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When fingers do the talking: a study of text messaging

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Abstract

SMS or text messaging is an area of growth in the communications field. The studies described below consisted of a questionnaire and a diary study. The questionnaire was designed to examine texting activities in 565 users of the mobile phone. The diary study was carried out by 24 subjects over a period of 2 weeks. The findings suggest that text messaging is being used by a wide range of people for all kinds of activities and that for some people it is the preferred means of communication. These studies should prove interesting for those examining the use and impact of SMS.

Keywords: SMS; Text messaging; E-mail; Communication

1. Introduction

One of the largest growth areas in communication is the Short Message Service (SMS) or text messaging as it is more popularly known. SMS grew out of what was initially a by product of the mobile phone industry. It was never expected to take-off in the way that it has and was taken seriously at first by the telecommunications companies (Agar, 2003). It was always seen as a very marginal means of communication; one set aside for the mobile phone companies to communicate with their customers. Since it was not the purpose for which mobile phones were developed, its rise has caught technologists, sociologists and others very much unawares. Some commentators argue that the rise in text messaging

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owes its popularity to the growth of cheap prepaid phones. Others suggest it is due to the flat rate for text messages which makes the messages cheaper under some circumstances. According to the Mobile Data Association (MDA) the total number of chargeable person-to-person text messages sent across the four UK GSM networks in 2002 totalled 16.8 billion (MDA, 2003a). In releasing the figures for 1st January 2003, Mike Short, Chairman of the MDA, said: "The large amount of text messages sent at New Year confirms that most people see text messaging as a warm, personal and cost-effective way to greet their friends and loved ones on special occasions. The use of text is also expanding into picture messaging as people explore the range of mobile messaging services that is becoming available." (MDA, 2003b). The total figures for text messages sent in the UK in 2003 was 20.5 billion (Ananova, 2004).

In the face of such large and rapidly growing figures it is important to see these numbers in context. At present there is a 44% penetration of the 5–24 years age range. This rate is expected to grow (Wireless World Forum, 2004). Using the available figures and trends as a guideline for future development, it is estimated that SMS users aged between 5 and 24 years of age will increase their current 11.9 billion Euros spent on SMS to 17.2 billion by 2006 (Wireless World Forum, 2004). In other words, it could be that this is simply the tip of the iceberg and that SMS has much more profound growth to occur in the future as it discovers its full potential and its full market. In Finland, for example, text messaging came to the attention of the youth culture in 1998 and it is now very common for Finnish youth to pay more for text messages than for voice phone calls (Kasesniemi and Rautiainen, 2002). A similar story is emerging in the UK.

A study of the Instant Messaging, SMS, and Multimedia Messaging Service (MMS) markets estimated that the market for SMS will continue to grow over the next 4-years as SMS finds a place for itself in revenue-generating applications—at the moment it is mostly used for interpersonal communications (Sillence and Baber, 2004). In 2003, the Mobile Data Association estimated that about 14% of mobile phone users sent business text messages (Kotadia, 2003). In December 2003, the MDA also released results from a telephone interview survey they had carried out on over 300 businesses. This showed that the majority of text messages were sent internally within the organisation and by over 35-year-olds (MDA, 2003c).

Norman argues that when a new product is developed, it does not fit immediately and naturally into people's lives. He says that products have to be introduced gradually as people find a place for them (Norman, 1998). He adds that in the early phases of adoption, if the product can carry out a task that cannot be done any other way, then it will be used, no matter how difficult it is for users to operate it (Norman, 1998). It certainly needs to be said that at present, SMS is not a particularly easy technology to use. The mobile phone was designed with the preconceived ideas of the older technology of the landline. The first mobile phones resembled the roving equipment used in the home; they were large and bulky and greedy on power. The first mobiles were also unstable and mobile users' most frequent words consisted of 'Are you still there?' Re-dialling was often necessary. In contrast, SMS being asynchronous proved much more reliable. It can be sent and received in the user's own time and when the network is stable. A phone call is much more problematic in the sense that it requires two parts of the system to be operating perfectly and simultaneously, and for both recipient and caller to be available and free to talk at

the same time. SMS is therefore more like e-mail in its ability to be convenient for both recipient and sender. It is also more private. For teenagers wishing to talk to friends, or to carry out flirting, it provides a privacy that phone calls may not give (Davie et al., 2004). For people wishing to have private 'conversations' in public, text messaging is far more discreet. Norman has described how he has watched people in a meeting, surreptitiously receive and send text messages (Norman, 2004).

However, the modern mobile is a slimmed down, sexy descendant of its clunky ancestor, which has been modified through use. Norman explains that technologies become more adapted to user's needs as the technology matures (Norman, 1998); we are certainly witnessing that process with the mobile phone and the transition is taking place at an astonishing rate. It is no longer merely a tool, but a cool accessory, a companion, an extension of self that somehow is seen to express what the owner is like (Ling, 2004; Davie et al., 2004). It is no accident that the Finnish word for mobile is 'kännykkäs' which is derived from käsi meaning hand and thus stressing the idea of the mobile as an extension of self (Räty, 2000). In the UK, current advertising emphasises this and adverts stress the mobile's place as a fashion icon, playing on the idea that users might be ashamed of their 'old fashioned' mobile or show it as a fun companion that needs to be up-to-date if the user is to enjoy the relationship to the full and have a good time. Mobiles now come with skins that turn them into funky accessories or sober work tools as the user's mood might dictate (Norman, 2004; Ling, 2004). However, the mobile is not a piece of technology that is even in its adoption and appeal but seems to have infiltrated into the essence of the cultures of the societies that have embraced it. Finnish sociologists have already commented at length on the change it seems to have brought about to Finnish culture with one Finnish sociologist commenting that mobile phones are owned and used enthusiastically by the normally silent and taciturn Finns whose culture hitherto excluded small talk (Puro, 2002).

