

2007

THE SOCIAL AND PSYCHOLOGICAL EFFECTS OF SMS TEXT MESSAGING

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<http://hdl.handle.net/10026.1/1635>

<http://dx.doi.org/10.24382/3781>

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THE SOCIAL AND PSYCHOLOGICAL EFFECTS OF SMS TEXT MESSAGING

By

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A thesis submitted to the University of Plymouth
In partial fulfilment for the degree of

DOCTOR OF PHILOSOPHY

School of Psychology
Faculty of Science

May 2007

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THE SOCIAL AND PSYCHOLOGICAL EFFECTS OF SMS TEXT MESSAGING

This thesis reports an exploration of the phenomenon of mobile phone SMS text messaging and examines the applicability of two key theories of computer-mediated communication that forecast contrasting outcomes of this medium for personal relationship development and maintenance. It explores how SMS texting is being used, the impact it can have on the formation and maintenance of interpersonal relationships, and its attraction to particular groups of users. The importance of individual differences in moderating the use and outcomes of text messaging is emphasised throughout the studies reported.

The investigation was split into two phases. An exploratory phase analysed samples of text messages collected in one-shot studies (Studies 1 and 2) and a longitudinal study (Study 3), and provided initial evidence for the social-relational use of SMS that refuted a cues-filtered-out approach. These studies also focussed the investigation on the hyperpersonal potential of SMS—the possibility that text messaging can facilitate more intimate contact than can be achieved in face-to-face settings. Study 4 examined the uses and gratifications of text messaging and revealed that there were two groups of users ('Texters' and 'Talkers') who differed in their motivations for using the medium.

The experimental phase extended the Hyperpersonal Model, first by examining the role of perceived affordances and individual differences in impression formation in text interactions between strangers (Studies 5 and 6), and second by examining more closely two processes assumed to contribute to hyperpersonal communication in this setting—selective self-presentation by the sender, and the over-attribution of personal characteristics to the sender by the receiver (Studies 7 and 8). These latter studies utilised a novel quasi-signal detection approach to investigate this in more detail. It was found that over-attribution had a stronger impact on some of the impressions formed, although there was tentative evidence for a sender effect too, suggesting a combination of these two processes is at work.

A weak and strong version of the Hyperpersonal Model was discussed, whereby communication can indeed become hyperpersonal for certain people who have discovered the social affordances of the medium. To accommodate this, a Social Affordances Model of Text Messaging was developed over the course of the thesis to explain how SMS is used and its potential outcomes. The present results suggest that those who are socially anxious are more likely to prefer using their mobile to text rather than to talk, and this in turn is related to more expressive message content and social-relational uses and gratifications beliefs. These findings point towards the importance of the affordances of visual anonymity, asynchronicity and text-based communication, which together make text messaging an important medium for individuals to gain control over their self-presentation in challenging interpersonal relationships. This adds to the existing literature as it identifies individual differences, specific affordances of text messaging and potential relational outcomes.

The thesis argues that there is an interaction between the technological and psychological affordances of text messaging and the ability of individuals to recognise these and to capitalise on them when needed.

Acknowledgements

I would like to take this opportunity to thank the many people who have helped over the last few years. There are so many people to mention by name, who have offered their support, advice and friendship throughout the course of the project. Thanks firstly to my Director of Studies, Dr. Fraser Reid, for his guidance, encouragement and pep talks from start to finish, and who still seems to know the answer to everything! This thesis hopefully reflects the great synergistic relationship we had on the project. I'd also like to thank my second supervisor Professor Jonathan Evans for his assistance during the write up. Your book helped greatly too! Thanks to Professor Steven Furnell, Nathan Clarke and the Network Research Group, for taking me under their wing and providing me with many research outlet possibilities. Thanks also to Professor Paul Reynolds and Orange, for supplying the handsets and contracts for the later studies.

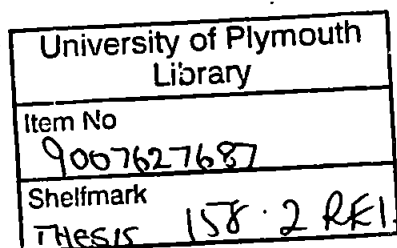
There are many other people within the school who deserve mentioning, and without whom the research would not have gone as smoothly. Thanks to all the technicians who were always so helpful- Simon, Mark, Ben, Ian and Lynne; And to Geraldine and Gill, who helped me out in so many ways from raiding the stationary cupboard to multiple office moves!

This work was funded by the ESRC, to whom I am grateful for allowing me the opportunity to do the work in the first place.

Huge thanks are given to my mum, grandad and little brother James who were there when I needed them the most, and allowed me to believe in myself. Also to Stephen who as well as giving me support through the toughest parts, gave me the opportunities to switch off and keep sane, putting up with the ups and downs along the way. Similarly, thanks to Roger for taking me in as part of the family. I will be forever thankful to you all.

Also special mention to my friends Helen, Pete, Alison, Ian, Janet and Val, you all helped keep me positive when everything seemed so bleak.

The last few years have been an amazing journey, and I am grateful to you all for being there for me.



Authors Declaration

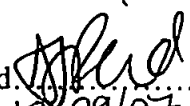
At no time during the registration for the degree of Doctor of Philosophy has the author been registered for any other university award without prior agreement of the Graduate Committee.

This study was financed with the aid of a studentship from the Economic and Social Research Council.

Relevant scientific seminars and conferences were regularly attended at which work was often presented; and several papers prepared for publication.

Publications and presentations and conferences attended are listed on the next page.

Word count of main body of thesis: 90,827 words.

Signed 
Date...10/09/07

Publications

Journals

- Reid, F. J. M. & Reid, D. J. (in press) The expressive and conversational affordances of mobile messaging. *Behaviour & Information Technology*.
- Reid, D. J. & Reid, F. J. M. (in press) Text or talk? Social anxiety, loneliness, and divergent preferences for cell phone use. *CyberPsychology & Behavior*, 10 (3).
- Reid, F. J. M. & Reid, D. J. (2004) Text appeal: The psychology of SMS texting and its implications for the design of mobile phone interfaces, *Campus-Wide Information Systems*, 21 (5), 196-2000.
- Reid, D. J. & Reid, F. J. M. (2005) Online focus groups: An in-depth comparison of computer-mediated and conventional focus group discussion. *International Journal of Market Research*, 47 (2), 1-32.
- Reid, D. J. & Reid, F. J. M. (2004) The social and psychological effects of text messaging. *Journal of the British Computer Society* January.
- Reid, D. J. & Reid, F. J. M. (2005) Texting in context: The conversational use of mobile phone texting. *Proceedings of the British Psychological Society*, 13 (2), 115.
- Reid, D. J. & Reid, F. J. M. (2005) Face-to-face versus computer-mediated focus groups. *Proceedings of the British Psychological Society*, 12 (2), 136.

Chapters in Books

- Reid, D. J. & Reid, F. J. M. (2005) Textmates and text circles: Insights into the social ecology of SMS text messaging. In: Lasen, A. & Hamill, L., *Mobile World: Past, Present and Future*, Springer Verlag: London.

Refereed Conference Contributions

- Reid, D. J. & Reid, F. J. M. (2005). Mobile phone text messaging: A user oriented perspective. In: ISOneWorld 2005, Las Vegas, USA, 30 March - 1 April
- Reid, D. J. & Reid, F. J. M. (2004). Texting to know you: Forming impressions of new acquaintances through SMS text messaging. In : *BPS Social Psychology Conference* , University of Liverpool, 1-3 September.

- Reid, D. J. & Reid, F. J. M. (2004). Texting in context: The conversational use of mobile phone text messaging. In : *BPS Social Psychology Conference* , University of Liverpool, 1-3 September.
- Reid, F. J. M & Reid, D. J. (2004) Text appeal: The psychology of SMS texting and its implications for the design of mobile phone interfaces. In S.M. Furnell & P.S. Dowland (eds.) *INC2004: Proceedings of the 4th International Network Conference* , Plymouth 6-9 July . pp. 511-518.
- Reid, D. J. & Reid, F. J. M. (2003) Face-to-face vs. Computer-mediated focus groups. In: *BPS Social Psychology Conference*, London School of Economics, 10-12 September.
- Reid, D. J. & Reid, F. J. M. (2003) Textmates and text circles: The social ecology of SMS text messaging. In *The Digital research centre: Proceedings of the Fourth Wireless World Conference, The mobile Revolution- A retrospective; Lessons on Social Shaping*, The University of Surrey; U.K; 17-18 July.

Reports & Invited Presentations

- Reid, D. J. & Reid, F.J.M. (2004) Sociable texting- improving the mobile interface. In *Mobile computing: Requirements and Applications*. The British Computer Society (South West Branch), 13 April.
- Reid, F. J. M. & Reid, D. J. (2004). The psychology of online communication: How email disputes can escalate. *Wired West Inaugural Meeting*, DTI, Exeter, 28 Jan 2004.
- Reid, D.J. & Reid, F.J.M. (2004). *Insights into the social and psychological effects of SMS text messaging*. Available online at www.160characters.org.
- Reid, D.J. & Reid, F.J.M. (2004). *The social and psychological effects of SMS text messaging*. British Computer Society (South West Branch) January.

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CD ROM: PhD Data and Research Output

Studies Data

- Study 1
- Study 2
- Study 3
- Study 4
- Study 5
- Study 6
- Study 7
- Study 8

Research output

- Conferences, conferences, presentations
- Grant/Business proposals
- Papers
- Press coverage

Glossary

C

CFO Cues Filtered Out

CMC Computer Mediated Communication

E

EMS Enhanced Messaging Service

Email Electronic Mail

F

FTF Face-to-Face

G

GSM Global System for Mobile communication standard

I

ICQ 'I seek you', an IM application

IM Instant Messenger

IPIP International Personality Item Pool (Goldberg, 1999)

M

MMS Multimedia Messaging Service

S

SDT Signal detection theory

SIDE Social Identity explanation of De-individuation Effects

SIP Social Information Processing

SMS Short Messaging Service (mobile phone text messaging/ texting)

V

VC Voice call

Chapter One: The Psychological Appeal of Mobile Phone Text Messaging, Parallels with Computer-Mediated Communication, and Potential Theoretical Explanations

1.0. General Overview

This thesis is concerned with the social and psychological impact of mobile phone text messaging, otherwise known as 'short messaging service' (SMS). This chapter provides an overview of what SMS text-messaging is, and sets the scene for the later chapters. It draws upon theoretical models and work that has been done in the closest area to this one - that of computer-mediated communication (CMC).

To help classify the type of communication that this thesis is concerned with, it is useful to refer to Applbaum *et al.*'s (1973) seven levels of communication:

- i. Intrapersonal
- ii. Dyadic
- iii. Small-group
- iv. Intercultural
- v. Public Speaking
- vi. Mass-media
- vii. Non-verbal

Text messaging falls into the dyadic and small group categories and it is these that will be focussed on, as was the case with Short, Williams and Christie (1976) when considering the impact of telecommunication media. The seventh category of non-verbal behaviour is important to consider due to the variations in the level of it between face-to-face and text messaging interactions.

This chapter is in four main parts. Firstly a brief history and description of the communication phenomenon of SMS text messaging is given. Then a comparison of

this medium with other electronically mediated communication media is given, with a discussion of the history of the impact of communication technologies. The third part consists of a discussion of the theoretical models that are at the forefront of research into the effects of computer-mediated communication on human behaviour.

Predictions deriving from these models for SMS text messaging will be discussed.

Finally the broad aims of the PhD and programme of work are specified.

By the end of 2004 when work on this programme of research began there were an estimated 1.52 billion mobile phone users world wide (Cellular Online, 2004). In a MORI survey in 2005, 82% of the UK population used mobile phones (MORI, 2005). Indeed, the mobile phone had by then become a somewhat omnipresent feature in everyday life (Vincent, 2003). Over the past decade, the mobile phone has evolved from being a device used to talk to others to one which has multiple functions. It can be used to send SMS text messages, to take and send pictures, to browse the Internet, to record and watch video clips and to listen to the radio. The two predominant communication uses the mobile affords are voice calls and SMS text messaging, or 'texting' (MDA, 2007). It is this latter technology that forms the focus of this thesis.

1.1. What is Text Messaging?

To set the scene for the present chapter, a brief history of text messaging is needed. By the end of 2005, an estimated 80% of the UK owned a mobile phone (Reuters, 2005). Text messaging referred to in this PhD is that of the Short Messaging Service (SMS) provided on mobile telephones. SMS was not intentionally created for use by the public, it was actually developed as part of the GSM standard to send call information to mobiles from an SMS centre (Haig, 2002). On the 3rd December, 1992,

Neil Papworth, an engineer at Vodafone UK, sent the first ever mobile phone text message "MERRY CHRISTMAS" to his work colleagues (Textually.org, 2004a). In 1994, two-way text messaging was introduced and allowed for the communication by text that we see today. A single SMS message can only take 160 bytes of information at a time, and as 1 byte is equivalent to 1 character, the restriction of a text is set to 160 characters per billed message.

On first impressions it is hard to imagine how text messaging has become so popular. On early handsets, users were presented with a small, cramped keyboard with which to type a message, each "multi-tap" key requiring a number of presses to get the character that was wanted. The screen was typically no more than one inch square, leading to a limited display of the message. Many of the displays were not backlit and were of poor contrast making the message quite hard to read. However the value of sending a text message seemed quickly to overcome the difficulty of physically typing it in on the early mobile handsets (Jenson, 2004; Sun, 2003). Present day handsets offer larger, backlit, colour screens and predictive text messaging. However the keyboard issues still remain, with a very limited number offering full Qwerty keyboard functionality. Yet still the phenomenon of SMS texting continues to grow and impact on the way people communicate.

One of the major turning points that really helped texting take off was the advent of 'pay as you go' tariffs introduced in Europe in the mid 90's which allowed younger people with limited finances to be able to own a handset and "top up" the credit when funds allowed (Joinson, 2003). By the start of the 21st century, texting had exploded onto the communication scene. Indeed the best selling book in the UK for Christmas 2000 was a guide to texting (Joinson, 2003). As well as being used to communicate with other people, texting is also now used for a wide range of other

purposes including text voting (typically for TV reality shows), paying parking tickets and entering competitions.

Certainly it can be said that the increasing and widespread use of SMS texting has revolutionised communication in today's society. By 2002, it was estimated that over 72% of western Europe use a mobile phone (Katz & Aakhus, 2002). They have become popular with very young children too, so that by 2003 at least 400,000 children under 10 years of age in the UK owned a mobile (Cellular news, 2003). By 2006, over three billion messages of up to 160 characters were sent each month in the UK alone (aolmobile.co.uk, 2006). Nokia, the market leader in mobile technology, was able to claim that "...mobile messaging is the modern way to communicate. It's instant, location independent, and personal. That's why the new mobile phone generation has started to favour messaging, making it one of the fastest-growing segments of the mobile communications industry" (Nokia.com, 2002). The growth in the volume of text messaging—particularly among young people (Haig, 2002)—is a social phenomenon which needs to be explained, and its impact on human relationships and psychological well-being understood.

Since the advent of two-way text messaging in 1994, the number of texts sent has grown at a phenomenal rate (see Figure 1.1). In 1999, the total number of chargeable person-to-person text messages sent across the four UK GSM networks was around 1 billion. This figure rose to 11 billion in 2001. By 2005, 32 billion texts were sent compared to 48 million in September 2002. The Mobile Data Association (MDA) reported texting had reached over 40 billion for 2006 (MDA, 2007). Worldwide, 1.25 trillion SMS text messages were sent in 2005 (Atun & Sittampalam, 2006). In 2003 around 10% of mobile operators revenues were forecast to come from texting, and this is predicted to rise to 29% by 2008 (Lin & Zhou, 2003). This is a

large portion of their revenues and is made all the more enticing by the relative cheapness of providing the service compared to other services such as phone calls and the mobile Internet. So the use of SMS text messaging seems still to be on the increase and most industry experts predict that it will continue to rise (de Lussanet, Nordan & Roitman, 2002).

In a MORI survey in 2005, texting was used by a reported 89% of 15-24 year olds, 85% of 25-34 year olds, 76% of 35-44 year olds, 61% of 45-54 year olds, 37% of 54-64 year olds and 11% of those over 65 years of age. The phenomenal market penetration of this new communications technology demands explorations into the social and psychological impact that it has on the millions of users that foster it.

No other technological device has infiltrated so widely and quickly as the mobile phone (Hulme & Peters, 2001; Goggin, 2004). Many people have reported that they feel it impossible to imagine their life without a mobile phone (Motorola, 2002). It has been reported in the press that 46% of 25-34 year olds reportedly cannot live without their mobiles (Sky News, 2003; BBC News, 2003). According to Livingstone (2004), 28% of 9-19 year olds report that they would actually miss the mobile phone more than they would miss the TV and the Internet.

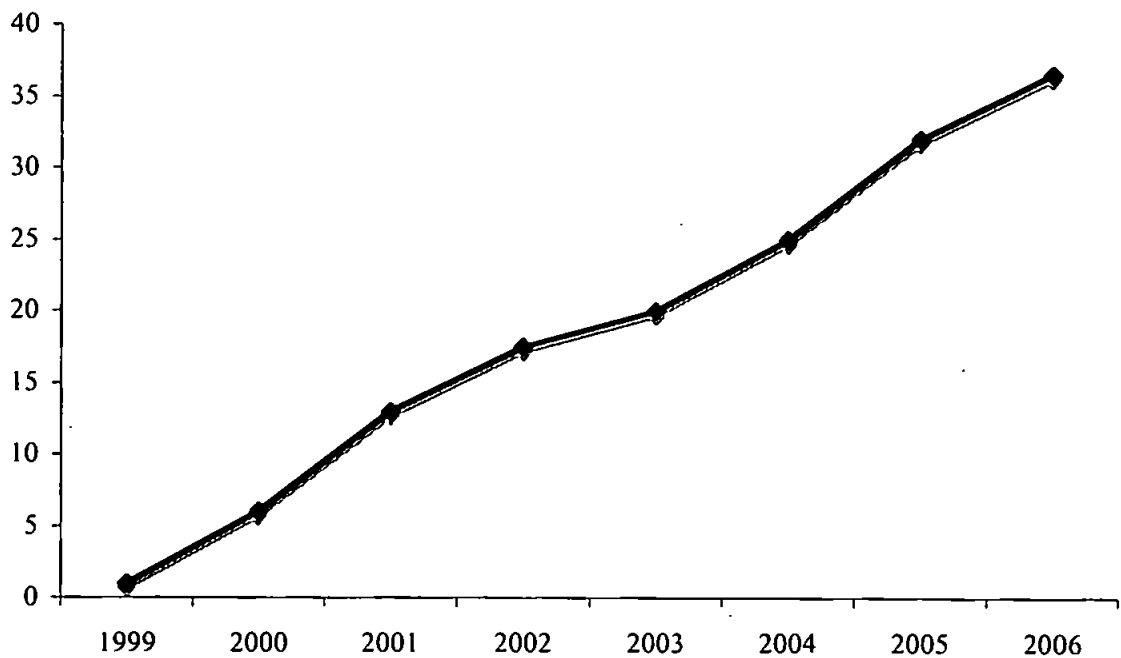


Figure 1.1. Texts sent (billions) across 4 major networks in the UK (MDA, 2006)

1.1.1. Parallels with Computer-Mediated Communication

Unsurprisingly, there was an acute absence of psychological research on text messaging when the current programme of research commenced. Whilst the use of mobile phones for making voice calls attracted some interest (e.g. Taylor & Harper, 2002, Katz & Aakhus, 2002), research into mobile messaging had not kept pace with the uptake of this mode of communication. Even now, nearly four years on, there is sparse literature covering text messaging and what there is seems to be mainly descriptive and framed within a sociological perspective (e.g. Taylor & Harper, 2003; Thurlow, 2003). Due to the lack of psychological research into SMS, theoretical ideas and predictions will be drawn from a closely related text-based but comprehensively studied area - that of computer-mediated communication (CMC). Computer-mediated

communication includes keyboard-based communication methods such as email, Instant Messaging (IM), Internet chat-rooms, discussion groups, and online gaming worlds. The main feature of computer-mediated interactive communication technologies are the 'capacity to store and transmit large amounts of information combined with instant, interactive and perpetual connectivity' (Pertierra, 2005, p26). Table 1.1 shows some of the properties of the main types of Internet communication and SMS messaging (adapted from Joinson, 2003, p24-25).

Table 1.1. Properties of different communication media

Medium	Synchronicity	Cues/format	Anonymity- type and level	Exclusivity	Mobility
Telephone	High	Voice	Visual/Low	Sometimes- not party lines	Low for landline, high for mobile
SMS	Medium	Text	Visual/Medium	Yes	High
Instant Messenger	High	Text	Visual/high	Yes	Low
Email	Medium	Text	Visual/Medium	Yes	Low

As can be seen from the Table, like email and Instant Messenger, SMS is text based and as such users are visually anonymous. SMS is slower than IM in terms of synchronicity, and the main difference between SMS and both email and IM is that SMS is mobile.

In comparing teens usage of different media, Livingstone and Bober (2004) asked 9-19 years old Internet users about their use of different electronic media. They

found that 51% used text everyday, 24% used instant messaging (IM), and 20% email. When asked for a preference, the majority preferred texting compared to IM and email.

There are some similarities between text-messaging and CMC. The primary use of text-messaging, such as CMC, is communication. Tyler (2002) suggests there is a positive social impact of CMC as it increases the frequency and quality of interpersonal communication among people, which in turn should lead to people feeling better connected, and supported. This should also hold true for mobile text messaging.

Instant messaging, a text-based computer conference over the Internet between two or more people, is perhaps the most similar medium to text messaging. Grinter and Palen (2002) reported that teenagers prefer to use IM because of the constraints they face when using other methods of communicating, for example their cost (e.g. the telephone), the lack of places to congregate together (e.g. face-to-face), as well as for reasons of the medium's unique conversational affordances. Similar to the reasons people may choose to use text. The main difference between text messaging and IM concerns their temporal characteristics - IM is more immediate than text messaging, and exchanges usually take place in real-time. Typically responses are quickly typed, with little time for self-reflection.

There are also some major differences between CMC and text-messaging. Text-messages are restricted to a limited number of characters per message compared to the unlimited length of messages in email/IM. This means that users have to economise in their use of language to be as concise as possible.

Perhaps the biggest difference is the mobility that is afforded by the *mobile* phone. Users do not have to be constrained to a specific physical location as much

with a mobile phone as they do with CMC and face-to-face communication. Indeed, this feature potentially allows for perpetual contact with mobile phones (Katz & Aakhus, 2002). This term defines the sense of social connectedness that a mobile phone can provide, the feeling that one is within a key-stroke of being touch with another person, and the 'always-on' potential for social connectivity that it brings (Rheingold, 2003).

Unlike the CMC research where respondents are found to have 'Internet' friends and 'real' friends; texting is integrated more closely into one's real social network rather than to a different social network altogether. Therefore one's 'text' friends are also one's 'real' friends. This is expected to hold true for the majority of 'text-mates', but maybe not all - there may indeed be some people who have a purely text-based relationship, but these are expected to be a minority. Research on IM has tended to show that most contacts on IM are 'real space friends' i.e. those friends people knew and had seen face-to-face beforehand (Grinter & Palen, 2002). However a recent study by Bryant, Sanders-Jackson & Smallwood (2006) found little evidence of overlap between online IM networks and offline networks.

In relation to SMS uses, it would be expected that the text-network would overlap with ones real network as one would need to have acquired a phone number for their contact in order to text them. So the mobile may be used to complement rather than replace existing communication in that it is used between those who have already met physically (Geser, 2004).

Of course there are exceptions, such as SMS dating lines whereby people are given numbers of other people with whom the dating agency has matched their compatibility. Also there are reports of 'Smartmobs' (Rheingold, 2003), loosely organised groups that micro-coordinate their activities for specific purposes, eg. text

messages were used to rapidly organise a demonstration to overturn the Estrada government in the Phillipines (Katz & Aakhus, 2002). In the Phillipines virtual friends are commonplace - individuals send a text to a random number and start chatting! They ask 'may I be your textmate?' and go on from there. There have been some reports of marriage resulting from this (Pertierra, 2005).

Another potential difference between CMC and text messaging is in self-disclosure. People have been found to self-disclose highly personal information about themselves on the Internet purportedly because the risks of rejection and/or ridicule by friends and family are greatly reduced as one is communicating with strangers (McKenna, Green, & Gleason, 2002). However when a person uses SMS to text somebody they are often already acquainted with that person, so although they may be visually anonymous, they are not strangers. They are also more likely to meet each again in the future. As mentioned above, people are likely to text people who are in, or have access to, their social circle, so the dyadic boundary between the communicators could potentially be violated by text messages being leaked into their social circle. This may have implications for self-disclosure in text-messaging in that people may not reveal as much as they may otherwise have done in CMC. This research may be able to clarify this issue.

1.1.2. Characteristics of SMS Text Messaging

Perhaps one of the most unique properties of the mobile phone that sets it apart from a computer is that it offers the user an immediate choice between making a voice call and composing and sending a text message. On recent handsets, this choice has been widened to voice versus email and/or SMS. Choosing whether to text or talk is a significant initial step in using a mobile phone to connect with another person.

Which step is chosen will depend on the expectations and goals of the user, and the way these goals interact with the affordances of texting and talking. A number of attributes of text messaging have been proposed to account for the popularity of SMS.

Haig (2002) lists these as:

- *Cost*: It costs around 10 pence to send a text message so may be used as a cheap alternative to other media of communication like voice calls. However it has been found that cost may not be as straightforward a factor as this - cost actually may be small driver behind usage as sometimes it can prove to be more expensive to engage in a drawn out text conversation than just ringing someone in the first place (Jenson, 2004). In the authors own research it has been found that many people spend more on text than they do on voice calls (Reid & Reid, 2005).
- *Convenience*: The ease of which names, numbers and messages can be stored is a useful affordance of these devices. Texts can be sent at any time and place and can be quite discreet.
- *Immediacy*: Texts can be quick to type and are sent/received quite fluidly. This can create feelings of perpetual contact- that the other person is always there.
- *Privacy*: Texts can be covert and discreet, certainly more so than a face-to-face or voice call conversation.
- *Ubiquity*: According to Haig (2002), there are over 700 million mobiles worldwide which are able to send/receive texts.
- *Open communication*: Texting affords visual anonymity which may facilitate greater self-disclosure than is usual in other methods of communication.

Other important characteristics include:

- *Asynchronous communication:* Unlike face-to-face communication, text messaging is asynchronous. This has the beneficial affordance of allowing those who are interacting time for reflection and editing of their texts. Users can carefully construct their texts and re-read them as many times as they want before hitting the 'send' button. This offers invaluable opportunities for maximising one's self-presentation. . The asynchronous nature can also act as a cooling off mechanism (Etzioni & Etzioni, 1999) whereby the delay loop can help reduce any tensions that may build up. However, because the mobile phone is indeed *mobile*, one may not be as tolerant about delays in reply as they may be in other media, e.g. email, as it is expected that the other person will have their mobile on them at all times.
- *Visual anonymity:* The fact that people cannot see, or indeed be seen by, the person with whom they are communicating, offers a number of advantages. It can help those individuals who struggle in traditional face-to-face communication, for example those who are socially anxious and/or have a marginalised identity. It can give such people chance to communicate through a medium which they feel a lot more comfortable, and help them develop friendships that may not have been possible without such a technology. Visual anonymity can also aid in impression formation as it takes away traditional gating features such as physical appearance and attractiveness, which may hinder some relationships from getting off the ground in traditional communication. Visual anonymity can also lead to higher levels of self disclosure, or 'what individuals verbally reveal about themselves (thoughts, feelings and experiences) to others' (Derlega *et al.*, 1993). Self disclosure is a

major factor in relationship development as it reduces uncertainty and facilitates deeper relationships (Dindia, 1997). However, according to the CMC literature, visual anonymity can also lead to deindividuation which can result in disinhibited behaviour, termed as flaming. The evidence for this is mixed though, with many studies showing no evidence of such behaviour (e.g. Joinson, 2003, O'Sullivan & Flanagin, 2003).

- *Text only:* Text messaging in SMS is as it is as its name implies - plain text. There are no other modalities involved, although many phones now allow upgraded versions of SMS including Enhanced Message Service (EMS) and Multimedia Message Service (MMS). EMS allows for special text formatting (such as bold or italic), pictures and animations. MMS is the most recent messaging application and allows for photographs, music, animations and pictures to be sent to both mobiles and email addresses. Interestingly both EMS and MMS were postulated to lead to the eventual demise of SMS as operators believed their superior features would make SMS less appealing. However three years on, SMS is still by far the strongest messaging application, and again calls us to question what it is about this medium that is propelling its use.
- *Permanence of message:* Unlike face-to-face communication which is ephemeral, text messages are permanently stored on the mobile phone until deleted. This can have its benefits and drawbacks. It can be beneficial in helping people remember what was said and can be kept as a 'gift', for example token messages such as 'I love you' may be a pleasant reminder. Re-reading messages can function to build and maintain relationships (Kasesniemi & Rautiainen, 2002). However, the fact that there is a permanent

record can also be used to fuel arguments as an exact record of what was said can be provided and interpreted in many different ways. There is also the problem of security. At present none of the handsets on sale employ a security code to access text messages. As a result anyone with access to a person's phone may read the messages, which may cause problems if they get into the wrong persons hands. This links to the next point.

- *Sender-receiver exclusivity*: On the whole, people send messages to one person in particular. Then again, text messaging cannot be a totally trusted medium allow for private conversation between people. Not only does the recipient need to be trusted not to share certain texts, but also how does the sender know that someone else other than the intended recipient will not open the message?
- *Self-observation*: Users can participate in a relationship whilst at the same time being able to observe and reflect on themselves, as they can have a precise record of what they say and how they respond (Suler, 2000).
- *Identity flexibility*: Communicating through a visually anonymous medium allows people to be flexible in the way they present themselves (Suler, 2003). They can write and re-write their message until they are happy with the way they believe they are coming across and then send their message. They can respond to their recipients reply by being who they believe their recipient wants them to be. This opportunity for selective self-presentation may be a key draw of the medium to many people especially at the outset of a new relationship.

These are some of the key features of SMS. However the way in which people use a technology is a complex interaction between the features of that technology and the individual characteristics of the person. This thesis will begin to untangle some of the key individual differences that seem to predispose people to use to text messaging usage and value the relational outcomes it leads to, and allow us to differentiate the type of person who might typically benefit most from the medium from those that perhaps will benefit from using other methods of communication. What follows in the first part of the thesis is a more thorough discussion of key individual differences (Chapter 2), analysis of text message content (Chapter 3 & 4) and potential motives that lie behind text messaging (Chapter 5).

1.1.3. Cultural Differences in Communication Media Usage

In relation to cultural differences in use of communication media, little work has been done. There were 1.16 billion mobile phone subscriptions in 2003 (Ling, 2004), with 22 countries having adoption rates over 75%. In regards to text messaging the Philippines is the texting capital of the world with over 200 million texts sent per day, 10 times the world average (Pertiererra, 2005). Surprisingly the USA has a very low penetration rate. In 2003, Kornblum (2003) reported 12% of the 144 million mobile phone users in the USA used text messaging. The reason for this is thought to be problems with interoperability, whereby it is very hard to send a message to those contacts on a different mobile network (Woods, 2002). Also there are problems in that the receiver has to pay to receive the message which may be a deterrent to adoption (Ling, 2004). Another reason thought to be behind the low uptake is that in the USA the primary method of transport is driving. In Europe and Japan trains and buses are used more often and these are more likely to be open to the use of texting (Geser,

2004). In contrast to the States, texting has had a huge uptake in Europe. In Norway, 280,000 texts are sent per hour, a surprising figure given that the population is only 4 million. (Ling, 2003). Cross-cultural differences are not examined in the current work, although future work could investigate cultural differences between Europe and other countries - such as the United States - where SMS has not taken off.

1.1.4. Motives for Text Messaging

Many theories have attributed the effects of communication media such as CMC to the technology itself, i.e. technology determinism. Another way to approach this however is to focus on the users and why they intentionally choose a specific medium (Markus, 1994; Markus, 1994). In Markus' study, a large organisation's use of email was investigated. It was found that people chose to communicate via email deliberately as to avoid negative social outcomes such as intimidation. A negative effect of CMC may be what the user wanted in a particular circumstance, for example they may want to have social distance from the person with whom they are interacting. Markus concluded that: "research on the social effects of electronic communication technology should consider not only the technological characteristics of various media, but also those purposes and goals users attempt to accomplish through the media" (p145).

O'Sullivan (2000) highlighted the importance of the motivational influence of self-presentation and impression management in media choice, with people acting strategically to choose the medium that would present them in the best light. The greater control over self-presentation that is afforded by communication media such as CMC may make this method more appealing in certain situations, for example in initial interactions where people may be afraid of getting nervous and not being able

to think of anything to say, or when communicating bad news, such as the termination of a relationship.

Mediated channels offer ambiguity which can help in impression management strategies as they can conceal perceived flaws in appearance, help disclose embarrassing aspects about oneself, and avoid confrontation. So such strategic media use can help people attain self-presentational goals. This in turn may explain the positive effects of CMC observed on relationship development and maintenance (e.g. McKenna *et al.* 2002). So, according to O'Sullivan, self presentation is a central issue in choosing a medium to communicate. People aim to maximise benefits and minimise costs in relation to self-presentation. In his study he asked participants to think about a time when they felt their self-presentation was threatened or boosted and which of email, letters, answering machine, telephone and face-to-face communication media they would prefer for this interpersonal situation. The findings demonstrated that mediated methods were preferred when self-presentations are evaluated to be threatened or enhanced.

In examining the purposes and goals of the Internet, McKenna & Bargh (1999) argued that the Internet was not a vital utility, so people must connect to it because it gives them something they want and/or need. In a similar vein to O'Sullivan, they postulated that the reason many people use it is they want to feel they belong and to have a positive feeling about self and self-worth. Another potential reason is that CMC can support socio-emotional communication (Rice & Love, 1987). The same principles may be said of text-messaging as this is not a vital method of communication, yet people choose to use it, and to choose it at high levels.

So motivations can influence the way in which a medium is used, and ultimately the outcomes that medium can have on relationships. Utz (2000) found that

those people who typically develop friendships online are those that are less sceptical about the Internet's potential for relational development. Those individuals who were more sceptical were less likely to have found positive outcomes on their relationships from using the Internet.

For mobile text messaging these motives will be investigated, along with possible individual differences. One of the present studies was conducted specifically to find out potential reasons why people used their mobile phone for text messaging, using the uses and gratifications approach employed by Leung (2001). This discussion can be found in Chapter 5.

1.1.5. Relationship formation

In contrast to early fears of loneliness and decreasing networks of real-world contacts, the Internet has been found in recent research to offer positive effects on relationship formation and development. In fact, social communication is one of the most common reasons for using the Internet (Hamburger, Wainaper & Fox 2002).

CMC has been found to aid in relationship development and maintenance. For example, email was found to improve the lives of people who used it frequently by encouraging deeper social connectedness, and enabling users to have larger social networks than non-users. In another survey, it was found that 48% of 12-17 year olds in the USA reported that email had improved their relationships. The use of IM in America is also quite widespread amongst teens. One in five teens report IM is the main way they converse with friends and that they find it essential to their social life, reporting that it allows them to be their 'true self'. Over 37% used IM to say something they felt uncomfortable saying face-to-face, 17% used it to ask someone out and 13% used it to end a romantic relationship (Lenhart, Rainie, & Lewis, 2001).

Parks & Floyd (1995) have reported that online relationships and offline relationships are similar in terms of their depth, breadth and quality. McKenna *et al.* (2002) reported the results of a large scale survey of Internet users, many of whom had formed a close relationship with someone they had met online. Fifty per cent of these relationships had moved into the face-to-face domain, and 22% of those had resulted in marriage, cohabiting or engagement. In their laboratory studies to investigate why relationships may develop on the Internet, McKenna *et al.* found that meeting someone online led to greater liking for ones partner as the traditional gating features (appearance, accents etc) are hidden and people feel better able to express their 'real' self, leading to increased self disclosure. Similarly, Hancock and Dunham (2001), have reported that deeper more intense impressions of ones communication partner are formed through IM than through face-to-face communication, although the number of attributes participants felt able to rate their partner on was significantly less than those who met their partner face-to-face.

There have been reports of more partner idealization in CMC conditions compared to face-to-face (Bargh, McKenna & Fitzimons, 2002). Mabry (2001) has reported an 'online halo effect', whereby interactant's communicating via CMC take for granted the genuineness of their interacting partner and rate them more positively than if they were communicating face-to-face.

Self-presentation theory is highly relevant in explaining some of these effects. This theory that is based on the assumption that in social situations individuals try to control images of themselves and identity relevant information (Schlenker, 1980), and strive to portray themselves in a way to serve their best interests, to gain approval, to avoid disapproval from others and so on (Stritze, Ngyen & Durkin, 2004). The theory argues that a central aspect of interpersonal relationships is impression management

(Schlenker, 1980) and that people attempt both unconsciously and consciously to control their image in social interactions as they are concerned with how they are perceived or evaluated by others (Leary, 1995).

‘As soon as other people are encountered we form some impressions of what they are like, how they are likely to behave and how they should be treated. Everyone has stereotypes about others based on their hair color, eye color, complexion, race, sex, height, weight, clothes, jewellery, possessions, place of residence, home furnishings, and so on. Personal appearance, props, and scenery provide a major basis for identity’ (Schlenker, 1980, p268).

For individuals wanting to manage impression formation, there are a number of cues available in CMC and text messaging that can help them to do this, such as the temporal aspects of sending and receiving messages, visual anonymity, the language used in messages and style of communication, the frequency and duration of a text exchange and emoticon use (Liu & Ginther, 2001). The visual anonymity and asynchronous communication can allow people to carefully craft their text messages in their own time, and send them on when they are happy with how they are presenting themselves, compared to face-to-face communication where people are under greater pressure to speak as soon as they can. More cognitive resources may be available for impression management in text messaging and CMC due to the reduced social cues that need to be processed compared to face-to-face communication where people have less time to carefully think their responses through and have a lot more

cues to try to manage, for example their choice of clothing, non-verbal behaviours and so on.

In contrast to popular belief, it is those who have large social networks who seem to benefit most from the Internet. Birnie & Horvath (2002) proposed online social communication supplements/complements face-to-face communication, the so-called 'rich get richer' phenomenon (Kraut *et al.*, 2002). Their research contradicts McKenna *et al.*'s (2002) as CMC is not being used as a substitute but rather as a supplement to face-to-face. They concluded that CMC promoted existing socialising rather than compensating for shy or social anxious people and that CMC was an extension of face-to-face networks. The more connected people were the more they made use of the media available. Mobile phones also help to maintain social links (Carroll, Howard, Vetere, Peck, & Murphy, 2001). The present research will hopefully shed more light on whether or not text messaging is being used as a compensatory or supplementary medium.

In summary, it appears that contrary to popular thinking whereby relationships were assumed to require physical proximity and nonverbal cues to develop, rich and fulfilling relationships can develop through mediated communication. This has been explained as largely being a result of the greater control over self-presentation and impression management. Like CMC, text messaging also has the qualities of asynchronous and visually anonymous communication and so the same effects on relationships may be predicted. As text messaging is also used for social purposes, its impact on relationship formation and maintenance is a key question to investigate.

A number of laboratory based studies based on McKenna's liking study paradigm (Studies 5 & 6) and Hancock and Dunham's impression formation paradigm (Studies 7 & 8) were conducted to investigate the impact of text messaging

on impression formation. These are reported in Chapters 6 and 7 respectively.

1.2. Lessons from the Past

In studying the history of communication technology, it can be seen that whenever a new communication technology is introduced, people forecast the worst in terms of its impact on human communication (Lasen, 2005). Indeed this has been the case for the written letter, the telegraph, the telephone and more recently CMC using the Internet.

It is hard to believe that the actual technology of writing itself was controversial when it first appeared 5,000 years ago, with worries that it would weaken the mind and worsen memory. The telegraph was another medium causing panic as people had to adapt their communication to be as concise as possible due to bandwidth and cost issues. This led to shorthand and abbreviations being developed and people worrying about the effect that it would have on both written and spoken language (Joinson, 2003). These concerns have also been voiced about mobile text messaging, with worries in the popular press that the restriction of characters used in SMS, and the resulting language shortcuts that have since evolved, will transfer into spoken language and formal writing, especially amongst young children (USA Today, 2003). There have been many reports in the press about the negative impact of text messaging on children's formal English language skills, with 'text speak' (for example the phrase 'see you later' is often shortened to 'CU L8r') translating over into the formal education setting (e.g. DeCuir, 2005). The extent of this has, however, been questioned (Kasesniemi and Rautiainen, 2002).

The use of special abbreviations and of a general 'text language' between young teens especially, is similar to that reported by users of the telegraph. The sense

of a shared community that has its own ways of texting is also similar to that reported for the telegraph (Joinson, 2003, p11): ‘the sense of community amongst telegraph operators was heightened by their own norms and customs, vocabulary, [and] the use of short (usually two or three letters) signatures or ‘sigs’.

In her review of the history of the landline telephone, Lasen (2005) describes how it was initially invented for use as a broadcasting tool. However this use soon disappeared as the unexpected use as a conversational instrument took over. ‘An important lesson from the history of the landline telephone is the power of users to impose their own purposes and competencies...unknown or dismissed before by the experts’ (Lasen, 2003, p7). Like the landline telephone, the mobile phone has also shown how a medium created for one main purpose (being a mobile telephone for voice calls) can soon be used in a different way (text messaging) to suit users’ own personal agendas.

Many of the concerns regarding the physical and social impact on users of a communication technology can also be seen to be a repeating cycle as new technologies have evolved. Worries of addiction, fears about social behaviour and relationships, worries that face-to-face contact would be greatly reduced and that the technology would be used in socially inappropriate and malicious ways have been well documented in today’s press in relation to text messaging and the Internet just as they were in the past in relation to the telephone.

