages to the wrong person:

> B4: I uh — someone came around mine and I had a bit of an argument with them as they were leaving, and, uh, they left, and I thought, oh I'll apologise, so I write this text out apologising, um, and sent that to someone that wasn't them, and then, uh I sent it to this girl who — I wanted to say, can I come around now, and I wrote a text message saying can I come around now to the person that just left — that I'd just fallen out with, and he got really, really confused.

The combination of multiple simultaneous communications with people who have extremely similar numbers creates confusion for the sender. Learning to manage communications, in the same way that e-mail programs have evolved to help people save, sort, search and filter their messages, may be necessary for text messaging systems in the future.

Conclusions

This paper has described why text messaging has become popular among teenagers. Our findings show that teenagers use it to coordinate media and times to interact, revise and adjust arrangements, and chat. We found that text messaging mainly happens among peers (71%) and at home (71%).

The teenagers told us that they found text messaging quicker, cheaper, and easier. They find it quicker because they have mastered the interface and optimised their language. The restrictive length of text messages — rather than being a technological disadvantage — allows teenagers to forego conversational conventions and reduces the overall time spent on the interaction. Text messaging is cheaper for them because it reduces the total costs and helps them to predict and manage their expenses. They find text messaging easier and more convenient

because it supports quiet interactions and it supports communications with people who have difficulty holding conversations.

We found that text messaging changed the dynamics of how teenagers communicate. For example, it let them coordinate from many more places because it is a discrete and mobile communications medium. However, the content of the majority of messages focused on traditional topics. One kind of message — the goodnight message — used the affordances of text messaging to allow the teenagers to interact in a new way.

While our findings focus on teenage use, they have revealed affordances of text messaging that may well extrapolate to adult use. For example, it seems plausible that adults may also find the terseness and directness of the medium useful for asking questions of colleagues, scheduling meetings and appointments, and coordinating with family members while at work. This may be particularly true for mobile workers (Palen et al., 2000).

Although infrequent, teenagers sent their parents text messages. We did not ask their parents whether this had encouraged them to use text messages more frequently. However, if today's adults do not find text messaging useful, then tomorrow's adults who are already "power users" probably will. We expect them to find job-related uses for text messaging in the office.

In conclusion, when we view work broadly as the "work" of interacting in the social world, our study reveals why teenagers use text messaging. Text messaging gives them opportunities to coordinate from new places. It lets them conduct brief but rich exchanges. It also lets them coordinate opportunistically, finding out in real-time whether people are proximate and then adjusting their commitments on the fly. For teenagers, text messaging fills a gap left by other communications media.

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Rebecca E. Grinter
Xerox PARC
3333 Coyote Hill Road
Palo Alto CA 94304
United States of America
Tel: +1 650 812 4818
Fax: +1 650 812 4471
E-mail: grinter@parc.xerox.com

Margery A. Eldridge
Xerox Research Centre Europe
Ravenscroft House
61 Regent Street
Cambridge, CB2 1AB
United Kingdom
Tel: +44 1223 431518
Fax +44 1223 431510
E-mail: eldridge@xrce.xerox.com