Recent research in the UK into mobile phone ownership involving mainly a group of 25–43-year-olds and carried out by Henley Management College found that 46% 'could not live without' their phones. However, increasingly these phone users would be far more likely to text rather than to phone (Ananova, 2003). Although texting is becoming more and more popular as a means of communication, mobile phone keys still owe their design and their layout to the older phone-call technology. Phones were initially designed for dialling numbers on. However, the mobile was designed for use on the hop and this meant that users would either have to carry numbers with them or remember them (Roos, 2000). The mobile phone, therefore, quickly expanded to hold an address book that could automatically dial out for the user. In fact, very few users dial numbers these days. Some commentators have already noted that they no longer remember phone numbers—including their own—since there is no longer any need to remember them. The incoming number can be redialled or stored thus saving key presses and the need for dialling has been dramatically reduced. However, at present the mobile phone still has a keyboard designed for dialling numbers which makes text messaging difficult. Several companies are now experimenting with the design of the keyboard in an attempt to make texting easier since dialling is of lesser importance even to those who do not use SMS. Users today tend to get the phone to do the work for them by using their address book and nicknames. However, the keyboard design remains a number orientated design with multiple key presses to achieve even simple messages. The standard ISO/IEC 995-8 1994 layout uses

12–15 keys to facilitate text input. These keys must accommodate 26 letters of the alphabet as well as punctuation and numerical characters. Each key is, therefore, expected to perform several tasks (Butts and Cockburn, 2002) and it may need more than one keypress to achieve the desired character. Keying in rates are slow with experts reaching about 21 words per minute (wpm) (Silfverberg et al., 2000) and novices about 6 wpm (Pavlovych and Stuerzlinger, 2004) on a multipress keyboard (12–15 keys). There is also the question of the readability of the text itself. Gustav Öquist and Mikael Goldstein have suggested that improving screen readability will improve usability for mobile devices with all of the implications that has for use (Öquist and Goldstein, 2003). It needs to be emphasised that the rise in text messaging is despite these drawbacks. In theory, at least, it is faster to talk (Lacey, 1985).

But in examining the texting phenomena it needs to be remembered that users are texting despite the difficulties and the problems in use. Grint and Woolgar explain that there is 'no best way to design any particular object' and they emphasise that technologies themselves do not determine by themselves a best way; there is nothing inherent in them that generates a good design. They add 'once the technology is designed, its capacities and effects become embedded in material form' (Grint and Woolgar, 1997). This insight explains how the mobile phone is beset with problems as a communication device that is not based on voice input and output and perhaps underlines the extraordinary success of text messaging despite these considerable pitfalls. Kurvinen suggests that "…the motives to use a product or service grow from mundane interpersonal interactions as people invite each other in…" (Kurvinen, 2003). The success of SMS could be seen as a result of the desire of individuals to unite others into their closer circle of communication. This is certainly borne out by the various studies of teenagers which show close knit communities conversing with each other on a regular basis and with set rituals (Grinter and Eldgridge, 2001, 2003).

Technologists may invent technologies but any given technology is not a stable and unchanging artefact; in use technologies succeed or fail and sometimes those successes and failures are the result of re-negotiation of the purpose of the technology on the part of the user which can drive the later designs (Grint and Woolgar, 1997; Taylor and Harper, 2002, 2003). Norman sums this up: 'In the early days of a technology, it doesn't matter if it is hard to use, expensive or ungainly. It doesn't matter as long as the benefits are sufficiently great: if the task is important, valuable, and can't be done in any other way' (Norman, 1998). Presumably, the billions of text messages sent so far this year are testimony to the fact that text messaging fulfils all of those needs.

At the moment the majority of text messages are sent by individuals to individuals and are of a personal nature. It is mostly being used as an effective one-to-one method of communication between friends (Sillence and Baber, 2004) but business has started to realise that text messaging is a good way to stay in touch with distant employees and to carry out business activities. The New York Times 14 March 2000 describes how one executive who spent the day in a meeting 'exchanged more than 20 messages' with his assistant in a different part of the building, 'confirming appointments and answering questions'. We are told that 'most of the other participants' at the meeting 'sent and received messages too…' (Meyerson, 2001). The market researching group Radicati estimates that during 2004 55% messaging will be for business use.

Text messaging has been a communication method favoured by the teens (Grinter and Eldridge, 2003; Madell and Muncer, 2004). It is arguable that if it remained an obsession of the young, little by way of improvements in usability would have taken place quite so dramatically as teenagers appear to be coping very well with the keypad (Harper, 2001). But with a potentially huge business market yet to be won over improvements in text messaging usability could bring in massive profits. Interestingly, in America the mobile phone has been much slower to take-off and there as elsewhere the market has first been dominated by the young. Commentators on America's use of the mobile refer to the need to explain to older people the potential uses for the mobile in very similar ways to the comments made about the emergence of mobile phone use in Europe (Bluestein, 2003). Again, the message is very similar to the European experience. Scott Shamp, head of the University of Georgia's New Media Institute suggests that: "Teens will put up with it because technology is cool and crazy. But they've got to show the American public why they should do it." (Bluestein, 2003).