For example, the growth of the Internet as a social medium was associated with fears that loneliness, depression, pornography, and addiction would all increase within society. Indeed the influential HomeNet study (Kraut *et al.*, 1998) appeared to show that the Internet had negative outcomes (depression and loneliness and neglect of personal offline relationships). However a number of problems in the design and

conduct of this study and lack of replicability since have brought these findings into question. Indeed many others have found the opposite - Internet users are no less likely to visit or call friends, and their social networks can actually increase in size (see Bargh & McKenna, 2004 for review).

Similar concerns to these have been raised in relation to mobile phone text messaging. The media often paints the image of teens alone in their rooms with their mobiles, texting away instead of physically going out and seeing people face-to-face, (e.g. the Register, 2003) and of the negative uses of texts including bullying (Bully online, 2006), stalking (Cady, 2006) and ending relationships (Breitbart, 2005). And just like the concerns raised about the effects of the landline telephone on physical health (from hearing damage to being able to catch viruses and diseases through the handsets), there have also been concerns of physical health problems arising from texting, with scare stories of repetitive strain injury in the right thumb, and the risk of cancer from using the mobile phone. (the Register, 2006; BBC news, 2001).

Notably, just as in the past, the focus is on the negatives rather than the benefits. Despite the overall negative perspective on the landline phone, there were eventually reports of the positive effects the medium had, including strengthening and renewing membership within a community, and reducing loneliness and social anxiety. On the whole, the media hype surrounding text messaging has generally been negative, reports of people having affairs to causing teenagers to become socially isolated. Indeed some of the work in this thesis has been covered by the media, but has been unusual in showing the positive aspects of text messaging (See Appendix A).

In drawing comparisons between the introduction of the Internet with earlier communication media, Joinson (2003) makes the important point that 'tools do not simply translate a behaviour to a new medium without some impact on psychological

processes' (p18) which may be due to the unique affordances of the medium itself. For example as mentioned SMS offers a medium where words are restricted due to the limited bandwidth and there is an acute lack of visual social-context cues so one expects an impact on language used to accommodate for this limitation as well as to increase social presence and express socio-emotional content. Adapting to a medium's affordances in such a way also carries a psychological effect - the need to be concise for example and to get straight to the point may encourage more candid communication in comparison to face-to-face (Joinson, 2003).

Joinson draws on Kiesler's (1997) distinction between whether the impact of a new technology is transforming (changing the way people think about the world, their relations etc.) or whether it is amplifying (just allowing people to do the same as they did before but it may be a more economical/satisfying etc alternative). This thesis will investigate whether text messaging can be placed into either of these categories. But either way, we need to take one major lesson from the past – to not be too quick to judge a medium's impact before looking at the overall picture.

1.3. Theoretical Explanations

In looking at the social and psychological impact of text messaging, this thesis will also explore whether current theoretical models of CMC can be extrapolated or extended to help explain the usage and effects of this medium. What follows below is a brief history of some of these models, with a focus on the Cues Filtered Out (CFO) approaches and two of the most recent theories: the Social Identity explanation of De-individuation Effects (SIDE) model and the Hyperpersonal Model. These models will be evaluated in terms of their applicability to text messaging and a number of research questions arising from this will be formulated for the current thesis to address. It may

be the case that elements from more than one model are needed to explain the current data, or that a whole new model is needed. Having formulated these research questions, the rest of this thesis will repeatedly return to the question of if and how they are applicable to SMS text messaging, culminating in an broad theoretical model to help explain the popularity of this medium.

We begin with a brief background history to the development of the early models. Over the past few decades researchers have tried to develop models of mediated communication. Early models focused on the lack of social-context cues inherent in CMC from the lack of visual and auditory information and looked to examine what effect the loss of such cues had on interaction. These models have been termed technologically determinist (Markus, 1994) as they look at the distinctive qualities of the technology and the impact that this has on the psychological and behavioural outcomes of communication. Such technologically determinist models include the so called Cues Filtered Out models of Social Presence Theory (Short, Williams & Christie, 1976) and the Reduced Social Cues model (Sproull and Kiesler, 1986). These theories predict behaviour will be less constrained by social norms and will be more impersonal, uninhibited and de-individuated via CMC. However, CFO approaches such as these have come under attack in the last few years and newer theories have been proposed. The two main contenders have been the SIDE approach (e.g. Lea & Spears, 1992) and Walther's Social Information Processing and Hyperpersonal Models (e.g. Walther 1992, 1994), both of which forecast that positive outcomes of CMC are possible and that highly intimate social relationships can be developed given the right circumstances.

The following section will provide a brief history of these theories, including their weaknesses and strengths, and will culminate in the identification of the two dominant models used to explain behaviour via CMC that will be drawn and expanded upon during the course of this thesis - the Cues Filtered Out approaches and the Hyperpersonal Model.

1.3.1. The Cues Filtered Out Approaches

1.3.1.1 Reduced Social Cues

The reduced social cues model was proposed by Sproull and Kiesler in 1986. They identified three variables- geographical, organisational and situational- that are important in determining the social context for communication. There are two types of cues that help people to understand this social context- static cues, such as appearance, environment etc., and dynamic cues arising from non-verbal cues such as eye-contact, gestures and facial expressions. Sproull and Kiesler argued that these social context cues are needed so as to regulate behaviour during an interaction. The absence of such cues serves to undermine perceptions of leadership, power and social status, reduces the impact of social norms and as a consequence, leads to deregulated, depersonalised behaviour (Utz, 2000).

According to this framework then, media such as the telephone reduces dynamic and static cues by the inherent loss of the visual channel. Letters reduce static cues due to employment of standardised formatting, and dynamic cues are totally eliminated. The problem with this approach however is that many studies (as discussed in section 1.1.5 earlier) have shown CMC to be high in socio-emotional content and that normal friendships can develop e.g.(Parks & Floyd, 1995; Rice & Love, 1987), and so the theory cannot explain why this is the case.

1.3.1.2. Social Presence Theory

Social presence theory was proposed by Short, Williams and Christie (1976) to address the question of the psychological processes involved with telephone communication. The basic idea behind the theory was that communication media vary in social presence (Gunawardeng, 2002). The definition provided by Schein (1965) of what constitutes a group is: 'any number of people who (1) interact with one another, (2) are psychologically aware of one another, and (3) perceive themselves to be a group' (p.67). This is important as it brings into play the concepts of psychological awareness of self and others within the group, which is a central tenet of the social presence theory (Short *et al.*, 1976).

Short *et al.* focused on what was missing in telecommunication media, such as the telephone, in comparison to the baseline of face-to-face communication. In particular they identified the visual channel and non-verbal cues that are lacking in such media. They argued that the lack of cues such as facial expressions, hand gestures, and body positioning in limited cue media such as the telephone will result in lower social presence, and impact on people's behaviour. They postulated that it was through the visual channel that 'interpersonal' exchanges (to aid in developing relationships) were primarily transmitted, whilst the verbal channel is primarily concerned with 'interparty' information (acting out certain roles) so without the visual channel, the interaction will mainly be task-focused rather than social-emotional and concerned with self-presentation.

Social presence is a quality of the communication medium, and is an important determinant of the way individuals will interact. It is basically the cognitive and affective salience of the other person(s) to the individual, and the consequent salience of the interpersonal relationship(s) that result. It is more of a subjective,

rather than objective quality of a medium, as it is the individuals who decide whether a particular medium is appropriate for a particular task. Short *et al.* measured social presence of different media by employing semantic differentiation scales (e.g. cold-warm, impersonal-personal, sociable-unsociable, sensitive-insensitive). Participants are asked to complete the scales for a variety of media. Media that are high in social presence are typically described as warm, personal, sensitive and sociable, compared to low social presence media which are described as the opposite; cold, impersonal, insensitive and unsociable. It was typically found in Short *et al.*'s research that media lowest in social presence were those that lacked the visual channel – such as the telephone and writing letters – whilst face-to-face communication had the highest degree of social presence.

Short *et al.* also proposed that the interaction task itself will affect the suitability of a medium. For example some tasks require a high degree of social presence such as tasks where one has to assess the reactions of others and be sensitive to their feelings require a high social presence medium. They pointed out that the degree of social presence in a medium “is affected not simply by the transmission of single non-verbal cues, but by whole constellations of cues which affect the ‘apparent distance’ of the other” (p157), and that the ‘relative importance of the various channels varies according to the particular people, situation and subject matter involved’ (p56)

Social presence, argued Short *et al.*, will impact on the intimacy of an interaction. They predicted that the higher the degree of social presence inherent in a medium, the more intimate the resulting communication, with all other things being equal. So the basic assumption was that there was a one-to-one correspondence between cues and their functions, and that in limited cue media, the remaining cues

could not perform the function of those that are lost, so CMC as a result must always be impersonal (Walther & Parks, 2002). This was criticised by Lea and Spears (1995) as it ignores factors outside non-verbal cues which may affect attraction and relational development.

However, this theory fails to account for findings, such as those of McKenna and her colleagues, who have found that intimate relationships can develop in low social presence media lacking the visual channel such as the Internet (McKenna *et al.*, 2002; McKenna & Bargh, 1999), and that sometimes CMC is used for social purposes explicitly (McCormic & McCormick, 1992). In terms of mobile texting, there are fewer cues available than through CMC due to the restriction in character length. So this medium has even less social presence, so one would expect it to be even more limited in supporting intimate or social interaction. However, early findings in the sociological literature looking at the content of SMS text messages (e.g. Thurlow, 2003) have found that for SMS, the majority of texts seem to be socially-oriented as opposed to task-oriented, a finding that goes against the CFO approaches.

During the current investigation, predictions forecast by the CFO approaches will be tested alongside more current theories of CMC. Mobile phone text messaging is arguably perhaps one of the most limited cue media due to its visually anonymous, asynchronous and limited character nature, and so a perfect candidate to test the CFO hypothesis. For tasks such as getting to know one another such a low social-presence and limited cue medium would be expected to cause difficulties in comparison to face-to-face. This will be looked at more directly in Studies 5 and 6 (Chapter 6) and Studies 7 and 8 (Chapter 7).

1.3.1.3. More on the Cues-Filtered Out: Non-Verbal Cues and their Functions

As we have seen in the discussion of the cues-filtered out approaches, there is much emphasis in the literature on the loss of the visual channel in CMC and the negative effects this will have on resulting communication and relationships. This is thought to be because the function of the visual channel is to convey non-verbal cues e.g. gaze, appearance, physical distance etc.

According to Argyle (1969), there are six functions of non-verbal cues: (1) Signalling mutual attention/responsiveness: e.g. eye-gaze, gestures and nodding one's head (2) Channel control: e.g. head and eye movements to signal when the next person should speak and when they should finish; (3) Feedback: the need to see reactions to what is said to plan what to say next, usually occurs simultaneously with verbal communication rather than interrupting it. (4) Illustrations e.g. hand gestures to describe objects, add emphasis, signify directions (5) Emblems: where gestures used instead of word, e.g. head nod/shake. Obviously though, in non-visual conditions this can be replaced by verbal, so it's not as important as some of the other functions of non-verbal cues; (6) Interpersonal attitudes: non-verbal cues such as speakers body positioning, eye-gaze direction, facial expressions etc can give information to the listener about their attitude towards them and the topic being discussed. This, like feedback, can be severely affected when visual cues are absent

However some of these functions may be compensated for verbally and as such may not completely rely on the visual channel to get them across. For instance, signalling mutual attention/responsiveness can be signalled via brief utterances such as 'mmm', 'uh huh' when on the telephone, or via the written word through a text-based channel. The same is true of emblems. In terms of channel control, in text-based communication, such as text messages, a conversational turn may be signalled

by the sending of one text message, signalling the other to reply back if there are questions posed within that text. Or even by the explicit use of the abbreviation 'TMB' (text me back). So the function of some non-verbal cues may be compensated for in limited cue media by interactants being more explicit about their use, rather than the cues remaining in the background of communication.

Interpersonal attitudes and feedback could be seriously impaired by lack of visual information and may be a lot harder to get across using non-visual media (Short *et al.*, 1976). Short *et al.* predicted that this could lead to people avoiding topics that are too personal and have the risk for embarrassment or misunderstanding. However, preliminary results from our own work (e.g. Reid, D.J. & Reid, in press) and other reports seem to suggest the opposite; that the reduction of visual cues can lead to more self-disclosure and discussion of sensitive issues (McKenna & Bargh, 1998). This is often reported to be due precisely to the fact that it allows people to say what they want without seeing the other person's reactions. So feedback and interpersonal attitudes may be negative functions of non-verbal cues in certain circumstances. Indeed, *not* being able to see someone's reactions may make it easier to say some things, and that may be one of the added attractions of text messaging. Fifteen percent of British people have used text to dump their partners (Vickers, 2001) and 50% prefer apologising via text message compared to face-to-face (Sturgeon, 2004). A reported 44% of Nokia users have used text messaging to tell a significant other that they love them (Textually.org, 2004b; Haste, 2005).

One of the most important cues not available without a visual channel is appearance, especially when interacting with strangers (Short *et al.*, 1976). Unlike the Internet however, whereby strangers often communicate having never before laid eyes on one another, for SMS text messaging the majority of users know the person they

are texting, having had to initially meet them to exchange numbers. Short *et al.* predict that the effects of a medium will vary depending on the level of familiarity between interactants, the medium becoming less of a barrier for people who know one another than for complete strangers. It also depends of course on what the medium is being used for. As emphasised by Short *et al.*, ‘...the relative importance of the various channels varies according to the particular people, situation and subject matter involved...’ (p.56). In the case of text messaging, this thesis can hopefully shed more light on this through looking at key individual differences (Chapter 2) and whether they correlate with any reported motivations and uses of text messaging (Study 4, discussed in Chapter 5). Studying the content of a collection of real-world text messages (Studies 1-3, discussed in Chapters 3 & 4 respectively) will also be useful in looking at how the medium is actually being used.

The literature often seems to imply that there are no non-verbal cues in CMC, but this is not the case. There are cues but not necessarily the same ones as would be found face-to-face. For example, in CMC, as Liu and Ginther (2001) point out, non-verbal strategies include paralinguistic cues to express attitudes (e.g. emoticons), chronemics (which can affect feelings of intimacy and liking), frequency of messaging, length of messages, and timely responses (impact on immediacy/responsiveness).

The emoticon has become synonymous with mediated text-based communication. Emoticons can be typographic symbols that resemble expressions when one looks at them sideways (Walther & D’Addario, 2001), some of the most common ones are shown in Table 1.2 below. There are numerous sources of emoticons, including the Oxford English Dictionary (2007) and a multitude of websites e.g. <http://www.cknow.com/ckinfo/emoticons.htm>. On some phones and

computer programmes the emoticon has developed from a purely typographic symbol into an actual picture that people can insert, e.g. ☺, ☹, 😊. The most modern handsets now offer animations that can be included in text messages including confusion, anger, laughing etc., all of which may help the receiver interpret the message that the sender is trying to get across.

Table 1.2. *Examples of emoticons*

Emoticon	Meaning
: -)	Happy
: - (Sad
: - s	Confused
;-)	Winking/sarcastic
: - *	Kiss

The impact of the emoticon has been assumed more than it has been tested. The limited number of studies that have looked at their use have found that women use them more than men (Witmer & Katzman, 1996), which may be expected given general gender differences in expressing emotion (e.g. Wood, 1997). Utz (2000) found that emoticon use increased over time on the Internet as people got used to the medium and the lack of non verbal cues. Walther and D'Addario (2001) went beyond just the use of emoticons to look at what they actually do conversationally. They highlight the fact that although emoticons may be used as a substitute for non-verbal facial expressions, they are actually more controlled and conscious compared to non verbal cues. Their study looked to find out the impact an emoticon had on interpretation of a verbal message. Overall, there were no great effects on message interpretation, it seemed the verbal message was more important, so it seems an emoticon may compliment, but not contradict a verbal message.

Along with emoticons, other language conventions have evolved to try and indicate more emotion in text such as acronyms (LOL = laugh out loud; CU L8R= see you later) and artistic symbols (e.g. <3 = a heart; @-;--- = a rose) (Witmer & Katzman, 1998). CMC users have also been found to adapt to technical limitations by expressing emotion and meta-communicative intent by embedding words in text, e.g. 'just kidding', 'joke' etc (Parks & Roberts, 1998).

In summary, although CMC and SMS texting may be void of traditional non-verbal cues, they seem to have made up for it by each separately developing their own unique systems for translating such information into written or graphical form.

1.3.2. Challenges to the Cues Filtered-Out Approaches

There have been two main challenges to these cues filtered out approaches (Hancock and Dunham, 2001). These have questioned the technological deterministic nature of these approaches and also given more focus on social heuristics and inferential processes. These two theories are the Social Identity Explanation of De-individuation Effects (SIDE) and the Social Information Processing Model.

1.3.2.1 SIDE: The Social Identity Explanation of De-individuation Effects

According to Tajfel and Turner (1979), identity is comprised of both social and personal identities (the characteristics that define each individual as unique). The former is characterised by the groups one may belong to. When the groups we belong to are salient, we compare attitudes and behaviours to other members and maybe even to an imagined 'typical' member and try to match these attitudes and behaviours - a process known as 'self stereotyping'. The distinction between personal and social identities is regarded as a continuum, so that at one side the focus will be on

individual identities and interpersonal psychological processes and the opposite side will involve focusing on inter- and intra- group identities and processes (Spears & Lea, 1992).

Reicher (1984) argued that reducing *personal identifiability* led to increased salience of social identity, so de-individuation as based on the immersion in the group should increase the salience of the relevant social identity and hence adherence to group norms. If one is also *visually anonymous*, the effect is strengthened as intragroup differences are minimised and intergroup differences are maximised. However this would also result in a removal of group boundaries, thereby reducing the salience of social identity.

Assuming that a person identifies themselves with the social group that is salient, they are more likely to be influenced by it under deindividuating conditions. However where the personal identity is more salient then Reicher proposed that deindividuation conditions could enhance individuality, reducing the salience of group norms. In terms of CMC, this often provides the conditions that result in deindividuation (e.g. visual anonymity) and may have different effects depending on whether the group or personal identity is salient. The other route for social influence is via social isolation. This leads to increased self-awareness (Matheson & Zanna, 1988) and Spears and Lea (1992) predict this in turn will lead to a heightened awareness of salient identities, and their ensuing norms and standards.

The strongest support for this theory has come from those researchers working in the SIDE research group. The social identification/deindividuation (SIDE) model was developed initially to explain the behaviour of people interacting on the Internet (Lea & Spears, 1995) to fill in the spaces left by other theories e.g. polarization effects that are sometimes inherent in CMC and sometimes not. The model fills in these gaps

by referring to the social context of CMC, such as anonymity and physical isolation, which combine with the psychological states of deindividuation and self awareness to mediate the observed effects. These identities are made more or less salient depending on the social context and influence the way in which we behave. The model extends self-categorization theory in attempting to specify the situational conditions that are needed for 'behaviour normative to a particular self-category (to) be made appropriate and plausible' (Lea & Spears, 1995). Basically, the model states that when individuating cues are absent, people have little to judge one another except information about group similarities and differences (Walther, 1997). Such group-based cues are therefore given more weight than they may otherwise have in face-to-face situations, leading to over-attributions (negative and positive) and stereotyping based on these minimal cues.

There are two components of the model. The first is a cognitive component which refers to the 'level of identity made salient in a particular context'. The second is a strategic component, referring to the 'possibility/appropriateness of expression of behaviour in line with the content of that self category' (Lea & Spears, 1995). The cognitive and strategic effects of CMC were found to be influenced by contextual features, particularly anonymity and isolation. Isolation enhances normative behaviour and conformity to the group that is salient at that point in time. This is because it has the cognitive effect of increasing self-attention as there is nobody else physically present. In terms of anonymity, anonymity of others to ones self can strengthen intragroup similarities, increasing the perception of a homogenous group, leading to normative behaviour associated with the salient group. This is another cognitive effect. However identifiability of self to others influences self presentation and accountability (a strategic effect) which in turn leads to behaviour that is

normative to the given context. A further strategic effect is that of co-presence that may encourage behaviour that may have been sanctioned if identified by a powerful outgroup.

Spears, Lea & Lee (1990) ran an experiment using computer-mediated groups. They manipulated the salience of the group (by telling members they were a group/individual), the visual anonymity of the participants - they either sat together (visually identifiable) or were isolated (visually anonymous). At the start of the experiment they were given a booklet of peers' responses to an attitude survey and measured their attitudes before and after interaction. They found that visual anonymity increased the salience of the group and attitudes of the group members were more towards the group norm. The opposite effect happened when the salience of personal identity was increased. It was concluded that visual anonymity strengthens social norms when social identity is salient.

When individual identity is more salient, early research found that this would tend to result in negative evaluations, as people tend to disparage those who are dissimilar to themselves (Walther, 1997). More recent theorising however has argued that the valence of liking of those one is communicating with is not determined solely by whether or not the group or the individual identity is salient but rather the group identity increases the magnitude of group norms on behaviour of the interactants and the individual identity reduces it, regardless of the norms valence (Walther, 1997). Consequently, when group identity is salient, the groups norms are more likely to be adhered to. When individual identity is more salient, it is expected that those interacting will evaluate one another in a less polarised way as the group identity, and the over-attributions associated with it, is suppressed. This means that on the whole, attributions about others should be fairly neutral. So rather than the original thought

that CMC produced negative evaluations of others when individual identity was salient as opposed to positive evaluations when group identity was salient, it seems that group identity leads to more extreme positive and negative evaluations compared to salience of the individual identity which will be similar to a face-to-face interaction, based on personal impressions. Such normative communication styles are proposed to be based on both the social context and the shared group identity rather than as a learnt response within groups. Norms are proposed to be dynamically socially constructed during interaction with other group members (Joinson, 2003). Spears and Lea (1992) concluded that it is because of the lack of social cues that group norms and standards become salient in CMC.

The SIDE model fares better than the CFO models in accounting for seemingly contradictory results such as the absence or presence of polarization. Just because many social cues are filtered out in CMC does not mean that there is no social dimension at all. The critique of SIDE, outlined in Joinson (2003), has come mainly from the SIDE research group itself. It is recognised that the theory focuses too heavily on the cognitive dimension of SIDE – the attentional salience of group identities - to the neglect of the strategic aspects of SIDE - the role of accountability and power relations. However, cognitive identity salience and how identity is expressed are both influenced by power relations, e.g. if one is observable by the ingroup and not the powerful outgroup then ingroup behaviours can ensue. However if one is identified by the outgroup then behaviour is likely to be repressed that may be sanctioned. More focus needs to be given to other factors aside from anonymity such as synchronicity etc. (Joinson, 2003).

It follows from this model that the computer-mediated environment will not cause a total abolition of social context cues- those cues that are at the interpersonal

level (e.g. eye contact, appearance, etc.) will be more affected than those at the social level which tend to be 'very sparse, unelaborated, discrete rather than continuous' (Spears & Lea, 1990, p46). There are lots of group cues available in CMC - including newsgroup topics, message headers etc. It can be argued that the salience of category cues that underlie social identification and group processes, interpersonal and social identities are inversely related, whereby the salience of personal identity in the context of interpersonal relations can be seen as the opposite of identity as a member of a social category. This then explains a number of inconsistencies that many prior models face when applied to CMC behaviour (Spears & Lea, 1992).

Walther and Parks (2002) point out that 'although SIDE theory offers a powerful lens through which to view certain CMC relationships, its application to *interpersonal* relations (in the sense of dyadic or close personal relationships) is less clear. The implication that all on-line interaction stays fixed at the social or group level, is particularly troubling' (p. 540). As such, the generalisability of results from experiments where the group identity is manipulated to be salient may be questionable in real-world relationships where people may move into personal dyadic friendships or romantic relations.

This issue has yet to be resolved. However, in relation to mobile SMS messaging, this criticism is particularly salient. The problem the SIDE model encounters in dealing with such interpersonal relations is one that will also affect its application to this communication method. In contrast to the visually anonymous Internet exchanges studied by SIDE researchers, most text messages are person-to-person messages received from and sent to known individuals with whom the sender is already acquainted, however fleetingly. SMS is a personalized, individuating social medium. Thus the appeal of texting is difficult to reconcile with the emphasis on

anonymity and depersonalization at the heart of the SIDE model of online communication. It is for this reason that the SIDE model will not be the focus of study in this thesis. The next theory to be discussed is far more accommodating to these observations about the use of text messaging.

1.3.2.2. Social Information Processing and Hyperpersonal Models

Walther and Burgoon (1992) argued that the problem with CFO approaches to mediated communication is that they do not take time into account. Many experiments that have looked at the effects of CMC compared to face-to-face have taken place in a laboratory and have been time-limited, which as a result may hinder interpersonal relationships. They also point out that many experiments suffered from methodological confounds, for example non-verbal behaviour was not coded in face-to-face interactions, so negative behaviour encoded within these (e.g. shaking ones head in disagreement) may have been missed, giving the impression CMC is more negative than face-to-face.

Walther and Burgoon (1992) proposed CMC is able to communicate social information such as status and affiliation (e.g. through typographic and linguistic manipulations) but it does so at a slower rate than face-to-face communication as the rate of message exchange is much slower. Consequently, they predicted that if one controlled for time, then there would be little difference in the communication of those communicating via CMC and those communicating face-to-face. The supposition that verbal and textual behaviour can convey relational meaning underlies this Social Informational Processing (SIP) approach. The basic idea is that affiliation motives encourage communicators to develop impressions and form relationships despite the limitations inherent in a medium. They adapt their behaviour and use

alternative cue systems to get their messages across and to fulfil their informational needs. As communication is slower than face-to-face, the relationship development will also be slower, and as such can be negatively impacted on if time is limited (Walther, Slovacek, & Tidwell, 2001). As the messages accumulate, the character of messages exchanged between people communicating via CMC will change.

Relational cues are thought to be adapted to cues that are within the CMC medium, such as typographic, chronemic, and linguistic cues (Tidwell & Walther, 2002). Examples of such are given by Walther and Burgoon (1992), including:

- 1 Immediacy/affection: signalled by verbal immediacy
- 2 Receptivity/trust: self-disclosure
- 3 Formality/informality: form of address, language used
- 4 Dominance/submissiveness/equality: participation rate
- 5 Similarity/depth: first person plural, private language, self-disclosure

The SIP model also postulates that relational motivators exist before the interaction takes place e.g. affiliation, dominance drives, impression management, which motivate people to exchange information. Through knowledge generation strategies such as interrogation, detecting deception, and self-disclosure, interactants develop 'interpersonal epistemologies' (distinctive representations of their partner) (Utz, 2000).

A meta-analysis of 350 studies on CMC was conducted to examine the effects if time restrictions on social interaction via CMC (Walther, Anderson, & Park, 1994). The basic hypothesis was that 'given sufficient time for multiple message exchange and development, .. relational patterns in CMC and face-to-face settings should

become similar' (Walther *et al.*, 1994, p466). They found, as predicted, that time-restricted CMC groups had less social-emotional content in their exchanges than time-unrestricted groups. The difference between CMC and face-to-face groups was much smaller in time-unrestricted groups compared to time-restrained groups. So it appears time was a confound in many earlier experiments and explains why CMC was found to be more task-focussed and less socially oriented. It was concluded that 'the interpersonal effects that are expected to accrue quickly over time in face-to-face interaction can indeed occur in CMC, but require extended time interactions' (Walther *et al.*, 1994, p477). Although Tidwell and Walther (2002) emphasise that it is the quality of interactions over time rather than just the quantity that is important.

In 1995, Walther looked at relational communication (i.e. interpersonal messages that define relationships) in CMC, comparing interpersonal messages exchanged via CMC with those exchanged face-to-face. It was found that in no instance did CMC demonstrate less intimacy or more task orientation than face-to-face, and that in fact CMC was more positive on several dimensions of interpersonal communication. This is something that fails to be forecast from the CFO approaches to the medium. As predicted by SIP theory, CMC became less formal over time and increased in personal/social nature at a faster rate than face-to-face - findings that taken together lead to the conclusion that CMC is better suited to longitudinal interaction.

Utz (2000) highlights two problems with the SIP perspective. Firstly, the focus has been on the media inputs and relational outputs with little attention to the processes that occur in the middle. Secondly, the SIP approach seems to assume that all communicators are motivated to develop significant relationships via CMC, however this may not be the case. In her study, Utz looked at addressing these

shortcomings by examining whether people verbalise relational content, and the impact this has on relationship development. It was found that over time, otherwise non-verbal behaviour increased. The more a person used emoticons, the more friendships they formed. More recently, Walther, Loh and Granka (2005) have looked at the basic communication processes that occur online. One member of a dyad was asked to act with greater/lesser affinity either face-to-face or via CMC. They assessed (1) whether CMC participants expressed as much immediacy and affection as face-to-face, (2) whether the proportion of affect expressed verbally in CMC was comparable to that expressed face-to-face, and (3) specific behaviours that are attributed for affective communication. Partner's ratings showed that CMC and face-to-face were equivalent in affection/immediacy. When behavioural strategies were examined it was found that face-to-face affinity/immediacy was most likely to be associated with non-verbal cues such as eye-gaze, posture and smiling; whereas CMC was more associated with explicit statements of affinity, expressing joy, emoticons etc. So it appears that communicators adapt to the remaining cue systems in CMC to exchange affective information, as was predicted by the SIP model. In relation to the individual differences found, those who expected poor outcomes from using computer mediated communication on relationship formation indeed found no benefits of using the medium. However those who were more open to using CMC were more likely to find a positive impact on relationship development.

The SIP model was later updated to form the Hyperpersonal Model of CMC. The Hyperpersonal Model extended its predecessor by identifying the unique affordances of CMC that allow people using the media to achieve greater levels of intimacy and better impressions than those interacting face-to-face (Walther, 1997). Going back to Kiesler's (1997) distinction (see section 1.2), the differences between

the SIP and Hyperpersonal Model may be interpreted as SIP forecasting the technology to be *amplifying*, allowing the same outcomes as face-to-face communication given time, whereas The Hyperpersonal Model forecasts that given certain conditions, CMC can be *transforming*, allowing greater intimacy and having a greater impact on impression management than face-to-face. The basic idea is that the reduction in non-verbal cues combined with editability, identity-relevant cues and temporal aspects facilitate selective self-presentation and partner idealization, leading to more intimate exchanges than in traditional face-to-face interaction (Tidwell *et al.*, 2002).

Anticipation of future interaction is a powerful factor in predicting the outcome of CMC interaction (Walther, 1994) as it prompts partners to find out more information about each other (Berger & Douglas, 1981), to disclose more information, to be more socially oriented in communication, and leads to higher levels of affinity. Anticipation of future interaction also prompts increased numbers of personal questions and self-disclosures in CMC than in face-to-face first encounters (Tidwell *et al.*, 2002). Walther (1994) found that overall this anticipation was more of an influence on CMC interactions than face-to-face.

Walther discussed several elements of communication that may lead to hyperpersonal communication: senders, receivers, channel characteristics and feedback processes. The sender is concerned with optimising their self-presentation. Selective self-presentation may be facilitated by the visual anonymity and asynchronous nature of CMC. The visual anonymity and lack of social context cues means that impressions are made on how people write their messages, and the content within them. In asynchronous communication, senders have time to carefully construct their message to get across the points they want to make.

The second element of communication is the receiver. CMC users may inflate the impression of their partners in certain situations. This is because, as explained in SIDE theory, people have to rely on limited personality/social cues (e.g. spellings, typographic errors, under/over-use of punctuation) which are given greater value than one may expect. This may lead to over-attribution of qualities of ones partner, that are the result of over-relying on the minimal cues provided (Walther, 1996). As discussed earlier, the CMC medium allows for sender to selectively present information about themselves. This may further add to the elevated impression of the sender by the receiver.

Channel characteristics, for example whether communication is asynchronous or synchronous, is also important. Asynchronous interaction may be 'more socially desirable and effective as composers are able to concentrate on message construction to satisfy multiple or single concerns at their own pace' (Walther, 1996, p26). The greater degree of private self-awareness that individuals obtain by using CMC may enable them to express themselves more honestly than in face-to-face. If the medium is asynchronous, this further helps selective self-presentation as it allows those interacting time to carefully craft and edit their messages.

Feedback between the sender and receiver is important in communicating. Walther proposed that CMC produces an intensification loop, whereby a cycle of behavioural confirmation and magnification takes place. So senders selectively present information about themselves and receivers selectively filter through this information to construct their idealized impressions of their partner, which through reciprocation are confirmed and magnified.

These elements - selective self-presentation, idealization and reciprocation - may all lead to CMC becoming hyperpersonal i.e. 'interaction that exceed[s] what we

may accomplish face-to-face, in terms of our impression-generating and relational goals' (Walther, 1996, p28). So this Hyperpersonal Model tries to account for the depth and intimacy sometimes reported in CMC relations (e.g. Bee Hian, Li Chuan, Mon Kiat Trevor, & Detember, 2004). CMC interactants may idealize their partners and overattribute characteristics to them, as suggested by the SIDE framework. The selective self-presentation in CMC helps people to mask the physical and behavioural cues that the receivers may find undesirable. The editability of messages is also an important feature of CMC. This helps more desirable self-presentation compared to face-to-face interaction (Walther, 1997). The reciprocal interactions of self-selected presentation by both partners intensifies these processes through self-fulfilling what they believe their partner wants (Walther, 1994). The cognitive load is reduced in CMC compared to face-to-face interactions as there is not as much simultaneous processing to carry out (e.g. monitoring non-verbal social cues). Interactants do not have to attend to various environmental stimuli or back-channelling of their own behaviour (Walther *et al.*, 2002). These cognitive resources can be reallocated to the process of message construction.

The Hyperpersonal Model therefore, takes into account the sender, the receiver, the channel of communication, and feedback. The receivers sometimes create idealised perceptions of the people they are communicating with, and may 'fill in the blanks' of the sparse information they receive. The sender has the opportunity to optimise how they are perceived, especially in reduced social cues, asynchronous media. The feedback that each interactant is given can lead to behavioural confirmation and fuel further selection over self-presentation.

So what makes an interaction hyperpersonal? Walther (1996) defines CMC as hyperpersonal when the following conditions are met: (1) interactants experience

commonality; (2) increased self-awareness; (3) physical separation; (4) communicating via a limited cues channel that enables selective self-presentation and editing; (5) one can construct/reciprocate representations of partners without being faced with 'environmental reality'; and (6) communication is asynchronous.

In 1997, Walther attempted to integrate the Hyperpersonal and SIDE models to provide a better account of CMC behaviour. He questioned the group norm development in zero-history groups, suggesting that groups may develop norms arising on the basis of the groups temporal existence, 'namely a predisposition to engage in interpersonal enquiry, the norm of reciprocal self-disclosure, and affinity induced as a result of the anticipation of future and ongoing interaction...the fact that a group knows it will be a continuing group becomes an artefact of the group, leading to relational behaviour, which becomes normative and reciprocal and therefore enhanced among members with a strong group identity...[A] salient group identity and a high level of expected future interaction should prompt rewarding communication and high levels of interpersonal and social attraction' (p.351). Short-term groups on the other hand are predicted to be more task-focused and impersonal, and as a result there will be less interpersonal and social attraction.

Walther predicted that anticipation of future interaction will have little effect when the individual identity is salient as interactants will be interacting as individuals and not as group members, so group norms will not be initiated. These predictions were represented in the following model (Figure 1.2.). The valence is specified by whether or not groups are communicating as long-term or short-term groups. The magnitude is specified by whether or not the individual or the group identity is most salient. Attraction to partner and interpersonal communication are predicted by this model.

In testing this model, the majority of these predictions were confirmed however there was no evidence for the greater task focus of short-term groups. The condition where short term groups were conversing at the interpersonal level produced the most ‘hypernegative’ results and is a starting point for research into the conditions that are needed for negative relationships to develop. So in conditions where time is limited, and there is no anticipation of future interaction, more negative impressions may be formed than may otherwise have been the case in face-to-face interactions, combined with disaffiliation and the construction of hostile messages (Walther *et al.*, 2002).

This formulation then seems to have ironed out some of the problems when the two theories stood alone. For example it can explain why, in a long term group where individual identity is salient, the effect of time on positive relational outcomes

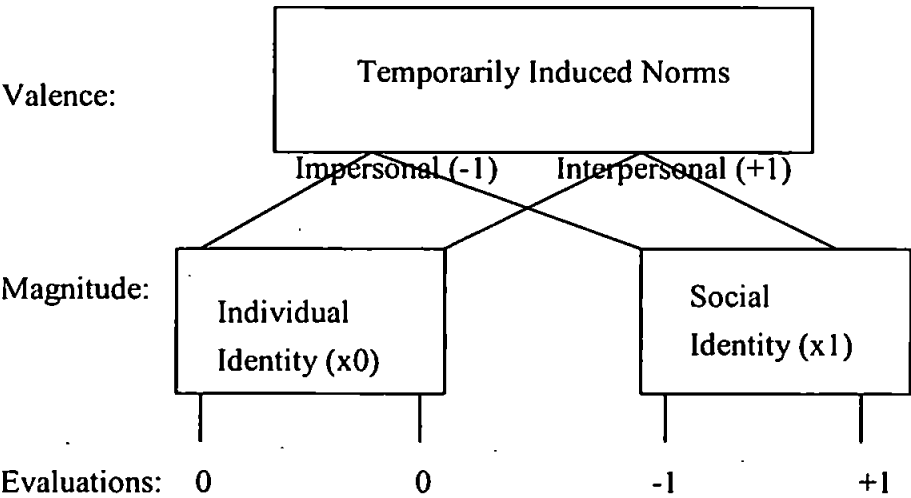


Figure 1.2. Walther's (1997) model (p.352).

can be hindered. In terms of the SIDE model, the emergence of the finding that group norms can be instigated by temporal factors is a valid addition.

There are contradictions that arise from integrating the models however. Walther (1997) points out, for example, that the SIDE model hypothesises that group members identify with one another by their group membership and not as individuals within a group. The Hyperpersonal Model however, which has as its central tenet the value of personal and affective information, although acknowledging that initial communication may be very much influenced by the group identity, also allows for interpersonal information exchange. This approach then perceives CMC as an amplifier of social and psychological phenomena.

In relation to mobile phone text messaging, the effect of the group is thought to be quite minimal as the medium itself is more of a personal technology, being used to communicate on a one-to-one basis and so is more individualised and personalizing than other forms of communication media.

On first glance, the Hyperpersonal Model seems to be most fitting to the text messaging that is to be investigated in this thesis. It can deal with interpersonal dyadic communication and also fits Walther's tenets of what is needed for hyperpersonal communication i.e. (1) interactants experience commonality; (2) increased self-awareness; (3) physical separation; (4) communicating via a limited cues channel that enables selective self-presentation and editing; (5) one can construct/reciprocate representations of partners without being faced with 'environmental reality' (well not in the short term, although in longer term it is expected those interacting via text will also see people in real life); and (6) communication is asynchronous.

Criticism for the Hyperpersonal Model comes from Walther himself who critiques the model for being less informative about negative consequences of CMC.

He postulates that in some circumstances people are motivated to enact negative outcomes and negative evaluations may arise from selective presentation (Walther, 1997). As a result, research needs to be carried out to investigate the relational goals of interactants when they come to converse with others (Walther *et al.*, 2002). This may explain the relative ease of 'dumping' ones partner via text messaging, of arguing via this medium as opposed to face-to-face communication. The loss of this strategic and motivational element is also picked up by Joinson (2003). People may strategically pick a communication method such as text for example because they are avoiding lengthy conversations. Also motives of using a particular medium are also not discussed within these theories and as highlighted in section 1.1.4., these motives cannot be ignored in any model of communication media choice. Motives for using text messaging are investigated in Study 4 in Chapter 5.

Another criticism is that the theoretical links between the four components of the model (sender, receiver, channel and feedback) and the processes that the model specifies are not clear, they may not even be necessary. As such this brings the robustness of the theory into question. 'The danger of this is that it is difficult to reconcile either supportive or inconsistent empirical results with the overall model, or to identify which aspect of the model may have been supported or disconfirmed' (Walther *et al.*, 2002). Parts of this model will be challenged and extended within the present investigation. In particular Studies 7 & 8 in Chapter 7 look to try and untangle whether more intense impression formation is a sender or receiver effect.

A number of research questions can be tested in looking at the applicability of this model to mobile phone text messaging. Are impressions formed through text more intense than impressions formed by face-to-face communication? (Studies 5 & 6, Chapter 6) And if so is this because of the sender being more selective over what

they are sending or is it that the receiver is more biased and over-attributes characteristics to the sender? (Studies 7 & 8, Chapter 7) Do people use text messaging for relational purposes or is it mainly for informational and practical purposes? This can be tested not only by self-report (Study 4, Chapter 5) but also by collecting a sample of real-world text messages (Studies 1 and 2, and Study 3, discussed in Chapters 4 and 5 respectively).

Each chapter in the thesis will try to consolidate the data within it in relation to both the CFO and Hyperpersonal theory framework to try and develop a model to explain the use of mobile phone texting.

1.3.3. Concluding thoughts on the theoretical models

The CFO approaches all have one thing in common: they focus on what is *lost* in communication compared to face-to-face. However it needs to be considered what is *gained* in CMC and text based interaction. Instead of comparing media to face-to-face and looking at the disadvantages rather a more eclectic approach should be taken to see why people are choosing these technologies; if reduced social cues is a bad thing then why are people using it? As discussed in our own work (e.g. Reid & Reid, 2005), people seem to be manipulating communication media to suit their own agenda - in the case of text messaging we believe that a big draw is the perpetual contact such a medium affords - knowing that someone is on the other end of the phone connection and that you are in constant contact with your peers, as well as the chance to control how one is self-presented. As already mentioned the asynchronous, visual anonymous environment afforded by SMS allows people to control their self-presentation and involvement in an interaction, something that is a lot harder in face-to-face communication (e.g. Reid & Reid, 2003, Reid & Reid, 2005).

The Hyperpersonal Model of communication is far more accommodating to the social affordances of limited cue media such as text messaging. This model will be held up in direct comparison with the CFO approach in generating alternative hypotheses in looking at the social and psychological effects of mobile phone text messaging. It is hoped by doing this an overall model surrounding the use and effects of text messaging can be generated. A very general model of text messaging use, which sets up the general predictions from the CFO and Hyperpersonal Models is shown in Figure 1.3. As can be seen from Figure 1.3, the two chosen models predict different outcomes from the choice of text.