However, as the use of the mobile matures, many of the preconceived and intuitive ideas we have had about mobile phones have been disproved by the data. For example, Puro has pointed out that the argument that mobile phones are mostly owned by the young in Finland, is not true and ownership is actually very even, apart from amongst the over 1960s who live alone (Puro, 2002). The idea that mobile phones are a male preserve is also erroneous in Finland at least where ownership across the genders is equal although young males are more likely than young females to obtain a mobile phone via their work (Puro, 2002).

The expectation is that mobile phone owners carry their mobiles at all times. A study of Finnish users found that 70% of women kept their phones on all the time and about 50% of men turn their phones off at night. Interestingly, Davie et al. (2004) in their study of school children found that girls were more likely to keep their mobiles with them than boys. Further, the girls were more likely to carry their phones at all times than the boys (63% vs. 48%) so it could be that the gender differences emerge quite early on and are maintained. However, it may not always be possible or even desirable to speak to someone on the phone, and at such times a text message will reach them and is a discreet and convenient way to communicate given its asynchronous nature.

Text messaging, however, still appears to be especially favoured amongst women and the young and several surveys have commented upon that. In Finland, which is far ahead of the rest of Europe, if not of the world, in the mobile phone phenomena, many of the cultural and linguistic changes seen in the UK have their parallel there. In English people talk of 'texting' and receiving 'texts'. The Finns use the word 'texstata' (Puro, 2002). Its growth means that it has attracted a lot of attention from the companies who own and run the mobile phone networks in an attempt to maintain and increase profits and it is just now attracting the attention of researchers.

Interestingly, the work that has been done spans several disciplines. It is clear that text messaging is not just interesting for technicians concerned with developing better systems for users and exploiting the technologies. But it is interesting too for Human Computer Interaction (HCI) specialists and sociologists who see it as a social phenomena that is really affecting the way that people interact with each other. In Finland, the mobile phone seems to have redefined the culture of the young, especially, and sociologists there have

produced some excellent and illuminating commentaries on the mobile phone and its influence. This is perhaps because Finland started using text messaging much earlier than the rest of Europe and partly because Finns appear to be amongst the most enthusiastic users of the mobile phone and text messaging (Räty, 2000).

The Finnish sociologist, Roos (1993), suggests that some people want to be constantly available since this fulfils an emotional and a practical need. The mobile phone allows them to do this although there appears to be a difference between male and female attitudes towards the mobile phone. Women see it more as a means of extending responsibility and care for loved ones. Men view it more as a business tool (Puro, 2002). However, this could well coincide with other means of communication as well. Kasvio suggests that mobile phones are popular with the young since they know who will answer and this is useful in establishing their own identities since it offers privacy from prying parental ears. In phoning a landline you know where the telephone is but you do not know who will answer it. In phoning a mobile you know who will answer it but not where they might be. Hence, many calls to and from a mobile phone will include, usually in the early part of the conversation a discussion of where the mobile user is (Kasvio, 2001).

Uptake amongst the young may also be accounted for by the fact that it is a much cheaper technology to own than say the computer, offering e-mail use (Grinter and Eldridge, 2003) and more readily available to them (Davie et al., 2004). It is also more private than a computer which is much more likely to be shared by the family because of its cost. In Grinter and Eldridge's study only three out of the 10 subjects had their own computer. The rest shared one as part of a family resource and with all the implications that has (Grinter and Eldridge, 2003). Protecting personal space on a computer may well be beyond the capabilities of some households; before the advent of XP this would not have been quite so transparent. XP assumes the computer will be a shared resource to an extent that earlier Windows based operating systems did not. Although it was possible to set up separate areas under earlier versions of Windows, XP has treated this as a norm and facilitates and even encourages it. Parents may also be fuelling teenage adoption of the mobile by helping to buy equipment and pay for use (Davie et al., 2004) since the mobile phone allows them to keep an eye on youngsters when they are away from home. Several commentators have included interview material to support this, most notably Ling (Ling, 2000, 2004). The rise of the prepaid phone probably also accounts for the rate of adoption since a user with a prepaid phone knows that if it is lost or stolen they only pay for the calls left on the card. Any additional calls will have to be paid for. This has removed one of the fears of mobile phone ownership that the owner of a lost or stolen phone will be left with a huge bill not of their making. A study by Davie, Panting and Charlton of 351 school children aged 10–11 found that about 20% had lost, damaged or had phones stolen (Davie et al., 2004). Further more, teenagers can budget for a prepaid phone and they do not have to go through security checks (Grinter and Eldridge, 2003).

Mobile phones have seen a phenomenal growth. They have changed from being a busy office worker's accessory to being something everyone must have. But although research has been carried out by the mobile phone networks because of commercial considerations what has been released to the general public is of a tantalising and sparse nature. There are still many questions left unanswered about SMS and its impact on UK society. The studies of text messaging in the UK at least are still therefore in their infancy and as text

messaging continues to grow and develop, it shows itself to be a very interesting and rich area to study. In the light of this, the two studies described here were undertaken in the hope that they would shed more light on who is texting, why they are texting and how this fits in with their use of other methods of communication.

2. Methodology

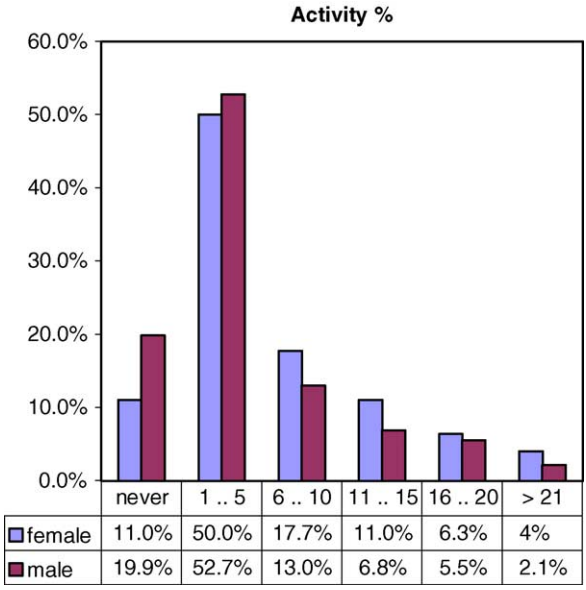
This study took place in two parts. First of all a questionnaire was designed and administered. It was kept short—two sides of A4—in order to encourage as many people as possible to participate. Five hundred and sixty five questionnaires were returned. These questionnaires were distributed by students studying a final year option in Usability Engineering at a London university. They were asked to distribute the questionnaires widely but not to their fellow students at the university. Additionally, one student took a batch of the questionnaires to the mobile shop where he worked and customers were asked if they wanted to take part in the survey. The 565 returned and usable questionnaires, therefore, consisted of about 440 returned by the students and the rest from the mobile phone shop. The 565 questionnaires were usable in that none were so incomplete that they had to be discarded. However, a few were incomplete. This means that some tables will show figures below the 565. Of the 565 questionnaires 256 were completed by women, 298 were completed by men and 11 respondents left this part of the questionnaire blank.

Secondly, a diary study was carried out with 24 mobile phone users who also used SMS. A total of 24 diaries were kept by a group of 25 final year students on a computer studies course at a university in the United Kingdom, two students did not own mobile phones and therefore could not take part in the study. Both tutors owned mobile phones and one contributed to the study and the other did not receive nor send any text messages during that time and has only been known to send one message in several years of mobile phone ownership, and so did not contribute by default. The study consisted of part of the students' course work. The students were mostly in their mid 20s and consisted of 21 men and 3 women.

3. Findings

The questionnaire on SMS attempted to examine who was sending messages and why. It also sought to put this use into context with other forms of communication: e-mail, phone, fax, letter, face-to-face. Fig. 1 shows the gross text messaging activity, including both the sending and receiving of messages, categorised by gender. Women are slightly more active than men. More men have never sent messages and women are more active at the higher levels of both sending and receiving. It has to be remembered that it is possible for someone to be sent a lot of messages but to reply to few. This would increase their apparent SMS activity.

Females average approximately 6.3 messages per day and males 4.8. These findings agree with other studies that show females are more active in their use of all communication tools. Table 1 shows activity by age. The younger age groups contain smaller proportions of people who have never sent text messages and this figure rises as



	never	1 .. 5	6 .. 10	11 .. 15	16 .. 20	> 21
female	11.0%	50.0%	17.7%	11.0%	6.3%	4%
male	19.9%	52.7%	13.0%	6.8%	5.5%	2.1%

Fig. 1. Average daily text messaging activity by gender (sending and receiving).

the age of the respondent increases. The gross pattern of usage changes with age, clearly indicating that, apart from the very youngest who might be constrained financially and from the lack of language and communication skills a phone requires (Ling, 2004) from using the technology, activity declines with age.

The questionnaire also looked at the use of text messages in an attempt to explain why it might be preferred over other means of communication. No clear pattern emerged, people who send text messages sent them consistently in preference over other forms. This is in contradiction to interview material with subjects who say they choose text messaging

Table 1
Text messaging activity by age

Age	Number of text messages sent daily						
Subjects	Never	1–5	6–10	11–15	16–20	>21	Average
<16	1	10	6	3	8	1	4.9
Subjects = 29 (%)	3.4	34.5	20.7	10.3	27.6	3.4	
17–18	7	25	9	10	6	5	6.4
Subjects = 62 (%)	11.3	40.3	14.5	16.1	9.7	8.1	
19–21	12	64	21	22	11	4	5.5
Subjects = 134 (%)	9.0	47.8	15.7	16.4	8.2	3.0	
22–25	20	85	29	8	5	3	4.3
Subjects = 150 (%)	13.3	56.7	19.3	5.3	3.3	2.0	
26–30	17	67	11	2	1	1	3.3
Subjects = 99 (%)	17.2	67.7	11.1	2.0	1.0	1.0	
31+	36	39	2	0	1	0	1.7
Subjects = 78 (%)	46.2	50.0	2.6	0.0	1.3	0.0	

Table 2
Gender differences in first date scenario

Method	Female (%)	Male (%)
E-mail	8.1	7.5
Fax	0.9	1.2
Phone	55.4	74.0
SMS	35.6	17.3

under particular circumstances. Certainly, the adverts for texting seem to suggest that is the case as well, although as has already been noted there is an element of educating users on how to use the mobile phone, in current UK adverts at least. But these findings do not support the picture that users consider circumstances at all carefully. However, there was a degree of modality involved in that if subjects received a text message they were more likely to reply with a text message. Women showed a slightly higher incidence of staying with the incoming modality. This idea has been supported with a further small study but the question of modality and abandoning the incoming modality for another, needs to be examined in much more detail. It is on the face of it, quite complex.