One thing the models all fail to take into account is individual differences. This will be discussed in the next chapter. The reason this is important is that one can perceive different people will want different things from different media and will have different preferences and needs regarding communication. Figure 1.4 depicts this proposed relationship. The communication method chosen will have its own affordances which will impact upon the outcome of the communication. The outcome will in turn impact back on the user and influence future communication decisions. The overall model developed will therefore need to take such factors into account.

1.4. Summary and Aim of the Thesis

This chapter set out to describe the phenomenon of mobile phone SMS text messaging and examine two key theories that help to explain the increasing popularity of this medium for personal relationship development and maintenance. On the basis of this review, we can now state the broad aim of the PhD - to explore how SMS texting is being used, the impact it has on the formation and maintenance of interpersonal relationships,

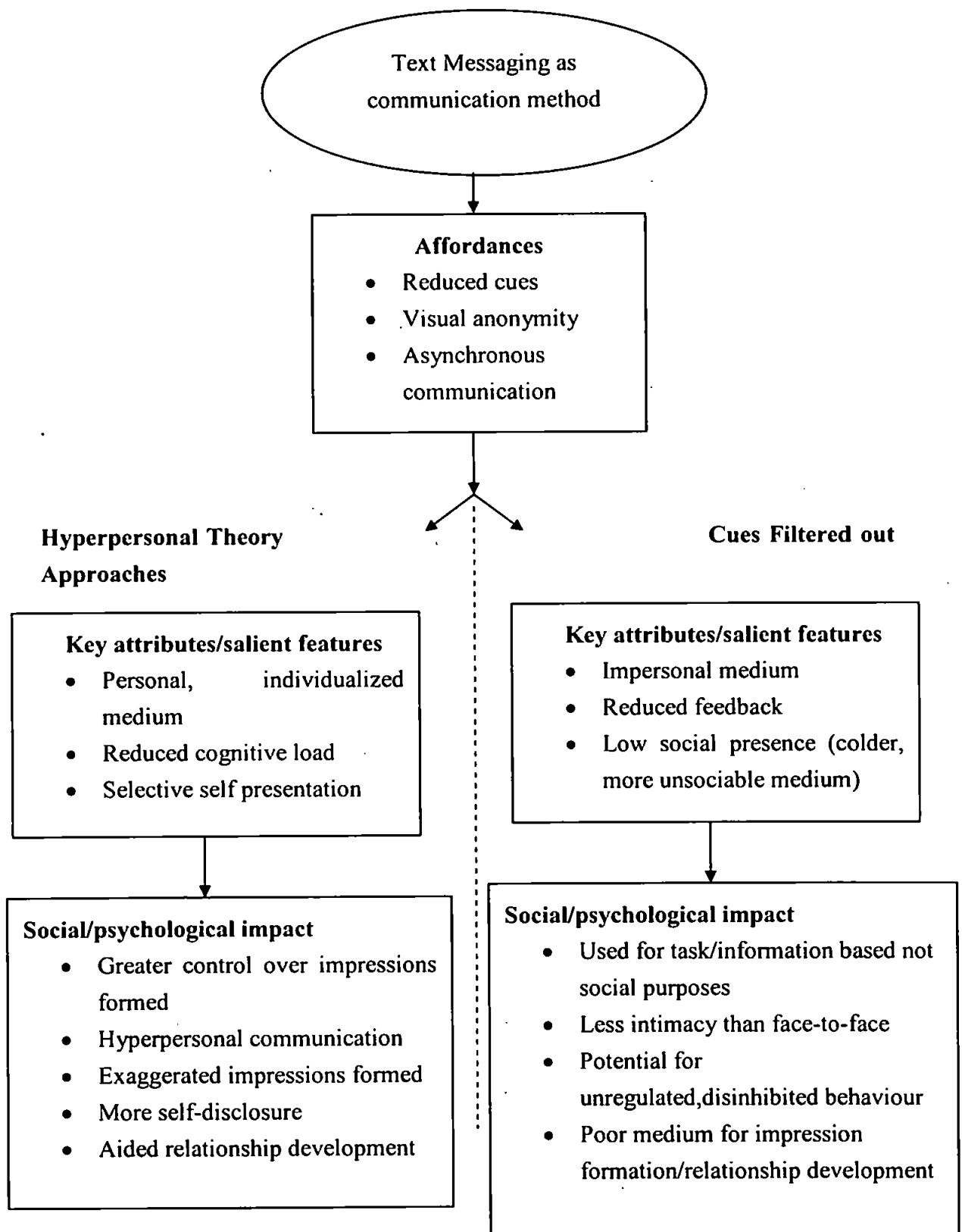


Figure 1.3. Alternative predictions for text messaging

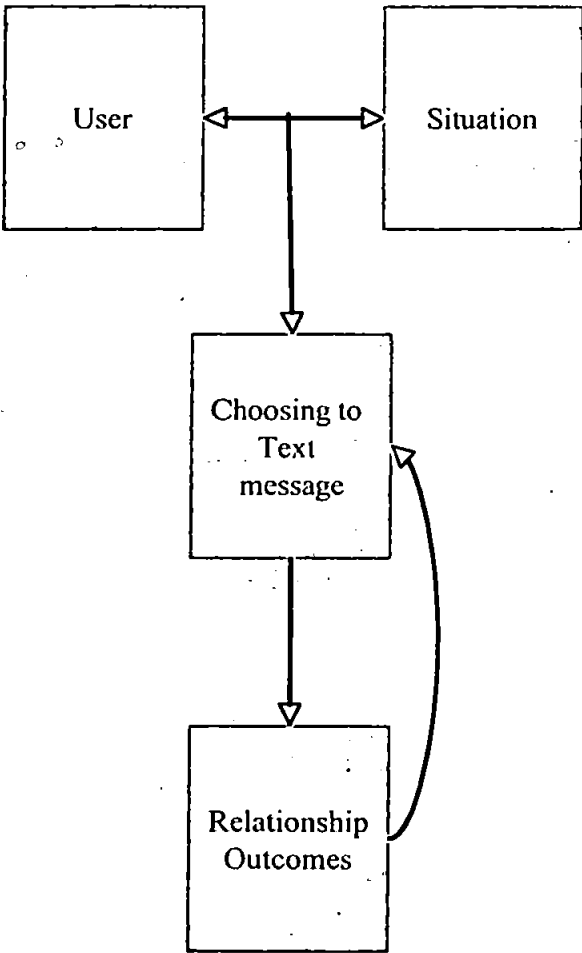


Figure 1.4. Predicted model to explain text messaging use

its attraction to particular groups of mobile phone users, and the applicability of two key theories to the explanation of these phenomena. However, throughout this chapter reference has repeatedly been made to the importance of individual factors in moderating the popularity of text messaging. In the following chapter, these broad aims are refined and focussed through a discussion of the role of individual differences in SMS uptake and use.

Chapter Two: Individual Differences in Communication

2.0. Overview

The last chapter emphasised the key point of this thesis, namely what is *gained* rather than what is lost in using mediated communication generally, and mobile phone texting in particular. We have seen that the two theories juxtaposed in Chapter 1 - the Cues Filtered Out approach and Hyperpersonal theory - make different forecasts for the use and resulting outcomes of informationally lean media such as text messaging. The former concentrates on what is lost, arguing that the reduction in social context cues in CMC and mobile texting will result in poor communication, which is cold, distant, and unsuitable for social purposes. Hyperpersonal theory on the other hand posits that the reduction of cues can actually be a bonus, and actually a gain in the communication process leading to positive social effects, with communication being in some cases more intimate than face-to-face.

One factor that is very important to consider in this research is that of individual differences. Given that text messaging is so popular, the question arises as to whether everyone uses it the same way or whether certain individual differences predispose people to use texting in different ways. It would be naive to assume that everyone uses text in the same way for the same purposes.

By examining the moderating role played by individual differences, this thesis adopts a 'social shaping' approach to text messaging (Ellison *et al.*, 2006), rather than a technological determinist approach, in which the features and affordances of the technology itself are assumed to be the primary causes of technology use (Markus, 1994), or a socially determinist approach, in which an individual's behaviour is assumed predominantly to be determined by social phenomena, e.g. customs,

expectations and interpersonal interactions. Instead, the social shaping approach assumes there is an interaction between the affordances of a technology and the willingness of individuals to recognise these affordances and capitalise on them as they see fit. People are not passively affected by a technology, rather they actively shape its use. This approach makes room for individual differences in user orientation as different people may capitalise on different affordances depending on their individual wants and needs. The unique affordances of a communication channel (e.g. anonymity, synchronicity, etc.) can facilitate relationships, but they can also lead to misinterpretation and problems, so one's own desires and goals can make a significant difference on the effect a medium can have (Bargh & McKenna, 2004). Therefore, it is important to explore how dispositional characteristics of mobile phone users interact with the affordances of SMS, and differentially predispose them to seek out, explore, and capitalise on the interpersonal benefits SMS can bring

In conducting this research it was clearly impossible to test all the different dispositional characteristics on which people may differ and which might affect SMS use. Instead, the focus here is on two individual differences - social anxiety and loneliness – which have particular relevance to interpersonal and affiliative concerns. Both have found to be important in research on the use of the Internet as a social medium (e.g. McKenna & Bargh, 2002) and have also been found to interact with the use of text as a preferred medium of communication (Reid , 2002).

What follows below is a discussion of each of these individual differences and some of the preliminary findings from earlier MSc work, along with resulting predictions for the current work. Gender, age and a number of variables associated with text messaging, but that were not the focus of study within this project will also briefly be discussed.

2.1. Social Anxiety

Social anxiety is a concept that seems to be quite loosely defined in the literature with a general overlap between that and the concepts of shyness, social-evaluation apprehension, communication apprehension and so on (Leary, 1983). The general definition of social anxiety used is that it is 'an aversive, cognitive-affective reaction characterised by autonomic arousal and apprehension regarding impending potentially negative outcomes' (Leary, 1983; p.67). Schlenker (1982) believes that social anxiety occurs in situations when a person is motivated to make a certain impression on others yet they expect that they will fail in doing this and will get negatively evaluated as a result.

Schlenker (1982) outlined three classes of behaviour associated with social anxiety. Firstly there may be nervous responses (e.g. speech disturbances, blushing, perspiration etc), secondly there may be withdrawal (e.g. physically removing oneself from the setting, speaking less, less eye contact, shyness, avoidance of certain situations) and thirdly there may be image protection whereby they speak and interrupt less, provide more backchannel responses, and generally act to try and avoid a negative impression as opposed to putting their efforts into achieving a good one- a term Leary (1995) referred to as 'innocuous sociability'. They may even go to the opposite extreme and self-handicap, engaging in behaviours that actually confirm the negative impressions they think others will form of them anyway e.g. dressing badly.

As a result of the many guises of social anxiety there are many self-report scales of social anxiety available (e.g. Cheek & Buss, 1981; Paul, 1966). However many have been criticised for their validity in that they suffer the major confound of not distinguishing between the measure of social anxiety and the measurement of behaviour that may sometimes occur with that social anxiety (see Leary, 1983 for

complete review). For example someone would be classified as highly socially anxious if they were to rate on the scale that they had a subjective experience of social anxiety when interacting with others as well as certain behavioural patterns associated with social anxiety as highly indicative of them, however if they rated highly on the former yet did not rate as highly on the typical behaviours one may associate with social anxiety then they would not be classed as being as high in social anxiety, which is obviously a serious shortcoming of these scales.

Leary (1983) developed a more valid instrument to help combat some of these earlier problems. He also defined the construct more clearly as the usual definition meant that socially anxiety was being operationalised in a manner that made it dependent on overt behaviours. To remedy this Leary made the definition more specific and developed a scale that focused on experienced anxiety only. According to Leary, 'social anxiety is defined as a state of anxiety resulting from the prospect or presence of interpersonal evaluation in real or imagined social settings' (1983, p67).

Social anxiety is basically typified by a deep concern at how one is being perceived and evaluated by others (Leary, 1980; Leary, 1983; Leary & Schlenker, 1981). Leary (1983) argued for two types of social anxiety based on the structure of the situation in which they occurred: (1) Contingent interaction social anxiety is where an individuals responses are contingent on the person(s) with whom they are communicating, and (2) non-contingent interactions are situations where an individuals responses are minimally, if at all, contingent on others, and primarily is the result of a guided script or plan, for example presentations, acting etc. The first of these is the one of most relevance in the current thesis, and is termed by Leary as 'interaction anxiety' (1983, p69). Leary developed a specific 15-item scale for this

type of anxiety (See Appendix B) which was shown to have high internal consistency and criterion validity. It was this measure that was utilised throughout this research.

There has been a wealth of research on social anxiety and impression management. For example, Jackson, Towson & Narduzzi (1997) found that those individuals who were high in social anxiety think more about how others see them so are more attuned to these impressions and in managing these. They seem to have more protective styles of self-presentation (avoiding making bad impression rather than focussing on making a good one) than those who are lower in social anxiety. In looking at social phobia, Chen *et al.* (2002) found that those participants who were social phobic showed attentional avoidance of threatening cues (directing attention away from pictures of faces regardless of their emotional expression valence towards less threatening household objects) leading them to neglect social feedback that may lead to a more positive self impression (e.g. a smile) and also disrupting the interaction as it may make them seem disinterested to the other interactant(s). Stritzke *et al.* (2004) found that shy people over-respond to social feedback cues in social interaction not because they are more sensitive to those cues but rather they over-attribute negativity to ambiguous cues. Winton (1995) also found this, with participants who scored higher on the Fear of Negative Evaluation scale showing better accuracy in identifying negative emotional expressions. However on closer inspection Winton found that this was not because they were more sensitive, rather they were more biased in attributing negative interpretations to ambiguous cases, a finding replicated by Downey & Feldman (1996), where participants who rated themselves more sensitive to rejection more readily perceived intentional rejection in ambiguous behaviours.

2.1.1. Social Anxiety and the Internet

The use of electronic communication media such as the Internet to help those who experience social anxiety has begun to emerge in the literature over recent years. McKenna *et al.* (2002) postulated that situational factors that may otherwise cause social anxiousness in face-to-face settings (e.g. talking out loud in front of others, having to respond straight away, evaluation apprehension) are alleviated when one communicates online. Indeed, the same is true through mobile phone texting.

So communication media such as email and text may help break the social anxiety cycle by allowing people to break out of public self-awareness and focus more on themselves. The removal of cues, and the resulting reduction in self-presentational concern may be a reason why socially anxious people prefer text-based media. Chak & Leung (2004) proposed that CMC is the perfect environment for those individuals who are shy as it gives them a greater amount of perceived control over the communication process. As such they may feel more confident in trying to develop relationships online. In support of this, a survey by Scharlott & Christ (1995) found that shy people were more likely to use computer dating services to find romance or sex.

Stritzke *et al.* (2004) compared shy and non-shy individuals online and offline on rejection sensitivity, initiating relationships, self-disclosure and providing emotional support and advice. They postulated the absence of face-to-face evaluative feedback may be particularly appealing to shy people as gives them greater comfort in interaction. They believe that shy people experience difficulties in social interaction as they do not think that they have the necessary repertoire of behaviour needed to participate effectively in social encounters and experience a discrepancy between the way they want to self-present and the way they expect they will present themselves

which may be identified in face-to-face interaction in the form of non-verbal cues (pauses, reduction of eye contact, body language which may be interpreted as uninterested etc). CMC reduces feedback cues and so may make it easier for shy people to communicate as they feel more in control of their impressions and less likely to evaluate perceived negative feedback cues. Roberts, Smith and Pollock (2000) found that shy people felt less shy online, matching a non-shy group, and also offline shyness decreased for the shy group over time. Birnie, (2002) also found evidence that shy people use the Internet for deeper contact than face-to-face communication (Birnie, 2002).

McKenna and colleagues have looked at the interpersonal consequences of using the Internet (McKenna & Bargh, 2000). This work in itself was novel at the time in that it was looking at the positive aspects of Internet use in a climate where research on the whole was pointing to its negative aspects, for example in the much cited 'Homenet' study, Kraut and colleagues (1998) found that Internet use led to a decrease in social capital, depression, social withdrawal and other generally negative effects. However in a follow-up three years later, the same sample reported the opposite findings with the Internet showing positive results (Kraut *et al.*, 2002). In support of these positive findings, McKenna and Bargh (1998) found that communicating via the Internet could actually improve the lives of some users. They hypothesised that for people who may find face-to-face communication problematic such as those who are socially anxious, lonely, and/or who have stigmatised/marginalised identities may find communicating face via the Internet easier due to the visual anonymity it affords (Bamrud, 2002; McKenna *et al.* 2002). They developed an online questionnaire to look at relationship formation on the Internet and found that those people who were socially anxious and/or lonely were

helped by the Internet to develop relationships where in normal circumstances gating features present (like appearance, stuttering, shyness etc.) may have prevented those relationships getting off the ground. It was the participants who were rated as higher in social anxiety who were better able to express their 'real self' on the Internet than face-to-face and who as a result were more likely to develop relationships online. They concluded that many people turn to the Internet to form and maintain relationships in a relatively safe environment (safe in the sense that there is less fear of sanctions and/or disapproval as one is communicating visually anonymously, allowing people to feel at more ease to self-disclose personal information).

2.1.2. Social Anxiety and Mobile Phone Texting

The MSc study and resulting papers that preceded this PhD (e.g. Reid, 2002; Reid & Reid, 2005) attempted to extend and extrapolate McKenna's work to text messaging on the mobile phone. A large scale Internet survey was conducted to find out how people were using their mobiles, their preferences for texting or talking, underlying motivations and outcomes of using the medium. The results showed that those who scored above median levels of social anxiety were more likely to find that text messaging on their mobile had helped them to develop new relationships, maintain existing ones and to allow them ways of expressing their real self, something that they felt otherwise uncomfortable to do when interacting face-to-face. The sample was divided into those respondents who indicated that they preferred using their mobile phones for texting (the 'Texters'), and those who preferred using their phones for talking (The 'Talkers'). Texters were more likely to be young and female, and to use text messaging to form close knit 'text circles', interconnecting with a small group of friends in perpetual text contact. Compared to Talkers, Texters were

also found to be more lonely and socially anxious, but more able to disclose their 'real-self' through text than via face-to-face or voice call exchanges. They also spent more time and call charges on text messaging and engaged in longer text conversations than the less socially anxious Talkers. Structural equation modelling confirmed a model showing that where respondents located their real-self and whether they were a Texter or a Talker mediated between the experience of loneliness and social anxiety and relational outcomes, in line with McKenna's theoretical framework. Thus it appears that there is something special about texting that allows some people to translate their loneliness and/or social anxiety into productive relationships whilst for others the mobile does not afford the same effect. The finding that texting was used to support intimate relations and social connections was replicated in Australia by Horstmanshof and Power (2005).

Viewed from a self-presentation perspective, many social encounters threaten cognitively to overwhelm anxious individuals. It follows that the expressive affordances of SMS should be particularly congenial to anxious individuals: the absence of direct cues from their communication partners will attenuate the preoccupation with one's appearances, eliminate social feedback that might be read as disapproval or rejection, and release cognitive resources for composing more thoughtful and effective social responses.

Certain situational factors may interact with social anxiety to heighten preferences for text messaging. For example Greenberg, Pyszczynski and Stine (1985) found that anticipating future interaction may lead to differences in the subsequent self presentation of participants according to their levels of social anxiety. They predicted that as anxious participants worry about their competence to present a desired self image consistently over long periods of time, they are less likely to

present themselves positively from the outset. So social anxiety is one individual difference that may be a key determinant of the preference for text messaging, and as such will be examined in this thesis.

2.2. Loneliness

The second individual difference that will be focussed on is loneliness. In discussing this concept, it is important to point out that loneliness is not the same as social anxiety although they do tend to positively correlate quite highly. Of course loneliness could be a direct result of acute social anxiety as the avoidance of social situations greatly reduces social networking (Leary, 1983). However not every lonely person is anxious, indeed for some people loneliness could be a temporary state caused by perhaps a change of social situation e.g. moving house, change of job etc, whilst for others it may be a more enduring factor.

Loneliness is qualitative rather than quantitative attribute in that a person may report having many friends but they may still feel they lack any deep and meaningful friendships, causing the feeling of loneliness. The experience of loneliness arises from the absence of social relationships capable of satisfying needs for attachment and belonging (Weiss, 1973). So it is the quality of relationships rather than quantity that is important to people (Green, Richardson, Lago & Schatten-Jones, 2001; Baumeister *et al.*, 1995). Mere social contact does not cushion people against loneliness, and may even exacerbate it. Although the sheer number of social contacts matters to young people, it is the quality of these contacts—particularly the presence of a truly intimate friend or romantic partner—that is important to young and old alike (Green *et al.*, 2001). In short, loneliness is more likely to arise from a lack of intimate contact than from a lack of contact per se (Williams *et al.*, 1983; Baumeister *et al.*, 1995).

Weiss (1973) claimed that there were two types of loneliness - emotional and social. Emotional loneliness being the affective reaction to the absence of a close attachment/bond, and social loneliness being the inadequate integration into a social network (Ouelette, 2001). So loneliness is classed as a deficit, the 'being without some definite needed relationship or set of relationships' (Weiss, 1973, p17). When this deficit is apparent, rather than sitting around and not trying to interact, lonely people actually try to interact more, trying to desperately seek out human contact as they look to fulfil the two needs of security and of affiliation (Ouelette, 2001). Pickett, Gardner & Knowles (2004) found that lonely people with a high need for social inclusion are more accurate in identifying vocal tone and emotional facial expressions, being more sensitive to social situations and cues as they seek to alleviate their loneliness.

2.2.1. Loneliness and the Internet

In relation to the Internet, lonely people are more likely to be socially inhibited, anxious, self conscious, more sensitive to rejection, to find difficulty making friends and have poorer social skills so the visual anonymity afforded Internet may help them interact with others as it facilitates disinhibition, self-disclosure and intimacy and can help them to practice their social skills and self-presentation (Gross, Juvonen, & Gable, 2002).

Gross *et al.* (2002) found that lonely and/or socially anxious teens turn to Instant Messenger to communicate with others on the Internet to avoid being alone. Initially it was thought that although it may afford the opportunity for lonely people to meet others, and decrease their feelings of loneliness, it may also replace their existing offline relationships with online virtual ones, which may be a double edged

sword as it may actually result in their loneliness getting worse (McKenna, 2002). This is a concern also voiced by Caplan (2003), although the Internet offers lonely people benefits it can also cause excessive use resulting in negative consequences, hiding from real world. Many may prefer online and sacrifice real world relationships for virtual ones. However this concern seems to be unfounded as research has shown that the Internet does not mean an end for existing real world relationships. In fact, the Internet has been found to extend existing face-to-face and phone contacts, especially amongst weaker ties (Wellman, 2001).

A few studies have actually found that it is people who are socially rich already, with many contacts, who benefit the most from the Internet: the 'Rich get richer' idea (Kraut *et al.*, 2002). Which is basically that the more people are socially connected, the more they will use the communication media available to them, in contrast to the poor get richer hypothesis of McKenna (2002). Birnie (2002) through a questionnaire study found size and frequency of traditional contact networks (face-to-face and voice calls) predicted Internet socializing, and frequency and intensity of contact, supporting this rich get richer model.

Other studies have shown that lonely people use the Internet more than non-lonely so there seems to be some variation in findings. For example, Morahan-Martin (2003) conducted a questionnaire study on university students and found that lonely people used the Internet and email more, especially for emotional support, to make new acquaintances and for social interaction. They also reported preferring online communication to offline, feeling more themselves online, being able to talk more about personal things, disclose secrets, and role played more. They found it easier than non-lonely to make friends, and they went online more when they felt isolated, depressed or anxious. However they also reported that it interfered with offline work

and activities more than the non lonely. Whether the benefits outweigh these negatives needs further investigation.

2.2.2. Loneliness and Mobile Phone Text Messaging

In relation to the mobile phone, it may be a particularly good medium at helping alleviate the feeling of loneliness precisely because it is mobile, giving the feeling that there is always someone there to contact. The mobility of SMS has lead to situations where people previously did not communicate becoming socially shared experiences, e.g. sitting on a train or in a cinema (Döring, 2002). However unlike on the Internet whereby one can go and chat to strangers, texting usually occurs amongst pre-existing friendship groups or at least with someone a person will have met or seen at least once in order to get their number (although there are some services advertising in the national newspapers on TV that have started recently that offer text chats for friendship/dating/flirting through a mediating server). This may impact on levels of self disclosure as if a person knows someone already face-to-face and there is a high likelihood they will see them again so they may be more anxious about this than in Internet communication. Our research to date has been against this however in finding that people do feel better able to express them selves and their true feelings through text (e.g. Reid & Reid, 2002).

Text messaging is postulated here to be of benefit to lonely individuals as it allows them to seek out communication with other people in their phone book and help develop their relationships, perhaps strengthening these ties. It may be preferred to a voice call as it allows relationships to be developed more slowly, it may be seen as more acceptable for weaker ties and/or be used to acknowledge that they are still there although not physically present.

2.3. Age

Age is clearly an important variable when it comes down to media usage and preference. Mobile phones themselves are often seen as a status symbol and a fashion accessory, which also accounts for their popularity among teenagers (Ling, 2004). Simply owning a phone gives the impression that one is socially connected. It can also be used to express style: with changing personalised fascias, and ring tones to help express ones identity.

Mobiles have been found to be used by young people to demonstrate their participation in a social network, and their status within that network at both a functional and symbolic level (Taylor & Harper, 2001). At the functional level this is demonstrated through performance – by talking and/or texting on a mobile one indicates to those around them that they are involved in a social network. At the symbolic level, the phone's appearance and the way it is carried indicate street credibility etc. The mobile is quite paradoxical as it may be seen to symbolise independence from the family whilst at the same time being indicative of belonging to and immersion within young people's peer groups.

It had been widely reported in the sociological literature that the earliest users of text were teenagers (e.g. Katz & Aarkhus, 2002; Ito *et al.*, 2004; Grinter and Eldridge, 2001). A survey of 1000 UK mobile phone users found that 16-24 year olds were the highest users of text, with 41% of them preferring to use text instead of voice calls (Fox, 2001). Older people on in comparison were more likely to use voice calls. In support of this, it was found in the MSc work that preceded this thesis that there was a strong correlation between age and text use with younger people reporting higher rates of text use and preference for texting than older people (Reid, 2002).

Texting was reportedly the most frequent media used for communicating with

one's friends in a sample of 1058 11-21 year olds in the UK in 2005. (Haste, 2005), 54% sent at least 5 a day, 90% sent a text daily. Texting was preferred for getting information, arranging meetings, sending thanks, relationship initiation and maintenance and termination. Ling (2003) reported that of a sample of 883 Norwegians, 85% of teens and young adults text on daily basis, compared to 2.5% over 66 year olds.

Ling (2002) reported that different age groups use texts for different purposes with the oldest users primary use being for safety and security, middle aged users for co-ordinating and planning, and teens for expressive and conversational uses. Ito *et al.* (2004) also reported the use of text by teens being primarily for social and/or emotional uses, especially amongst their peers.

Text messaging seems to be propagated by, and supports, social networks. It allows people to assert their identity and to define themselves, which seems to be particularly appealing to young people (Rheingold, 2003). However due to the nature of the participant sampling (often university undergraduates) there is a strong bias towards the younger age group of 18-25 year olds. As such the discussion surrounding age is quite limited and cannot be generalised without further investigation. In the studies that follow, age was taken as a demographic variable, and where appropriate statistically controlled as a covariate. Future research will need to compare SMS usage across age groups in more detail.

2.4. Gender

Gender differences in relating to others have also been widely reported in the literature. It is already known from previous research on friendship groups that marked gender differences exist in attachments to groups and peer interactions

(Seeley, Gardner, Pennington, & Gabriel, 2003; Markovits, Benenson, & Dolenszky, 2001; Benenson & Christakos, 2003). Women form deeper more intimate same-sex relationships than males (Caldwell & Peplau, 1982), and are more likely to share emotions and self disclose (e.g. Derlega *et al.*, 1993; Berndt & Hanna, 1995). It has been claimed on the basis of this evidence that women are more relationally oriented, and men more collectively oriented in their groups (Seeley *et al.*, 2003), and that male same sex relationships are more interconnected whilst women have fewer, but more intimate friends of the same sex (Benenson *et al.*, 2003; Markovits *et al.*, 2001)

In terms of communication and joint activities, men prefer actually doing an activity with same sex friends (84% vs 43%), whilst women preferred just to talk (57% vs 16%). Women are also more likely to list personal matters as topics of their conversations, along with talking about others (Derlega *et al.*, 1993). It is not surprising then that the preference and use of communication media also differs between the genders.

Baumeister (1998) argues that its not that men are less social than women, rather they orient towards different types of sociality: women orient more towards a small number of close dyadic relationships, and men towards larger, tribal groups with multiple interconnected relationships. As a result they act differently in their interactions with women being more emotionally expressive during interaction than men (e.g. more smiling, use of backchannels, etc). Benenson and Christakos (2003) reported that female same-sex friendships were less stable than males due to higher levels of self-disclosure and intimacy, and the fact they needed more time and effort to maintain. Girls also experienced greater distress if they broke up with their closest friends.

2.4.1. Gender and Communication Media Use

In regards to gender differences in communication media use, a number of differences have been found in landline telephone, Internet and mobile phone usage.

2.4.1.1. Gender Differences in Landline Voice Calls

There have been gender differences found for landline voice calls, with women having been reported to use the landline phone more than men (Boneva *et al.*, 2001). Women also make longer calls, enjoy speaking more, stay in touch, and maintain distant relationships more (Lacohee & Anderson, 2001).

Men on the other hand reportedly use it more instrumentally, only calling if there is a definite reason to and using the medium primarily to check and make social arrangements. However in contrast to this, other research (Travis, 2002; Boneva *et al.*, 2001) has shown that it is men who use the mobile phone more for calls.

2.4.1.2. Gender Differences in Internet, Instant Messaging and Email use

Many studies have been conducted comparing males and females use of the Internet and *email*. Men have been found to use the Internet and *email* more than women (Rainie *et al.*, 2000, Ling, 2003) although they use it in different ways: men for getting information and news, and women used it to get health information. Women reported using *email* and Instant Messenger more for relationship development and maintenance, and find the medium more gratifying than men (Rainie *et al.*, 2000; Lenhart *et al.*, 2001).

In terms of the content of messages sent via the Internet, email messages sent by women have been found to contain more personal content (Boneva, Kraut, & Frohlich, 2001). Baron (2004) looked at a corpus of Instant Messenger conversations

from 23 college students in America. The average turn length between the sexes did not differ, however the longest single turns were between female-to-female dyads. This group also had longer conversations on average, more emoticon use and better punctuation than males. The discourse style of men and women has also been found to be different online (Herring, 2000) with men having a more assertive and adversarial style, and women being more apologetic, supportive and empathetic.

2.4.1.3. Gender Differences and Mobile Phone Text Messaging

There is evidence in the sociological literature of differences between males and females in mobile phone texting too. Females have been found to send and receive more text messages than males (Grinter & Eldridge, 2003). In his sample of 883 Norwegians, Ling (2004) found that 36% of men reported sending at least one text per day, compared to 40% of women. Ling also found that women send longer messages (6.95 vs 5.54 words), more complex messages, and use texts for practical co-ordination as well as expressing emotion. In line with this, Kasesniemi and Rautiainen (2002) found boys texts to be more brief, informative, and pragmatic. Girls texts were more likely to be full of 'social softening', extra words, sharing experiences, and to utilise nuanced and meandering language, compared to their male counterparts.

In looking at the use of text messaging to register interest or ask someone out for a date, Byrne and Findlay (2004) found females preferred to use SMS compared to voice calls to make the 'first move', males had no preference. This is thought to be due to the 'buffer effect' whereby the physical distance from the partner and the visual anonymity reduce the potentially negative reaction that could occur. Of 1996 adults surveyed in UK, men were twice as likely to use their mobile for talking

compared to women who preferred text (Reuters, 2005)

Gender differences are examined at different points in this thesis. Because of the samples used, there is a general bias towards females in the current investigation, so gender differences are only focussed on when the sample of participants has a feasible number of males in relation to females in order to make valid comparisons. Elsewhere, gender was taken as a control variable, and where appropriate statistically controlled as a covariate

2.5. Self-Efficacy

Self-efficacy is a concept that has started to receive more attention in the academic literature in relation to Internet use (eg. Eastin & LaRose, 2000; Compeau & Higgins, 1995; Staples, Hulland & Higgins, 1998). It is defined as the 'belief in ones capabilities to organize and execute the courses of action required to produce given attainments' (Bandura, 1997, p3).

2.5.1. Self-Efficacy and Internet Use

Eastin and LaRose (2000) examined Internet self-efficacy to help explain the digital divide that is apparent in terms of Internet use. Internet users have been found to be predominantly affluent white and middle class groups, whereas non-users are typically from ethnic minority and low income groups. They argued that self-efficacy in using the Internet was just as important as cost and access issues as barriers to using the medium. People with low self-efficacy have little confidence in their ability to use the medium and may as a result feel uncomfortable using it to achieve certain outcomes. They are less likely to use the medium in future if they have low self-efficacy. This falls within the realm of social cognitive theory (Bandura, 1982), with

self-efficacy being 'a form of self-evaluation that influences decisions about what behaviours to undertake, the amount of effort and persistence put forth when faced with obstacles, and finally, the mastery of the behaviour. Self-efficacy is not a measure of skill; rather, it reflects what individuals believe they can do with the skills they possess' (Eastin & LaRose, 2000).

The stronger the person's self-efficacy beliefs, the more likely they will try and achieve a desired outcome, e.g. meeting new people on the Internet. In line with this, Utz (2000) found that people who prior to using MUD Internet sites had negative expectations about using the medium were the people who failed to report developing new relationships. Eastin & LaRose (2000) found that that self-efficacy correlated strongly with usage (with those high in self-efficacy reporting greater usage of the Internet), prior experience and outcome expectancies.

In relation to email, it was found that the more it was used, the more impact it had on one's life (Suler, 2003). Suler reported it as being an upward spiral, the more one emailed, the more relationships one would develop and the more one would email to stay connected. So the pacing of the interaction is an important factor - the more one uses email, the more important/intimate the relationship becomes (Suler, 2003) and at the same time, skill in composing and reading emails will increase. Parks and Roberts (1998) concluded in their study of computer-mediated communication that as the use of CMC increased, so did the social contexts and opportunities to develop relationships.

2.5.2. Self-Efficacy and Mobile Phone Text Messaging

People vary in their use of mobile phone text messaging. One can assume that the more someone uses text messaging, the more likely they are to discover and

exploit positive uses for it, which in turn will fuel their usage even further. If someone does not feel comfortable using text it may be assumed that they will avoid it, and so are less likely to see the benefit and to capitalise on its affordances.

Self-efficacy in the context of text messaging reflects the person's belief in their capability to capitalise on the affordances of texting. The actual process of sending a text can be quite daunting for a novice user, they are presented with a small display and have to figure out how to get the letters they want or, in the case of predictive text, work out how to select the correct words. On top of that, they have to think concisely enough so their message fits in the 160-character limit. Once the message is composed they then have to go through the appropriate menu options to select the contact(s) they wish to send the message to. Also they may have to get used to text etiquette, for example not using capital letters throughout, learning acronyms and emoticons, responding in a reasonable period of time, etc. A negative experience in using the technology reduces the likelihood they will use it again and reduces the self-efficacy they feel regarding that medium of communication. Eastin and LaRose (2000) highlight that non-users have to experience the benefits of using a technology in order to make way in decreasing the gaps between users and non-users. If this is the case and people can learn to capitalise on the benefits of text messaging then training could be given to help increase self-efficacy among those who avoid the medium.

Although no formal measure of self-efficacy was used in the current thesis, belief systems that potentially underlie efficacy judgements are examined in detail in Chapter 5. An interesting follow up to this thesis would be to examine self-efficacy in more depth and to see if people can be taught to capitalise on the affordances of text messaging in a positive way.

In summary, there are many individual differences that may be important in

determining whether, when and how a particular communication method is utilised. Proximal reasons including cost, communication availability and situational opportunity are obvious factors that can explain the decision to compose and send a text messaging at a particular moment in time. In order to explain consistent preferences over extended periods of time, however, relatively enduring distal factors must also be considered such as personality, long term relationship goals, and so on. Because of their relevance to interpersonal and affiliative concerns, this chapter has focused on two key individual differences that will be investigated as moderating variables throughout this thesis - social anxiety and loneliness. It is postulated that mobile phone texting may be preferred by anxious and/or lonely mobile phone owners due to the opportunity texting allows for selective self-presentation and involvement.

In relation to the model proposed in Chapter 1, this chapter has discussed factors to do with the user. This is depicted in Figure 2.1.

2.6. Research Questions and Overview of Thesis

The broad aims of this thesis set out in Chapter 1 are therefore be qualified by the addition of these moderating variables. This PhD will investigate the unique affordances of the text medium that support relational outcomes, and develop a theoretical model that can help to explain why texting might be preferred even to direct face-to-face contact by some individuals. Drawing on the theoretical models discussed in Chapter 1, two key questions will therefore be addressed:

- (a) Why might SMS texting might be preferred to face-to-face meetings, voice calls, and other text-based media (such as Instant Messaging) for establishing and maintaining personal relationships?

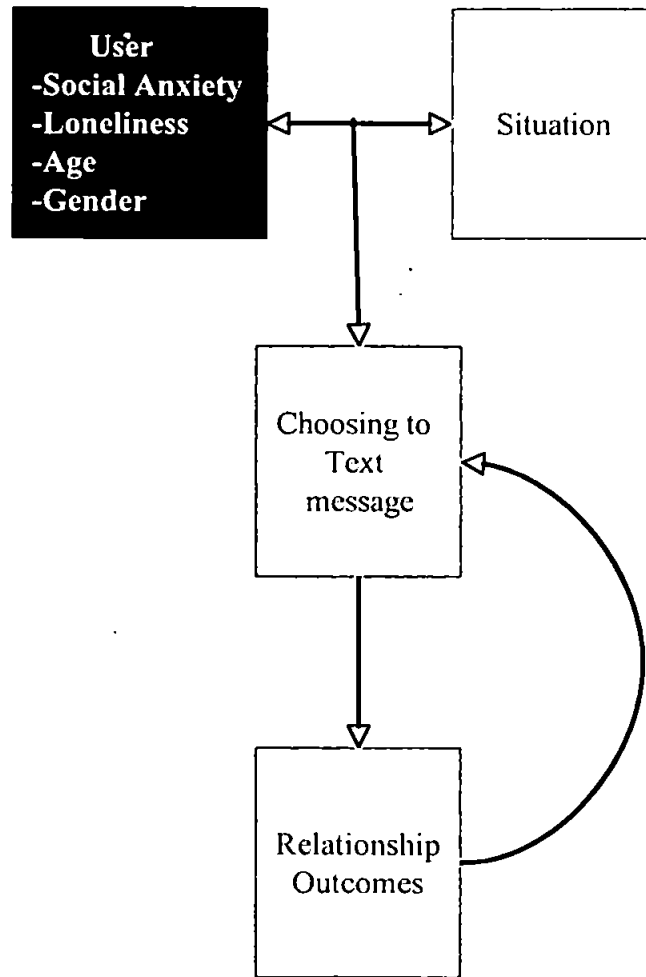


Figure 2.1. Model development

(b) How do key individual differences, such as social anxiety and loneliness, influence the content and patterning of text messaging?

The programme of work was structured around two phases of data collection and analysis, differing in methods and orientation. The thesis is therefore divided into two main sections, in the first of which exploratory investigations are introduced and discussed. As little is known about the psychological basis for the appeal of text messaging, this section begins with field studies of authentic text messaging behaviour among relevant user groups. Initially, one-shot studies are used to gather a sample of authentic text messages from undergraduate and web-based samples, and to

analyse the relationship between gender, personality, as well as the style and content of text messages (Studies 1 and 2). Subsequent to this, the results from user panels of mobile phone owners designed to monitor texting over extended time periods are reported (Study 3). All messages sent and received by panel members are tracked and recorded. In addition, panel members are required to complete various questionnaires. This provides a unique opportunity to map message exchange across individuals' social networks and provided insight into language use and message content in real-world networks of personal relationships.

This section concludes with a study on the reported uses and gratifications of mobile text messaging (Study 4). This investigates what motivations people have for using the medium and how these mediate texting behaviour. In the second section, experimental studies of the impact of text messaging on impression formation in comparison to face-to-face communication are reported. These experiments are designed to investigate the effects of the loss of social cues (such as appearance, paraverbal behaviour, etc.) in text-based communication compared with face-to-face communication on relationship formation in brief "getting acquainted" interactions between strangers (Studies 5 & 6). Finally, the novel use of a quasi-signal detection paradigm is used in two further experiments (Studies 7 & 8) to try and disengage aspects of the Hyperpersonal Model and determine whether the impression formation effects observed are biased on the side of the sender, the receiver, or both.

PART ONE

Exploratory and Field Studies

3. Overview

The first phase of data collection was exploratory, and involved collecting real text messages in one-shot (Studies 1 and 2, Chapter 3) and longitudinal (Study 3, Chapter 4) studies. The aim of this exploratory work was to generate a detailed picture of how texting is being used in real-life contexts. Asking people why they choose to use text to communicate opens up insights into the perceived uses and gratifications of text messaging. These perceptions can then be compared against actual uses of the text messages to see if how people think they use text messaging compares with how people actually use the medium.

As well as qualitative analysis in Chapters 3 and 4, quantitative analysis will also be used in analysing content of the text messages to look for differences between different groups in the content and/or characteristics of the text messages. Due to the nature of the data- 12 participants and over a thousand text messages, Chapter 4 will also be using multi-level modelling to analyse the data.

Chapter 5 will examine peoples reported motivations behind text messaging, utilising the Uses and Gratifications approach to identify perceived uses and gratifications and Baron and Kenny's (1986) test of mediation to examine whether these mediate communication behaviour.

The longitudinal study in particular has plenty of data with which many other research questions that can go beyond those asked in the current thesis, and indeed, this will be used in other work (e.g. Reid & Reid, 2003). In the current thesis, the main aims were to develop a theoretical model to help explain the use of text

messaging. What was needed in order to fit a model was an idea of how text messaging was being utilised. The general question to be addressed was whether or not text messaging was being used for social communication or whether it was being used mainly for task based purposes. Once this question could be answered, a more experimental framework could be used to look at more specific theoretical questions regarding the medium.

The benefit of studying text messages is that the mobile phones record communication exactly as it was carried out. This means that the 'observation' of the use of the medium is arguably more reliable than other methods of observation that may be more intrusive and cause reaction effects. By using the field as opposed to setting up artificial situations for gathering text messages in the laboratory, a more accurate and reliable picture of how text messaging is being used can be generated.

Chapter Three: Two 'Snap-shot' Studies of Text Messaging

3.0. Overview

This and the following chapter aim to examine authentic text messages to understand how people are actually using the medium in the real world. Samples of text messages were gathered by three different methods. Firstly a sample of texts were collected from two first year psychology lectures, in which undergraduate students were asked to record on a sheet provided their most recent received text (Study 1). Secondly, a text message sample was collected via an Internet questionnaire, in which participants visiting a research web site were asked to record their most recent received and most recent sent text message (Study 2). Thirdly, a longitudinal panel study was also used, and this forms the main focus of the next chapter. Here, a group of 12 participants were recruited to note every text they sent and received to their phone over their first semester at university (Study 3).

The rich and complex nature of this data allows many features of text messages to be examined. However, for the purpose of this thesis the key focus at this stage is on the general content of the text messages, and how this relates to the broad expectations of the contrasting Reduced Social Cues and Hyperpersonal models. For example, the RSC model emphasises the instrumental aspects of text messaging and hence expects text messaging to be predominantly task based, low in sociability, and fairly cold in emotional tone, whilst the Hyperpersonal model expects text messaging to be used for intimate social contact and the exchange of personal information. The present studies therefore examine authentic text messages in the context of these two contrasting models.

3.1. Introduction

As stated in Chapter 1, little work has been carried out on the psychological factors underlying the popularity of mobile phone text messaging. However, two studies have examined the content of messages from a sociological perspective - Ling (2003) and Thurlow (2003). In these two studies the texts that were analysed were a “snapshot” samples of messages that were either sent (Ling) or sent *or* received (Thurlow) at a single point in time. Thurlow collected a sample of 544 messages by asking a undergraduates to write down the five most recent messages, either sent or received. He also recorded the gender and age of the participants but did not take any information about the person that the texts were sent to/received from. As it was not noted whether the messages were received or sent, it was not possible to do any gender/age comparisons. Variables such as message length, language use and common themes in the text messages were examined. Among the results, it was found that the length of texts were quite variable with some people making full use of the 160 character limit and others being very succinct. In terms of language use, abbreviations were found to be used less frequently than was expected - less than 20% of message content were found to be abbreviations. When the content of the text messages was examined, it was found that less than one-third of the messages accomplished functional or practical goals - the remainder fulfilled a combination of phatic, friendship maintenance, and social functions associated with highly intimate and relational concerns.

More recently, Ling (2003) collected a sample of 882 SMS messages by asking Norwegian participants to write down from their mobile phones the last three messages that they had sent. It was argued on ethical grounds that received messages could not be recorded due to the sender not having given consent to this use of their

messages. Because Ling only examined sent messages, he had the advantage over Thurlow in that demographic information such as gender and age were taken of the sender of each message so any differences that may arise in these variables could be analysed. It was found that young females were the most prolific texters, confirming other research (Boneva, Kraut, & Frohlich, 2001; Grinter & Eldridge, 2003). Ling also looked at the common themes in texts, finding the most common content was that regarding social co-ordination and 'gift' messages, this latter group was defined in a similar way to Thurlow's definition of 'friendship maintenance messages', so included messages classified as tokens, or gifts, for example, the 'night night' text. Ling noted the use of text for micro-coordination, the ability to coordinate on the move. In looking at the texts in more detail, Ling found that quite a low proportion of the texts contained abbreviations. This was consistent with Thurlow's findings.

The results of these two studies seem to provide preliminary evidence that text messaging is being used extensively for intimate social purposes, which at first glance is consistent with the Hyperpersonal theory. The current study seeks to replicate and extend these existing findings.

3.1.1. Research Questions

The purpose of this particular study was to collect a number of texts to provide a general picture of the content of mobile phone text messages. One of the benefits of studying text messaging is that the messages themselves can be saved onto the mobile phone and analysed later. Dates and times are also recorded by the device.

There are some general research questions that can be developed. The earlier studies of Ling and Thurlow indicate that text messages have been found to convey social and relational content. This leads to the broad research question as to whether

the sample of texts in these studies will be consistent with these earlier findings in that the content of the texts will show high levels of social-relational content. This will be consistent with the Hyperpersonal model but difficult to reconcile within the RSC model. At a very basic level the general coding of texts into task/informational or social-relational content categories would provide a general idea as to which of the two theories were better a fit to the phenomenon of text messaging.

A further research question concerns mobile phone owners preferences for use of their mobiles for texting or talking. “Texters” may be those who have discovered the social affordances of text messaging for establishing and maintaining social contact, and may therefore use texting for more social-relational purposes. This will be examined in the second of the two studies as the first could not collect information on the preference for texting or talking of the person the participant was communicating with.

Gender differences in usage and content will also be examined. As discussed in Chapter 2, the general trend in computer-mediated communication studies is for females and males tend to use media in different ways, with men making more use of the Internet and email for getting information, and for brief, pragmatic purposes and women being more emotional and socially oriented in their content (e.g. Rainie *et al.*, 2000; Ling, 2004; Lenhart *et al.*, 2001; Boneva *et al.*, 2001; Kasesniemi, 2002).

3.1.2. Ethical considerations

Ling (2003) argued that it is unethical to collect received messages as the sender had not given their consent. However, in this study the second party is anonymous - no information was gathered about their name, gender or their age, so their messages cannot be traced back to them. Also the participants themselves are

anonymous to the experimenter. So it was concluded that the consent of the recipient was deemed to be enough.

The text messages were viewed only by the researcher and her supervisor, and participants were made aware of this before they consented to take part in the study and were given the opportunity to ask any questions or voice any concerns that they may have had about the study.

3.2. Study 1: Lecture Gathered Texts

3.2.2. Method

3.2.2.1. *Participants*

Ninety-three first year psychology students were asked to participate at the start of one of their lectures.

3.2.2.2. *Procedure*

Participants were asked to find their most recent received message on their mobile phone and write it down exactly as it appeared on their phone onto a worksheet provided. Background information such as age and gender of the participant was noted as well as whether they preferred using their mobile phone for texting or talking, the average number of texts they sent and received each month and the length of time they had owned a mobile phone. Further questions probed for information about the sender. (What relationship do you have with this person?; How long have you known this person?; How long have you been texting this person?; Gender of person; Average number of texts sent to this person per month). The names of the participants or the senders were not recorded. The messages were then entered into a word document for later analysis.

As participants had only a few minutes in which to record their message, only received texts were asked for. Also at the time of collection (2003) some phones did not have the capability to store sent messages so this would have limited the potential sample.

3.2.2. Results

3.2.2.1. *Characteristics of the Participants*

A total of 92 participants recorded their most recently received text message. Ages ranged from 18 to 52, with a mean of 22 years old ($SD = 5.96$). As is typical of the undergraduate psychology population at the University of Plymouth, there was a bias towards females, with 76 of the participants being female. The messages participants recorded came from 38 males and 54 females. On average, participants had owned a mobile phone for 44.2 months ($SD = 16.45$), sending around 157 ($SD = 143.89$) texts and receiving around the same amount ($M = 156$, $SD = 140.16$) per month.

Participants had known the sender for an average of 42 months ($SD = 58.87$), and had been texting them for between one and 42 months ($M = 19.0$, $SD = 14.94$). Participants reported both sending and receiving around 36 texts a month ($SD = 58.97$ and $SD = 65.24$ respectively) to the sender of the recorded message. Preference for texting or talking was exactly 50:50 within the sample, with 46 preferring each option.

3.2.2.2. *The Text Messages*

Text messages ranged in length from five characters to 164 ($M = 77.75$, $SD = 44.03$), with the number of words ranging from one to 41 ($M = 17.81$, $SD = 9.56$).

Sixty-eight percent of the texts recorded by the participants had come from a friend, 25% from a partner and the remaining 6.6% from potential love interests, parents, ex partners or commercial businesses.

The first aspect that was explored was whether the text messages showed any evidence of social content. The messages were therefore coded holistically by the author as being purely task/information based, having a social/relational orientation, or as neither (no code). A task/information based message were identified as those that focused on only getting or giving information and that showed no sign of social purposes e.g. message 18: 'RU IN SCOTT BUILDING' and message 45 'have emailed su + heisproceeding to pig hole now'. Messages that were coded as social/relational were those that contained tokens of affection, social plans, empathy, initiation of relationships, self disclosures, interpersonal enquiries, etc. Examples are as follows: message 1: 'Well done!Hav just remembered that my fieldwork cw is due on tues,so if ur bored u could always do that 4 me!What ru up 2 over the wkend?think im comin bak sun'; message 10 'Oi missus I miss u loadz-its been a year and I wanna cu soon lov yax [Lauren]¹'. Some texts were unable to be coded as it was hard to determine their orientation based on just the one text taken out of context. The full text interaction would be needed e.g. message 79: 'cool' and message 72: 'yeah sure'.

Figure 3.1 shows the results of content analysis. Based on this preliminary coding, 45 (48.4%) of the messages were shown to contain social/relational content, 39 were task/informational (41.9%), and 9 (9.7%) were unable to be coded. So in line with the findings from Ling and Thurlow, this seems to indicate that text messaging is indeed being used for social-relational purposes, and what is more this seems to be as or more frequent a use for text messaging as task/informational purposes.

¹ To anonymise messages, fictional names with the same number of characters have been substituted where appropriate.

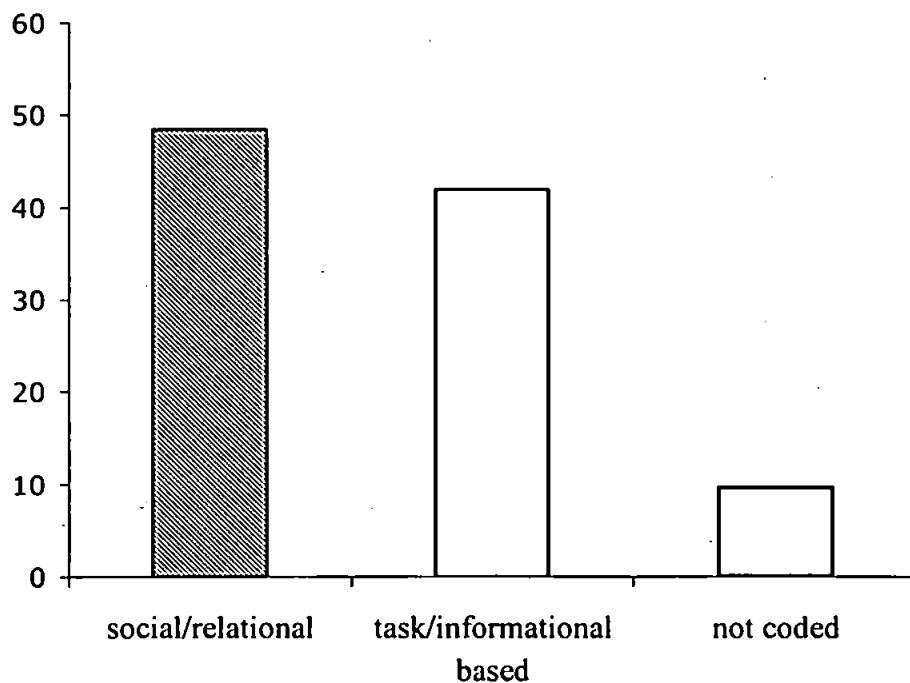


Figure 3.1. Content analysis of text messages received in Study 1.

Having coded the messages at this preliminary stage, the next step was to develop a more fine-grained approach to the coding scheme. An inductive, open coding approach was used in further coding of the messages, in accordance with guidelines specified by Bakeman and Gottman (1997). These codes are shown in Table 3.1. Each message was broken up into self-contained units of meaning and a code assigned to each part. As a result multiple codes could be applied to a single message. For example the fictional message:

How are you? Im fine. What are you doing later? I am sitting in my room watching neighbours.

Table 3.1. Content codes used to classify messages

Code	Definition
Self-oriented	
Self feelings	About how one is feeling e.g. 'I'm so happy', 'feeling really crap'
Self information	Giving the other information about self that is not about feelings 'I have 5 pairs of shoes', 'read that book last night'
Self actions	Explaining what doing this instant e.g. 'I'm shopping'
Self plans	Texting about self plans/future arrangements e.g. 'I'm off to the library this afternoon'
Other-oriented	
Other feelings	Asking about the others feelings/insinuating others feelings e.g. 'How are you?'
Other information	Asking the other for information 'What are you wearing?', 'have you tried the spaghetti?'
Others actions	Asking/telling other what they are doing/ how to act 'What are you up to?'
Other plans	Asking/texting about others plans/future arrangements 'are you going to Johns party?'
Both self and other plans	Texting about joint plans/meetings, social coordination 'fancy the cinema with me later?'
Acknowledgement/Greetings	Acknowledging others text only, e.g. 'O.K.', or just greeting 'Hi'.
Gifts	'gift' texts that contain only text such as 'night night', 'I love you', 'Good luck'
Situational	Texting about situational/environmental issues e.g. 'this lecture sucks'
Swearing/profanities	Swearing/profanities in text
3 rd Party	Texts concerning 3 rd party e.g. 'she is so ugly'
No Code	Message does not fit into any of the other categories/does not make sense

can be broken into four units. The first 'How are you?' is coded as asking about the other's feelings; the second, 'Im fine', is coded as a reference to self feelings, the third 'what are you doing later', is coded as asking about others plans, and finally 'I am sitting in my room watching neighbours' is coded as a reference to self actions. So this message will receive four different codes, indicating that this message fulfilled

four separate functions. As the purpose of this coding scheme was to classify text messages holistically, if a single message contained several units receiving similar codes, these codes would be recorded only once. The various components of self- and other- oriented codes were also summed up to give one score on each of these dimensions (a sum out of 4). This was to check that segregating the self-other codes into smaller units did not diminish their significance.

Table 3.2. Kappa values for each of the content codes

Content	K
Self feelings	.69
Self information	.52
Self actions	.64
Self plans	.75
Other feelings	.75
Other information	.56
Others actions	.80
Other plans	.89
Both self and other plans	.64
Acknowledgement/Greetings	.80
Gifts	.80
Situational	.50
Swearing/profanities	1.0
3 rd Party	.81
No Code	.77

This coding scheme was developed and refined by examining each text message from this study (and those from Studies 2 and 3) in turn, and representing the content with one or more codes. This process was repeated throughout the content analysis, adding new codes where appropriate. After the first 300 texts were coded, they were then re-coded with the full code set, to check for consistency in coding. The reliability of the coding was calculated using Cohen's kappa as the agreement statistic, comparing the first run of coding with the second. Table 3.2 shows the kappa values for each code. Kappa is preferable to using simple agreement percentages as it corrects for chance and documents point-by-point agreement (Bakeman & Gottman, 1997). Fleiss (1981; cited in Bakeman & Gottman, 1997) characterised kappa's of .40 to .60 as fair, .60 to .75 as good and .75 and over as excellent. As can be seen from Table 3.2, Kappa values ranged from .50 to 1.00, so are in the accepted range.

Coding the content of each of the messages showed the results presented in Table 3.3. Here the percentages texts that contained each of the different types of content are shown.

At the text message level, the most popular type of content was asking the receiver for information about themselves, followed by giving the receiver some information in relation to the sender. Combined plans between the sender and receiver and texts concerning the senders feelings were the next most popular. The reduced social cues approach forecasts that the medium would be used for asking for and giving task based information and being impersonal, and this was in fact found not to be the case- a great deal of the content goes beyond such task/informational purposes to being concerned with social-relational functions as well.

Table 3.3: Percentage of texts containing each type of content

Content	% texts
Other information	43.0
Self information	37.6
Both self and other plans	11.8
Self feelings	10.8
Other feelings	7.5
Gifts	6.5
No Code	6.5
Acknowledgement/Greetings	5.4
3 rd Party	5.4
Self actions	4.3
Others actions	4.3
Self plans	3.2
Other plans	2.2
Situational	1.1
Swearing/profanities ²	0

As the Hyperpersonal theory would predict, there is evidence that text messaging is being used for social purposes and that it goes beyond just being a practical/task-based medium. Of the messages, 10.8% contained information about the sender's personal feelings, and 7.5% were concerned with the feelings of others. Furthermore, 6.5% were classed as 'gifts' containing content that may be seen as

² There were no instances of swearing/profanities, leading to a cell size less than 5 for the chi squared analysis.

helping to maintain relationships, e.g. 'I love you', 'nite nite', and appear to be very relational in nature. A further 5.4% of the texts were third party or 'gossip' related, again indicative of a social-relational function. Contrary to the reduced social cues hypothesis that a medium devoid of traditional social context cues may lead to disinhibited and hostile behaviour, no instances of swearing or profanities were recorded - although the public setting in which this text sample was gathered may have introduced an element of self-selection or censorship of the text messages reported by students in this sample.

In summary, this initial analysis has demonstrated that the reduced social cues approach may struggle to account for the fact that text messaging is actually being used for not only task/informational based reasons, but also and extensively for social-relational purposes too.

3.2.2.3. *Texters and Talkers*

The second general research question concerned mobile phone owners preferences for using their mobiles for texting or talking. As the data in this first study did not contain information on the *sender's* preference for texting or talking, differences in the content of messages cannot be examined in the present study. In relation to the receiver, however, as expected there were significant differences between those classified as Texters and those classified as Talkers in the number of texts they sent each month ($t(78.1) = 3.14, p < .01$), with Texters sending more ($M = 201.85, SD = 162.8$) than Talkers ($M = 111.50, SD = 107.7$). The same pattern of differences arose for the number of texts participants reported receiving each month ($M = 191.71, SD = 159.2$ and $M = 119.11, SD = 110.63$; $t(78.3) = 2.52, p = .01$). This

is as one would expect from individuals who prefer using this medium, and supports a previous study (Reid, 2002).

3.2.2.4. Gender Effects

No significant gender differences were observed in the time participants had known the sender of the message (for males and females respectively; $M = 42.03$, $SD = 57.9$; $M = 42.03$, $SD = 60.10$), the time they had been texting this person ($M = 16.87$, $SD = 13.2$; $M = 20.53$, $SD = 16.0$), the number of texts they sent to ($M = 49.32$, $SD = 71.6$ for males; $M = 26.96$, $SD = 46.9$ for females) or received from this person ($M = 46.30$, $SD = 71.9$; $M = 30.37$, $SD = 60.1$ for males and females in turn).

There were, however, significant differences between male and female participants in the number of texts they sent each month ($t(61.1) = 2.01$, $p = .04$), with males reporting sending more ($M = 192.97$, $SD = 167.8$) than females ($M = 127.43$, $SD = 115.6$). Although the same pattern of differences arose for the number of texts males and females reported receiving each month ($M = 179.11$, $SD = 151.2$ and $M = 134.79$, $SD = 127.45$), this difference was not significant ($t(89) = 1.51$, $p > .10$). So it appears that men send more texts than women, which is contrary to previous findings that females were the most prolific texters (e.g. Boneva *et al.*, 2001; Grinter & Eldridge, 2003)

The data was next split by gender of the sender. There were 38 male and 54 female senders in the analysis. The only significant difference in content was in gift texts. Males were more likely to send this sort of text (13.2%) than females (1.9%; $\chi^2 = 4.68$, $p < .05$). This is contrary to the expectation that there would be significant content differences between males and females with the former being more practical/information oriented and the latter being more emotional/social oriented.

As can be seen in Table 3.4, females used more of the available characters in their text messages than males however this difference failed to reach statistical significance ($t(90) = -1.19, p > .05$). Males also used fewer words in their texts ($t(90) = -2.2, p = .03$). As reported earlier, males reported sending more texts than females per month: this may be the direct result of not being as economical in their text messages, implying that they send more than one text where a female participant may just send the one.

Table 3.4. Gender differences in text characteristics

	<i>M</i>	<i>SD</i>
No. characters in text		
Male	70.6	42.4
Female	81.5	44.3
No. words in text		
Male	15.1	8.6
Female	19.5	9.8

Although males sent more texts, females' messages contained more words and used around ten characters more per message, although this latter difference was not significant. One possibility is that women are more economical in their messaging than males. Alternatively, it is widely reported in the literature that females tend to have a preference for close, often dyadic friendships where males often are more group based (e.g. Bennenson, 2002; see Chapter 2). As there were no significant differences between males and females in the number of texts they sent to the person from whom they had received the recorded message, the implication is that males are sending more messages because they have larger social networks rather than because they send more texts to each member of their network

The gender composition of each dyad was next examined to explore whether there were differences in text characteristics and/or content dependent on same-sex/cross-sex pairings. There were four groupings - texts sent from a male to a male ($n = 4$), female to female ($n = 42$), female to male ($n = 34$) and male to female ($n = 12$). As the numbers of some of these pairings were quite low, these were combined to form two groups- same sex ($n = 46$) and cross sex ($n = 46$) dyads. Chi-squared tests were conducted to look for any significant differences in message content between these two groups: however none were found (all $p > .05$).

3.2.2.5. *Other Comparisons*

It appears therefore that the only significant gender differences in terms of texts characteristics and content were that males sent more gift texts than females, and males also sent more text messages than females. This was surprising as more differences had been thought to be found.

All participants in this study seem to be receiving messages of similar content. To test whether time of knowing the recipient/sender had any effect, a median split was carried out on the data based on the length of time people had known the person who sent the text (Median = 18.5 months) and then on the length of time people had been texting this person (Median = 18 months). Again no significant differences were found. It may be that the median time of relationship of 18 months is not low enough to capture the 'getting to know one another' stage in relationships. This will have to be delved into in future work.

In terms of relationship with the sender, two major groupings arose - friends ($n = 63$) and romantic partners ($n = 23$). The only significant difference to arise was, as

may be expected, in the gift texts. Romantic partners sent more of these (21.7%) than friends (2.0%), $\chi^2 = 10.5$, $p < .01$.

3.2.3. Summary

Study 1 has resulted in a coding scheme that seems to be quite robust across raters and text messages. Examining the content of the text messages gathered revealed that the most popular content was concerning informational/practical purposes, however social-relational uses were also apparent, as would be predicted by the Hyperpersonal model.

As expected, those participants reporting a preference of text sent and received more text messages than those who preferred voice calls on their mobile, backing up previous research (e.g. Reid, 2002)

Some of the findings relating to gender were contrary to expectations. There were few differences in content between males and females, however males were more likely to send gift texts than females. However this was a content area that was primarily sent between males and females as opposed to same-sex messages. So texting seems to be offering the opportunity for males to send sentiments of affection to females. Another finding that was unexpected was that males report sending more texts per month than females, which is contrary to the research done previously (e.g. Grinter & Eldridge, 2003).

Having now developed a coding scheme, Study 2 was conducted to examine more text messages to investigate further the differences in content between those who preferred to talk and those who preferred to text on their mobiles.

3.3. Study 2: Internet Gathered Texts

3.3.1. Introduction

To examine the distinction between Texters and Talkers and their use of messaging in more depth, a larger sample of texts were collected, this time including both received and sent messages. To gather a large message sample, an Internet questionnaire was developed and advertised on the Internet at various sites, including Plymouth and other universities on-line research pages, chat forums, newspapers and a range of list servers, and a link to the study was also hosted by one of the Internet's largest search engines. In addition, the questionnaire was advertised through a distribution list to all students at the University of Plymouth. When respondents arrived at the questionnaire on the Internet, they were presented with an information page, detailing what the study was about and how to complete the questionnaire.

The questionnaire requested background information concerning the participant, including age and gender, and various questions on mobile phone use including whether participants preferred texting or talking on their mobile phones and the reasons for this, the length of time they had owned a mobile phone, the average number of texts and calls made per month, and the person with whom they text the most. Having completed the background information, participants were then asked to type in their most recent sent message exactly as it appeared on their screen i.e. taking note of capitalization, abbreviations etc. They were also asked to give information about the recipient, in particular their relationship with this person, their age, gender, how long they'd known them and had been texting them, and the number of texts they sent and received from this person per month. On completing this information, participants then filled out the same information about their most recent received

message. Once this was finished participants had the option to fill in more sent and received messages or continue to the debrief page.

The questionnaire used cookies so that if a participant came back to enter more messages they would not have to enter all the background information again. Responses to the questionnaire were uploaded to an SQL server and were transferred to a Microsoft Access database, held on the department's web server. To protect confidentiality, at no point were participants asked their names or mobile phone numbers, or any other identifying information.

3.3.2. Results

3.3.2.1. *Respondent Characteristics*

After screening the data for replicated entries, anomalies, and data mis-entry, a total of 1014 respondents recorded their sent text messages, of which 876 also recorded their received ones. Ages of respondents ranged from 15 to 55 ($M = 22$ years old). 36% of the respondents were male and 64% female. The mean number of text messages reported sent per month was 148.78, with 150.13 were reported received. A total of 223 respondents reported preferring texting and 392 as preferring talking on their mobile, with 'no preference' being reported by 398 of the sample, and one non-response to this question. Participants had owned a mobile for between 1 and 144 months, averaging at 42.1 months ($SD = 19.97$). Overall, text messages contained an average of 67.78 characters ($SD = 49.66$).

3.3.2.2. *Sent Text Messages*

On average, participants had known the recipient of their sent texts for 56 months ($SD = 97.13$) and had been texting them for 21.33 months ($SD = 21.89$). The

mean age of the recipient was 23 years, ranging from 10 to 74 ($SD = 7.46$). A mean of 55.5 ($SD = 93.69$) texts per month were reported to be sent to the recipient, and 53.9 ($SD = 89.31$) were received back. Of respondents answering the question concerning who they text the most (957), 65.0% (622) said their friends, 32.2% (308) that it was their partners, and 2.8% (27) said their parents. The gender of recipients of texts was split equally between males and females.

3.3.2.3. Received Text Messages

On average, participants had known the sender for 55.5 months ($SD = 77.89$) and had been texting them for 21.5 months. The mean age of the senders was 23.7, ($SD = 7.38$) ranging from 1 to 65. A mean of 65.6 were received from the sender per month, and 57.6 were sent back.

3.3.2.4. Text Message Content

There were no significant differences in age, gender or any other demographic variable between those participants who recorded sent messages only and those who recorded sent and received. Nor was there any evidence of differences between sent and received texts in terms of relationship between the interactants and gender. As a result, it was possible to combine together all the sent and received text messages to examine their general characteristics and content.

Text messages were coded using the content coding scheme developed in Study 1. Table 3.5 shows the percentage of the pool of 1890 text messages that contained each of the content codes. As was found in the lecture-gathered sample, the most frequent type of content was other information, followed by self-information and then combined plans, although the Internet study had a greater frequency of each of

these codes than the lecture gathered text study. This may be due to the sample characteristics with Study 1 using purely students and Study 2 using a wider range of individuals.

Table 3.5. Percentage of Internet gathered text messages displaying each type of content.

Code	% of texts
Other information	34.1
Self information	23.7
Both self and other plans	12.3
Other feelings	8.7
Gifts	8.3
Others actions	7.6
Self feelings	7.2
Other plans	6.8
Acknowledgement/Greetings	5.5
Self actions	5.2
Non Coded	5.1
Self plans	4.1
3 rd Party	3.4
Swearing/profanities ³	1.9
Situational	1.1

It was found that 12.3% of the texts were concerned with combined plans or 'social coordination', 8.7% of the messages were related to others feelings and 7.2%

³ Both swearing and situational content had cell sizes of less than 5 in the analysis.

to the senders feelings, so again this seems to suggest that text messaging is not just a task-oriented medium, it is being used for social-relational purposes too. This is in support of the first hypothesis that, consistent with Hyperpersonal theory, there is evidence of social-relational usage of text.

3.3.2.5. *Preference for Texting or Talking*

The second general research question was concerned with the differences in content between those who preferred talking, those who preferred texting on their mobile phone, and those who had no clear preference either way. A chi-squared analysis revealed no significant differences in terms of gender between Texters and Talkers. Of Talkers, 51.0% were male and of Texters, 49.1% were male. In terms of males as a whole, of those reporting a preference, 63% were Texters. For females, 65% were Talkers. ($\chi^2 (1, n = 609) = .18, p > .10$).

This differs from the MSc study discussed in Chapter 2 where Texters were more likely to be female than male. This may be because this study had the option of 'no preference' meaning that participants were not forced to choose between one and the other.

Other variables examined for differences between Texters, Talkers, and those with no clear preference included total number of texts sent per month, total number of texts received per month, length of message (i.e. number of characters), time respondent had owned their phone, the length of time (in months) they had known the person they were sending a text message to, the length of time (in months) that they had been texting the person, the number of texts they send to the person whom the recorded text was for (per month) and the number of texts they receive from this

Table 3.6. Comparisons between those who preferred text (Texters), talk (Talkers) and those who indicated no preference.

Code	<i>M</i>	<i>SD</i>	<i>F</i> (2,1009)
Total messages sent per month			
Text	191.1	170.9	39.1***
Talk	75.7	112.1	
No preference	148.4	160.1	
Total Messages received per month			
Text	187.0	170.3	33.3***
Talk	80.3	97.9	
No preference	153.2	167.0	
Length of message			
Text	69.4	49.6	3.2*
Talk	58.7	49.6	
No preference	65.1	50.2	
Length of time owned phone (months)			
Text	43.7	23.7	.35
Talk	42.1	21.6	
No preference	42.7	26.7	
Length of time known recipient (months)			
Text	63.6	111.3	.15
Talk	50.1	64.1	
No preference	52.0	97.3	
Length of time texting been recipient (months)			
Text	21.8	18.8	.13
Talk	21.1	20.4	
No preference	21.0	25.3	
Number of texts send to recipient per month			
Text	64.4	97.1	13.1***
Talk	27.4	43.9	
No preference	62.6	107.0	
Number of texts receive from recipient per month			
Text	61.2	93.7	10.7***
Talk	29.6	43.7	
No preference	60.5	100.9	

* $p < .05$, ** $p < .01$, *** $p < .001$

person (per month). Respondents who stated no preference were also included in this comparison. Table 3.6 shows these results.

A MANOVA, revealed significant differences in total texts sent ($p < .001$) and received ($p < .001$) per month, number of texts sent to ($p < .001$), and received from ($p < .001$) the other person, and in the number of characters within their sent message ($p = .03$). The remaining variables were not significant at the .05 level. An LSD post-hoc comparison of the significant differences revealed between which groups these differences lay.

There were found to be significant differences between all three groups in texts sent per month ($p < .001$). As might be expected, Texters sent the most, followed by those with No Preference, followed by Talkers. The same pattern arose for total received texts ($p < .001$ for the differences between Texters and Talkers and No preference and Talkers; $p = .002$ for Texters and No preference). There were significant differences between Talkers and Texters ($p < .001$) and Talkers and No preference ($p < .001$) in texts received from the recipient per month, and the same for texts sent to this person per month ($p < .001$ for both comparisons). There were no significant differences between Texters and No Preference for either of these variables ($p > .10$). Both Texters and those with No Preference sent and received more texts to/from the recipient than Talkers. Finally, there was evidence of a significant difference in terms of length of text message sent, with Texters sending significantly more characters in their texts than Talkers ($p = .01$). Both Texters (58.6%) and Talkers (58.7%) primarily sent texts to their friends. Partners came a close second (32.1% of Talkers and 29.2% of Texters).

The content of sent messages was examined by applying the same coding system as discussed earlier. Only sent messages were examined for differences

between Texters and Talkers in content as the preference of those sending the received messages was unknown. Differences between Texters ($n = 392$) and Talkers ($n = 223$) in the content of their texts were examined (see Table 3.7).

Table 3.7. Percentage of Texters and Talkers texts that contained each of the content codes.

Code	% of Texters texts	% of Talkers Texts	χ^2
Self feelings	4.6	4.5	.00
Other feelings	5.6	5.9	.02
Non Coded	5.4	10.3	5.33*
Self information	25.7	24.6	.09
Other information	35.2	31.4	.92
Others actions	6.9	7.6	.12
Self actions	5.6	4.5	.38
Other plans	8.4	7.6	1.27
Self plans	0.1	3.3	3.51
Both self and other plans	12.5	7.2	4.31*
Acknowledgement/Greetings	7.2	8.1	1.70
Gifts	9.0	10.3	.31
Situational	2.3	1.4	.67
Swearing/profanities	2.6	2.7	.01
3 rd Party	2.8	4.0	.68

* $p < .05$

A chi-squared analysis revealed very few significant differences between these groups in their text content. Significant differences lay in the content areas of

combined self and other plans and in texts that did not fit into any of the codes. Of Texters messages, 12.5% were concerning combined plans with their partner, compared to 7.2% of Talkers messages ($\chi^2 (1, n = 614) = 4.31, p = .04$). Uncoded messages comprised 10.3% of Talkers messages and 5.4% of Texters messages ($\chi^2 (1, n = 614) = 5.33, p = .02$). Uncoded texts were those that were ambiguous as to what/who (self/other/third party) they were referring to, e.g. 'bla bla bla', 'wasnt invited', 'dave'. The large number of these may be due to the fact that this is a mere snapshot of text messaging, and as such contextual information, including the pre- and post-responses are lost, making the content ambiguous. So it appears that looking at the snapshot of sent texts, there are not many differences in their content.

3.3.2.6. *Gender Effects*

Gender differences were examined next. In relation to the usage variables (see Table 3.8) of the 365 males and 643 females who responded, significant differences arose between the genders in length of message (the number of characters in their text). The length of time participants had owned their phone and had been texting the recipient also differed significantly between genders. To check that these were not confounding variables, an ANCOVA was conducted on message length using these as covariates. This revealed that females sent longer messages, even after controlling for differences in the relationship variables. This result supports early findings in the literature.

In studying gender differences both the sent and received messages were combined in the same analysis. Owing to missing data, this resulted in a total of 676 male messages and 1210 female messages. The average characters in texts sent by

Table 3.8. Gender differences in Internet sample

Code	<i>M</i>	<i>SD</i>	<i>t</i>
Total messages sent per month			
Male	147.2	163.8	-.27
Female	150.1	159.7	
Total Messages received per month			
Male	147.1	159.5	-.49
Female	152.3	161.6	
Length of message			
Male	58.4	48.8	-3.35**
Female	69.3	50.3	
Length of time owned phone (months)			
Male	45.5	25.0	2.45*
Female	41.5	24.1	
Length of time known recipient (months)			
Male	60.8	121.6	1.16
Female	53.3	80.0	
Length of time texting been recipient (months)			
Male	23.6	21.6	2.50*
Female	20.0	21.9	
Number of texts send to recipient per month			
Male	57.1	94.9	3.82
Female	54.8	93.2	
Number of texts receive from recipient per month			
Male	54.9	88.8	.22
Female	53.6	89.8	

* $p < .05$, ** $p < .01$

males was 62.8 ($SD = 48.78$) and for females this was 70.7 ($SD = 49.9$). A t-test showed this difference to be statistically significant $t(1884) = -3.32, p = .001$.

The relationship between the interactants was predominantly as friends (58% of both males and females texts) and romantic partners (31.4% and 31.7% of males and females texts respectively).

Table 3.9. Content of males and females text messages gathered in the Internet sample

Code	% of Male Texts	% of Female Texts	χ^2
Self feelings	5.2	8.3	6.23**
Other feelings	6.1	10.2	9.22***
Non Coded	7.0	4.1	7.56**
Self information	22.8	24.2	2.24
Other information	34.3	34.1	.01
Others actions	8.9	6.9	2.51
Self actions	6.6	4.3	5.57**
Other plans	5.3	7.7	3.76*
Self plans	4.6	3.7	.86
Both self and other plans	11.4	12.8	.79
Acknowledgement/Greetings	5.3	5.6	.07
Gifts	5.5	9.9	11.17***
Situational	1.2	1.0	.15
Swearing/profanities	2.8	1.4	4.58*
3 rd Party	2.2	4.0	4.43*

* $p < .05$, ** $p < .01$, *** $p < .001$

When gender of the sender of all the texts in the sample was examined, there were found to be significant differences in several of the content measures (see Table 3.9). As can be seen from Table 3.9 below, males sent significantly fewer texts containing self and other feelings, third party and, contrary to results found earlier, gift texts; and more texts containing self-actions, other plans and swearing compared to females. To fine tune the analysis even further, the data was also examined differences in gender composition of each dyad, i.e. males sending to males (M:M, $n = 271$), males sending to females (M:F, $n = 399$), females sending to males (F:M, $n = 650$) and females sending to females (F:F, $n = 548$). The results are depicted in Table 3.10. In examining content differences between different gender dyads both the sent and received texts were used.

It can be seen then that male-to-male texts were the least likely to contain self and other feelings. This group was also more likely to have texts containing some swearing. Same-sex texts were more likely to have a self-informational content than cross sex. For gift messages, females-to-males were the most likely to contain this content, followed by males-to-females. This is probably as a result of the majority of cross sex relationships being romantically oriented (57.5% of F:M texts and 50.1% of M:F texts were between romantic partners). The texts of males sending to females were more likely to be concerned with self or others actions. So it appears that there are some gender differences in content when this variable is looked at more closely in terms of dyad gender composition.

Table 3.10. Content of text messages sent by male: male, male: female, female: male and female: female dyads

Code	% of M:M texts	% of F:F texts	% of F:M texts	% of M:F texts	χ^2
Self feelings	2.2	8.9	7.7	7.3	12.86**
Other feelings	3.7	9.3	10.8	7.3	13.56**
Non Coded	9.2	3.8	4.2	5.3	12.69**
Self information	24.7	28.3	20.9	21.6	13.87*
Other information	33.6	37.2	31.5	34.3	4.32
Others actions	5.2	7.7	6.3	11.5	12.51**
Self actions	2.6	4.6	4.0	9.8	23.03***
Other plans	4.8	8.4	7.2	5.8	4.64
Self plans	4.8	4.2	3.4	4.5	1.39
Both self and other plans	14.4	14.1	12.0	16.0	6.11
Acknowledgement/Greetings	5.2	6.2	5.1	5.5	.80
Gifts	3.0	3.6	15.2	7.3	66.84***
Situational	2.6	1.1	.9	.3	8.5*
Swearing/profanities	5.5	1.5	1.4	1.0	22.11***
3 rd Party	3.0	4.6	3.4	1.8	5.81

* $p < .05$, ** $p < .01$, *** $p < .001$

3.4. Discussion

The purpose of this chapter was to examine two samples of authentic text messages to investigate their characteristics and general content in the context of

competing models of mediated communication. An initial coding of the data revealed that there were both social-relational and informational based texts.

When the analysis was more fine grained, asking for information about the communication partner or giving information about oneself proved to be the most popular content, along with planning things to do together, a concept akin to Ling's 'social coordination' content. Texts containing feelings and 'gifts' accounted for around 10% of the messages, again indicative of social-relational uses of texts. This begins to add support to the applicability of the Hyperpersonal model of communication in explaining the use of mobile phone text messaging.

The categories of self and other feelings, gifts, greetings and acknowledgements and self and other actions are all evidence for social-relational uses of text messages and their combined frequency of around 50% in both studies again suggests a key motivation of text messaging may be social-relational. Study 3 will investigate reported motivations for text messaging and help shed light on this issue.

The Cues Filtered Out perspective predicts highly unsociable content that is mainly task based and that swearing and rudeness may be apparent due to the disinhibitory effects of the medium. This was certainly not apparent in the current sample however, in fact there were no instances of swearing/profanities in the first sample, and less than 2% in the Internet sample. So there was far more evidence for pro-social behaviour than there was for disinhibitory behaviour, something that the CFO approach struggles to accommodate.

In terms of individual preferences, the expected differences between Texters and Talkers in reported usage was observed. Unfortunately in the present study participants had not been forced to make a preference either way in relation to text

and talk so there was a 'no preference' group, making the numbers categorised as a Texter or Talker much smaller than hoped. However, Texters reported sending and receiving over twice as many texts per month compared to Talkers and their texts were also more likely to make full use of the character limit. This reinforces past findings, as reported in Chapter 1. However there was only one significant difference between the content of the text messages sent by Texters and those sent by Talkers: Texters showed more social co-ordination content in their messages than Talkers.

Study 2 shows that Talkers did report sending fewer text messages suggesting that they do not use the medium to communicate as often as Texters do, however the lack of significant differences in the content of the messages suggests that when they do use the medium they are using it for similar purposes, even though it may be a last resort. This also suggests that they are aware of some of the social relational affordances of text messaging but for some reason they do not find these affordances as good as other communication methods, hence their lower preference for using the medium.

The third variable of interest was gender. As found in previous studies (e.g. Grinter & Eldridge, 2003) males sent shorter texts than females. The first sample indicated males also sent more texts per month than females, however this difference was not supported in the much larger second sample. When gender composition of dyads was examined some interesting differences arose. First, male-to-male texts were the least likely to contain reference self feelings and the feelings of others. This is consistent with the research literature, where females are often reported to be more emotional and engage in more self-disclosure regarding feelings (e.g. Derlega, 1993). Second, the male-to-male group was also more likely to have texts containing some swearing, again something that is often more associated with males (e.g. Selnow,

1985). Third, same-sex texts of both genders were more likely to have a self-informational content than cross-sex texts. Finally, female-to-male texts were the most likely to contain this “gifting” content, followed by males-to-females. This is probably as a result of the majority of cross-sex relationships being romantic in orientation (57.5% of F:M texts and 50.1% of M:F texts were between romantic partners). So the hypothesis that there will be few differences in content, based on the previous studies findings that there were no significant differences in reported uses and gratifications of texting by males and females, is not supported. It appears that there are some differences in the typical content of males and females text messages.

Interestingly, the average number of texts sent to the person was around a third of what respondents reported sending in general per month. This seems to imply that people have quite small “text mate” networks. The longitudinal study will be able to shed more light on this as it looks more specifically at the full range of texts sent and received by each participant.

3.4.1. Limitations

The samples reported here were quite biased towards young adults and females. Also the sample seemed to report quite a high average rate of text messaging at around 150 texts sent per month. However as the reason behind this thesis is to explain the phenomenal rise and uptake of text messaging, it could be argued that these are precisely the type of people that are needed to study as these are the people who are using it most frequently.