The effect of circumstances on people's choice of communication medium was examined. Subjects were given various scenarios and asked to select their preferred method. There were no apparent differences between any of the groupings, except on one scenario where subjects imagined they were asking someone out on a first date. Again, this coincides with the findings from elsewhere which show that young people use text messaging for a wide variety of activities from locating friends to talking about serious subjects (Kasesniemi and Rautiainen, 2002; Ling, 2004).

Table 2 shows that women were more likely to use a text message. 35.6% of women said they would whereas 17.3% men said they would. Men preferred to phone. 74% of men said they would phone compared with 55.4% of women. However, this data was obtained by asking respondents to imagine their responses and does not represent actual behaviour. Studies of e-mail use show that women are less likely than men to flirt using e-mail. Men stated that 27% of the time they wasted on using e-mail for non-work activity was spent on flirting but with women it was only 13%. However, it has to be said that no time was given for these activities (Left, 2001).

Table 3 shows the gross activity levels for the number of text messaging, e-mails and phone calls sent and received per day. The table shows that overall phone communication

Table 3
Overall activity level for all three mediums

Number	SMS	E-Mail	Phone
0	83 (15.9%)	98 (18.8%)	18 (3.5%)
1–5	279 (53.6%)	245 (47.0%)	297 (57.0%)
6–10	74 (14.2%)	90 (17.3%)	125 (24.0%)
11–15	43 (8.3%)	47 (9.0%)	48 (9.2%)
16–20	30 (5.8%)	18 (3.5%)	15 (2.9%)
21+	12 (2.3%)	23 (4.4%)	18 (3.5%)
Average	5.3	5.5	6.0

is more pervasive than e-mail which in turn is more pervasive than text messaging. However, gross differences are not very great at all. There is some suggestion in the table that the presented level of text messaging is supported by a relatively small number of users who send and receive a large (16–20) number of messages per day. Likewise, the presented level of phone activity is supported by the large number of moderate (1–10) users of this more traditional medium.

These findings are well in line with current research and show a picture that is similar to that which has emerged from the Finnish studies. For example, the MDA survey found that the phone was by far the most popular communication medium for business (MDA, 2003c).

In the light of our first study we decided to move on to an examination of the contents of the text messages themselves. The questions to be answered here were what are people saying to each other via text messages and is this communication different from other communications they might have via different technologies?

The second study consisted of asking a group of phone users to keep diaries for sent and received text messages over a period of 2 weeks. The study started at midnight on February 15th to avoid the sample being affected by Valentine's Day greetings. A total of 24 diaries were kept by a group of mobile phone users, mostly in their mid 20s and university students. The following information was recorded by each subject:

Book number
Message number
Date
Time
Send or receive
The original message
A translation if it was not in English
Sender's details
Relationship of sender to receiver

The attributes listed above were obtained by examining a sample of messages. These attributes were distributed to the subjects as a crib sheet, with examples to guide them and a numbered notebook in which to keep a record of the messages they received and sent. The study began and ended at midnight on a Friday and ran for 2 weeks.

The classification categories for the messages were developed using a set of test messages from the subjects in the diary study. The messages were shared out to the team of subjects who classified them. These classifications were then pooled and refined until all of the messages could be classified according to the categories developed. Once this had been done the pool of messages was classified by the team. The subjects entered each message into a web based database. Once they had finished entering their messages they were shown random messages from the entire pool and had to read them and classify them according to the agreed criteria. A radio button was used to select the appropriate category. Messages were displayed only once to each subject. If subjects were unsure about their classification then they were allowed to add a note explaining their doubts. Each subject

attempted to classify as many messages as possible and a consensus was drawn up from the classifications based on the number of times it was assigned to a particular category.

The findings discussed here are, therefore, based on these classifications shown below:

1. Advertisements
2. Questions
3. Rendezvous immediate and ongoing
4. Rendezvous near future
5. Events
6. Instructions
7. Reminders
8. Jokes
9. Signon
10. Signoff
11. Gossip
12. Dates
13. Information—personal
14. Information—commercial
15. Information—operational

Fig. 2 shows the average length of words in each category of message. The maximum length of a text message is 160 characters. In any case, the keys are not particularly easy to press and for both reasons messages are best kept as short as possible. Textish is another