One of the limitations of the Internet study was that the order in which the texts were asked for (sent and received) was not counterbalanced. This may have been the reason why there were slightly less received text messages recorded. However

there was no evidence of any significant differences between those respondents who completed both and those who only completed the sent text so the results should not be affected.

As with all self-report data, estimations regarding average usage may be inflated. However the average messages reported to be sent and received, and other variables such as time owned a mobile, time know ones communication partner, and time texting ones communication partner were consistent over the two samples presented in this chapter. Similarly although participants had been asked to select their most recent messages to record, they may have self-selected messages that they thought the researcher may be more interested in, giving a biased sample of messages.

The next study will be able to provide a more realistic account and act as a validity check by monitoring a group of participants over a three month period. The benefit of such a longitudinal design is that it can be seen exactly how many texts are sent, to whom they are sent to, and is less reliant on self-estimations and, as long as participants record correctly, it therefore provides a true account of text messaging use.

Another limitation of such one-off snapshots of text messaging is that context information is lost. Many of the texts classified as 'no code' would have been easier to interpret given the preceding exchange of texts. However the purpose of the studies reported here was to get a general idea of the content of text messages. The study described in the next chapter will be able to provide a more detailed picture of text messaging use as it records whole conversations.

3.4.2. Summary

By examining a sample of 'real-world' text messages, this chapter has found evidence that as well as being used for purely informational purposes, people also use text messaging for social-relational purposes further distancing the cues filtered out approach from being a valid explanation. The finding of social-relational uses of text messaging suggests that text messaging can be used for relational purposes and provides evidence for the weaker version of Hyperpersonal theory- the Social Information Processing approach, whereby the medium can be used for equal purposes as face-to-face. For the stronger Hyperpersonal theory there would have to be evidence of participants being more intimate that they may otherwise be. The experimental series in this thesis, discussed in Chapters 6 and 7, will delve into this further.

Texters were found to send more texts concerning combined plans than Talkers. Talkers had more texts that were unable to be coded due to lack of context information. At first glance of these results there seemed to be less differences found in the content of text messages sent between Texters and Talkers, than expected which is surprising as it was thought that Texters would make more of the expressive nature of the medium. Study 3 will look to examine whether this lack of significant differences is robust looking at a more representative sample of text messages by users over a longer period of time. However the findings as they stand indicate that that both groups are aware of the affordances of using the medium for social relational purposes although it may not be the first medium of choice for Talkers.

Gender differences were found in the second study, with females sending longer text messages, and more likely to have self and other feelings, and gift messages in their texts than males,. Males were more likely to send texts related to

self-actions, others plans and swearing. These differences are as expected by the literature (see section 2.4 in Chapter 2). The failure to find evidence of gender differences in Study 1 may have been down to the much smaller sample size or the sample demographics, biased towards undergraduate psychology students in Study 1.

The model that has been developed is demonstrated in Figure 3.2. This chapter has shown potential outcomes of choosing to use text messaging, in terms of their content.

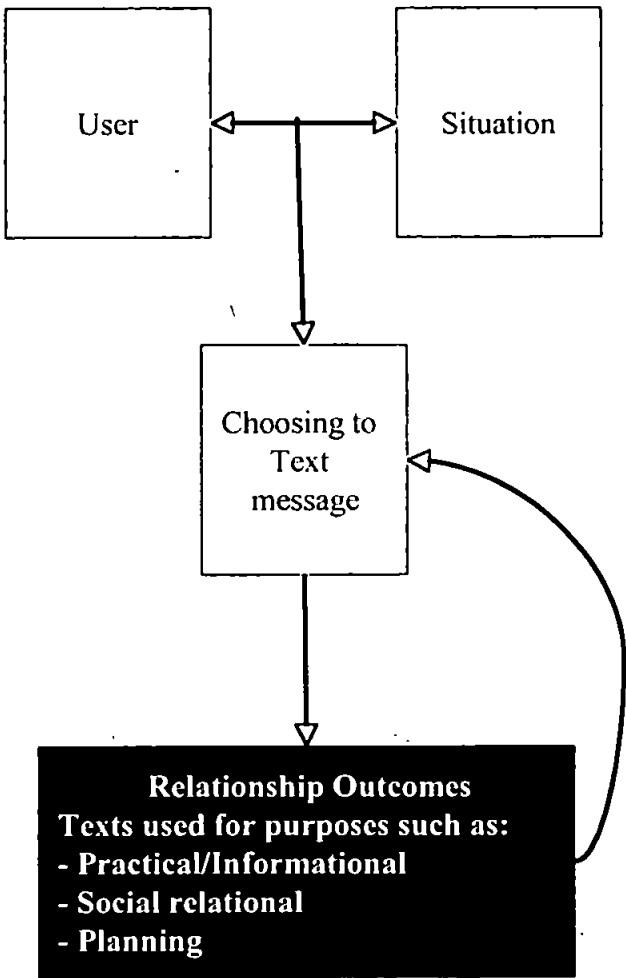


Figure 3.2. Model development.

The next chapter details the longitudinal study of text messaging use and aims to address the same questions discussed here along with a more detailed analysis of the conversational properties of text messaging as well as looking in depth at participant's communication networks. Evidence for Hyperpersonal communication will also be sought to try and begin to distinguish between whether text messaging is an equivalent to face to face (the SIP approach) or whether text messaging goes beyond the levels of intimacy typical in face-to-face communication (the Hyperpersonal Theory).

Chapter Four: Study 3. Texting in Context: The Conversational Use of Mobile Phone Text Messaging

4.0. Overview

The previous study detailed the results of two one-shot studies examining snapshot samples of text messages. The present study aims to go one step further and look at text messages collected over a longer period of time, examining the conversational nature of the messages and allowing greater insight into the way in which the medium is being used in the context of relationship management over time. One benefit of such a study is that by collecting all of the texts that are sent and received in an extended “text message conversations” (Kasesniemi & Rautiainen, 2002; Ling & Yttri, 2002), the content of the text messages can be interpreted more reliably as the full context of the conversation can be seen.

The previous chapter demonstrated that the content of the texts gathered was often quite social, a finding supported by the Social Information Processing Model. By examining the conversations more in depth, further research questions that would distinguish between the Hyperpersonal and Cues Filtered Out perspectives can be postulated and put to the test.

4.1. Study Background

In examining the way people use text-messaging it is necessary to have a corpus of texts that have actually been sent and received in the context of authentic and ongoing relationships. The purpose of this particular study was to collect a corpus of texts over a ten-week period to explore the ways in which people actually use text

messages in their everyday lives. In the other studies described in the previous chapter, only 'snapshots' of texts were accessed with only one or two texts gathered from each participant. However this then lacks information about the context in which texts were sent. Conversational turns are missed and the pattern of the interaction is lost. Various aspects of text messages including inter-relationships between messages in their content, who they are typically sent to and the frequency of texting will be examined, along with examining network properties like the size of the networks. Analyses of the relationships between gender, personality and message content can also be explored in greater depth than that which has been attempted in these prior two studies.

Hyperpersonal theory would predict that over time, relationships would have the potential to become more intense and intimate through text messaging than face-to-face communication. The asynchronous, visually anonymous and text-based nature allows for more expressive communication between the interactants. Evidence of such highly social content will be looked for in the present study. Taylor and Harper (2002) noted the phenomenon of 'social gifting' in reference to the finding that many texts are sent as 'gifts' to the recipient, with content that is social and phatic, for example the 'night night' or 'I love you' texts. These may serve to make the receiver aware that there is someone who cares about them and is a feature that is particularly unique to text messaging due to the perpetual, discrete contact the medium affords.

Ling & Yttri (2002) highlighted another aspect of the mobile phone that may contribute to the phenomenon of hyperpersonal communication, namely hyper-coordination. The ability to be contacted at potentially any time due to the mobility, portability, and ubiquity of the mobile phone allows for continuous social contact and social coordination "on the move", as well as for expressive emotional and social

communication amongst peers. 'Expressive messages are confirmation of a relationship. It is a type of social interaction in which the sender and receiver share a common, though asynchronous, experience. Sending a message refreshes the contact between the two' (Ling & Yttri, 2002, p158). The meta-content that results gives the interactants a common base to discuss when they do meet face-to-face. Text messages then may act as a 'social glue' tying partners in a dyadic relationship and individual members in a group together.

So hyperpersonal communication may be evidenced in these studies by the findings of social gifting of text messages and the sending of expressive and romantic messages. It is therefore expected that SMS is not being used purely for instrumental purposes but rather the affordances of mobility, asynchronicity and visual anonymity allow it to be used for expressive purposes and micro-coordination.

Hyperpersonal communication may also be evidenced beyond just the content of the text messages, for example in the frequency and pacing of the sequence of texting. This is something that has yet to be investigated in the literature. Unlike many media, SMS is mobile and discreet, allowing for almost perpetual contact (signal permitting). As such messages can be sent as and when one likes without worrying that the other person has to be available to receive the message, as is the case with voice calls or face-to-face contact. This means people may text one another many times over the course of a day, staying in touch and up-to-date with one another through an electronic form of micro-coordination. These extended patterns of texting will be examined in the current study.

4.1.1. Longitudinal Designs and Multilevel Modelling

Longitudinal designs allow researchers to study participants over time in order

to examine dynamic aspects of a problem (Frees, 2004). In the present case it allows for the collection of a sample of text messages sent and received over a period of time, capturing the way the medium is being used in everyday interaction. Although the data is observational, meaning that causality cannot simply be inferred, there are a number of benefits, including the ability to study dynamic relationships as well as detecting heterogeneity among subjects: responses may 'share a common, yet unobserved, subject specific parameter that induces a positive correlation' (Frees, 2004, p.8.) eg. the preference for text or talk may impact on the typical content sent in the text messages.

One downside of longitudinal studies is the possibility of attrition. The present study was conducted over a 10-week period with an undergraduate sample participating for course credits, and it was hoped that the risk of attrition would be fairly low. As a precaution, a reserve list of potential participants was compiled for the present study in case any of the original participants were to drop out.

Multilevel modelling is used to analyse measures derived from the sample of messages gathered from participants over the course of the present study. In multilevel models data is assumed to be hierarchically nested, where the lower level observations are nested within higher levels. This nesting is an important feature of the present study. It would be a mistake to analyse the messages collected in this study as though they were simple random samples from the population of messages generated by these participants. Messages are sent to and received from communication partners in the context of conversational text exchanges. Features of the messages sent by each participant will inevitably be intercorrelated, as will the messages they receive from their partners. These intraclass correlations must be represented in the analysis for correct inferences to be drawn from the study.

Multilevel modelling makes it possible to analyse these data by taking into account the hierarchical structure underlying these intraclass correlations i.e. texts are grouped within conversation clusters, conversation clusters within dyads, and dyads within individual participants. At each level, different variables may affect message characteristics. Furthermore, relationships among variables within each level as well as across levels can be assessed (Rasbash, Steele, Browne & Prosser, 2004).

4.1.2. Design Issues

In Ling's (2003) study, discussed in Chapter 3, he argued that it is unethical to collect received messages as the sender had not given their consent. However, in this study the second party is anonymous - no information is gathered about them other than their name (not their full name rather their initials/first name/how the participant referred to them), their gender and their age, so their messages cannot be traced back to them. Also the participants themselves are anonymous to the experimenter. They were given a participant ID number and at no time were they asked for their name. In the texts reported here for demonstration purposes, personal information like names were substituted for names of a similar number of letters. It was also argued that excluding such messages would take away the context and sequence of the messages as a whole and so there was great need to include them. So it was concluded that the consent of the recipient was deemed to be enough.

The text messages were viewed only by the researcher and her supervisor, and participants were made aware of this before they consented to take part in the study and were given the opportunity to ask any questions or voice any concerns that they may have had about the study. In line with other ethical requirements, participants were informed of the studies nature and were told that they had the right to withdraw

at any time. A total of 12 participants agreed to take part in this study. Having been briefed, they were then given a week to think about whether or not they wanted to participate before starting the recording of their messages. All 12 decided to go ahead and there was no participant attrition during the course of the study.

Because of the longitudinal nature of the study and the commitment required to complete it, it was only possible to recruit 12 participants at this particular time. This user group will not be representative of the population at large, but rather a small subset of the students at the university. Although there are only 12 participants, each participant will have text exchanges with a number of other people, so potentially there are a large number of communicator dyads and associated text message exchanges within this sample.

4.1.3. Research Questions

Like studies 1 and 2 in the previous chapter, this study is very exploratory in nature. As a result specific hypotheses are not appropriate. Instead, it is possible to formulate a number of general research questions.

4.1.3.1. Content & Usage

In analysing the longitudinal data, the Hyperpersonal Model would predict that the content of the text messages would not only be task or informational based but also social and relational. Evidence for this was found in Chapter 3, and it is expected that this will also be replicated in the current data set. Further evidence for the hyperpersonal perspective would be the finding that text messages were being used in a conversational manner, that is people are choosing to reply and to communicate using text messaging rather than the communication simply consisting

of a series of unrelated, one-off text messages. The Cues Filtered Out approach would find this hard to explain, as when a person receives a text on their mobile they actively choose to send one back or to use their handset to make a call. The fact that people would actively choose to engage in a conversation through such a limited cue medium would not be forecast by this approach.

The third question is related to frequency of texting. If the Cues Filtered Out approach is to be a general explanation of the use of text messaging, then it would have to explain the very high frequencies of texting observed among some groups of users. The hyperpersonal approach on the other hand would be more comfortable predicting high frequencies of texting, as it assumes this new medium can be used in a social relational way and that people learn to use it to develop and manage intimate relationships.

4.1.3.2. Texters and Talkers

As the current sample consist of only 12 participants, comparisons between Texters and Talkers will need to be interpreted with caution. On the basis of the previous chapter's findings, it is expected that Texters and Talkers will differ in the frequency of texting, with Texters using the medium more frequently. Differences in the number of conversations and length of those conversations will also be examined. Because they are able to capitalise on the unique affordances of text messaging -and obviously prefer the medium to talking on their mobile phone - it may be expected that Texters engage in more, and longer, conversations than Talkers. Texters are likely also to use the medium for more relationship-oriented purposes, for example expressing their feelings or asking about their partners feelings than Talkers.

4.1.3.3. *Gender*

There were some differences evident between males and females reported in the previous chapter. Further investigation will be carried out here, although once again the small sample size means that these results are to be interpreted with caution. Evidence of content and usage differences will be investigated. Chapter 3 found that males' texts were significantly shorter than females' texts and that male-to-male texts were least likely to be concerned with feelings. Cross-sex dyads were more likely to have 'gift' type content like 'I love you'. These patterns will be looked for in the current data set.

4.2. Method

4.2.1. Participants

Nine female and three male psychology undergraduates participated in this study as part of a course requirement. Their ages ranged from 18 to 46. In order to participate in this study, participants were required to possess a mobile phone that could store sent and received text messages, and allow these to be retrieved. A sign up sheet was placed on the undergraduate notice board that outlined this requirement. Participants were asked to save every single text message they sent and received over the duration of the study. Originally the plan was to download these on a regular basis to a computer program by transferring the SIM cards from participants mobile phones into a Samsung T100 phone which was attached via a data cable to a computer which had the Samsung Easy GSM II 2.0 Software installed, enabling the downloading of the received text messages into a spreadsheet. However due to the massive numbers of text messages some participants received and sent during the study, and the limited capacity of mobile SIM cards (usually around ten messages), this option became

unfeasible. It was therefore decided to require participants to write down their texts into a Microsoft Excel spreadsheet on a weekly basis, exactly as they appeared on their text screens. Along with the text message itself, participants were also asked to record the date and time the message was sent/received, who sent/received it (initials or first name only) and the age and gender of this person. These excel spreadsheets were sent to the researcher each week, all the participants complied with this.

4.2.2. Procedure

On agreeing to participate in the study, participants were given a questionnaire that probed for demographic information. They were also asked questions on the way that they used their mobile phone, i.e. whether they preferred talking or texting on their mobile, the length of time they had owned a mobile phone, the average number of texts and calls made per month, the proportion of their mobile phone bill that was spent on texting, and the number of people that they text on a regular basis. Individual differences in user orientation were assessed by the 10-question abbreviated UCLA Loneliness scale (Russell, 1996) and the 15-question Interaction Anxiousness Scale (Leary, 1983), both of which have reported Cronbach reliabilities of $\alpha = 0.89$.

Participants were also asked questions on real self expression developed from McKenna, Green and Gleason's (2002) questions (Reid, 2002). These included the items: 'do you say things in text that you would not feel comfortable saying face-to-face or in voice calls' (yes/no), 'to what extent would your family and friends be surprised if they read the text messages you sent?' (1 = not very surprised, 3 = very surprised) and 'do you feel better able to express your true feelings in text-messages, voice calls or face-to-face conversations?'

After completed this questionnaire, participants then completed an Excel

spreadsheet with their sent and received text messages and e-mailed them to the researcher on a weekly basis. Participants had the right to withhold messages, but if this occurred then they were asked to write why they chose to withhold the particular message(s) in a diary they were provided with. In fact, none of the participants reported withholding any of their messages.

4.3. Results

Both quantitative and qualitative approaches to data analysis were used to get the most from the current data. Multilevel modelling was used to examine the relationship between variables at the level of the individual and dyad on the content and frequency of text messages, and qualitative analysis was used to explore patterns in the way text messages were actually being used in the context of real, ongoing relationships.

4.3.1. Descriptive Analyses

A series of tables are presented below which summarise key descriptive information about the participants, their text messages, and their relationships with their communication partners. Table 4.1 provides demographic information relevant to the sample of participants. Table 4.2 provides information regarding text frequency and characteristics and Table 4.3 shows the content of the texts sent by each participant. Table 4.4 provides information on relationships between the communicators and the percentages of texts that were “one-off” messages (i.e. messages that were not associated with any preceding messages or replies) or

Table 4.1 Demographics of sample

Participant	Gender	Age	Relationship status	Texter/ Talker	Time owned mobile (months)	Estimated monthly texts sent	Estimated Monthly voice calls made	Number of people text regularly	Medium preferred for self expression	Say things in text would not say face-to-face	Extent family surprised if read texts (1= not very, 3= very)
1	Female	19	Partner	Talker	1	80	100	6	FTF	No	1
2	Male	27	Single	Talker	7	30	80	4	FTF	Yes	1
3	Female	18	Single	Talker	6	300	20	3	Text	Yes	3
4	Male	19	Single	Texter	3	400	70	10	FTF	Yes	2
5	Female	22	Single	Texter	10	1050	10	10	FTF	Yes	3
6	Male	24	Married	Talker	24	100	100	6	VC	Yes	2
7	Female	23	Partner	Talker	8	20	3	2	FTF	No	1
8	Female	18	Partner	Talker	12	300	80	4	FTF	No	1
9	Female	46	Divorced	Texter	36	70	10	5	FTF	Yes	1
10	Female	23	Single	Talker	1	100	200	5	FTF	No	1
11	Female	18	Partner	Talker	72	150	200	5	Text	Yes	3
12	Female	18	Partner	Texter	72	220	100	6	No pref	No	1

Table 4.2. Text frequency and characteristics

Participant	Days ranged	Number of messages sent	Number of messages received	Average messages sent per day	Number of contacts	Average messages sent to each contact	Average messages received from each contact	Average number of characters per message	Average number of turns in a text conversation
1	78	104	190	3.76	15	6.5	11.5	70.0	4.0
2	54	24	48	1.22	18	1.4	2.6	62.8	3.2
3	69	44	56	1.45	6	7.8	9.3	73.6	3.9
4	64	370	382	11.75	30	11.9	13.3	68.7	6.7
5	73	200	219	5.77	26	7.7	8.3	75.9	4.0
6	62	50	58	1.76	15	3.3	3.9	58.6	2.4
7	58	32	39	1.22	13	2.5	2.9	72.2	2.2
8	64	297	548	13.20	15	20.0	36.3	158.9	4.1
9	64	58	71	2.02	18	3.2	3.9	101.0	3.4
10	73	123	197	4.39	27	4.9	7.3	94.8	3.3
11	74	86	119	2.77	16	5.4	7.4	82.3	3.7
12	66	257	348	9.17	32	8.0	10.9	131.7	3.2

Table 4.3. Content of texts sent by each participant (percentages)

Participant	Self feelings	Other feelings	No code	Self Info	Other info	Others actions	Self actions	Others plans	Self plans	Combined plans	Greetings	Gifts	Situation oriented	Swearing	3 rd Party
1	2.7	5.4	9.2	12.9	8.5	1.7	15.0	3.1	2.7	18.7	4.8	9.9	4.1	1.0	3.7
2	1.4	4.2	15.3	16.7	13.9	1.4	12.5	12.5	5.6	16.7	0	0	0	0	9.7
3	6.0	3.0	9.0	5.0	10.0	2.0	26.0	2.0	3.0	4.0	2.0	29.0	0	0	0
4	8.0	4.4	8.4	18.2	17.8	1.6	12.6	6.6	9.4	9.8	2.4	0.3	4.8	0.4	10.5
5	5.5	8.1	5.5	39.7	47.0	1.0	5.0	4.0	4.3	2.1	3.1	4.8	1.2	0	5.7
6	1.8	2.8	2.8	9.2	13.8	0.9	3.7	18.3	21.1	22.9	0	7.3	0	0	1.8
7	5.6	2.8	0	18.3	18.3	2.8	5.6	11.3	11.3	31.0	1.4	1.4	0	0	9.9
8	5.8	2.2	0.7	44.1	35.9	0.5	12.8	0.4	6.5	2.0	3.0	23.8	2.2	0	2.1
9	3.9	3.9	0.8	31.0	27.9	0.8	3.1	2.3	3.9	10.9	8.5	4.7	0	0	2.3
10	2.5	0.3	3.4	21.9	31.3	0.6	9.7	3.8	6.6	15.6	3.8	2.2	1.9	0	2.8
11	3.4	2.9	1.0	21.0	34.6	0.5	2.9	2.9	3.4	10.2	5.9	13.7	0	0	2.9
12	9.1	10.7	1.0	48.6	41.8	9.9	13.6	6.8	5.5	10.6	1.7	7.8	0.7	0	14.5

Table 4.4. Relationships between the communicators and the percentages of texts that were one-offs or conversational.

Participant	% text between same sex	% texts between opposite sex	% texts between friends	% texts between parents/ children	% texts between partners	% texts between house mates	% texts 1-off	% texts part of conversation	% one off texts from participant	% conversational texts initiated by participant
1	39.3	60.7	42.6	10.0	47.4	0	17.7	82.3	46.2	31.3
2	69.4	30.6	62.5	11.1	0	8.3	29.2	70.8	19.1	11.8
3	13.0	87.0	0	13.0	78.0	9.0	4.0	96.0	75.0	67.9
4	52.5	47.5	92.7	2.4	0	4.5	8.8	91.2	47.0	51.7
5	20.1	79.9	n/a	n/a	n/a	n/a	17.6	82.4	46.0	56.8
6	49.1	50.9	66.4	0	28.0	2.8	17.4	82.6	53.0	41.2
7	57.7	42.3	19.7	35.2	0	0	38.0	62.0	48.1	43.8
8	8.3	91.7	1.5	5.9	89.8	1.4	9.7	90.3	31.7	30.6
9	50.4	49.6	72.1	10.9	0	0	11.6	88.4	46.7	58.3
10	52.5	47.5	71.9	0.6	4.4	19.7	23.1	76.9	32.4	24.3
11	72.7	27.3	27.3	72.7	0	0	21.5	78.5	38.6	37.0
12	43.8	56.2	29.8	10.4	49.9	3.3	24.5	75.5	29.3	38.0

conversational messages (i.e. those that were embedded in a sequence of text messages, linked by topic or conversational dependency). It also shows the percentages of texts that were initiated by each participant.

Five participants were single, five participants reported having a partner, one was married and one was divorced. A preference for using mobile phones for text messaging rather than for voice calls was reported by four participants, the remaining eight preferred talking on their mobiles. At the start of the study, participants had owned a mobile phone for an average of 21 months, reported sending around 247 texts and making 79 voice calls per month. They reported texting an average of five people regularly. Seven participants reported saying things in text that “they did not feel comfortable saying face-to-face”, including personal thoughts and feelings, confrontations, and sexually explicit content. Given the choice of text, face-to-face and voice calls to express themselves, two participants preferred text, one preferred voice calls, one had no preference and the remaining eight preferred face-to-face.

The total duration of this study was 78 days, or approximately one university term. Over this period, a total 3925 texts were recorded. The average number of messages recorded by each participant was 327, around four per day. The average number of people participants text messaged during this time was 10, sending around seven and receiving around 10 texts from each. Out of a maximum of 160 characters, the mean text length was 102.4 characters ($SD = 57.71$). There was a total 234 different dyads within the sample, with a mean of 4.23 ($SD = 3.31$) texts sent in each text conversation.

In view of the small number of participants, the unit of observation in this study were the texts messages themselves. To model the hierarchically nested structure of the data, multilevel modelling using the computer statistical programme

MLWin (Version 2) was used (Rasbash, *et al.*, 2004). To ensure independence of data, messages between participants within the sample ($n = 2$) were deleted from the analysis. All the participants completed the study and none reported having withheld any of their messages. There was no observable evidence within the text messages examined that participants were reacting to the fact their messages were being collected. The word 'partner' is used in the following in the sense of a conversational partner with whom the participant was communicating.

On initial observations of these results several of the research expectations seem to be supported. Self and other-information seemed to be the most popular types of content for all the participants' text messages. This is in line with the results from the last chapter and provides partial evidence in support of the Hyperpersonal Model. Further support comes from the finding that many texts not only contain informational content but also contain self and other-feelings, 'gifts' and social coordination or 'combined plans'. People are using the medium on a regular basis to text personal information and feelings to their friends and romantic partners.

The sample of 3925 text messages provide information on the full text conversations occurring within each dyad, allowing an in-depth analysis of the conversational structures underlying these exchanges, both in terms of content and length of conversation. Each individual text conversation or 'message cluster' was identified by examining all the texts exchanged between each dyad in time order, and identifying the sequence of the conversation. This was an easy task as the topic and/or content in one text is typically in a meaningful and detectable relation to its successor. If there was no link between two texts to suggest that one was in reply to the other, then a new text conversation was coded. 'One-off' texts were identified as those that had no relation to either the previous or next text sent/received by the participant

or their communication partner.

Over 62% of each participant's text messages were part of a 'conversation' as opposed to one-off messages, with an average of four texts sent per text conversation. This again is in support of hyperpersonal theory in that it signifies that people are using text messaging for more social purposes, sending a number of texts, presumably instead of picking up the phone to have a conversation.

The majority of texts were sent between friends or romantic partners. These relationships are typically more intimate than those with strangers or work colleagues, and so the fact that texting is used more frequently in this context again demonstrates that the medium is being used for social-relational purposes.

The number of people participants reported regularly texting was quite small—between two and ten. The number of contacts typically recorded was more than this however, between six and 32 with between one and 20 texts sent to each contact over the course of the study. On average the number of contacts text was ten. This is indicative of a fairly small network of 'text mates'. In terms of Texters and Talkers (classified by their reported preference for texting or talking on their mobile) participants who were classified as Texters reported sending more texts than they made voice calls, around half of the Talkers reported more voice calls than texts. This is exactly what would be expected, as Texters obviously have a greater inclination—and possibly greater expertise—to use this medium.

Interestingly participants estimates of texts sent were typically slightly higher than those actually sent, especially participants 3 and 5. This illustrates that self-report measures of media use can often be lacking in reliability.

4.3.2. Text Content Analysis

All the text messages were coded using a scheme discussed in section 3.2.2.2 in Chapter 3. Each message was broken up into self-contained units and a code assigned to each part, as a result multiple codes could be applied to an individual message. However, content categories were scored as present or absent in each message, irrespective of the number of units classified within content categories the message. As reported in Chapter 3 (section 3.2.2.2), the inter-rater reliability for the coding scheme ranged between .52 and 1.0, within the accepted range. The overall percentage of messages containing each of the content codes is shown in Table 4.5.

4.3.3. Multilevel Modelling

The rationale behind using multilevel modelling was because the data here was clearly multilevel in its structure. In examining the text message sample, it was expected that differences would exist between one participant and another, and within participants, between one dyad and another. If each text was taken individually and compared to others without reference to the fact that messages derive from 234 different dyads and 12 different participants, these differences would be overlooked, and multilevel modelling allows for such a nested design to be analysed taking into account these different levels of variation. 'By focussing attention on the levels of hierarchy in the population, multilevel modelling enables the researcher to understand where and how effects are occurring. It provides better estimates in answer to the simple questions for which single level analyses were once used and in addition allows more complex questions to be addressed' (Rasbash *et al.*, 2004, p7).

Table 4.5. Percentage of messages containing each of the content codes

Content	% in total texts (<i>n</i> =3925)
Self-feelings	5.8
Self information	30.6
Self actions	11.1
Self plans	6.5
Other feelings	4.8
Other information	29.8
Others actions	2.4
Other plans	4.6
Both self and other plans	9.4
Acknowledgement/Greetings	3.0
Gifts	9.6
Situational	2.1
Swearing/profanities	0.2
3 rd Party	6.5
No Code	4.1

Table 4.6 shows the levels of analysis and the variables that were located at each level.

Table 4.6. Levels of analyses and variables located within each level

Level of Analysis	Dependent Variables	Variable name
Level 1: texts	Whether texts were sent/received (sent/received) Content codes (13 codes, each scored 0 = absent in message, 1 = present in message)	Sent/received As in Table 4.5
Level 2: Dyad	Dyad gender (male:male, female:female, male:female) Closeness of text mate (average number of messages sent per dyad per day) Partner's Age (in years)	Dyad gender Closeness of text mate Partner's age
Level 3: Participant	Age (in years) Preference for texting or talking (Texter, Talker)	Participant's age Preference text/talk

Differences in the content of text messages were examined first. Texts were taken as the first level of nesting, dyads as the second and participants as the third. Preference for text or talk, gender of dyad (male:male, female:female, female:male), age of participant and age of partner, and the closeness of text mates (a measure devised by calculating the average number of messages sent per dyad per day of their participation in the study) were used as the predictor variables. The continuous variables were centred before analysis as advised by Goldstein (1999).

The basic regression model analysed here was:

$$y_{ijk} = \beta_{0jk} + r_{ijk}$$

where β_{0jk} is a random coefficient representing the mean of y_{ijk} across all text messages (subscripted i), nested within each dyad (subscripted j), in turn nested

within each participant (subscripted k), and r_{ijk} represented the residual variance.

Binomial models were used for dichotomous data e.g. the content measures (coded as either present (1) or not present (0)) and Normal distribution models were used for continuous dependent variables (e.g. number of texts sent in text conversation).

The general multilevel model analysed here can be represented as follows:

$$y_{ijk} = \beta_{0ijk}x_0 + \beta_1x_{1ijk}$$

$$\beta_{0ijk} = \beta_0 + u_{0jk} + e_{0ijk}$$

where subscript i takes values from 1 to 12 (the number of participants in the sample), subscript j takes values from 1 to 234 (the number of dyads), and subscript k takes values from 1 to 3925 (the number of texts). Separate terms for each predictor variable were added to this basic equation. These were preference for text/talk (Talkers coded as 1, Texters as 2), gender composition of each pair (male:female coded as 1, female:female as 2, mixed sex as 3), age of participant (centred around the mean), age of partner (centred around the mean), closeness of textmates (centred around mean) and whether texts were sent or received (1=sent, 2=received).

The full model used for each of the binomial content codes was:

$$\text{Logit}(\pi_{ijk}) = \beta_{0jk}\text{cons} + \beta_1 \text{preference for text/talk}_k + \beta_2 \text{dyad gender}_{jk} + \beta_3 \text{sent/received}_{ijk} + \beta_4 \text{partner's age}_{jk} + \beta_5 \text{participant's age}_{jk} + \beta_6 \text{closeness of text mate}_{jk}$$

The main effects of each factor of interest were tested by the significance of the regression coefficient corresponding to the variable that represented that factor (e.g. β_1 represents the regression of the content code represented by the expression $\text{Logit}(\pi_{ijk})$ on the preference for text/talk, a level 3 variable).

The normal distribution model used for examining differences in the number of characters in texts was as shown below. Similar models were tested for the remaining continuous dependent variables,

$$\text{Characters}_{ijk} = \beta_{0ijk}\text{cons} + \beta_1 \text{ preference for text/talk}_k + \beta_2 \text{ dyad gender}_{jk} + \beta_3 \text{ sent/received}_{ijk} + \beta_4 \text{ partner's age}_{jk} + \beta_5 \text{ participant's age}_{jk} + \beta_6 \text{ closeness of text mate}_{jk}$$

4.3.4. Multilevel Modelling: Differences in Content

Table 4.7. shows the results of the multilevel modelling for content measures.

4.3.4.1. *Texters and Talkers*

The preference for texting or talking on mobile phones emerged as a significant predictor of self-feelings, other feelings and self-information ($p < .05$). The probability of Texters sending or receiving messages containing self-feeling content was 6.7%, compared to Talkers 3.2%. There was an 11.4% and 3.7% probability of messages containing reference to other's feelings, and a 23.9% and 13.0% probability of the texts containing self-information for Texters and Talkers respectively. This is in line with the earlier prediction that there would be differences between Texters and Talkers in the way they used text messaging. Texters clearly have become accustomed to making more use of text messaging for expressing feelings and managing personal relationships, and this social functionality clearly underlies their preference for using this medium.

Table 4.7. Standardised regression coefficients (and standard errors) for content measures

	Self-feelings	Other feelings	No code	Self-information	Other-information	Other-actions	Self-actions	Others-plans
Preference text/talk	0.79*** (0.20)	1.21*** (0.34)	-0.20 (0.53)	0.75* (0.34)	0.55 (0.40)	0.45 (0.44)	-0.33 (0.43)	-0.14 (0.45)
Dyad gender	0.12 (0.14)	-0.02 (0.16)	-0.12 (0.20)	0.05 (0.09)	0.17* (0.08)	0.36 (0.32)	-0.10 (0.13)	-0.10 (0.14)
Received/sent	-0.07 (0.17)	-0.31* (0.16)	-0.63** (0.20)	0.30*** (0.08)	0.02 (0.08)	-0.02 (0.19)	-0.14 (0.10)	0.05 (0.15)
Partners age	0.01 (0.11)	-0.09 (0.07)	0.05 (0.13)	0.08 (0.07)	-0.01 (0.05)	0.41 (0.29)	-0.03 (0.07)	0.04 (0.12)
Participants age	-0.01 (0.11)	0.10 (0.07)	-0.06 (0.13)	-0.07 (0.07)	0.01 (0.05)	-0.42 (0.29)	0.03 (0.07)	-0.09 (0.12)
Closeness of textmate	0.001 (0.001)	0.001 (0.001)	-0.004*** (0.001)	0.001 (0.001)	0.00 (0.00)	0.003 (0.002)	0.003** (0.001)	-0.001 (0.001)

* $p < .05$, ** $p < .01$, $p < .001$.

Table 4.7. (cont.) Standardised regression coefficients (and standard errors) for content measures

	Self plans	Combined plans	Greetings/ Acknowledge	Love/gifts	Swearing	Third party
Preference text/talk	-0.28 (0.41)	-0.44 (0.34)	-0.08 (0.30)	-0.67 (0.51)	-0.30 (1.34)	0.59 (0.42)
Dyad gender	-0.19 (0.13)	-0.32* (0.12)	0.04 (0.18)	0.50* (0.22)	1.55 (1.14)	-0.23 (0.19)
Received/sent	0.55*** (0.13)	0.12 (0.11)	-0.12 (0.20)	-0.36** (0.12)	-0.42 (0.88)	-0.06 (0.14)
Partners age	-0.001 (0.095)	-0.01 (0.07)	-0.06 (0.08)	-0.03 (0.07)	0.68 (1.21)	-0.02 (0.09)
Participants age	-0.009 (0.095)	-0.04 (0.07)	0.07 (0.08)	0.06 (0.07)	-0.81 (1.22)	0.01 (0.09)
Closeness of textmate	0.001 (0.001)	-0.003** (0.001)	-0.001 (0.001)	0.003** (0.001)	-0.002 (0.002)	-0.002* (0.001)

* $p < .05$, ** $p < .01$, $p < .001$.

4.3.4.2. *Gender*

The gender pairings of each dyad were found to be a significant predictor of reference to other information, combined plans and “I love you”/gift texts. For other information, male:male dyads showed a 9.0% probability of their texts containing this content, whilst female:female dyads were more likely at 12.8% and mixed gender dyads were slightly more likely with 13.8%. For combined plans the probabilities were 16.5%, 16.0%, and 10.7% for male:male, female:female and mixed gender dyads, respectively. As expected, I love you/gifts were most likely to be exchanged by mixed sex dyads (28.7%), less frequently by female:female dyads (21.47%) and least by male:male dyads (9.6%). This latter finding supports the results found in the previous chapter where the majority of gift texts were sent between male:female pairs.

4.3.4.3. *Age & Closeness of Text Mates*

Neither age of the participant nor their partner proved to be significant predictors for any of the content measures. Closeness of text mates, however, was a significant predictor of reference to self-actions, combined plans and ‘gift’ texts, with closer text mates being more likely to have self-action and gift content and less likely to have combined plan content or content that was unable to be coded than partners who were less close.

4.3.5. Multilevel Modelling: Differences in Message and Conversational Characteristics

Having examined the content of the texts, the next variables of interest were message and conversational characteristics. These results are presented in Table 4.8. Variables included the average number of characters per text and the number of turns

in the average text conversation. Differences in the number of one-off texts were also examined. One may expect Talkers to be more likely to send one-off texts as they would prefer talking and would potentially be using text messaging only as a last resort. For similar reasons they may be less likely to initiate a text conversation, whereas Texters may be more likely to start text conversations, and make more use of the social functionality of the medium, sending longer messages and exchanging more texts in extended conversations. Note that the Texter/Talker distinction strictly applies only to the 12 recruited participants and not to their partners. However, the characteristics of Texter's received messages and the conversational nature of their text exchanges is also expected to differ from Talkers in predictable ways

Table 4.8. Standardised regression coefficients (and standard errors) for conversational/text characteristics.

	Conversational Turns	Characters	One-off texts
Preference text/talk	0.29 (0.34)	12.12 (12.82)	-0.18 (0.23)
Pair sex	-0.13 (0.16)	-2.38 (3.13)	-0.02 (0.12)
Received/sent	0.10 (0.09)	2.32* (1.14)	-0.49*** (0.09)
Partners age	0.12 (0.07)	-0.61 (0.98)	0.18** (0.07)
Participants age	-0.13 (0.07)	0.21 (0.99)	0.19** (0.07)
Closeness of textmate	0.007 (0.001)	0.05 (0.03)	-0.003** 0.001

* $p < .05$, ** $p < .01$, $p < .001$.

On conducting the regression analysis, neither preference for text or talk, nor gender proved to be significant predictors of conversational turns, characters in texts or one-off texts. The closeness of text mates proved to be a significant predictor of the number of conversational turns as well as the number of one-off texts. The closer the text mate (i.e. the more texts sent per dyad per day) the longer the text conversation. Less close partners were more likely to send and receive one-off texts. Partner's and participants age were significant predictors of whether the text sent was a one-off or conversational text. Older participants were more likely to send one-off messages.

So closeness of text mate seemed to be the most important variable in predicting text characteristics, with closer text mates showing more turns per conversation and least likely to send a purely one-off text.

The gender differences found in the last chapter (females sending longer text messages) were not reproduced in the current data.

4.3.6. Summary

The use of multi-level modelling allowed for a thorough analysis of the text messages gathered over the 12-week period. There were found to be several differences in regards to preference for Text or Talk, in the direction expected, with the messages of Texters being more likely to contain self- and other- feelings than Talkers, as well as self-information. These strong predictive effects of the text/talk variable suggests that Texters are making better use of the medium's affordances for sociability, relationship development and management. This is as may be expected by groups of individuals who prefer to text than to talk on their mobile. It also suggests that the stronger version of Hyperpersonal theory, may be more applicable to Texters as these are the group who seem to be more able to capitalise on these affordances to

express their feelings so would be predicted to be more likely to develop communication surpassing the intimacy of face-to-face.

At this point it may be speculated that hyperpersonal effects are more likely to occur when users have learnt to make the most of the affordances the medium has to offer. This relates back to Utz's (2000) work where she found that self-efficacy of Internet use was a significant predictor of whether users developed relationships online. The question of whether preference for texting is a result of learning these affordances or is a precursor to being able to capitalise on them in the first place is one that warrants further investigation in the future.

There were some gender effects in the data too, with cross-sex dyads being more likely to send gift texts, followed by female:female dyads, and male:male dyads were least likely. Again this is as may be expected in line with the literature (see review of gender literature in Chapter 2) and with the results found in Chapter 3. Surprisingly there was an absence of gender effects on the number of characters sent. The last chapter had reported females sending longer text messages however the present analysis showed no significant differences between males and females. One potential explanation for this is that when asked to record a one-off text, females may actively choose longer text messages rather than their most recent, so there may have been problems with earlier sampling methods. The longitudinal data is more reflective of texting behaviour as it is taken over a longer time period. This needs to be investigated further.

There were no age effects apparent in the present data, however this may be due to the biased nature of the sample towards university students.

The next stage of analysis was to capitalise on the richness of the data by examining some of the qualitative characteristics in the messages.

4.3.7. Qualitative Analysis

Whilst coding the text messages for general content using the content analysis procedures discussed earlier, there were some general patterns that were detected. The benefits of using a panel design are that the conversational nature of the text messages collected can be analysed, and it is these conversational affordances of text messaging that help differentiate between the two competing theoretical accounts of the CFO and hyperpersonal perspectives. The former would predict that the medium would be incapable of being able to support conversational communication: the reduced social cue's available would make it hard to communicate subtle nuances in topic and feeling, and the limited characters that are available in texts along with the physical difficulty of keypad entry would be qualities that would be predicted to deter people from using the medium for conversational purposes. The hyperpersonal approach however would predict that the medium's reduced social cues and asynchronous nature would be beneficial, as it allows people to engage in conversation in their own time at their own pace. They can read text messages at a time that suits them and can carefully craft and edit their replies, taking as much time as they need to formulate a reply.

Similarly, the hyperpersonal perspective would expect there to be more examples of extended exchanges of conversational texts as people use the medium to maintain and develop their relationships, keeping in contact through text. In contrast, the reduced social cues approach forecasts a greater likelihood of one-off information/task based texts, used only when other contact opportunities are unavailable. However over 60% of each participant's text messages were part of a text conversation, each on average consisting of four turns, although some were exceptionally long - one participants' text conversation was 24 turns in length (see

Excerpt 1 below). The interesting thing about these conversations was that they were also extended in time, for example the 24 length conversation of participant 4 shown below started at 6.14 pm and finished at 8:48 pm. Arguably it would have been faster and more efficient (and cheaper) to conduct this exchange in a voice call, taking minutes rather than hours. The reduced social cues approach struggles to interpret behaviour like this. The hyperpersonal approach is a better account as it forecasts that people like asynchronous media such as text messaging as they allow one's real views and opinions to be expressed more easily. Indeed such expressiveness can be seen in the first text in which the participant's partner is conveying her feelings of insecurity. They are discussing a friend who has obviously upset them both and they are trying to figure out how to solve the problem.

Excerpt 1.

Participant 4

Relationship: Friend

18:14

Partner: [Kelly] has made me insecure again! I'm so pissed off with myself for allowing her to do this to me! She thinks she has upset you and you are being weird?? Had a good day?

18:20

Participant 4: I'm being weird?!? Can she blame me when she's always going on about you know what! I read her email, that was out of order have had a good day thanks- done absolutely nothing. You?

18:23

Partner: Got my work in, a few problems but it is an informall assessment so can touch it up now! She has been saying that he has no other friends thats why he is friends with me! I want to cry, she has been so harsh!

18:27

Partner: But don't bring me in to it, i really don't know what to do! Want to show [Paul] that mail, but its not a good idea, he will hate her even more! What have i done to deserve that?

18:30

Participant 4: I'm so pissed off with her. Stupid bitch! I really could go mad at her

18:31

Partner: I've gone past being mad, its upsetting me now! I'm not looking forward the christmas! She has started e-mailing [john] now and i really don't trust her and what she is saying to him!

18:34

Participant 4: Why has she got his email address for god's sake? I really don't think i want to see her over christmas

18:37

Partner: Oh, you are not the only one! Fcuk knows how but neither of them will tell me what she said! [Tony], i don't trust her! What are we going to do?

18:42

Participant 4: I have no idea. I must admit i'm a bit worried what she's saying to [john]

18:45

Partner: Yeah you are not the only one, [john] said he thought it was meant for [paul]? They both read it, it could be about either of us! How did she get the address?

18:48

Participant 4: Probably from one of the email forwards we send to them. Shit!

18:50

Partner: She is such an interfering bitch! Seriously what are we going to do?

18:52

Participant 4: I really don't know. I think we need to have crisis talks with [john] and [paul]

18:55

Partner: Might be meeting [john] tomorrow! [Paul] already knows how interfering she is! What can we say to them?

18:57

Participant 4: I don't know. I think i'm gonna have to come home world cup final weekend

18:59

Partner: When is that? Next weekend? I'll try and sort everything!

19:02

Participant 4: Weekend of the 22nd. I'll try and find out from [john] what she's said

19:05

Partner: Yeah but it will look obvious that we are worried about it!

19:12

Participant 4: Oh, it's so bloody difficult.

19:14

Partner: I know! she has a habit of making me trust her, i tell her something and then she tells everyone! We are just going to have to not tel her anything! Do you think she would say anything?

19:16

Participant 4: To be honest i don't know. I'd like to think she wouldn't but she might

19:46

Partner: Oh i think she will at least stir shit for me! She hates [paul] and h being friends! Am going to talk to him at the weekend! Could get [paul] to block her tomorrow when [john] is off?

20:22

Participant 4: Very devious but a very good idea also

20:48

Partner: Great, now [paul] is pissed off and won't talk to me! Why does she always cause so much trouble? I'm ducking mad now!

In the exchange it can be seen that there tends to be a text sent one way or the other every three to four minutes, with the last three texts being more spread out in time. Apart from indicating a preference for SMS over other communication methods, this closeness in timing was an interesting quality that appeared in many of the text conversations and could have interesting consequences for theory development. The fact that a message can take at least a minute to read, interpret, compose a reply and

send it on suggests that participants may be more highly involved in the conversation than first thought. It seems that rather than something that is going on in the background, people are extending their involvement in the conversation by spending long periods of time engaging in the crafting, editing and reading of texts as they converse through the medium. Of course, a benefit of the medium is that it can be used whilst multitasking however the data seems to suggest that people often actively engage in communication as their sole activity, and not just as something whilst they are doing something else. It would be a lot faster to converse through face-to-face communication however maybe the long drawn out nature of communicating through text is acting to make communication longer and more drawn out so personal contact is lengthened. Ling and Yttri's (2002) concept of texting being used as a 'social glue' is in line with this finding. This explanation would be supported by the hyperpersonal approach as it demonstrates the medium being used for more social and intimate purposes. However to clarify this issue further, more work needs to be conducted to investigate what participants are doing at the time of messaging to differentiate this from the alternative hypothesis that they only text because no other methods of communication were available, for example if both were in lectures. However the fact that texting allows people the opportunity to communicate in situations where they were previously unable and users chose to capitalise on this is an important affordance in itself.

The concept of "perpetual contact" is in line with the hyperpersonal approach (Katz & Aarkhus, 2002), and was particularly evident in the more intimate text exchanges. Many of the participants were using texting to communicate with their romantic partners. In one case, participant 8 (female), 89.7% of the 845 texts were between her and her boyfriend. 90.8% of these texts were conversational as opposed

to one-off messages. This averaged out at around 12 messages sent between the pair every day. This pair was quite interesting as they used many symbols in their texts to express their feelings, e.g. <3 (a sideways on love heart), and --;-@ (a sideways on rose). It seemed to be a way for the pair to communicate perpetually when they were away from each other, constantly letting each other know what they were doing and sending sentiments of affection. They used a lot of nicknames too, e.g. buttercup, munchkin, angel, poppet, bubba, sweetie etc, again signs of affection. They were constantly reemphasising their feelings for each other throughout the day, reminding each other how they felt. This demonstrates texting being used to express intimate feelings and for generally 'phatic' communication, using Malinowski's (1923) sense of communication intended to overcome the tension created by silence or lack of contact, and establish a sense of sociability and personal communion between people. Excerpt 2 shows an example of their conversation.

Excerpt 2.

Participant 8

Relationship: romantic partner

1:10pm

Partner: Hey sweetheart my les jus fin i jus on my way home thinkin bout u beautiful i hope ur lecs r goin welll sweetheart i love u hava good aft mmmmaaaa XxXxXxXxXx<3<3<3<3<3<3<3

2:09pm

Participant 8: Hey baby my lecs went well thanku one was abit borin tho but neva mind,gota nip dwn the shops again in a min,ive been thinkin about u2 i love u baby xxxxxxxxxxxx

2:44pm

Partner: Hey beautiful im glad ur lecs went well apart from1 i hope it wasnt to bad hunny i hope ur aft goes well angel i jus off 2les soon ooohh ur sooo pretty n lovely..xx

2:46pm

Partner: ..i hope the shops go ok baby n its not to busy i jus gotta posta certain package to a certain beautiful munchkin:)i love u so much baby takecarexxxxxxxxxxxxxx:)

3:30pm

Participant 8: Hey sweetie ive just got a few pridgy bits.i hope ur less is goin well baby,im really xcited about my package i love u baby xxxxxxxxxxxxx

3:38pm

Partner: Hey baby my les is ok thanku sweetheart i cant wait for you to get ur package to :D Im glad u got sum more foody bits button i love u somuch i hopeur afts good2xxxx

6:06pm

Participant 8: Hey sweetheart im jus at wk at the min finishin bits off.my les was ok it was busnes i miss u baby i hope ur aft was good i love you so much baby xxxxxxxxxxxxx((SQWUDGE))

6:19pm

Partner: Hey angel i hope wk is goin ok,my aft was good thanks im just cookin my t at the mo havin chicken+chips.ive been thinkin about u i love u xxxxxxxxxxxxxxxxx

6:24pm

Participant 8: Arhhh baby ive been thinkin about u to beautiful im glad ur aft was good wk went ok thanku i up on my way home via the supermark njoy ur t ur so cute babe xxxxxx

6:44pm

Partner: Hey sweetheart i jus got home safe i miss u beautiful is it alrite to hava chat tonite baby i love u so much i hope u njoyed ur t hava good eve pumpkin <3<3<3<3<3

6:53pm

Participant 8: Hey sweetie my t was good thanks angel its fine 4u 2call angel we may b goin 4a drink but not till later.call wen eva u like i love u xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

Excerpt 3 below shows another example of a text exchange between participant 11 and her boyfriend. Again they demonstrate the use of text messaging to express their feelings for one another. This is just as Hyperpersonal theory would predict. The medium is being used to express feelings in an unrestricted way. It seems

that text is being used by couples to help maintain their relationships by constantly letting each other know how they are feeling about one another. As postulated by Ling and Yttri (2002), interactants use the medium to remind each other they are there and that the other is in their thoughts. In both these Excerpts it seems that the partners are keeping in perpetual contact with each other, reinforcing their feelings towards each other, and in the first case informing each other of nearly their every move and action.

Excerpt 3.

Participant 11

Relationship: Romantic male partner

1:40am

Partner: love you more love you more love you more plus infinity times more than however much you love me plus one.love you lots and lots and lots love your angel xxx

1.55am

Participant 11: is that all?hun even i love you more than that.love always my angel, r yet dreams [steve]
xxxxx x x x x x x x x x

1.59am

Partner: bitch!the size of my feelings for you are bigger than the whole universe,more that ever has does or will exist and i mean it.beat that :-)

2.17am

Participant 11: mines still bigger.i love you more than love itself.I cherish your every breath and every beat of your heart.i've broken the constraints of love for you xxx

10.37am

Partner: i love you so much my sweetheart.you make me the happiest man on earth just to be able to say that you are a part of my life.love always my angel your bitch x

11.34

Participant 11: i love u 2 my baby.my feelings 4 u r so strong i cant describe them they r incomparable the more i no about u n ur past the more i love u n the happier i am

Another example of extended time frame is the following exchange between participant 7 and her friend. (Excerpt 4). These 5 texts were sent over a 1 hour and 54 minute time period, and demonstrate the ability of the medium to be used in expanded or contracted time periods, the first text is sent and it is not until 42 minutes later a reply is returned. However the last four texts are sent within a 12 minute time frame. This is a key feature of SMS: the ability to be asynchronous over hours/days or near-synchronous in minutes.

Excerpt 4.

Participant 7

Relationship: female friend

10:43

Participant 7: Hello! How r u? Do u fancy lunch/ coffee/ alcohol thurs? I finish uni at 2pm. Could ask [Debbie] as well- she does Monday instead of thurs now. Let me know xxx

12:25

Partner: Would love to but am working till 5 how about an early dinner straight after at 5.30?

12:28

Participant 7: Ok cool. [Joe's] working late so where do you fancy going?

12:31

Partner: What about union rooms? Invite anyone who fancies it (within reason)

12:37

Participant 7: I take it you mean not [Andy]?! Ha ha. He really is worse than ever now. Anyway, I'll see who's up 4 it and text u one night xx

It seemed within many of the text exchanges that took place that participants were wanting to engage in such a conversational exchange. Often the initial text contained multiple questions to the other, indicating they wanted a reply. For example

the following text in Excerpt 5 is the first text received by participant 4 from his female friend:

Excerpt 5.

Participant 4

Relationship: Friend

8.12pm: Hi, this is my new number. How was your first week of real work? Freshers week is nearly over now, lectures start Monday. I have about 21 hours a week. How many hours do you have? Have you started working at sainsburys yet? Lou

Some of the texts were concerning self actions/information. These seemed to act as a way of keeping one's communication partner up to date with what one was doing/thinking. It would be hard to imagine the same thing occurring through other media, for example the following messages in Excerpt 6:

Excerpt 6.

Participant 4: Received from male friend:

I need to buy some new shoes

Participant 12: Received from boyfriend:

i jus buyd a folder,page breaks a pad ov paper a ruler and a hole punch 4 1 pound 90 wow.but my hole punch is a bit crap.

Participant 10: Sent to female friend:

I want to die with shame, just going for a session at the gym and walked into a room full of naked men BY ACCIDENT! Oh dear now they probably think I'm a pervert

Again, like those texts sent between romantic partners, these texts seemed to act to keep each other up-to-date with what one was doing/thinking. This is like micro-communication or some sort of shared consciousness, keeping those people one is close to informed of what one is thinking/doing.

This seems to be a unique niche of the text messaging medium - the ability to send a quick text without having a whole set procedure around doing so. For example Eldridge and Grinter (2001) highlighted that to make a phone call one has to wait for the other person to pick up the phone, then there is a 'social script' related to the etiquette of making a phone call- having to start with a greeting and pleasantries and generally talk in addition to the message one was wanting to convey. To just ring up and say 'I need new shoes' then hang up again is certainly not a normal procedure. However text allows for this micro-communication. It also allows for communication when only one party maybe available. So the thought 'I need new shoes' can be sent as it is thought and not have to wait for a later conversation when the recipient is free. So communication has no time boundaries.

As evidenced in Ling and Yttri's (2001) work, there are also plenty of examples of micro-coordination in the texts, some examples of planning/arrangement texts are shown in Excerpts 7 and 8. These show texting allows people to coordinate their activities in advance as well as in situ. So text messaging is helping people coordinate their social arrangements.

Excerpt 7. Advanced planning:

a.

Participant 10:

Relationship: Female friend

Friend: Hello lovely what are you doing this weekend are you free on Saturday for a visitor love loads
xxx

b.

Participant 6:

Relationship: Male friend

Participant 6: hello mate I will meet you in bar 38 at 830 if thats ok with you.

c.

Participant 2

Relationship: Male Friend

12:30pm

Participant 2: WANT TO GO TO THE GYM AGAIN TODAY

12:47pm

Friend: SORRY JASON BUT WERE GOIN TO SEE FINDING NEMO TONIGHT AT THE PICTURES- ARE YOU COMING? WE'LL GO TO THE GYM TOMORROW MORNING AND BURN

12:55pm

Participant 2: NAH THANKS GOING TO THE GYM STILL GO TOMORROW AT 730 MORNING

1.15pm

Friend: WHATS WRONG WITH FINDING NEMO? DID YOU JUST CALL ME A CHILD?

1.18pm

Participant 2: NAH NOT CHILD BIG GIRLS PANTS

Excerpt 8. Planning on the move

a.

Participant 2

Relationship: Female friend

Friend: Are you gonna join us?In the round about.

b.

Participant 1:

Relationship: Male Friend

7.10pm

Friend: Im in the roundabout if your any where near

Excerpt 9 shows an example of asking one's partner for information. The use of text in this way can be a valid alternative to a voice call in that when one just wants

a little piece of information then the text medium is perfect for this, as opposed to a voice call where people generally have to make small talk as well.

Excerpt 9.

Participant 11

Relationship: Female Friend

10.56

Participant 11: hey babe are we allowed to take bags into the exam with us? if not what are we supposed to do with them?

11.01

Partner: Hey. we allowed to take books n notes so i guessing we probs can take bags :)

Around 10% of the one-off messages were concerned with expressing sentiments of affection, or conveying a sensed of perpetual contact- the idea that someone is always there, for example the texts in Excerpt 10. These can be seen as mobile 'gifts'. They were also things that were brief and would probably result in time saved instead of making a phone call.

Excerpt 10

a.

Participant 12

Relationship: romantic partner

Partner: I mis u so much x I love you. Nyt-Nyt

b.

Participant 11

Relationship: Romantic partner

Partner: i love you my angel i don't know what i'd do without you. you are my life and sole you are everything to me and that will never change. love always my angel xxx

c.

Participant 12

Relationship: Mother

Partner: Good luck with the interview and have a safe trip to [bob] s

d.

Participant 11

Relationship: Romantic partner

Partner: honey i will call you in about 45 mins.love you always my angel [steve]

xx

e.

Participant 1

Relationship: mother

Mother: sorry I mist your call late now wil fone tmoro luv u mum

In examining the content of the text messages it seems that texting seems to have several functional niches. Communicating/flirting with ones romantic partner was quite a common use, as was general plans/arrangements and individual one-off gifts/sentiments. The latter use of 'gifting' of texts had been previously identified by Taylor & Harper (2002) and is indicative of hyperpersonal communication as it allows people to send positive sentiments at any time of day without need for idle chit chat as well as making people aware others are thinking about them, something face-to-face and voice calls may struggle to do. It seems text messaging is not simply replacing old methods of communication but rather it is offering a new way to communicate in times/places where other media would not be available or where the senders just have a simple message to communicate that other media do not offer the same simplicity to communicate; for example it does not need the added pleasantries

of a voice call. Partners can tell each other how much they love each other, friends can make quick arrangements and parents can send quick texts checking their children are ok. The fact texting is being used for purposes as diverse as a quick message to apologise for missing a call to a highly intimate expression of ones feelings shows how malleable and generic the medium can be. This malleability is another unique and important affordance of text messaging and allows it to be a medium that can be used across a variety of situations.

4.4. Discussion

This study has begun to explore how text is actually being used in the real world. The aim was to begin to get a better idea of the content and conversational nature of text messaging. The frequency of texting and general characteristics of the messages could also be examined.

The study showed that text messaging is being used for a wide variety of purposes, from quick one-off messages of warm sentiments or reminders to long drawn out text conversations expressing deep feelings or making arrangements. Even those participants who reported preferring talking on their mobile to text messaging sent a minimum of one text per day over the course of the study. This suggests that text messaging is not simply just being used in one-off circumstances but rather it has become a regular occurrence in many people's lives.

Of course, as emphasised throughout this chapter, the sample itself is very small at 12 participants and as such has to be taken with caution although the number of texts collected from these 12 (3923) lends the data a lot of power. All 12 participants were students enrolled on the first year psychology programme and this sample may not be representative of the wider population. However the age range of

the sample was quite varied and there were males and females. All of whom seemed to show evidence of using texts for social purposes as well as for more informational/practical ones. In fact, the majority of text messages proved to be part of an ongoing text conversation as opposed to being one-off and suggestive of a more task based/informational purpose.

Examining the results in terms of the research questions posed in the introduction, it can be seen that the prediction there would be a large proportion of text messages that were not just information/task based but that they would show evidence of social-orientation was shown to be the case. All 12 participants recorded texts demonstrating having social content - self and other information was the most popular category, followed by combined plans or 'social co-ordination'. Self-feelings and other-feelings were also demonstrated by all the participants showing that the medium was being used for more intimate purposes at times. The Cues Filtered Out model would struggle to be able to explain why such a cold limited cue medium would facilitate such content. This backs up the findings from the previous chapters. The examples of text messages given show that people can be quite intimate in their text messages, using nicknames and emoticons in some instances to demonstrate signs of affection. The majority of the messages certainly did not feel cold or hostile as the Cues Filtered Out model may suggest.

The second research question was regarding the conversational use of text messaging. A medium that is so limited in terms of characters available to use and limited social cues may be expected just to be used for one-off text messages and certainly not for long drawn out text conversations. However over 60% of each participant's text messages were part of a text conversation, and on average each conversation consisted of four turns. One participant's text conversation was 24 turns

in length. The interesting thing about the conversations was that they were often extended in time, for example the 24 length conversation of participant 4 shown in Excerpt 1 earlier started at 6.14pm and finished at 8:48pm. Arguably it would have been a lot quicker (and cheaper) to convey the same amount of information in a phone call that would take minutes rather than hours. The Cues Filtered Out approach again may struggle in interpreting behaviour like this. The hyperpersonal approach is a better account as it forecasts that people like media like text messaging as it allows for ones real views and opinions to be expressed more easily. Indeed this particular exchange can be seen to be expressing the interactants feelings about a person who has offended them both.

An interesting observation was in the timing of many of the text conversations - often they consisted of many texts over a few hours, suggesting participants were in constant engagement in the conversation. Certainly it would take less time for participants to pick up the phone or even to go around and speak to the person face-to-face than engage in such long drawn out text conversations. A speculative idea is that this is supportive of hyperpersonal communication- it is extending the connection with the other person for longer periods of time, making the interaction more salient to those communicating, which in turn may add intimacy and heighten the sense of involvement, making communication more hyperpersonal. A diary-based study may be an interesting idea for future work to see whether participants are indeed focussing entirely on the conversation at hand or whether they are multitasking.

As hypothesised, text messaging was found to be used frequently, often on a daily basis by the participants, showing that the medium has infiltrated peoples lives. The seeming malleability of the medium to be used for multi-functional purposes is probably one of the main reasons why it was used so often.

The analysis showed some interesting effects related to Texters and Talkers with the former being more likely to have feelings and self information expressed in their text messages. This is exactly as one may predict as the hyperpersonal approach suggests the medium is highly useful for self-expression and one would expect those people who prefer using the medium to have capitalised on this. There were no significant differences in the number of characters or number of messages sent in a text conversation between the two groups.

In the present data set it appears that there were fewer differences in terms of gender than expected. In regards to language use in text, the literature (e.g. Skog, 2002; Grinter & Eldridge, 2003) has reported 'genderlects', with the content of women's text messages being more likely to include attenuated assertions, apologies, justifications, questions, personal orientations and supportive aspects. Men's message content on the other hand are reported to include stronger assertions, self promotion, presuppositions, rhetorical questions, authoritative orientation, challenging others and humour/sarcasm (Yates, 2001). In the present data, male-to-male texts were less likely than female:female texts to be concerned with others feelings. They were also the least likely to contain 'gift' sentiments, like 'I love you' 'or night night'. Mixed-sex dyads were more likely to contain this sort of content, as may be expected as this category was more likely to be romantic relationships. Same sex text messaging was more likely than mixed sex to be concerned with combined plans, or 'social coordination', male: male slightly more so than female: female. These results seem to fit with McKenna *et al.*, (2002) who found that women disclose more and are more intimate they like to share emotions. The fact women were more concerned with others feelings is supportive of this. Men however tend to focus on shared activities. The fact male to male texts seemed particularly more likely to be concerned with

combined plans seems to fit this account. This finding is also in accordance with Herring (2001) who noted that women tended to be more supportive in their email communications.

In Ling's study (2003) men were found to be more likely to send one-word answers, in their texts whereas women would write longer messages. In Chapter 3 it was found that males texts tended to be shorter than females, however in the present study gender was not a significant predictor of the number of characters sent per text or in the number of turns sent in a text conversation. This maybe because in previous studies only one text per person was used and this may have led to a bias in the results. The present study had the advantage of examining a large number of texts from each participant so was more representative of the participants here.

Conducting a longitudinal study like this is useful when the phenomena of interest cannot be easily separated from the social and technological contexts in which they occur (Markus, 1994). Laboratory based studies to try to control for extraneous variables would not be naturalistic at all and would not give a good indication of the way the medium was being used in the real world. The advantage of studying text messaging is that the messages themselves can be preserved exactly as they were written and received, with date and time information, unlike voice calls and face-to-face communication which are more difficult to examine independently of their context.

Possible improvements to the study include monitoring a greater number and wider sample of participants. Also, getting participants to code their own messages may be useful as they know the full context of each conversation. Also finding out why they chose to text as opposed to call would be insightful, however that would take a lot more of participants time and it may cause problems with reliability as

participants may feel less likely to record such information.

This chapter goes beyond the previous chapters findings as due to the longitudinal design, it captured the conversational nature of the text messages. As was found in the previous chapter, text messages were again found to be used for social-relational purposes. The conversational nature of the messages was also a key finding in the present study, showing that the medium is not just being used for simple one-off texts but rather it is often being used to engage in long drawn out text conversations. Indeed some of the conversations would have been a lot quicker (and cheaper) by choosing the voice call medium as opposed to sending text messages. This finding is important in terms of theory development as it shows that text messaging is being used in its own right and not just for a last resort, It is being used for social purposes and it seems that some people are engaging in conversations that mean they are interacting for longer in a conversation through text than they would be if they chose to communicate via any other method, this is something that is of great interest as it suggests one of the qualities that may draw people to texting is the opportunity to be engaged in interaction with another for a longer period of time than is normally typical of other methods of communication. This is exactly the sort of finding that would support Hyperpersonal communication theory as communication is not only allowed to be more intimate but also more extended in time.

CFO approaches would struggle to interpret these findings as one may expect given the choice of texting or calling on the mobile device, interactants would definitely choose the talk medium especially for conversational purposes as it has more social cues and therefore would be more apt for social communication. Texting for one-off, informational purposes would be predicted but certainly not the intimate, social-relational text messages that were often evidenced in the sample studied.

Each participant sent between one to 13 texts on average per day and the majority of the texts were part of a conversation. Even participants who preferred talking to text messaging participated in conversational text exchanges and demonstrated social-relational content within their texts.

4.4.1. Summary

In summary, this chapter has begun to show insight into the way text messaging is being used in the real world. It has been shown how the use of the medium for conversational and social purposes is a common occurrence, in support of the Hyperpersonal Model.

There were differences found in the content of text messages sent by Texters and Talkers with the former more likely to capitalise on the affordances of the medium to express their feelings and ask about their partners feelings. This was not evidenced in the last chapter, however the better sampling of text messages in the present study is more representative of texting behaviour . Gender also proved to be a significant factor, with male: male pairs being more likely to discuss combined plans than female: female or mixed gender pairs. Mixed gender pairs were more likely to send gift texts than same sex pairs, and female-female pairs sent more than male-male pairs, which is exactly as found in the previous chapter, and in accordance with the literature.

It appears therefore that some groups get more out of the medium of text messaging than others, Texters seem to be getting more out of the expressive nature of the medium, as do mixed sex pairs.

In the data so far there do seem to be some suggestions of hyperpersonal communication. Indeed, a novel finding in the longitudinal study was the concept of a

shared consciousness- sharing little snippet's of ones thoughts and actions. This is inline with Hyperpersonal theory as its allowing communication of personal thoughts and feelings as they are thought and felt with no need for superfluous communication or to wait till one has more to say before they can make a voice call or meet face-to-face. The mobility of text has allowed for the medium to be a perpetual communication device and means communication can become hyperpersonal in the sense that there are hardly any limits, it can be a 'brain dump' as and when one feels, and ones communication partner can pick up the resulting messages at a time that is convenient to them.

This along with the finding that many text conversations occur over long drawn out periods where a voice call may otherwise seem more appropriate, and certainly may have been cheaper seem to provide early suggestions that text messaging is being used in a hyperpersonal way. The example in Excerpt 1 of a conversation where the first 20 of the 24 texts were over a 62 minute time frame, seems to suggest people are using it to make communication last longer, to make as much out of the communication as they can. The same conversation would take a few minutes at most in a face-to-face or voice call medium.

There were many examples in the texts collected of loving texts with deep feelings regarding one's partner expressed, again suggesting a hyperpersonal use for the medium. To call someone up by telephone 50 times a day to say I love you is an option people obviously have when they choose to text the sentiment, however texting is preferred and may be seen as more acceptable. Also these little 'gifts' can be stored, and re-read when people want to. Again this seems to allow people to be aware that they are constantly in each others thoughts, something one would expect to be capitalised on by those in close intimate relationships.

From the current analysis then, it is possible to itemise the potential hyperpersonal properties of SMS. These include 1. It's expressive nature (e.g. feelings communicated), 2. Perpetual contact (e.g. being able to communicate as and when one feels like it) 3. extended/contracted time frames, 4. Shared consciousness (sharing thoughts/actions as they occur), 5. Micro-coordination (coordinating and re-coordinating on the move), 6. Gifting (sending sentiments of affection, letting others know you are thinking about them), 7. Concise, and 8. Malleable to communication needs. These could all potentially allow for communication that goes beyond that possible face-to-face.

These discovered affordances have been added to the model developed over the last few chapters, shown in Figure 4.1. It is postulated that having used text messaging, users have the potential to discover these affordances, which in turn will inform their future decisions to text. The differences in discovery of these affordances may explain why there are individual differences in the use of text messaging.

At the end of Chapter 3 it was noted that the evidence so far was indicative that texting was comparable to face-to-face but there was no evidence of communication surpassing the levels of intimacy of face-to-face, i.e. that communication was hyperpersonal. This meant that the Social Information Processing theory was more applicable as it predicts that communication can equal that of face-to-face. The more fine grained analysis in this chapter seems to go beyond this and provides preliminary evidence for the potential of hyperpersonal communication for certain groups of people.

Chapters 6 and 7 will use a more experimental approach to try and differentiate between these weaker and stronger theories of Hyperpersonal communication. Chapter 5 contains the results of Study 4, ran in parallel with these

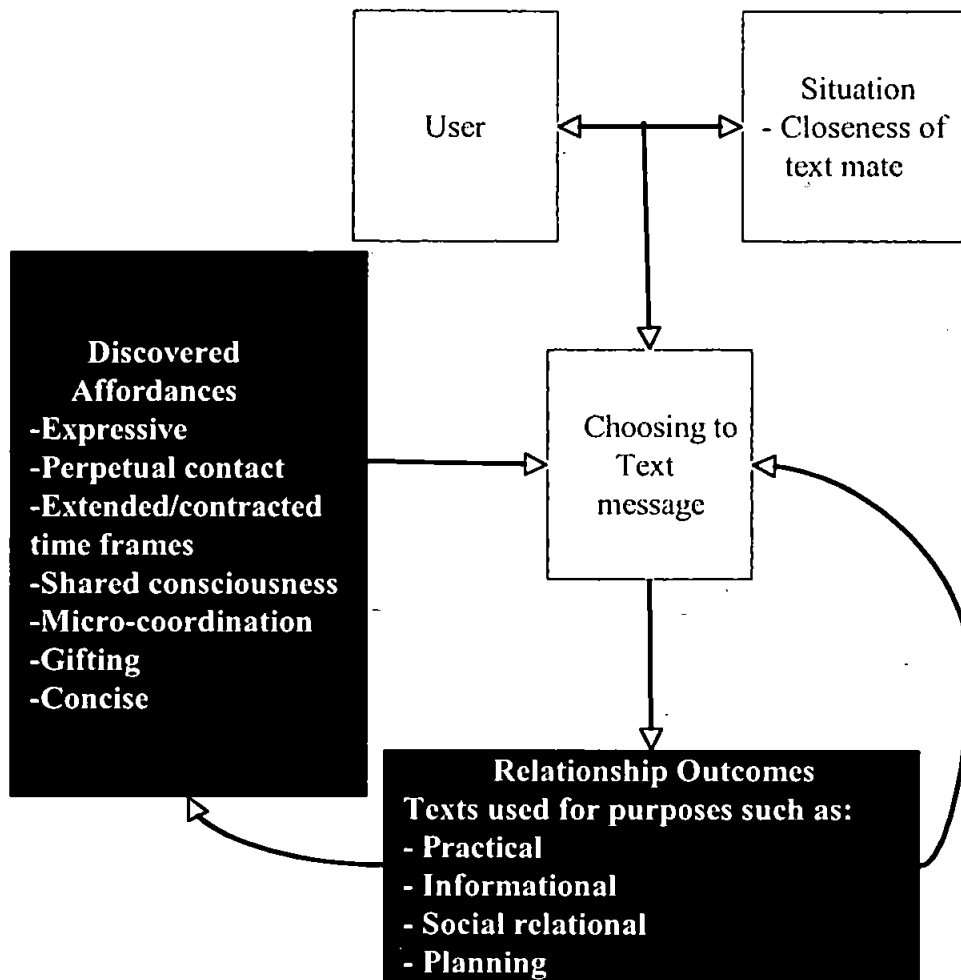


Figure 4.1. Model development

text collection studies, which aimed to uncover the reported perceived uses and gratifications of text-messaging.

5.0. Overview

“Research on the social effects of electronic communication technology should consider not only the technological characteristics of various media, but also those purposes and goals users attempt to accomplish through the media” (Markus, 1994, p. 145).

This chapter continues with a more systematic approach to the question of why people choose to use text messaging as a social medium. As was discussed in the previous chapters, a key question that will help differentiate between the competing Cues Filtered Out and Hyperpersonal models is what are people using text messaging for? Studies 1, 2 and 3 in the last few chapters have examined the content of text messages, with the general finding that people used the medium for both informational and social-relational purposes. In this chapter, this question will be posed within the broad framework of uses and gratifications theory. This study was conducted in parallel with studies 1-3 and was also exploratory in nature.

The cues-filtered out approach argues that the restricted bandwidth and the resulting reduction in cues would result in a medium that is only useful for task-based or informational purposes, for example to let someone know one was going to be late home, or to ask a quick question. In this perspective, people would use this media for social purposes only as a last resort, or if other more cue-rich communication methods were not available. Early reports (e.g. Ling, 2003; Thurlow, 2003), of the use of text messaging have shown that people are using it for social purposes and together with the findings reported in Chapter 3 that people actually use texting extensively for social purposes,

evidence is building that is difficult for this theory to accommodate.

In contrast to this, the Hyperpersonal theory of communication (Walther, 1997) would predict that people choose to use the medium precisely because of this reduction in available cues, as it is this that lets them express themselves free from the pressures of face-to-face communication, giving them the time and cognitive space to think carefully about their self-presentation. Walther proposed that key features of electronic media—in particular, selective self-presentation, idealization of one's partner, and reciprocation, may all lead to hyperpersonal communication. Hence, social-relational uses and gratifications may be a key reason why some people choose to use the medium. These alternative forecasts relating to the prevalence of social-relational uses of text messaging by the two approaches is something the study reported in this chapter will try to begin to untangle.

Furthermore it is expected that individual differences, particularly those discussed in Chapter 2, will influence how different people use text messaging. As stated by McLeod and Reeves (1980), communication media do not have a universal influence on all individuals. Studies 1, 2 and 3 have begun to highlight potential reasons for why text is preferred by some but not all mobile phone users, giving rise to differences between 'Texters' and 'Talkers'. For example, although many teens and young adults prefer sending texts, a significant proportion of this group of mobile phone owners still prefer voice calls to text messaging on their mobile phone (Fox, 2001; Reid & Reid, 2005), even for communication purposes that are overall most associated with texting amongst their cohort (Haste, 2005). The study reported in this chapter will examine the different gratifications identified by those who prefer texting or talking on their mobile. It will also determine the extent to which loneliness and social anxiety predispose mobile phone users to discover certain uses and gratifications of text messaging, and whether these explain why this differential preference may exist. Because age and gender effects in text

messaging uptake and use have been observed, these variables will be included as statistical controls.

5.1. Introduction

5.1.1. Uses and Gratifications Theory

Study 4 examines what people report they get from using mobile phone text messaging, using a Uses and Gratifications approach similar to that used by Leung and Wei (2000) in relation to voice call functions of the mobile phone. These researchers questioned what gratifications were sought when people use the mobile phone to call other people, whether individual differences in gratifications predicted the level of mobile phone usage and to what extent the gratifications sought could predict mobile phone behaviour. Uses and gratifications is one of the most influential theories in communication research (Ruggiero, 2000). The theory is useful as it can be applied to both mediated and non-mediated communication (Rubin & Rubin, 1985), and is flagged to be 'especially appropriate for studying new communication technologies' (Flaherty, Pearce, & Rubin, 1998). Uses and gratifications theory attempts to explain why certain media are used, specifically in terms of satisfying social and psychological needs. There are several assumptions made in the theory:

- i) people actively seek out media to satisfy individual needs
- ii) communication choices are purposive, motivated and goal directed
- iii) people are aware of specific types of media and can state motives for using them (Katz, Blumer & Gurevitch, 1974)
- iv) Media compete with other forms of communication in terms of selection and use

- v) People are influenced by a number of psychological and social factors when making their decisions on which medium to use (Flaherty *et al.*, 1998).

So it is assumed that people are active in choosing the medium that meets their needs based on evaluating the choices they have available (Perse & Courtright, 1993). Perse and Courtright talk about 'normative images' that people have of communication media, which are based on the functions they serve. These include content characteristics, modes of transmission and reception, ease of use and patterns of use. They suggest that people are aware of these communication media alternatives and select them based on the normative images these media are believed to possess.

Motives for choosing a communication medium include those that are reason for people to communicate in the first place. According to Schutz's (1966) fundamental interpersonal relations orientation theory, the three main reasons people need to communicate with others is for inclusion in a friendship group, control (both over others and to give to someone else) and affection (the desire to be loved/to love). Other motives discussed by Leung (2001) and Flaherty *et al.* (1998) include relaxation, companionship, habit, to pass time, entertainment, and escape from the task at hand or from personal problems and worries.

There are a number of additional motives that have been identified as specifically associated with the use of SMS texting (Döring, 2002). These include the need for distraction, to alleviate boredom and frustration, to provide independence from one's present surroundings (by avoiding interacting with others), to allow social interaction with ones circle of friends who are not physically present at that particular moment, and to offer a way to develop, maintain and end relationships.

The theory proposes that needs interact with personal characteristics and the social

environment to produce perceived problems and perceived solutions, constituting the motivations behind using a medium. The use of the medium in turn has an effect which will impact back on the individual determining whether or not they will use it again (Ruggiero, 2000). The theory recognises there will be individual differences, 'different individuals tend to display different types and amounts of activity in different communication settings and at different times in the communication process' (Ruggiero, 2000, p8), with certain conditions causing particular individuals, e.g. those who are stressed or lonely, to form high levels of attachment to a medium.

The Uses and Gratifications approach is not without its critics. Adams (2000) highlights some of these as being the failure to take into account the effects of habit and external constraints on media use, and vagueness of definitions for the concepts of 'use' and 'gratification'. Despite these criticisms of the uses and gratifications approach it was deemed to be an appropriate framework to use here for reasons as outlined by Ruggiero in his review. Ruggiero argues that despite critics arguing that uses and gratifications is not a rigorous theory, it provides a framework for identifying a 'typology of uses, although not providing what some scholars would consider a refined theoretical perspective, furnishing a benchmark base of data for other studies to further examine media use' (p12). In the current context, text messaging has yet to have its uses and gratifications examined and this approach provides a way to begin to form an impression of how the medium is being used and the reasons why people choose to use text messaging, what it is that they may be getting out of it and whether key individual differences can predict the uptake and use of the medium. As highlighted by Perse & Dunn (1998): 'Focussing on the social and cultural impacts of new communication technologies may be premature until we grasp more fully how and why people are making use of these media channels'. The main strength of using the uses and

gratifications approach is that it gives the opportunity to develop a more sophisticated theoretical model over time (Ruggiero, 2000), which is exactly the aim of the current investigation.

Furthermore, the approach to uses and gratifications adopted here has a close parallel to recent developments in models of Internet use (Eastin, 2005; Eastin & LaRose, 2000; Eastin & LaRose, 2005). The uses and gratifications approach envisages technology users as active agents, setting goals for themselves, exploring and adapting to new technologies, and anticipating the likely consequences of using these technologies to achieve communication goals (Rubin, 2002). A key feature of these developments is the recognition that predictions of Internet use can be significantly improved by reframing peoples' beliefs about the Internet in terms of their expectations of achieving specific outcomes (LaRose, Mastro, & Eastin, 2001). This reasoning is extended to mobile phone use in the present chapter, and uses techniques developed within the uses and gratifications approach to identify mobile phone users' beliefs about what they are able to accomplish using SMS texting, whether they think optimistically or pessimistically about SMS texting as a means of intimate social contact, what goals they have in mind when they select SMS texting on their mobile phones, how much effort and persistence they put into tapping in a text message, and the relational and other outcomes they hope to achieve from using SMS texting. The findings from the previous chapter suggested that Texters and Talkers differ in their ability to capitalize on the social-relational affordances of texting, with Texters demonstrating more self-and other-feelings in their text messages than Talkers. In relation to the uses and gratifications approach this may be reasoned to be a result of Texters demonstrating more self-efficacy with the medium having learned how to use the affordances it offers in the most beneficial way.

5.1.2. Technology Clusters and Transforming Technologies

The basic idea behind technology clusters is that adoption of a certain technology can be predicted by the adoption of functionally similar technologies. For example, the use of email and Instant Messenger applications may be associated with the use of text messaging across the user populations of these technologies. This concept is a useful one as it is indicative of whether text messaging is a completely unique medium, offering functionality perceived as unavailable through other media, or simply as an extension of existing technologies such as email or Instant Messenger. This allows us to test Keisler's (1997) distinction of whether texting can be categorised as a technology that is *transforming* (changing the way people think about the world, their relations etc.), or whether it is simply *amplifying* (just allowing people to do the same as they did before but it may be a more economical/satisfying alternative).

5.1.3. Past Research on Other Communication Technologies

Although there has been little work done on the usage of text messaging per se, research has been conducted on the uses and gratifications of the mobile phone for voice calls, and of the related technology of computer IM (Leung and Wei, 2000). In terms of the landline telephone, reported uses and gratifications have been shown to fall into two broad categories: (1) intrinsic/social e.g. socialising, having it for security etc., and (2) instrumental/task-oriented e.g. making appointments, information gathering (Keller, 1977; Noble, 1987). Intrinsic/social uses were found to be more frequent motives for using the landline than were instrumental/task oriented motives. Other motives include reassurance, entertainment or 'fun seeking', (Williams, Dordick & Jesuale, 1985) and time management. Research on 'newer telephony technologies' such as pagers found a new motivation factor emerged- 'fashion and status' whereby users with this motive were

looking for the gratification of integrating into peer networks (Leung & Wei, 1999).

In studying the uses and gratifications of the mobile phone, Leung and Wei (2000) identified 7 factors: (1) Fashion/status, (2) Affection/sociability, (3) Relaxation (e.g. relieve boredom, pass time), (4) Mobility, (5) Immediate access, (6) Instrumentality (e.g. instrument for/facilitator of business transactions, and (7) Reassurance (sense of security/safety). Compared to the landline phone, more instrumental uses were given, and these were much stronger than the social/intrinsic motives. Mobility, instrumentality and immediacy were found to be the strongest predictors of mobile phone use.