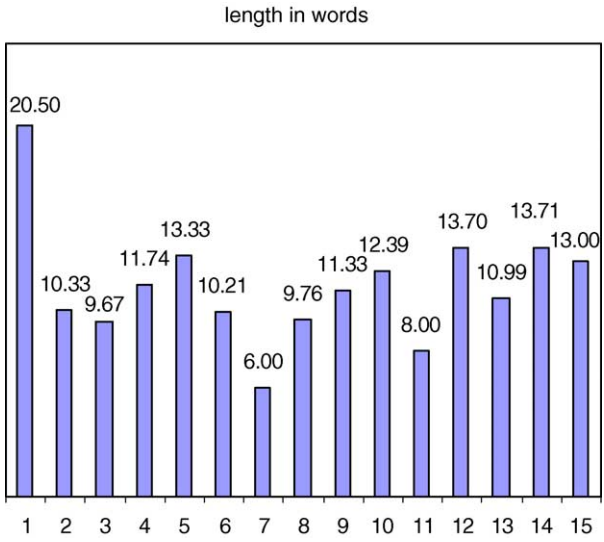


Fig. 2. Average length of messages in each category by number of words. (1) Advertisements, (2) Questions, (3) Rendezvous immediate and ongoing, (4) Rendezvous near future, (5) Events, (6) Instructions, (7) Reminders, (8) Jokes, (9) Signon, (10) Signoff, (11) Gossip, (12) Dates, (13) Information—personal, (14) Information—commercial, (15) Information—operational.

means of keeping key presses down as is auto-complete. In fact, the study suggested that textish was not used as much as it was thought it might be and it could be that auto-complete is now so effective that it is taking away the need to remove vowels.

Category 1 had the longest average number of words at 20.50. This is to be expected since adverts would be less likely to assume that the recipient can understand any abbreviations and textish (basically English with the vowels removed i.e. 'text message' would be 'txt msg') that friends and relations will be able to assume or at least have the chance to clarify. However, this was also one of the categories that was least well represented so these findings are based on a very small number of total messages received in this category. Contrary to the many complaints that circulate about text messaging being used by companies to send advertisements, this was not borne out by this survey. Indeed, this mobile phone user group received very few adverts neither from the network companies themselves nor outside advertisers.

Fig. 3 shows the relative numbers of messages in each category. The most frequently occurring types of communication via text message appear to be questions, signoff and dates. However, the group consisted largely of single phone users in their 20s and evidence from other surveys tends to show that different age groups send and receive different types of messages. For example, a Finnish study conducted in 1999 and updated in 2001 found that the most common form of content included questions, information and reminders amongst the age group 10–30-year-olds which covers the vast majority of the group we studied. Older age groups were found to be slightly less likely to ask questions but were about as likely to send reminders. The older age groups were also more likely to send text messages with some sort of informative content (Statistical Centre of Finland, 2001).

Of the 337 messages entered into the database 196 contained no textish. In other words, all of the communication was written in full, and in a dictionary recognisable natural

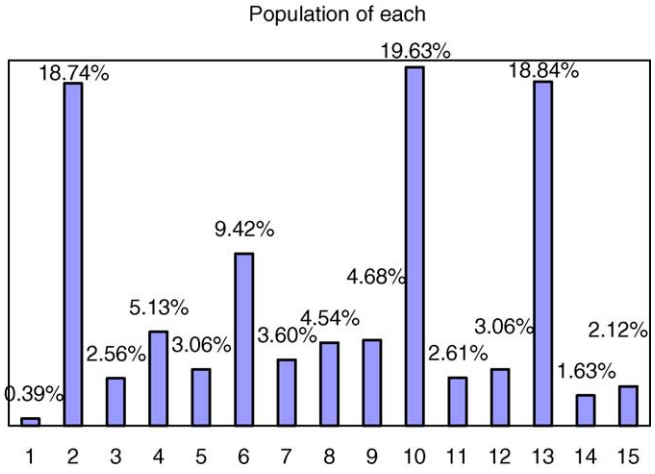


Fig. 3. Number of messages in each category. (1) Advertisements, (2) questions, (3) rendezvous immediate and ongoing, (4) rendezvous near future, (5) events, (6) instructions, (7) reminders, (8) jokes, (9) signon, (10) signoff, (11) gossip, (12) dates, (13) information—personal, (14) information—commercial, (15) information—operational.

language rather than abbreviations without vowels which is typical of textish. One hundred and forty five messages contained some form of textish. Punctuation was sparse although exclamation marks and question marks were used.

The most popular day for sending messages was Saturday with 81 text messages sent and received. Sunday followed closely with 72 and then Friday with 56. Most messages sent on Saturdays are questions (24.4% of the total of Saturday's messages) or personal information (32.9% of the total of Saturday's messages). Again, it does not seem to be the case that the group in this study are using text messages to synchronise their social activities. It could be that as the Finnish studies suggest, young people use the mobile phone and text messaging to stay in contact when they are physically apart (Roos, 2000; Puro, 2002). However, these studies were of teenagers and our studies were of an older age group. Further comments on this will have to wait until the content of the messages themselves has been examined in rather more detail.

It might seem that rendezvous would be one of the most popular uses for text messaging. One could imagine users checking where each other were in order to synchronise a meeting but in fact, these figures do not support this idea. Categories 3 and 4 are both about meeting. Category 3 describes an on-going meeting, occurring now and category 3 is a meeting arranged for the very near future perhaps an hour or two away. Category 5 was for future events maybe weeks or months away. In fact, even if categories 3 and 4 are collapsed, it is still a meagre 7.69% of the total text message population and future events only adds another 3.06% which still makes the rendezvous concept one of the least popular of the text messaging categories.

4. Categorisation and confidence

It would be nice to say that after training the subjects correctly assigned all messages to the same categories. However, that is not the case although a high degree of consensus did emerge. Table 4 shows the level of agreement. Total consensus was achieved for 53 message categorisations—that is 15.73% of the categorisations. At a level of 50% consensus 75% of the messages had been categorised.

Table 4
Levels of agreement between classifiers

% Consensus	Number of messages	% of total messages	Average classifications
100	53	15.73	5.6
90	53	15.73	5.6
80	80	23.74	6.2
70	135	40.06	5.7
60	155	45.99	5.7
50	254	75.37	6.2
40	310	91.99	6.2
30	320	94.96	6.5
20	337	100.00	6.5

Classification is arbitrary. It typifies a human response to the complex, an attempt to simplify and to bring order into a world that would otherwise be composed of a myriad of individuals whether they are animate or not. These classifications were developed in conjunction with a data set of 60 plus initial messages collected from the subjects' own phones. These classifications were applied by people who had not necessarily received nor sent the individual text message. To a large extent the interpretation of content depends on the receiver of that content. Interestingly, Kasesniemi and Rautiainen (2002) comment that young people sometimes show their messages to other friends in order to find out if they are interpreting the message correctly and have understood tone and implication. It has to be noted therefore that messages that appear to us as classifiers to be abusive, opaque, affectionate, etc. might to the receiver imply something quite different and something quite different again to the sender. In classifying we impose our agreed order on the world in an attempt to simplify. As Bowker and Star (2000) have said sometimes the attempts to simplify, create structures much more monumental than the originals ever did.

5. Conclusions

With regard to the first study, questionnaires were distributed to all age groups but there are smaller numbers of respondents outside the age range of our students who conducted this study as part of their normal course work. The high incidence of awareness of new technology makes us believe that this is not a representative sample of the population at large but it is probably a representative sample of university undergraduates and their associates. A batch of questionnaires was taken to a mobile phone shop and again it could well be that we have biased our sample though it would be difficult to decide exactly in which direction. The second study was carried out on a group of university students and one tutor, and again this may not be representative of the population as a whole.

However, the 565 questionnaires and the data set of 337 messages offers some tantalising glimpses into how messaging is being used. The subjects in this latter study appear to be texting particular types of content although there is no way of telling from this whether the other forms of communication they use—face to face, phone, e-mail—are likewise heavily biased towards the categories identified here. We can only speculate at this point in time, in the absence of supporting data. The Finnish studies have shown that young people use text messaging for a wide variety of activities that on our first study we ruled out as unlikely. However, it could be that the younger age groups know less restraint when it comes to using text messaging. Certainly, the respondents in our questionnaire survey thought that offering condolences for example, was not something that should be done with a text message and quite clearly had a sense of appropriateness of various mediums though to be fair, two respondents (one male and one female) thought that faxing someone to ask for a date was perfectly acceptable. It might be that the teenage users having grown up with text messaging are far more comfortable with it and therefore see it as just another means of communicating with their circle. Clearly, a different set of rules apply and a different sense of propriety (Ling, 2004).

Our findings showed that text messaging activity declines with age and various studies have shown that mobile phone ownership is much more widespread than the use of text

messaging itself. A study by Kasesniemi and Rautiainen (2002) over several years, on 1000 Finnish teenagers aged 13–18 years concluded that the 'average age of text message users… is constantly decreasing'. The study by Davie et al. (2004) of 351 10–11-year-olds found that 94% of the children had sent or received text messages. Again, as the technology becomes cheaper and the prepaid phones become the norm, these figures could rise.

These results concur with a UK report suggesting that people in the 15–25 year age range are abandoning e-mail perhaps in favour of text messaging perhaps because mobile phones are more readily available to them (and more private) whereas computers with email facilities are more available to the older age groups for reasons already discussed (Barclays Quarter Internet Report, 2001). However, in their study of the co-operative behaviour of 16 graduate students over 5 weeks, Schrott and Glückler (2004) found that email was favoured over SMS. They suggest that this might be because mobile email facilities were available to the students; in other words it could be that SMS is used only when other technologies are not available.

Text messaging seems to be more popular with women perhaps because they are less comfortable with speaking aloud in public, or it could be due to the designs of the phones themselves which are awkward for larger fingers and may be more difficult for men to use. Incidentally, the introduction of much better auto-complete capabilities has made text messaging easier and perhaps with better designed keyboards which support texting rather than number dialling, more people will use the facilities (Öquist and Goldstein, 2004). However, the heavier use of text messaging by women could be simply that women are communicating in the new medium at the same levels as they communicate elsewhere rather than favouring the new medium over other forms. In our study, the heaviest sender and receiver of text messages was a young woman whose text messaging behaviour most closely resembled the descriptions provided by Faulkner and Culwin (2001) and coincided with Culwin's comments at the presentation of the 2001 paper on his 20-year-old daughter's behaviour. More data collection is needed to examine this issue in more detail. The Finnish studies comment that boys send shorter messages than girls and do not use text messaging for gossiping to the extent girls do (Kasesniemi and Rautiainen, 2002). Again, this may go back to the idea that the genders do not view the tool in the same way.