In 2001, Leung carried out a study aimed to identify gratification factors that explained why people spend so much time and effort in using ICQ ('I seek you'), an instant messaging form of CMC. He wanted to look at why people chose to initiate conversations with others via such a medium, arguing that it is essential to examine the potential predictors of ICQ use to better understand its impact on relationships. They found seven factors behind ICQ usage. These included instrumental motives such as entertainment, relaxation and fashion, and more intrinsic motives such as affection, inclusion, sociability and escape. The more gratifications people sought, the more they used ICQ. Heavy ICQ users were more likely to report gratifications of affection and sociability, and light users were more likely to report fashion reasons, so evidence of individual differences in affordances sought and identified by users were suggested. This is similar to the findings of the MSc work (Reid, 2002) in relation to text messaging with there found to be differences in underlying personality, motivations and usage patterns of text messaging between those preferring using their phone for text and voice calls.

Although Leung's research is insightful into people's beliefs concerning the mobile phone and ICQ, it is important to conduct a study that looks specifically at mobile phone text messaging in isolation of the other functions on the mobile. There are at least

two communication functions one can do on a mobile: text message or make a voice call. This makes the use of it even more valid a reason for study as people are directly choosing one over the other when they pick up their handset to communicate. They are directly choosing between the two communication options. Some may argue cost is an obvious reason for preferring one method over the other, however as outlined in Chapter 1, sometimes more than one text is sent and in fact a text conversation can quickly surpass the cost of a voice call. This suggests that there are many more factors that may underlie the use of texting.

The study of computer instant messaging is perhaps the most similar area to mobile phone texting however as outlined in Chapter 1, as well as sharing key similarities such as asynchronous communication, being text based and visually anonymous, there are also key differences, mainly the mobility of the mobile making text a more valid option for communication in a wider range of settings and circumstances as well as being more asynchronous than IM, allowing for even greater control over selective self-presentation and involvement, with messaging sometimes taking place over days as opposed to over minutes.

To summarise, the study of the uses and gratifications of the mobile on the whole is not as informative about text messaging as a study that looks at the medium in isolation, and the differences between computer IM and mobile phone text messaging are enough to require a separate study of the latter in its own right. So the present study will take this next step and look at the uses and gratifications of mobile phone text messaging. It will also look for individual differences between high and low users of text messaging- the prior labelled Texters and Talkers, to see whether the two groups differ in their motivations and uses of the medium. Gender differences will also be examined as it was discussed in Chapter 2 how girls are more likely to engage in social-emotional

communication and boys are more likely to be task based and informational (e.g. Rainie *et al.* 2000) so if this was the case it may be expected that the two genders differ in their perceived uses and gratifications of mobile phone texting.

In studying the perceived uses and gratifications of text messaging, it is hoped this will begin to tease apart which of the two theories: CFO or Hyperpersonal, is more relevant to text messaging on the mobile phone. As already reported, both ICQ and the mobile have been found to be used for social purposes as well as for more instrumental reasons. So it can be hypothesised that the similar technology of mobile phone text messaging will also be used for both purposes, in support of the Hyperpersonal Model.

In relation to the concept of technology clusters, Leung found support for technology clusters in his research. Adoption of new communication technologies such as ICQ was predicted by the adoption of functionally similar technologies such as mobile phones and email. Leung observed that 'Students appear to be socialized into using new media technologies such as the cellular [mobile] phone, pagers and ICQ for specific purposes as a social technology in the information age' (2001, p. 497). The present study will test whether the use of text correlates with the use of the functionally similar technologies of email and Instant Messenger. If they are found to correlate then it assumes that they are used for similar purposes. If they do not correlate then it may indicate that mobile phone text messaging offers affordances that are unique to that medium and people are capitalising on those affordances as a result.

In the present study, Leung's items have been adapted to look at the unique features of mobile phone text messaging. Also more items relating to social-relational communication have been added, as this is a key piece in the theoretical model that I will attempt to develop. So items that are theoretically driven will be incorporated along with Leung's existing questionnaire modified for text messaging. In previous research (e.g.

Reid, 2002) people were asked the reasons why they used texting on their mobile phones. Some of these reasons will be incorporated into the questionnaire to see how widely they are endorsed. Also, items examining the Hyperpersonal theory will be developed. A list of these items can be found in Appendix D.

5.1.4. Research Questions

In summary, this chapter describes a study designed with the aim of investigating the uses and gratifications of mobile phone text messaging, examining differences between those who prefer using the texting medium and those who prefer talking on their mobile. The individual differences discussed in Chapter 2, including gender, age and the personality traits of loneliness and social anxiety will also be examined to determine or control their effects on communication preference and perceived uses.

5.1.4.1. RQ1: What is the predominance of social-relational uses of text messaging?

In regards to theory development, the first, broad research question to be addressed is whether or not uses and gratifications reported support those that would be forecast by the Hyperpersonal or CFO approaches. As stated previously, the Hyperpersonal approach would forecast that the affordances of mobile phone text messaging including being a text-based, asynchronous and visually anonymous method of communication would be capitalised on by some users to allow for social-relational communication. The CFO approaches on the other hand would forecast that those same affordances would lead to a communication medium devoid of important social context cues that as such would be incapable of social-relational communication and only be useful for task based and informational purposes.

5.1.4.2. RQ2: *What individual differences are apparent in the perceived uses and gratifications of text messaging and the preference and usage of the medium?*

This study also aims to address whether or not individual differences exist that predict the likely preference and usage of texting and the perceived usage and gratifications of text messaging. As Ruggiero (2000) pointed out, the better a medium is seen by an individual to satisfy their needs, the more it is likely to be used, and the greater the motivation for using it again. As such, it is hypothesised that those people who prefer texting will report more uses and gratifications of using the medium than those who prefer talking on their mobile. Previous research has shown that preference for text or talk can be motivated by individual differences such as social anxiety and loneliness, as well as by gender and age (Reid , 2002). In general Texters have been found to rate themselves as higher in social anxiety and loneliness, and more likely to use texting on their phone, spend more money on texting than voice calls and to find that texting has had a greater impact on their relationships, helping to develop new ones and maintain existing ones compared to Talkers.

This study will again examine whether these two groups differ in relation to gender, age, social anxiety and loneliness. Gender effects have been observed over a range of disaffiliation measures (Borys & Perlman, 1985; Turk *et al.*, 1998), as well as SMS texting adoption and use (Ling, 2004). Furthermore, the relative importance of relationships goals associated with social anxiety and loneliness are expected to vary across the lifespan: whilst acceptance and social integration may be a pressing concern for teenagers and young adults, the desire for close emotional attachments is more prevalent among older adults (Carstensen, 1995). As a result younger people may find text more useful for their needs than older adults.

Furthermore, earlier findings indicated that Texters score higher in social anxiety

and loneliness compared to Talkers. The present study therefore explores whether lonely and socially anxious respondents find the visual anonymity and expressive control afforded by text messaging offers them more intimate social contact than other communication methods.

5.1.4.3. RQ3: Does text messaging use correlate with the use of other communication media such as instant messenger and email?

This question is important as it will be indicative as to whether text messaging is a completely unique medium, offering something that is perceived as unique compared to other media or whether it is just an extension of other related technologies. If SMS texting offers mobile phone owners unique social functionality that cannot be obtained through other media, the case for classifying this new technology as transforming rather than amplifying is strengthened.

5.1.4.4. RQ4: Do perceived uses and gratifications of text messaging mediate between individual differences and the text message usage?

There are more than a dozen methods for statistically testing causal mediation (Holbert & Stephenson, 2003). However, the causal step approach of Baron and Kenny (1986) will be utilised here. The importance of using such an approach is emphasised in Holbert and Stephenson, who argue that this method is under-utilized in media research, and that it is important to consider both direct and indirect effects on media use.

This approach states that if beliefs concerning uses and gratifications are a mediator of communication behaviour, then four conditions have to be met:

(1) variations in the levels of the independent variable significantly account for variations in the presumed mediator (i.e. Path A in Figure 5.1.); (2) variations in the mediator

significantly account for variations in the dependent variable (i.e. Path B); (3) variations in the levels of the independent variable significantly account for variations in the dependent variable (i.e. Path C), and (4) when Paths A and B are controlled, a previously significant relation between the independent and dependent variables is no longer significant, with the strongest demonstration of mediation occurring when Path C is zero.

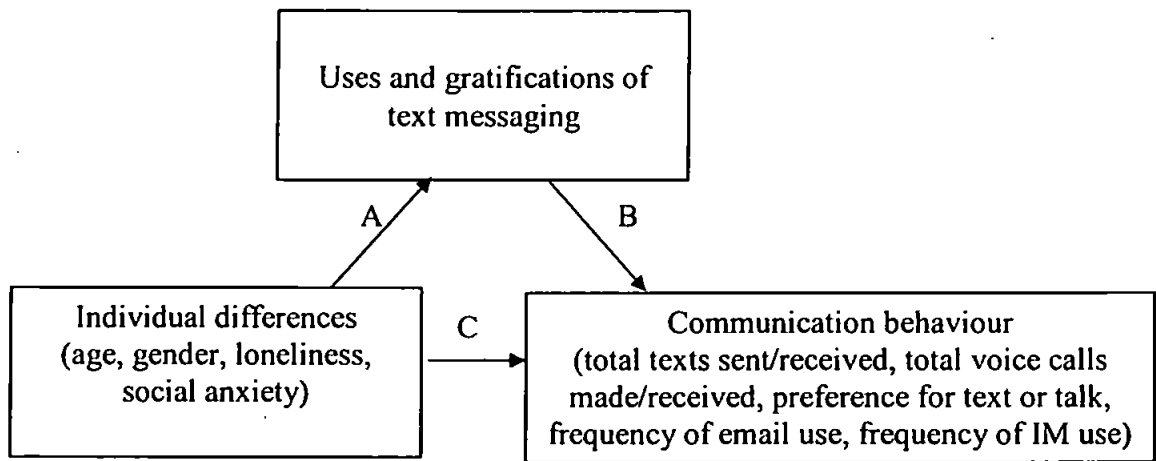


Figure 5.1. Basic mediation model to be used

The final part of the analysis will therefore test whether the perceived uses and gratifications of mobile phone text messaging (demonstrated pictorially in Figure 5.1. earlier) mediate between the individual differences and outcome variables. Chapter 2 outlined a general model to be developed during this thesis to explain the use of mobile phone text messaging. This model will be developed over the course of this thesis. This chapter specifically will be used to depict the mediating role of uses and gratifications as ‘perceived expectancies and beliefs’ regarding the text message medium. In contrast to the descriptive Studies 1 and 2, this chapter sets out to evaluate formally three linked hypotheses depicted within this model: (1) that social anxiety and loneliness are associated with a generalized preferences for texting rather than for talking on the mobile phone, (2) that this preferences is linked to beliefs concerning the uses and gratifications

of text messaging, and (3) that these beliefs mediate the effects of social anxiety and loneliness on mobile phone users' preferences for texting.

5.2. Study 4: The Uses and Gratifications Internet Questionnaire

5.2.1. Participants

The participants were 206 visitors recruited via advertising on the University of Plymouth mailing list as well as on experimental research websites (e.g. specific Internet research sites hosted by University of Plymouth & University of Hanover) over a four-month period in 2004. The study was also advertised on a University of Plymouth mailing list as well as on experimental research websites. Participants were also asked to encourage their friends to take part. Demographical information asked for were participants age and gender.

5.2.2. Uses and Gratifications Items

The study employed an Internet questionnaire available on a secure research website to gather information on respondents' uses of text messaging. As IM and mobile phone text messaging are functionally similar technologies, similar motives may lie behind their usage. Therefore, items for the questionnaire were drawn from both of these domains. The 38 items of Leung's (2001) uses and gratifications questionnaire, adapted to refer to text messaging, were firstly drawn upon. These items tap into six primary motives for instant messaging: to express affection, for entertainment, for relaxation, to appear fashionable, to be sociable, and as a form of escapism. An additional 19 items were generated from previous survey research on the reasons why people choose mobile phone text messaging to communicate (e.g. Reid, 2003; Reid & Reid, 2005) as well as

some items to try to tie in proposed motivations generated by the Hyperpersonal model of communication (Walther, 1997) e.g. concerns regarding impression management, relationship maintenance, and ease of use etc.

In total there were 57 items. Leung's items are shown in Appendix C in the categories that they fall into (entertainment, diversion, affection, sociability, inclusion, relaxation and peer pressure). Additional items added are shown in Appendix D. The items in this enlarged pool were randomly ordered and presented as separate statements completing the sentence 'I use text messaging to communicate with others...' with a 5-point likert scale to respond on (1 = "strongly disagree" to 5 = "strongly agree").

5.2.3. Social Anxiety

The 15-item interaction anxiousness subscale of the Leary Social Anxiousness scale (Leary, 1983) was used to gauge the frequency and/or intensity with which participants experienced anxiety during or prior to social encounters (See Appendix B). This subscale is a well-validated measure of dispositional and generalized social anxiety, and is particularly relevant to the present study because of its association with self-presentational concerns in interactional settings (Leary & Kowalski, 1993; Schlenker & Leary, 1982). In this scale, respondents are asked to indicate the degree to which each of 11 positively and four negatively worded statements is characteristic or true of them by responding on 5-point scale (1 = *not at all characteristic*, 5 = *extremely characteristic*). An aggregate score, obtained by summing over items after first correcting item polarities, yielded a standardized reliability of $\alpha = .89$, identical to values reported by Leary and Kowalski(1993) for college student samples.

5.2.4. Loneliness

The 10-item abbreviated version of the UCLA Loneliness Scale, Version 3 (Russell, 1996) was used to assess subjective feelings of loneliness, shyness, and social isolation (see Appendix E). In this well-validated scale, respondents report on the quality of their interpersonal relationships by responding to five positively and five negatively worded statements on a 4-point scale (1 = *never feel this way* to 4 = *always feel this way*). An aggregate score was obtained by summing over items after first correcting item polarities. This score showed satisfactory internal consistency, obtaining a standardized reliability of $\alpha = .84$, compared with the value of $\alpha = .89$ reported by Russell(1996) for an adult sample.

5.2.5. Preferences for Texting and Talking on the Mobile Phone

Three questions were included to assess participants' generalized preferences for using their mobile phones to make contact with other people. First, preferences for using mobile phones for texting was assessed with the dichotomous question 'Which do you prefer: talking or texting on your mobile phone?' Participants were classified into those preferring to talk (scored as 1) and those preferring to text (scored as 2). Secondly, participants provided two ostensibly objective estimates which were expected to reflect biased judgments of preferred usage of their mobile phones: an estimate of the number of mobile phone text messages they sent in a typical month, and a similar estimate of the number of mobile phone voice calls they made in the same month. To examine the concept of technology clusters, respondents were asked how often they used email and Instant Messenger (IM) (five point scale of 1= very often to 5= never) to examine

whether this was related to text use. These two technologies are the closest to text messaging in terms of their similarities.

5.2.6. Checks on Questionnaire Usability

As it is important to ensure that the web pages perform the function they were designed to do so with minimum time, effort and frustration on behalf of the user (Pearrow, 2000), a usability check on five volunteers was carried out (Nielsen, 2000). All participants understood the briefing and debriefing, and the readability of the questionnaire itself was found to be acceptable.

A common problem with Internet questionnaire administration is that participants drop out at various parts of the questionnaire and produce incomplete returns. In addition, duplicate responses can arise if participants attempt to retake the questionnaire, as may happen if a server time out occurs. In the present study, IP addresses and time stamps were screened to ensure that only one set of responses from each administration were included in the analysis. Data on the participants who dropped out were analysed separately to check for any differences between those who dropped out and those who completed the questionnaire in its entirety.

5.3. Results

5.3.1. Overview of Analysis

After first carrying out preliminary descriptive analyses, a principal components factor analysis (VARIMAX rotation) was carried out on the uses and gratifications items to examine the comparability of factor structures in this and Leung's original study. Once this was done, correlations between texting frequency and the gratifications identified

were examined, together with correlations between measures of texting and email, IM and voice calls. Next, hierarchical regression analyses were employed to test for mediation, using the Baron and Kenny causal step approach discussed earlier. Finally, a series of discriminant analyses were carried out to investigate differences between Texters and Talkers in their underlying gratifications for texting use.

5.3.2. Descriptive Analyses

From the total of 206 participants completing page 1 of the questionnaire, a total of 180 returned complete data sets. No significant differences in gender or age were observed between those who failed to complete the questionnaire and those who completed it. Fourteen of the remaining 180 reported never to have used text messaging on their mobile phone, so these were discounted from the following analyses. Of the remaining 166 in the sample, 33 (19.9%) were male and 133 (80.1%) were female. Ages of participants ranged from 15 to 53, with a mean age of 23. Of the sample, 52.5% were from the UK, 27.9% were from the USA, the remainder ranging across the globe, including Canada, New Zealand, Greece, Portugal and France. Of the sample, 45.2% reported a preference for text on their mobiles (classified as 'Texters'); the remaining 54.8 % preferred talking (classified as 'Talkers').

Table 5.1. shows the reported frequency of use of email and IM services. It can be seen that the majority of the sample reported using email on a regular basis, and IM was also used often by more than 50% of the sample. When asked which medium they would feel better able to express their true feelings, 68.9% reported face-to-face, 21.3% reported text and 9.8% reported voice calls.

Table 5.1. Reported frequency of use of other communication media

	Very Often	Often	Sometimes	Rarely/Never
Email	45.2%	28.3%	17.5%	9%
IM	40.9%	17.7%	18.3%	23.2%

The frequency of sending texts per month ranged from 0 to 3750, with a mean of 230. Texts received per month ranged from 0 to 1800, with a mean of 224. The number of calls made per month ranged from 0 to 900, with a mean of 143. The number of calls received per month ranged from 0-900, with a mean of 134.

5.3.3. Uses and Gratifications of Text Messaging

In line with Leung's analysis, a principal components factor analysis with VARIMAX rotation was employed to determine the factor structure of the 18 new items that were added to Leung's original questionnaire. This resulted in four factors with eigenvalues greater than 1, explaining a total of 61.3 % of the variance, with one item ("using texting to follow up new acquaintances") dropped as it obtained a loading less than .50 (Hair, Anderson, Tatham & Black, 1995). As recommended by Hair *et al.* (1995), two split sample checks on the stability of the factor solution were conducted. Two random 67% subsets were used to test the original factor structure. The same factors and items were extracted in both of these. Table 5.2. shows the resulting factors and their item loadings.

The first factor accounted for 19.3% of the variance, and seemed to concern 'relationship development and maintenance' as it referred to the use of texting to maintain existing relationships, for example by reminding people that one was there, to let others know they are being thought about, as well as to develop new ones. Cronbach's alpha for the 5 items making up this factor was .85. The second factor identified from the factor analysis

Table 5.2. Loadings (principal components with VARIMAX rotation) of each new item, ordered by factors explaining the most variance to the least. Scale of 1= strongly disagree to 5 = strongly agree.

I use text messaging to communicate with others...	Loading
<i>Relationship development and maintenance</i>	
to deepen my relationships	0.79
to let others know I am thinking of them	0.74
to add extra dimensions to my relationships	0.73
to remind others I am there	0.64
to express my real feelings on a matter	0.57
<i>Impression management</i>	
because it's easier to lie	0.78
because other people get a better impression of me than through other methods of communication	0.72
to avoid face-to-face communication	0.70
to express things I do not feel comfortable communicating via face-to-face	0.64
because I get a better impression of people than through other methods of communication	0.64
<i>Last resort</i>	
only if it is the only method of communication available	0.80
only when I cannot voice call the person	0.76
only when I cannot see that person face-to-face	0.68
to reply to a text sent, I never/rarely initiate a text conversation	0.53
<i>Convenience/ease of use</i>	
because it's less of an effort than other communication methods	0.77
because everyone uses it	0.61
When I cannot be bothered to chat face-to-face	0.58

was 'impression management' and this contained five items to do with caring about ones impression, for example using texting to lie, to give a better impression, and to say things that one might feel uncomfortable saying FTF. This factor helped explain 17.6% of the total variance. Cronbach's alpha for this factor was .80. 'Last resort' was the third factor, explaining 12.4% of the total variance. This seemed to indicate the use of text messaging as substitute for other media, such as FTF and voice calls, when these are unavailable. These four items obtained a Cronbach's alpha of .68. The fourth factor was 'convenience/effort' and explained 12.0% of the total variance. This appeared to be similar to Leung's 'relaxation' factor in that it was associated with the ease of effort related to text messaging compared to FTF interaction. Also 'because everyone uses it' suggests that texting is an easy/convenient option. Cronbach's alpha for this factor was .67.

Next, a factor analysis on the remaining items was conducted to test the original structure reported by Leung. This analysis resulted in a slightly different structure than that found originally (see Table 5.3.). In the present sample, Leung's factors of sociability and inclusion merged together into a single factor. Three items had a loading of less than .50 (texting 'because it is stimulating', 'because it is a pleasant rest', and 'to find something interesting to talk to my family about') and so were removed from the analysis, and the data was re-factorised. Another item (texting because it makes one feel less tense) was also removed as when the factor structure was tested against three random subsets of the sample, this item appeared quite unstable switching positions in different factors. The final factor structure explained a total of 69.8% of the variance. In terms of the variance explained, sociability/inclusion explained 18.1%, affection explained 13.2%, entertainment explained 12.5%, diversion/escape 11.1%, fashion 9.0% and relaxation 6.0%. Alpha reliabilities for these factors were .93, .88, .91, .88, .87, and .70 respectively.

Table 5.3. Loadings of each of Leung's items, ordered by factors explaining the most variance to the least. Scale of 1 = strongly disagree to 5 = strongly agree.

I use text messaging to communicate with others...	Loading
<i>Sociability/inclusion</i>	
To forget about my problems	.77
Because I just need to talk about my problems sometimes	.72
To make friends of the opposite sex	.68
To make new acquaintances	.67
Because I need someone to talk to or be with	.66
to find something interesting to use in starting a conversation	.64
Because it makes me feel less lonely	.63
to be less inhibited chatting with strangers	.60
Because it relaxes me	.57
to find something interesting to talk to my friends about	.56
to feel involved with what's going on with other people	.51
<i>Affection</i>	
Because I am concerned about them	.71
to let others know I care about their feelings	.69
to help others	.68
to thank them	.67
to feel closer to family and friends	.64
to show encouragement to others	.64
Because it's reassuring to know someone is there	.53
<i>Entertainment</i>	
Because it is entertaining	.83
to have a good time	.82
Because it is fun	.80
Because I enjoy it	.70
Because it is exciting	.60
<i>Diversion/Escape</i>	
Because I am bored	.85
to kill time	.74
to put off something I should be doing	.70
to get away from what I am doing	.70
Because I have nothing better to do	.67
<i>Fashion</i>	
to look fashionable	.84
to look stylish	.83
to not look old-fashioned	.72
<i>Relaxation</i>	
to get away from pressures and responsibilities	.67
Because it allows me to unwind	.60

If this is compared to Leung’s original seven factors which were ordered affection, entertainment, relaxation, fashion, inclusion, sociability and escape, one can see that the factors that explain the most variability have shifted around somewhat. Whilst the instrumental motives of fashion and relaxation featured primarily in Leung’s ICQ factor structure, in the present mobile phone texting study the intrinsic motives of sociability and affection become especially salient and hence explain more of the variance.

When the mean scores for all of the factors were examined, affection (Table 5.4.), entertainment, relationship maintenance/development and diversion/escape had the highest item mean scores suggesting these were the strongest motives for using text messaging. Fashion had the lowest mean score suggesting it was not a strong motive for texting. This seems to suggest that most people use texting for affection and for entertainment motives.

Table 5.4. Mean scores for each factor.

Factor	Item mean score
Affection	3.18
Entertainment	3.15
Relationship development and maintenance	3.01
Diversion/escape	2.98
Convenience	2.90
Last resort	2.83
Sociability/Inclusion	2.50
Relaxation	2.32
Impression management	2.26
Fashion	1.90

5.3.3.1. Texters and Talkers

The second research question was what individual differences are apparent in the perceived uses and gratifications of text messaging? Previous research had found that there were two distinct user groups in relation to the mobile phone: those who preferred text messaging and those who preferred voice calls: the Texters and Talkers. The present data was examined to see whether the previous findings of Texters being younger, female and higher in reported interaction anxiety and loneliness were replicated here.

First, the correlation between age and preference for text was near zero ($r = -.005$, $p > .05$), although the bias of the present sample towards the younger age group may be a reason why this failed to be significant. However, no significant differences in preference for text or talk between males and females were observed ($\chi^2 = 2.33$, $df = 1$, $p > .05$), nor were there significant differences between Texters and Talkers in their estimates of the number of texts sent ($t(164) = .09$, $p > .05$), again inconsistent with earlier findings. Finally, as gender failed to have any significant effect on any of the variables, this was dropped from the remaining analysis.

Table 5.5. Gender results for preference for texting/talking and number of texts sent per month

	Males	Females
Preference for text (%)	33.3	48.1
Preference for talk (%)	66.7	51.9
Number of texts sent per month		
<i>M</i>	227.2	220.7
<i>SD</i>	305.8	396.4

Furthermore, Texters did not differ from Talkers in either social anxiety ($M = 40.7$, $SD = 11.41$; $M = 39.8$, $SD = 9.53$, for Texters and Talkers respectively, $t(164) =$

.53, $p > .05$) or loneliness ($M = 20.0$, $SD = 5.38$; $M = 21.5$, $SD = 4.98$, for Texters and Talkers respectively, $t(164) = -1.86$, $p > .05$).

5.3.3.2 *Interim Summary of Uses and Gratifications Analysis*

It appears from this analysis that a combination of intrinsic and instrumental factors lie behind the use of texting on mobile phones. These data suggest that the answer to RQ1 - whether there was evidence of a prevalence of text messaging being used for social-relational purposes – is yes, affection and relationship management are reported as salient and predominant motives for the use of text messaging.

In relation to RQ2, concerning individual differences, it seems that gender, age, loneliness and social anxiety, taken separately, were not significant predictors of preference for texting over talking on the mobile phone.

5.3.4. Discriminant Analysis of Texters and Talkers

The next step in the analysis was to test whether these groups differed in their perceived uses and gratifications of texting, and the basis on which they differ. A discriminant analysis was therefore conducted to examine differences between Texters and Talkers in gratifications sought (Appendix F), estimates of texts sent/received and voice calls made/received (Table 5.6.). The major purpose of discriminant analysis is to predict membership in two or more mutually exclusive groups from a set of predictors, when there is no natural ordering on the groups (Hair *et al.*, 1995). The most common use of discriminant analysis is where there are just two categories in the dependent variable. Discriminant analysis tests the hypotheses that the group means for a set of measured variables are equal, and reveals which, if any, of these variables discriminate between the groups.

Table 5.6. Discriminant analyses of Texters and Talkers (Talkers coded as 1, Texters as 2).

Predictor	Structure coefficients
Affection	.35***
Entertainment	.07
Relationship development and maintenance	.37***
Diversion/escape	.11
Convenience	.24*
Last resort	-.59***
Sociability/Inclusion	.28**
Relaxation	.10
Impression management	.15
Fashion	-.19

* $p < .05$, ** $p < .01$, *** $p < .001$.

Texters were expected to report more uses and gratifications, and indeed this was found to be the case. Results revealed that Texters used texting more for relationship development and maintenance, affection, sociability/inclusion and convenience. Talkers on the other hand were characterised by using texting more for a last resort. Using this classification, 82.3% of cases were classified correctly.

5.3.5. SMS Text Messaging as Transforming Technology

RQ3 was concerned with the concept of technology clusters. When correlations between estimates of texting, voice calls, email and IM were examined, evidence for a common technology cluster was not found. The number of text messages sent and received did not correlate with the frequency of email and IM use. However, IM did correlate with email ($r = .22, p < .01$), and with voice calls ($r = .16, p < .05$). Clearly, email, IM, and to some extent, voice calls all share a common usage patterning, and may reflect an underlying technology cluster. However, estimates of texting frequency do *not* have a relationship with these other media. This suggests that text messaging is being used for functions other than those provided by these other media, i.e. text messaging is being used for new purposes.

5.3.6. Mediation Analysis

The causal step approach to mediation of Baron and Kenny (1986) was used to examine whether uses and gratifications of text messaging was a mediator between individual differences and preferences for texting/talking and outcome variables such as communication behaviour (see Figure 5.2).

Firstly correlations between the individual differences variables and the uses and gratifications factors were examined after first averaging ratings over items loading on each factor to obtain mean factor ratings for each respondent. This was a specific test of path A in Figure 5.2. Loneliness correlated positively with using texting for impression management ($r = .23, p < .01$), and negatively with affection ($r = -.21, p < .01$) and relationship development and maintenance ($r = -.18, p < .05$). Social anxiety correlated with sociability/inclusion ($r = .17, p < .01$), diversion/escape ($r = .18, p < .05$), relaxation ($r = .23, p < .01$) and impression management, ($r = .32, p < .001$). Loneliness and social anxiety were highly inter-correlated ($r = .46, p < .001$), as expected. These results suggest that those who are lonely tend not to use texting for affection or relationship development/maintenance, but are more likely to use it for impression management. In contrast, those who are socially anxious are more likely to use texting to manage their self-impressions and see it as a sociable medium, as well as use it to escape from what they are doing, and to relax.

Gender failed to correlate with any of the motivation factors. Age, however, correlated with the motivations of inclusion/sociability ($r = -.18, p < .05$), diversion/escape ($r = -.36, p < .01$) and impression management ($r = -.18, p < .05$). Because the individual differences factors of loneliness, social anxiety and age may covary with each other, a partial correlation analysis was conducted to test each of these variables independently whilst controlling for the other two.

Partial correlations of uses and gratifications with these three variables show there are diverging patterns of expectations, preferences and usage patterns regarding the text message medium (see Table 5.7.). Age showed the fewest correlations in relation to uses and gratifications, showing a negative correlation with the use of text for diversion/escape. Older participants were less likely to use it for these reasons than younger participants. Lonely participants use text as a last resort ($r = .20, p < .05$) rather than as a means to develop and maintain relationships ($r = -.20, p < .05$) or to show affection ($r = -.27, p = .05$). They preferred talking to texting on their mobiles ($r = .20, p < .05$) and had higher estimates regarding the number of voice calls they made each month ($r = .17, p < .05$). This was contrary to expectations, as in the pilot MSc work it had been found that loneliness was a predictor of preference for text. However as pointed out in Chapter 2, there can be at least two types of loneliness experience, one caused as a direct result of enduring states of social anxiety, a second as a transient or circumstantial form of loneliness. One may assume that the former would lead to a preference for text messaging as it would alleviate social anxiety and help to form and develop relationships. However if loneliness was not a result of social anxiety but rather the physical absence of existing intimate friends, then one may expect the richer medium of voice calls to be more appealing. High intimacy needs, a key characteristic of loneliness (Laurenceau, Barrett & Pietromonaco, 1998), may be better addressed by the vocally expressive, real-time communication provided by a voice call than by text messaging. Conversely, socially anxious participants did not just use text when other forms of communication were not available ($r = -.15, p > .05$) but rather they valued it for impression management ($r = .21, p < .01$) and relaxation ($r = .23, p < .01$) goals. Despite showing a weak correlation with preferring texting ($r = .09, p > .05$) they actually reported sending fewer texts ($r = -.10, p > .05$) although neither correlation was significant.

Table 5.7. Partial correlations of loneliness, interaction anxiousness and age with uses and gratifications factors

Variables	Loneliness	Interaction Anxiousness	Age
Uses and gratifications of text messaging			
Inclusion/sociability	.02	.10	-.16
Affection	-.27**	.13	.19
Entertainment	-.02	-.05	.04
Diversion/escape	.02	.09	-.34***
Peer pressure	.14	-.17	-.11
Relaxation	-.04	.23**	-.04
Relationship development and maintenance	-.20*	.06	.02
Impression Management	.10	.21**	-.16
Last resort	.20*	-.15	-.16
Ease/convenience	-.06	-.05	-.04
Mobile phone preferences and usage measures			
Prefer texting to voice calls	.20*	.09	-.04
Text messages sent per month	.04	-.10	-.15
Voice calls made per month	.17*	-.17*	-.08
Other technology use			
Email use	-.07	.10	.24**
IM use	-.05	.02	-.23**

Note. Partial correlations with loneliness control for interaction anxiousness and age, those with interaction anxiousness control for loneliness and age, and those with age control for interaction anxiousness and loneliness.

* $p < .05$, ** $p < .01$, *** $p < .001$

However they did show a significant tendency to make less voice calls ($r = -.17, p < .05$).

These partial correlations show that the perceived uses and gratifications of texting and some outcomes can be shown to be *differentially* related to at least two individual differences: social anxiety and loneliness. Age also had an impact on one of the factors.

5.3.7. Hierarchical Regression Analyses

RQ4 posed the question whether uses and gratifications identified by users of text messaging would mediate the effects of individual differences of loneliness and social anxiety on preference for text or talk and various other usage/outcome measures. A series of hierarchical regressions was conducted to test Baron and Kenny's (1986) four causal step conditions outlined in the introduction, i.e. (1) that loneliness and interaction anxiousness and age and separately predict significant variation in mobile phone preferences and usage; (2) that these predictors also separately account for significant variation in perceived uses and gratifications of text messaging; (3) that these perceived uses and gratifications in turn account for differences in mobile phone preferences and usage; and (4) that associations between predictor variables and mobile phone preferences and usage are eliminated (or at least significantly reduced) once the perceived expectations regarding usage and gratifications of texting are included in the regression equation.

The partial correlation results in Table 5.7. provide evidence for the first condition regarding the association between loneliness, social anxiety and age and the preference for texting or talking, estimates of monthly voice calls made, IM and email use. As the partial correlations for the other usage variables did not reach significance, these variables will be omitted from the following stages of analysis. Baron and Kenny's second condition that there be an association between the loneliness, social anxiety and age with the uses and gratifications variables is also supported by Table 5.7.

5.3.7.1. Predicting the Preference for Texting

For the preference for text or talk variable, logistic regression was used due to the dichotomous nature of these variables. Table 5.8. shows the results of the analysis. Model

1 is the direct test of condition 1. The three predictor variables are entered simultaneously to examine their influence on preference for texting or talking. Any effects here may be due to direct unmediated effects and/or effects mediated by the uses and gratification factors. Model 2 tests directly for condition 3 by entering the uses and gratifications factors and examining their independent effects of preference for texting or talking. Finally, model 3 tests for conditions 3 and 4. The uses and gratifications factors are entered simultaneously with the predictors. A significant increase in the explanatory power of this model over the first provides evidence that the uses and gratification factors have additional influence on the preference for texting or talking over and above the predictor variables (providing further evidence for condition 3). Also, if the magnitude of the regression coefficients of the predictor variables decrease, this will confirm condition 4 as it confirms the re-routing of causal influence through the uses and gratification factors. Partial mediation can be inferred if these coefficients remain significant and full mediation if they do not (Baron & Kenny, 1986). Comparing models 2 and 3 provides further evidence for the fourth condition. A non-significant difference in the models explanatory power will act to confirm the causal irrelevance of the predictors when they are entered simultaneously with the uses and gratifications factors.

Looking at Table 5.8, it can be seen that although model 1 fails to reach statistical significance ($\chi^2 (3, N = 166) = 6.48, p = .09$, the exponentiated regression coefficient for loneliness was significant ($\beta_{\text{exp}} = 1.09, p < .01$), confirming the partial correlation demonstrated in Table 5.7. Model 2 is highly significant ($\chi^2 (10, N = 166) = 61.89, p < .001$), explaining 32% of the preference variable. Three uses and gratifications were significant, relationship development and maintenance ($\beta_{\text{exp}} = 7.18, p < .01$), ease and convenience ($\beta_{\text{exp}} = 7.58, p < .01$) and the negative influence of using text as a last resort

Table 5.8. Hierarchical logistic regression models predicting preference for texting over voice calls

Variables entered	B_{exp}	Effect χ^2	R^2	Model χ^2	df
<i>Model 1</i>					
Loneliness	1.09	5.93*	.04	6.48	3
Interaction anxiousness	.97	2.63			
Age	.99	< 1			
<i>Model 2</i>					
Inclusion/sociability	1.34	.62	.32	61.89***	10
Affection	1.09	< 1			
Entertainment	1.71	3.47			
Diversion/escape	1.05	< 1			
Peer pressure	1.54	2.33			
Relaxation	1.01	< 1			
Relationship development and maintenance	.32	7.18**			
Impression management	.54	2.83			
Last resort	2.91	21.44***			
Ease/convenience	.41	7.58***			
<i>Model 3</i>					
Loneliness	1.02	< 1	.35	67.09***	13
Interaction anxiousness	1.01	< 1			
Age	1.01	< 1			
Inclusion/sociability	1.39	< 1			
Affection	1.16	< 1			
Entertainment	1.67	2.93			
Diversion/escape	1.06	< 1			
Peer pressure	1.56	2.36			
Relaxation	.96	< 1			
Relationship development and maintenance	.28	7.79**			
Impression management	.49	3.71			
Last resort	3.12	21.18***			
Ease/convenience	.37	8.76**			
Differences between Model 1 and Model 3			.31	60.61***	10
Differences between Model 2 and Model 3			.03	5.2	3

* $p < .05$. ** $p < .01$.

Note. $N = 158$. Table shows exponentiated logistic regression coefficients, B_{exp} , representing the odds of an increase (odds > 1) or decrease (odds < 1) in the preference for texting per unit increase in the predictor variable. For each model, all variables are entered simultaneously.

($\beta_{exp} = 21.44, p < .001$). These results provide confirmation of condition 3 of the causal step test.

In model 3 the influence of the mediating uses and gratifications factors were examined simultaneously with the predictor variables. This resulted in a significant increase in the explanatory power of the model compared to model 1 alone ($r^2_{diff} = .31$; $\chi^2_{diff}(10) = 60.61, p < .001$). This confirms condition 3. Support for the final condition is provided by the finding that loneliness, previously significant, is no longer so, and the magnitude of the chi-squared coefficients for all 3 previously significant predictor variables have dropped to below 1.

Finally adding the predictor variables into a model alongside the uses and gratifications factors does very little to improve the prediction of preferring text to talk, with a small difference of 5.2. This pattern of results confirm conditions 3 and 4. So it appears that loneliness is associated with a preference for talk, mediated by the perceived motivation of using text only as a last resort as opposed to relationship development and maintenance or for ease/convenience which would be in favour of a preference for texting.

5.3.7.2. Predicting Estimates of Mobile Phone Usage

Next, a similar analysis was carried out for the voice call measure, this time using a linear regression approach appropriate to continuous variables. Table 5.9. demonstrates the results. It can be seen that model 1 explains a small ($r^2 = .09$) but near-significant

Table 5.9. Hierarchical linear regression models predicting estimated number of voice calls made per month

Variables entered	β	Effect t	R^2	Model F	Df
<i>Model 1</i>					
Loneliness	.20	2.24*	.04	2.34	3,163
Interaction anxiousness	-.20	-2.28*			
Age	-.06	<1			
<i>Model 2</i>					
Inclusion/sociability	-.17	-1.25*	.25	4.94**	10,157
Affection	-.19	-1.51			
Entertainment	.18	1.82	(near-.07)		
Diversion/escape	.12	1.37			
Peer pressure	.33	3.41**			
Relaxation	-.15	-1.79			
Relationship development and maintenance	.11	<1			
Impression management	.15	1.16			
Last resort	.04	<1			
Ease/convenience	-.09	<-1			
<i>Model 3</i>					
Loneliness	1.00	1.07	.27	4.08**	13,155
Interaction anxiousness	-.14	-1.52			
Age	.04	<1			
Inclusion/sociability	-.17	-1.18			
Affection	-.19	-1.51			
Entertainment	.17	1.79			
Diversion/escape	.15	1.58			
Peer pressure	.32	3.23**			
Relaxation	-.13	-1.46			
Relationship development and maintenance	.14	<1			
Impression management	.17	1.30			
Last resort	.02	.29			
Ease/convenience	-.08	<-1			

Table 5.9 (cont.).

Differences between Model 1 and Model 3	.23	4.40***	10,152
Differences between Model 2 and Model 3	.02	1.01	3,142

* $p < .05$. ** $p < .001$.

Note. For each model, all variables are entered simultaneously.

amount of the variance of the voice call measure, $F(3, 163) = 2.34, p = .07$, resulting mainly from the loneliness variable ($\beta = .20, p < .05$) and social anxiety ($\beta = -.20, p < .05$). This confirms the first condition of the mediation approach. The second model shows that the perceived uses and gratifications of text messaging separately account for a significant proportion of the variance of this variable ($r^2 = .16, F(10, 157) = 4.94, p < .001$). This was found to be due to mainly 2 factors: Inclusion/sociability ($\beta = -.17, p < .05$) and peer pressure ($\beta = .33, p < .01$). These results provide support for condition 3. To test for conditions 3 and 4, the uses and gratifications factors were entered simultaneously with the predictor variables in Model 3. This produced a significant increase in the explanatory power of the model ($r^2_{\text{diff}} = .23$) over the predictor variables alone (Model 1), $F(10, 152) = 4.40, p < .001$. In addition, the loneliness and social anxiety coefficients, previously significant in model 1, are now non-significant ($\beta = 1.00$ and $\beta = -.14$ respectively) Finally, adding the predictors back into a model that includes the mediators i.e. the difference between models 2 and 3, produces a negligible increase in the variance explained ($r^2_{\text{change}} = .02; F(3, 142) = 1.01, p > .05$), providing support for the fourth and final condition. So these results support the mediational hypothesis for the voice calls measure.

5.3.7.3. Predicting Usage of Related Technologies

Examining the use of related communication media of email and IM revealed the

former was not mediated by uses and gratifications associated with texting, suggesting that usage of the two medium does not seem to be associated with similar motivational factors. Looking at table 5.10. it can be seen that model 1 explained a small but significant amount of variance on this measure ($r^2 = .08$, $F(3,163) = 4.34$ $p < .01$), with age accounting for most of this ($\beta = .26$, $p = .001$). Social anxiety was nearly significant ($\beta = 1.87$, $p = .06$), confirming condition 1 for this measure. However condition 3 was not satisfied; model 2 fails to account for any significant amount of variance in this measure ($r^2 = .03$, $F(10,157) = .48$, $p > .10$). As a result no more of the mediational analysis continued on this measure.