As regards to the differences between male and female attitudes towards using SMS to make dates, it has been pointed out to the authors that making dates with boys is something girls tend to do egged on by a mate or with a group of mates. It could be that text messaging lends itself more easily to that. Certainly, a mobile phone with text messaging capabilities is something a younger people are more likely to have and again it is the privacy that is important. A girl might be happy to share her dating secrets with her best friend but she will be less likely to want her father reading her attempts on a family based e-mail system. Again, this coincides with studies elsewhere that show girls are more likely to carry out their texting as a group activity and are more likely to show other people their text messages (Weilenmann and Larsson, 2001; Kasesniemi and Rautiainen, 2002).

Furthermore, asking someone out on a date carries with it the possibility of rejection. A phone call is potentially more embarrassing. This might support a tentative argument that some women have found text messaging empowering when it comes to asking for dates. Possibly, they still have less experience than men at asking someone out and text

messaging gives them the necessary distance. This issue of distancing and avoiding unpleasant retorts by using text messaging (for example, in order to end a relationship) has been commented on elsewhere (Harper, 2001).

SMS seems at the moment to be a medium favoured by the young (Ling, 2000, 2004) and certainly, it started-off as a medium used by the young with parents expressing feelings of being excluded from this technological advance (Ling, 2004). It has been observed that parents both resist and push the ownership of the mobile and that sometimes these seemingly conflicting attitudes are in response to the age of the offspring, again this will have an impact on phone ownership (Ling 2000, 2004). However, arguments about phone bills between parents and youngsters seem to be typical (Ling, 2000, 2004) and youngsters still prefer to use the landline when they can, often using the mobile to check the availability of the person they wish to contact first (Edridge, 2004). This reinforces the idea that the mobile phone is being used by teenagers especially, because it confers benefits—i.e. that of privacy—rather than it being a better technology to use than the landline. Other studies hint at the availability of technologies as a reason for young people's enthusiastic use of mobile phones and text messaging (Davie et al., 2004; Grinter and Eldridge, 2003; Sillence and Baber, 2004) but more work would need to be done in this area.

As for rendezvous not producing the numbers of text messages we expected, other studies have shown that many mobile phone calls appear to be about where people are and to help in planning. It may be that immediate rendezvous, therefore, requires a phone call. This finding is interesting in the light of Grinter and Eldridge's study of 10 teenagers between the ages of 15–16 where 9% of the texts led to face-to-face meetings although planning meetings occurred in 25% of the threaded conversations and 7% of the single exchanges (Grinter and Eldridge, 2003). Ling's work on the use of the mobile phone by teenagers suggests that the mobile is used for planning and scheduling in a much looser fashion that would otherwise be possible. Plans can be changed or left vague—but these plans would not necessarily be made and remade via SMS (Ling, 2000, 2004; Urry, 2002) and our study would seem to support that idea.

The lack of reliance on textish to condense the space of the messages contradicted our expectations from studies carried out elsewhere on the use of text messaging by young people. The study by Kasseniemi and Rautianinen (2002) found that teenagers used more formal language the more distant the person was from the family and social circle, so a text message to a music teacher would be formal, a message to a parent would resemble spoken language and a message to a friend would contain abbreviations and perhaps missed spaces between the letters. Their work is based on a long term study of text messaging which began in 1997 and by 2002 had interviewed about 1000 youngsters. Kasesniemi and Rautiainen remark that when they examined messages from individual teenagers over a period of a year they found that the content and tone of the messages changed. To start with messages were more structured and formal and gradually became more fluid and less like the written language. It could be that as more text messages are sent so users adopt and shorten their language or it might be that the younger age groups use their phones to gossip in a way that the older age groups do not, so whilst the youngsters need to condense messages there is no need for the older age groups to do that. Kasesniemi and Rautiainen's

study gives no breakdown for the behaviour of texting teenagers so that it is impossible to carry out a comparison with our work.

In assessing the impact that the business world could have upon text messaging it is important to remember that texting is not easy and it could well be that a more usable service could bring in larger percentages of the overall mobile user population as well as increasing the messages being sent by those who are active now. However, as Grinter and Eldridge have pointed out: this young generation of SMS users will one day enter the business world and have families. The question remains whether they will bring their text messaging skills with them and therefore place a new communications slant on working and social life (Grinter and Eldridge, 2001) or if they will revert to easier to use, and with adulthood more readily available, technologies as suggested by Schrott and Glückler's study (2004).

At present SMS appears still to be growing rapidly but as mobile phones continue their merger with PDAs and cameras, and replace the laptop perhaps the future for SMS is not as straightforward as it appears to be from the data gathered so far. As Norman says, technologies change through their associations with users and it could be that the current SMS is but a little step towards a much more usable and effective communications medium.

6. Future work

We intend to build on these studies by a further investigation into SMS behaviour and picture messaging to see how far that figures in every day communication. A comparison between that and the prevalence of digital images sent by email might also be a worthwhile study. The question of how many text messages are singletons (i.e. receive no answer) was not examined in our diary study. It has been examined extensively in the various studies of teenagers but it would be interesting to extend this work to older age groups. There is also the issue of how long senders of messages are prepared to wait for replies over the various methods of communication. The question of the influence of textish is likewise an intriguing one. It might be worth investigating as to whether the abbreviations from text messaging (textish) spill over into email amongst groups that habitually use textish for texting or if they resort to more conventional email 'language' which has its own shortened versions. Finally, the messages from the diary study await further investigation as to language structure and a more detailed examination of their content.

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