Table 5.10. Hierarchical linear regression models predicting estimated use of email

Variables entered	β	Effect t	R^2	Model F	df
<i>Model 1</i>					
Loneliness	-.12	-1.37	.08	4.34	3,163
Interaction anxiousness	.16	1.87			
Age	.26	3.36**			
<i>Model 2</i>					
Inclusion/sociability	-.06	<-1	.03	.48	10,157
Affection	.07	<1			
Entertainment	.03	<1			
Diversion/escape	-.12	-1.23			
Peer pressure	.07	<1			
Relaxation	-.03	<-1			
Relationship development and maintenance	.04	<1			
Impression management	.04	<1			
Last resort	.01	<1			
Ease/convenience	.00	<-1			

* $p < .05$. ** $p < .001$.

Note. For each model, all variables are entered simultaneously.

Next IM usage was examined. Table 5.11. shows there was a small but significant amount of the variance explained by model 1 ($r^2=.06$, $F(3,161)=3.39$, $p<.05$). With age

Table 5.11. Hierarchical linear regression models predicting estimated Instant Messenger use

Variables entered	β	Effect t	R^2	Model F	Df
<i>Model 1</i>					
Loneliness	-.08	<1	.06	3.39*	3,161
Interaction anxiousness	.04	<1			
Age	-.23	-2.90**			
<i>Model 2</i>					
Inclusion/sociability	-.04	<-1	.11	1.79 ($p=.07$)	10,145
Affection	-.08	<-1			
Entertainment	.15	1.42			
Diversion/escape	.21	2.17*			
Peer pressure	.06	<1			
Relaxation	.01	<1			
Relationship development and maintenance	.07	<1			
Impression management	.09	<1			
Last resort	.09	1.09			
Ease/convenience	-.03	<-1			
<i>Model 3</i>					
Loneliness	-.12	-1.23	.15	1.91*	13,153
Interaction anxiousness	.02	<1			
Age	-.15	-1.65			
Inclusion/sociability	-.06	<-1			
Affection	-.09	<-1			
Entertainment	.17	1.62			
Diversion/escape	.16	1.53			
Peer pressure	.06	<1			
Relaxation	.02	<1			
Relationship development and maintenance	.06	<1			

Table 5.11 (cont.)

Impression management	.13	<1		
Last resort	.09	1.00		
Ease/convenience	-.02	<-1		
Differences between Model 1 and Model 3	.09	1.47	10,140	
Differences between Model 2 and Model 3	.03	1.81	3,140	

* $p < .05$. ** $p < .001$.

Note. For each model, all variables are entered simultaneously.

being a highly significant predictor ($r^2 = -.23, p = .01$), providing confirmation for condition 1. Model 2 explains 11% of the variance in IM use ($F(10,145) = 1.79, p = .07$) however failed to reach statistical significance. Peer pressure was a significant uses and gratifications factor ($\beta = .21, p < .05$). This fails to support condition 3. Model 3, incorporating all the uses and gratifications factors along with the 3 predictor variables explained 15% of the variance in this measure ($r^2 = .15, F(13,153) = 1.91, p < .05$), the previously significant regression coefficient of age was no longer significant suggesting these uses and gratifications variables are indeed mediators however the analysis again failed to satisfy condition 3 as the difference between model 1 and 3 was not significant, meaning that adding the uses and gratifications factors did not have any additional influence over the voice calls measure compared to the predictor variables alone ($r^2_{\text{change}} = .09, F_{\text{change}}(10, 140) = 1.47, p > .05$). Condition 4 is supported as the age predictor was no longer significant in model 3, confirming condition 4 as it confirms the re-routing of causal influence through the uses and gratification factors. The comparison on the second and third models revealed a non-significant improvement in model fit ($r^2_{\text{change}} = .03, F_{\text{change}}(3, 140) = 1.81, p > .05$). However due to the failure to satisfy condition 3, the mediational hypothesis on this variable is not supported.

5.4. Discussion

The purpose of this chapter was to begin more systematically to investigate the uses and gratifications of mobile phone text messaging. What do people report as their reasons behind choosing to communicate via mobile texting? Differences between those who prefer using the medium compared to talking on their mobile were examined along with gender, age, loneliness and social anxiety in their relation to text use and perceived uses and gratifications. The study replicated the methodology used by Leung in his study on the gratifications of ICQ in regards to the relatively new communication medium of mobile phone text messaging. It was hoped that by identifying such uses and gratifications then the differentiation between the two theories of Hyperpersonal communication and CFO could begin to be differentiated in their applicability to mobile phone text messaging as they both forecast alternative predictions as to the uses and gratification of text messaging. The former predicts the mediums affordances allow for sociability and affection, the latter argues that the medium would be incapable of satisfying such motives.

A mediational analysis approach was used to determine which usage variables were predicted by these individual differences and whether or not perceived uses and gratifications mediated these effects. Several changes in factor structure were found when Leung's items were analysed. Leung's original seven factors were condensed into six, with two factors- sociability and inclusion seeming to merge together. A few items dropped below .50 loading so were dropped from the analysis. This was done so as to get the most reliable results from this particular data set. The present sample was smaller than Leung's, and this may be one reason why the factor structure was slightly different.

The added four factors- impression management, relationship development and maintenance, last resort and convenience proved to be quite important motivations in

whether or not people would choose to text. Impression management is a key feature of hyperpersonal communication- the ability to selectively present oneself to ones partner so that they may get a better impression or to use the medium to get a better impression of ones partner. Similarly, relationship development may be related to hyperpersonal communication as this included items such as using texting to deepen relationships, to add extra dimensions to relationships and to let others know that one is thinking about them, suggesting the use of the medium for pushing existing boundaries in relationships, going beyond that which may be possible face-to-face.

The most immediate observation arising from Study 4 is directly relevant to the theory development and the first research question posed in this chapter, specifically whether there was evidence of text messaging being used predominantly for social-relational purposes. In fact, a combination of intrinsic and instrumental factors appear to lie behind the use of texting on mobile phones. Most were social-relational uses of mobile phone texting, which is in accordance with the content analysis findings of Chapters 3 and 4 and sits well with the Hyperpersonal approach to mediated communication, but less comfortably with the CFO approaches.

The results showed that the main factor reported for using text messaging was for the exchange of affection. This included showing someone you are concerned about them, to let them know you care, to help someone, and to feel closer to them. This factor is highly supportive of texting being used in a social-relational way as forecast by the Hyperpersonal Model, and certainly is not one that the Cues Filtered Out approach would predict. Even the second factor of entertainment would be pretty hard for the CFO approaches to explain. That texting is used because it is fun, entertaining and enjoyable is certainly not what one would expect from a cold medium incapable of supporting social-emotional communication and good only for task based, informational purposes.

The third most represented factor was relationship development and maintenance, again a factor supportive of the Hyperpersonal Model of communication. Texting was reported to be used to deepen relationships, to add extra dimensions to relationships, to remind others of ones presence and to express ones true feelings.

The second research question was whether or not individual differences exist that predict the likely preference and usage of texting and the perceived usage and gratifications of text messaging. It was also postulated that the uses and gratifications may mediate these preferences. Loneliness, social anxiety, age and gender were the four variables investigated in their relation to the perceived uses and gratifications of text and to the outcome variables of text usage, preference for texting or talking on ones mobile and to other technology use.

With regard to preferences for texting or talking on the mobile phone, previous research (e.g. Reid & Reid, 2005) had indicated there to be around a 50:50 split between those who preferred texting on their mobile and those who preferred talking. These groups differed not only in this preference but also in relation to key individual differences of loneliness and social anxiety, their usage patterns and in the effects they reported texting to have had on their lives. As such it was predicted that these two groups may report different motivations for using text messaging. It was shown in past research that Texters and Talkers differed in loneliness and social anxiety with Texters being more likely to rate themselves higher than the median than Talkers. Texters were also found to be younger and more likely to be female. The same results were expected in the current study however this was not the case. The expected predictors of gender and age, were not significant in directly predicting preference of text or talk on the mobile phone. The failure to find these differences may be due to the bias of the current sample towards

females and younger age groups. Social anxiety and loneliness did have some effects, discussed below.

A discriminant analysis showed Texters report more uses and gratifications and that they identified different uses and gratifications compared to Talkers. A preference for texting was associated with the intrinsic motives of sociability/inclusion, relationship development and maintenance, impression management and diversion/escape. Texters also sent significantly more texts. Talkers on the other hand were only significantly associated with the use of the medium for a 'last resort', when there was no other way to communicate information and they reported making significantly more voice calls as expected. So Texters are using text messaging more for intrinsic purposes, whilst Talkers use it for instrumental purposes. This is exactly what previous work has suggested may be the case (Reid & Reid, 2005). Texters appear to have uncovered the social affordances texting has to offer, and capitalise on these to develop and maintain their friendship relationships. Talkers on the other hand use other means of communication and use texting for more instrumental motives.

So as expected, the more positive uses and gratifications associated with texting that are perceived by users, the more likely it is used and the greater the preference for using it again. Talkers do not seem to have perceived the same uses and gratifications as Texters and as a result they do not use the medium to the same degree. It appears therefore that motives for using texting frequently are intrinsically oriented, whereas low users motives were more likely to be instrumental. This is similar to Leung's ICQ findings. This finding also provides support for the Hyperpersonal model of communication as it shows that, certainly for those who use text messaging more frequently, the medium is being used for mainly social purposes, despite the limited cues in comparison to other communication methods such as face-to-face or voice calls.

Baron and Kenny's causal step approach to mediation analysis revealed that some of the identified uses and gratifications mediated between individual differences and the outcome measures of preferring text to talk and the estimated number of voice calls made per month. In particular it was noted that lonely people preferred talking on their mobile, especially if they had identified the text medium as only being useful as a last resort. Those who had identified it as useful for relationship development or for ease/convenience, and who tended to be socially anxious were less likely to prefer talking.

For the voice call frequency measure, respondents with higher loneliness and lower social anxiety scores were expected to make voice calls more often. As may be expected as socially anxious people may be less likely to make a call than those who are not, and people who are lonely and in need of intimate contact may be more inclined to pick up the phone and speak to someone. The uses and gratification factors that proved most significant as mediators were using text for inclusion/sociability, which was indicative of making less voice calls and using text due to peer pressure which was indicative of making more voice calls. So it seems that for these two variables at least, uses and gratifications associated with text messaging appear to mediate between some of the tested individual differences and usage variables.

Surprisingly there were no significant differences between the predictor variables on the text frequency variable. This may be due to the relatively high rates of texting and talking in present sample averaging 222 texts and 143 calls a month, so our sample may be biased towards the heaviest mobile phone users.

As expected, social anxiety was associated with a more likely preference for texting in the regression analysis. However loneliness was found to be more associated with a preference for voice calls, contrary to past research findings. The conclusion we

draw from this is that whilst asynchronous contact surely can ameliorate the experience of loneliness, the intimacy needs of lonely people will be satisfied more immediately and directly by vocally expressive, real-time telephony than by an asynchronous exchange of text messages. It is unlikely, therefore, that lonely mobile phone users will associate SMS texting with their sociability needs, and will instead show a generalized preference for talking over texting on their cell phones.

This conclusion illustrates the necessity of differentiating between dispositional orientations towards social interaction and their impact on media preferences. Measures of anxiety and loneliness are typically correlated (Leary, 1983), but the present study suggests that it is the self-presentational concerns associated with interaction anxiousness - rather than the experience of social isolation per se - that most closely defines loneliness that best predicts the generalized preference for texting. These results therefore are more consistent with a self-presentational approach to online interaction (Stritzke, Nguyen, & Durkin, 2004) than one based on generalized states of loneliness and disaffiliation (Morahan-Martin & Schumacher, 2003).

With regard to technology clusters, there were very few correlations found between the use of texting and the use of IM or email. This is not consistent with the assertion that the adoption of a technology will lead to greater adoption of functionally similar technologies. It may be that people view texting as fulfilling a very different function to IM or to email. However this is unlikely, as Leung's findings suggest that a primary use of ICQ was sociability, just as was found here for texting. Of course, the lack of a significant association may also come down to the measurements used. Two people may both think they use IM 'very often' whereas one person may see once using it for an hour a day as 'very often', and another may see 5-6 hours a day as 'very often'. Using

objective measures of usage frequencies as opposed to the scales used here may be more informative in future work.

Of course it is feasible that texting is seen as providing a unique function not offered by those media proposed to be functionally similar. As mentioned in the introduction mobile phone texting is exactly that – mobile – and this allows for it to be a genuine communication option in nearly all situations and contexts (given appropriate signal reception and that the recipient owns a mobile). This is an enormous difference to IM and email, where one has to be at a specific location equipped with a computer. Although these have both been added to the functions of modern mobiles, they are not as widely available on many handsets as text messaging so they are less of an option at present.

There are other differences between the social affordances of SMS texting and the Internet that might be considered here. On the Internet, it is quite possible to remain anonymous and unidentifiable, browse discussions on a message board, newsgroup, or chat room, and gain some benefit from social involvement without actively participating in online interaction. In contrast, most mobile phone texts are person-to-person messages received from and sent to known individuals with whom the sender is already acquainted, however fleetingly. SMS texting is a personalized, individuating social medium. Thus the self-presentational beliefs underlying texting observed in the present study are difficult to reconcile not just with CFO models of mediated contact, but also with the emphasis on anonymity and depersonalization at the heart of the social identity-deindividuation model of online communication (Spears, Postmes, Lea, & Wolbert, 2002).

5.4.1. Limitations

A major and obvious limitation in the present study is the reliance on reports of

attitudes and behaviours rather than on observable behaviour. The validity of self-report measures is a highlighted issue in uses and gratifications research (Ruggiero, 2000). It is known that individuals may not be that accurate at introspecting on their cognitive processes that mediate their behaviour (Nisbett & Wilson, 1977). However Leung (2001) points to evidence that shows that as media choices grow, people are becoming more aware of their media use, 'especially those that are paid for on demand and those that are interactive' (p498). Text messaging falls into this category and so the same should hold true.

Potential biases in the sample have already been identified. The fact that this study drew upon an Internet sample may also be a limitation in that this population may not be representative of the wider population; they may be more technologically savvy, for example. Although a great advantage of Internet questionnaires is the opportunity to access a very large population, Schmidt (1997, p2) makes an important point about the validity of web questionnaires: "because web demographics are likely to be skewed, one must be cautious in generalizing survey results based upon a general web sample that are intended to apply to the population at large". People who have access to the Internet are not a random sample of the world (Smith, 1997). Of course, as the number of people with access grows, the Internet will host a more representative population of the world. Indeed, typical web samples are no longer majority students and the majority are female despite fears in the past of a male-dominated web population (Baron & Siepmann, 2000; Carver, Kingston & Tirton, 2002). However there is still a 'digital divide' problem whereby there are certain people who still do not have access to computers or the Internet (Borgida, Sullivan, Oxendine, Jackson, Riedel & Gangi, 2002), further compounding the issue of non-representative sampling.

A further issue concerns the characteristics of drop-outs from the study (Bosnjak, 2001). In the present study, the submission of the questionnaire was not contingent on answering every question: instead a short sentence was added at the bottom of each page of the questionnaire, above the submit button, asking participants to check they had answered everything they could. Although it is not possible to assess the characteristics of visitors who commenced the questionnaire but failed to submit the first page, no differences in gender or age were observed between those who failed to complete the questionnaire and those who completed it. The predominance of female participants (over 80%) would lead us to expect higher texting base rates and a generally positive orientation towards texting in the present sample (Ling, 2004). Despite this, *differential* effects of texting and talking preferences were still detectable in these data. It is reasonable therefore to assume that a more systematic and representative sample of mobile phone users would actually reveal these effects with even greater force.

5.4.2. Summary & Conclusions

As communication technologies begin to present people with more choices, the motivations behind their use becomes more crucial to examine. The mobile phone offers at least two¹ communication possibilities in one device: voice calls and text. This study has begun to look at users reasons for using the medium of text.

Interestingly, the Texter-Talker distinction identified in previous work (e.g. Reid & Reid, 2004) seemed to be partly reinforced in this data. A discriminant analysis revealed that key discriminates between Texters and Talkers were that Texters used texting more for relationship development and maintenance, affection,

² Some more modern handsets now offer the options of email and Instant Messenger too, although this is certainly not as widespread and accessible to users of texting or talking.

sociability/inclusion and convenience. Talkers on the other hand were characterised by using texting more for a last resort when no other methods of communication were available.

A persons expectations, evaluations and motivations determine the usefulness of a medium (Ruggiero, 2000). Whether or not a person was reported as a Texter or Talker seemed to determine what uses and gratifications they reported from text messaging, with the Texters using the medium more frequently and using it for more social purposes.

An analysis of the effects of gender failed to show any significant differences between males and females in motives behind using texting. This is surprising given the findings of Chapter 3 where there were found to be evidence of content differences. Further work with larger samples of males is needed to be more conclusive about this. However on first glance it does appear that the mediums affordances are equally capitalised on by both males and females.

Age was also quite limited in its apparent effects of motivation and usage variables. It may be that as texting has become more widespread initial differences in these variables in uptake and usage have become less apparent. As expected, those who were socially anxious were more likely to prefer text and identified more social affordances for using the medium. Lonely people on the other-hand preferred voice calls, as one may expect due to the greater amount of cues available, maybe making them feel closer to the other person.

In conclusion, this study has shown that texting offers certain people opportunities to socialise and show affection and intimacy. Walther (1997) has suggested that mediated communication can lead to Hyperpersonal communication whereby communication can surpass the level of affection and sociability that would normally occur face-to-face. In line with this approach, this study has shown that sociability, affection, relationship

development and maintenance, and impression management are key motives participants in this study are reporting for using mobile phone texting, at least for those who have a strong preference for this medium. At this stage in the thesis however only the weaker version of Social Information Processing theory can be supported as the evidence suggests text messaging can be used for similar purposes as face-to-face communication but there is nothing in the present study to suggest that levels of intimacy and affiliation surpass that of face-to-face, as the stronger Hyperpersonal Model would forecast. The experimental series reported in the next two chapters will try to uncover which of these models, weaker or stronger, is more applicable to text messaging.

This study aimed not only to examine reported uses and gratifications of the novel communication method of text messaging, but to take a more integrative approach, as advocated by Joinson (2003) and O'Sullivan (2000), modelling causal relationships between personality and perceived uses and gratifications in order to derive differential predictions regarding the usage of, and preference for, text messaging. The model developed in the last chapter can now be elaborated on further following the results of this chapter (See Figure 5.2.). The highlighted boxes represent the elements specifically looked at in this chapter. It can be seen that individual differences can indeed predict preference for text or talk, and that this preference impacts on the perceived expectations and beliefs of using text. Communicating via text will lead to certain outcomes, the experience of which will feedback to the discovered affordances of SMS, in turn influencing the future preference for text/talk and perceived expectancies and beliefs.

The fact that Texters continue to use the medium suggests these affordances have positive social outcomes. It is important to emphasise here yet again that the mobile offers at least two communication options - to text or talk - and the majority of people will make a conscious decision between one method or the other as they are faced with

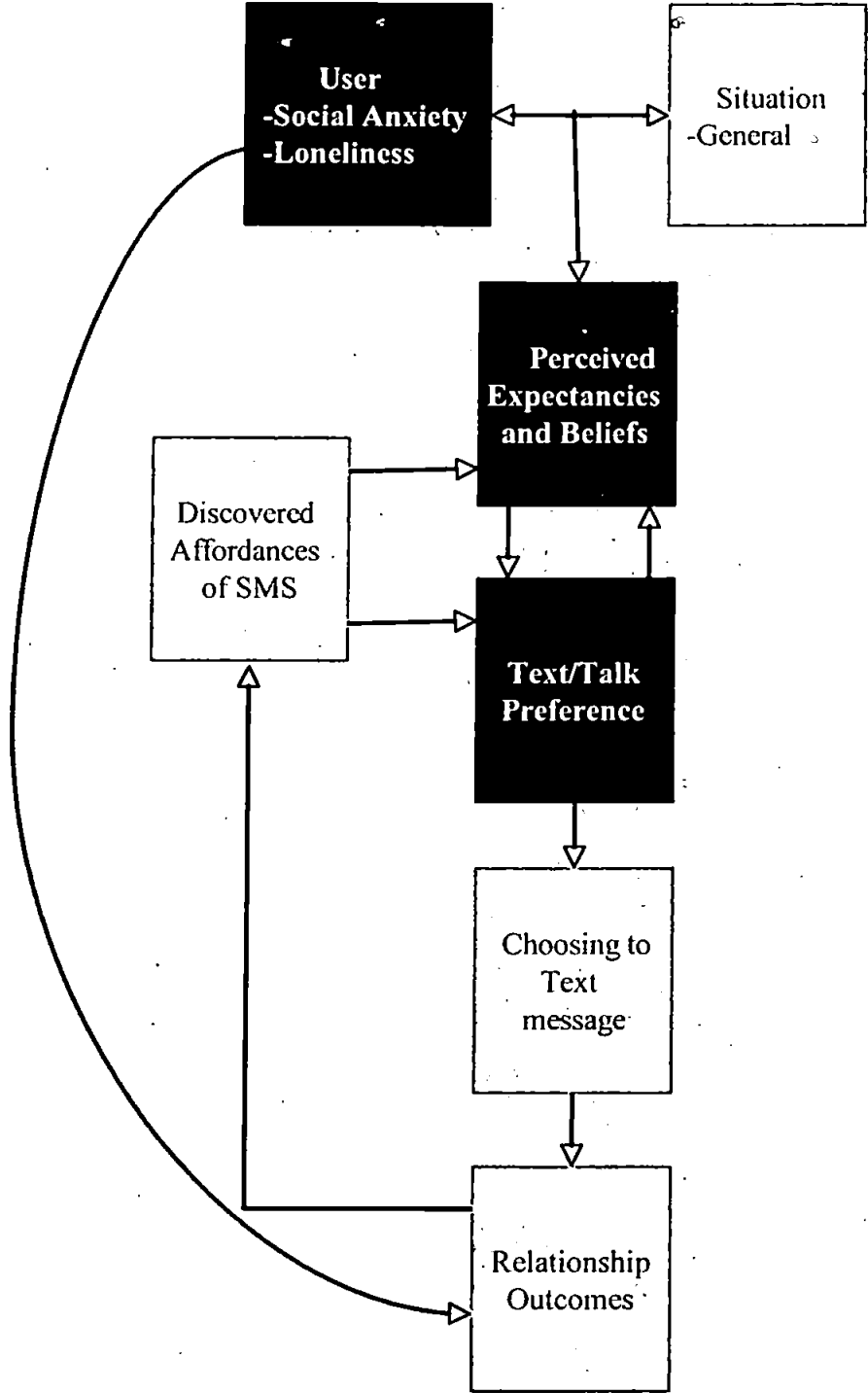


Figure 5.2. Model developed

the choice. This research seems to indicate that despite being leaner in social context cues, respondents were still actively choosing text messaging for social-relational purposes - a phenomenon that the CFO approach would find hard to accommodate. The outcomes of using text messaging for relationship development will be examined in Chapters 6 and 7.

There is an important lesson for technologists within the context of this chapter and that is that “technology for technology’s sake is never as powerful a tool as technology that makes sense in the everyday life of the user” (Crabtree, Nathan, & Roberts, 2003). Different people use texting for different means and ends and ultimately they capitalise on different affordances of the same technology.

This study is supported by the findings of the previous two chapters in that it adds extra reliability to the reported uses and motivations of text messaging and the further demonstration of social content in the text messages gathered.

These chapters in Part I of the thesis have helped demonstrate that text messaging is indeed being used for social purposes, and that there are underlying social motivations for choosing to use the medium, providing some initial support for Hyperpersonal theory, and distancing the use of the medium from the CFO approaches. The fact text messaging is being consciously chosen by many for social-relational reasons and not as simply a last resort is hard for such theories to accommodate. Hyperpersonal theory on the other hand posits that the use of the medium for social relational purposes is entirely as one would expect. Indeed, going back to the discussion in Chapter 1, rather than looking at face-to-face as the ultimate benchmark of communication and regarding anything with less social context cues as inferior and therefore always the lesser option with less positive social and psychological effects, what is needed is to look at what is *gained* through the use of limited cue media.

The current work to this point has shown that text is used for social purposes however this is only one tenet of the theory and at most all that can be said at this point is that Hyperpersonal theory is the better of the two that were tested. What is need now is to look more closely at what it is that is gained through the use of text messaging, and how this may be explained by Hyperpersonal theory. Is communication equal to face- to-face, in which case Social Information Processing would be more suited to explain the use of text messaging, or is it that communication surpasses levels possible through face-to-face communication, in which case the stronger Hyperpersonal theory would be more applicable.

The Hyperpersonal approach hypothesises that the limited cues inherent in visually anonymous, text-only communication along with the asynchronous nature of the communication allows for selective self-presentation and involvement. It allows communication to become more intimate and personal than may otherwise have been the case through other media and for impressions to be more exaggerated, although it is not clear whether this is a result of the receiver over-attributing characteristics of the sender or the sender over-exaggerating their own qualities.

Extending the discussion from the previous chapter, it may be the case that certain groups of individuals are more likely to experience hyperpersonal communication via text messaging. The previous chapter highlighted how preference for texting or talking was a strong predictor of some of the expressive content measures, suggesting that Texters were more able to capitalise on the affordances of the medium. The present study has added to this prediction by finding that Texters seem to have more social-relational uses and gratifications of using the medium than Talkers. So self-efficacy in using text may be an important moderator for whether communication becomes hyperpersonal or not. This will be further discussed in Chapter 8.

From these exploratory and qualitative studies, and the resulting knowledge that text is being used for social purposes, it is now time to report on the experiments to test the second part of Hyperpersonal theory- that communication through a text based medium like text messaging can lead to Hyperpersonal communication.

One facet of the theory that can be tested experimentally is whether or not text messaging can produce communication that surpasses the intimacy of face-to-face communication. The experimental paradigms discussed in the next two chapters provide a way of testing this. By looking at impression formation between interactants who converse face-to-face in comparison to those who interact via text messaging it is hoped that it can be demonstrated whether it is indeed the case that people form better impressions of one another through text. An extension to the Hyperpersonal model can also be directly tested- whether impressions formed are as a result of partners selective self presentation being over-exaggerated and this being picked up by the receiver or whether it is an over-attribution effect on behalf of the receiver. The way this is investigated is by applying a novel paradigm to this sort of data- a quasi-signal detection methodology. More on this will be discussed in Chapter 7.

PART TWO

Experimental Series

6.0. Overview

The second phase of the research consisted of two experimental series, each employing contrasting experimental paradigms for studying SMS text messaging. Although these experiments inevitably compromise the naturalistic context of text messaging, they will enable increased precision, control and internal validity over the variables of interest. Both series of experiments are concerned with the process of impression formation as it occurs through text messaging. In these experiments, participants are required to interact for a short time with strangers. One immediate difficulty concerns the nature and strength of the motivation to construct, present, and manage an impression of self with a complete stranger in an artificial environment. However, both experimental series adapt and extend paradigms already in use in the computer-mediated communication literature, chosen precisely because of the control they provide over extraneous variables.

The use here of laboratory studies in combination with the field and survey studies discussed earlier is intended to provide a more rounded picture of the way text messaging is being used and how the unique affordances of text may be capitalised on in relationship formation and maintenance.

‘Field research can contribute to experimentation a diversified panorama of ready materials from which to select data and amplify research. But these materials lose their distinctness when control, without which no research can proceed, enters into the scientific method to make pliant the obdurate confusion of experience. In the human sciences one kind of study cannot be pitted against another. Findings and fashions must be shared if progress in this puzzling area is to be made.’ (Black, 1954).

So, in parallel to the Internet and field studies that were conducted to gain insight into the way people were actually using their mobile phones and text messaging, controlled laboratory based studies were conducted to look more specifically at the effects of the loss of social cues (such as appearance, paraverbal behaviour, etc.) in text-based communication compared to face-to-face communication on relationship formation over brief 'getting acquainted' interactions between strangers. Subsequent experiments extend this experimental paradigm to compare text messaging with communication methods with different interactional affordances (i.e. face-to-face and Instant Messenger) following longer periods of interaction and more structured interaction tasks.

The last series of chapters began to develop a case for Hyperpersonal theory in being a potential theoretical model to explain the use of text messaging. The theory postulates that mediated communication that is text-based, asynchronous and visually anonymous can lead to highly social-relational communication that is at least equal to, if not more intimate, than face-to-face communication. This was in contrast to traditional early theories which forecast that such media would lead to impersonal, task-based communication. The studies in the preceding chapters have demonstrated that key motivations behind the use of text messaging were social and relational in nature and the analysis of samples of real-world texts added more strength to this finding. This series of experiments discussed here aim to take the next step to investigate the central tenet of the theory - that communication can be hyperpersonal through mediated communication such as text messaging compared to face-to-face communication. Looking back at the model that has been developed over the thesis so far the previous chapters have explored the outcomes of using text messaging in

relation to content, and at some of the potential individual differences. This section aims to deal with the next step in the model: the communication outcomes.

These four studies (Studies 5, 6, 7 and 8) mark the main experimental studies of the PhD. They are primarily concerned with differences in relationship outcomes between text messaging and face-to-face communication, with particular reference to impression formation.

Hancock and Dunham (2001), outline two factors they assumed to be involved in formulating impressions of others. Firstly, there are autonomous cues - physical appearance, behaviours and so on - and secondly, inferential heuristics and strategies involving schemas and stereotypes. The advent of CMC has led researchers to re-examine the factors assumed to be important in impression formation. Many of the early theorists tended to focus on the limited ability of CMC to convey social cues i.e. the so called 'CFO' theories (Sproull & Kiesler, 1986; Short, Williams & Christie, 1976) whereby it was postulated that the lack of impression-relevant social-context cues inherent in CMC, and the deindividuation that resulted, led to a very inhospitable, unsociable, task-oriented environment that inhibited interpersonal relationships. They have argued that the impoverished environment of computer mediated communication, caused by the lack of traditional social context cues like physical appearance and non-verbal behaviour, make it highly unlikely that meaningful social relationships can be formed. Indeed early studies showed that people struggled to form impressions due to the lack of non-verbal cues in the medium (e.g. Kiesler, 1986). As such examining the effect of the medium on interpersonal relationships was not really investigated. However on reflection, these studies were found to have several flaws, with groups often communicating only for brief periods of time, on task-based dimension as opposed to socially. It is now known

that positive impressions and relations can be formed via CMC (Bee Hian, Li Chuan, Mon Kiat Trevor, & Detember, 2004), something the CFO approaches cannot accommodate into their theories.

As highlighted in Chapter 1, the CFO approach assumes that face-to-face communication is the best way to form impressions and focuses on what is lacking in CMC, as opposed to the possibility that new affordances are gained and the benefits of these affordances. Walther's (1997) Social Information Processing (SIP)/Hyperpersonal Model, addresses this issue and focuses on what is gained.

Walther (e.g. 1994) argues that the cues in CMC are not simply just limited but rather that they take longer to emerge than in face-to-face communication. In comparing impression formation across face-to-face and CMC interaction, Walther (2003) found that initially impressions were less developed in CMC, as was predicted by CFO approaches. However over time the differences between the media decreased, with the same development of impressions in CMC as in face-to-face, supporting the theory. This led to his Social Information Processing theory of mediated communication and is the weaker version of Hyperpersonal theory. Further work by Tidwell & Walther (2005) showed that not only can impressions catch up to the level attained by face-to-face interactions, but they can actually surpass these, leading to 'accelerated intimacy' and so called 'hyperpersonal' communication - This is the strong version of the theory.

Walther's Hyperpersonal theory argues that these additional affordances of the medium, namely the visual anonymity, asynchronicity and text-based nature, allow users to selectively self-present themselves, to be more honest in their self-disclosures and to have greater control over the interaction. The lack of visual cues can be seen to be a good thing as their presence may have biased the impression formed and

prevented relationships from getting off the ground. Walther's Hyperpersonal approach argues that over time, impressions become more developed in CMC because the rate of impression-relevant cue exchange is a lot slower than FTF. It recognizes that the deindividuated nature of text-only communication combined with the lack of cues can lead to more intense, exaggerated 'hyperpersonal' attributions as due to the relative absence of individuating and potentially disconfirming information, a process of over-attribution and partner idealization occurs (Walther, 1997). Also, CMC affords the opportunity for participants to selectively self-present themselves, giving them more control over how their partner comes to perceive them, and a process of behavioural confirmation can arise whereby the impression given out is taken on by the partner in the interaction and reciprocated. In face-to-face communication there is more information to process as more cues are coming in and interactants have to filter through these to form their impressions. However in text-only communication there are more cognitive resources available for impression formation and for managing self-presentation (Walther, 1997). This approach allows for more intense interpersonal relations to be formed than previously allowed for in other theories like the cues filtered out approaches.

Support for this comes from two studies that will be discussed and replicated in Chapters 6 and 7 (McKenna, Green & Gleason, 2003; Hancock and Dunham, 2001). These researchers found that not only can impressions be formed but that in fact more liking for one's partner and deeper impressions are possible than what may be the case face-to-face. This challenges the beliefs of which particular cues and sources of information are important in impression formation (Hancock & Dunham, 2001), as many of those previously believed to be important (e.g. physical

appearance) are often not available in CMC. The lack of contrary visual information may lead to exaggerated impressions of one's partner.

These arguments can be extended to text messaging as this is a medium that shares the affordances Walther believes are key to hyperpersonal communication and so it may be postulated that similar benefits on impression formation and relationship development will be apparent. This potential benefit of text messaging on impression formation may be an important communication outcome of text messaging, and one that can be used to explain its popularity.

The first two experiments, Studies 5 and 6, discussed in this Chapter, build on a paradigm developed by McKenna and colleagues (2002) that investigate differences in liking for one's partner after an interaction. This is a useful paradigm to use in the context of Hyperpersonal theory, as it can help differentiate between the weaker and stronger versions of the theory. So if text messaging, given enough time, resulted in a similar level of liking as face-to-face, then this would be support for the weaker theory of Social Information Processing. If however text messaging resulted in greater liking then this would be support for the stronger theory of Hyperpersonal communication.

It may be the case that the weaker theory applies to the majority of people and that there are certain individual differences that predispose people to hyperpersonal interaction, for example those who are socially anxious. These studies will investigate this by looking at two of these variables: social anxiety and loneliness, that may impact on preference for text/talk and outcomes of using the medium on social relationships.

The second set of experiments, Studies 7 and 8, discussed in Chapter 7 use a paradigm employed by Hancock and Dunham (2001), to investigate how people

perceive each other's personality, in terms of both depth and breadth of impressions. Again, this was hoped to be a good test of Hyperpersonal theory in that it can be investigated whether selective self-presentation is being employed and whether over-attributing characteristics to one's partner is apparent. As well as testing for whether impressions formed through text messaging are deeper than those formed by face-to-face interaction, the study aimed to investigate a previously untested part of Hyperpersonal theory. Walther argues that more exaggerated impressions in text-based communication can be the result of the receiver of the messages over-attributing characteristics to their partner (the *over-attribution effect*) and/or the sender self-presenting a certain personae that is amplified by feedback from the receiver (the *selective self-presentation effect*). So if there is evidence of hyperpersonal communication this may be as a result of either one or the other or indeed an additive effect of selective self-presentation and over-attribution. However this single or combined effect has not been directly tested. To address which of these were the case, Hancock and Dunham's experimental paradigm used in Studies 7 and 8, was extended by taking a novel approach of using a quasi-signal detection method. This was where personality of the sender was taken as being the 'signal' given out and the impression formed was taken as being the detection of that signal. This allowed the possibility to analyse the data in more complex ways to begin to investigate whether or not any evidence of more intense impressions was due to the message sender selectively presenting themselves in an overly positive way or the receiver of the message over-attributing the characteristics of the sender.

The overall aim of these experiments was therefore to test the Hyperpersonal Model of communication in relation to mobile phone text messaging by determining whether communication can become as intimate and social (the *weak* model of

hyperpersonal communication) or more intimate and social (the *strong* model of hyperpersonal communication) than is possible face-to-face, and potentially to be able to develop this model further by offering further insights into the distinction between sender and receiver effects. Chapter 6 opens with a discussion of the affordances of texting that may contribute to the social and relational outcomes of using the medium. McKenna *et al.*'s (2002) experimental paradigm will then be discussed along with the results she found in relation to Instant Messenger, culminating in a set of predictions for the current studies.

Chapter Six:

Studies 5 and 6: Text Messaging and Impression Formation

6.1. Introduction

On first impressions it is hard to imagine how text messaging has become so popular. On early handsets, users were presented with a small, cramped multi-tap keyboard and a small low-resolution text display. However the value of sending a text message seemed to quickly overcome the difficulty of physically typing it in (Jenson, 2004; Sun, 2003). One affordance of text messaging that sets it apart from face-to-face and other mediated real-time communication such as Instant Messaging (IM) is that it is conspicuously asynchronous. This is a key difference from face-to-face communication whereby interactants have to think on the spot and respond immediately, and where long pauses are not the norm. Computer-mediated communication such as IM is also asynchronous. However it is closer to real-time interaction than texting, but at the same time allows participants slightly more time to consider and construct a response than in face-to-face communication.

Paradoxically, the mobility of the mobile phone also allows for more versatile forms of asynchronous discourse than either email or IM. Extended text message “conversations” can take place over hours or even days (Ling & Yttri, 2002; Kasesniemi & Rautiainen, 2002), and not simply whilst both interactants are sitting at their computers. These properties allow the texter the opportunity to compose and reflect upon their messages, and to be in control of their self-presentation and involvement when interacting with other people. They can carefully craft and edit their text messages until they are happy to send it on, without the normal pressures of responding.

Combined with the visual anonymity and the absence of social-context cues (e.g. eye contact, tone of voice, gesture) inherent to both texting and computer-mediated communication, this potentially allows for greater control over how people can present themselves and how they are perceived by those with whom they are interacting. The lack of “gating features” (e.g. appearance, social anxiety, mannerisms etc.) may allow for friendships to develop where they may not have otherwise had the chance to do so via traditional face-to-face communication (McKenna, Green, & Gleason, 2002). This would be a highly positive outcome of using such media. One may expect greater liking and better impressions to be formed of one’s partner as a result of these affordances. Studying this link between affordances and communication outcomes is therefore the next step in the proposed model that has been developed over the thesis so far.

To examine this idea further this study compares impression formation in SMS and face-to-face interactions, utilising an experimental paradigm used by McKenna, *et al.* (2002). McKenna *et al.* hypothesised that anonymity and the lack of gating features in CMC interactions aid the rapid formation of on-line friendships, as they help facilitate real-self expression. Internet relationships are based on what the interactants disclose about themselves rather than the more superficial gating features such as physical appearances, which McKenna *et al.* argue should provide a more stable basis for a relationship and allow it ‘to survive and flourish once those “gates” do come into operation’ (pp24). Interacting through visually anonymous media such as CMC and text messaging can lead to positive impressions being formed as rather than basing liking on appearance and other individual physical attributes, all one has to base liking on is the information given by the sender of the message and upon an individual’s own acts of self-disclosure that can lead to a feeling of closeness between

those who are interacting (McKenna *et al.*, 2002). As a result, the sender has a great deal more control over how they are perceived by the recipient.

In examining the effect of physical presence on how strangers came to like each other, McKenna *et al.* (2002) compared people who met online with those who met face-to-face. They predicted that liking would be greater for those who met online even after a second meeting that was conducted face-to-face where gating features would be present. This was reasoned to be the case because if relationships are developing faster on the Internet due to increased self-disclosure, then the relationships should be more stable over time than those based mainly on appearances and initial first impressions. Having established liking for one's partner, the operation of gating features in a further face-to-face interaction should have less of an impact. Their findings were consistent with this - liking for partner was significantly higher when participants met over the Internet first and then face-to-face as opposed to both meetings taking place face-to-face. In a third condition, participants interacted with one partner in person and also with a person he or she believed was a different partner online (in counterbalanced orders). In reality, it was the same person on both occasions, though neither partner was aware of this. This 'trading places' comparison was used to provide a more sensitive within-participants test of whether the medium was having an effect on how the *same pair* would like one another if they were to meet initially either face-to-face or online. It was found that participants liked the same person more when they met them first over the Internet than when they met them face-to-face, implying medium of first interaction can significantly affect first impressions, and therefore the future course of a relationship.

Further analyses showed that for those people who interacted on the Internet, liking for partner significantly correlated with the quality of interaction, unlike in the

face-to-face condition. This was used to support the conclusion that initial face-to-face interactions are dominated by more conspicuous gating features that override other features of the interaction.

As mobile text messaging has similar affordances to the Internet, these findings may be extrapolated. The greater control over impressions afforded by text messaging may be a bonus for impression formation, and a key outcome of using this communication method, particularly in initial interactions.

The experimental paradigm used in this chapter aims to investigate the effects of the loss of social-context cues in mobile phone texting compared to face-to-face on relationship formation over brief 'getting acquainted' interactions between dyads of strangers. We can predict, along the same lines as McKenna *et al.*, that text messaging will help people control how they present themselves to others, and that liking will be higher than that through face-to-face. These predictions are in line with Walther's Hyperpersonal Model.

The Hyperpersonal Model would predict, as would the CFO perspectives, that initial impressions of partners interacting via SMS would be relatively incomplete compared to those interacting face-to-face. But unlike the CFO perspectives, the Hyperpersonal Model would forecast that over time the impressions formed should be relatively similar (Walther, 1993). It would also predict that in the absence of contradictory information, those in the text condition would over-attribute characteristics of their partners based on the minimal cues provided. In concordance with this theoretical approach, over the two interactions it is expected that in an SMS-to-SMS condition, initial impressions may not be as well developed as in the face-to-face condition but that after the second meeting the differences will decrease as participants start to read into the text based cues provided.

McKenna *et al.* (2002) hypothesised that anonymity and lack of gating features present in CMC facilitate real-self expression which consequently leads to the rapid development of on-line friendships. This was supported in their results. In another of the studies presented in their 1999 paper, they found that individuals who were rated as higher in social anxiety and loneliness felt that they were better able to express themselves online compared to face-to-face. As discussed in Chapter 2, social anxiety and loneliness are individual differences that have important implications for text messaging preferences. The current study will also examine these individual differences for any patterns that may arise. On the basis of previous studies (e.g. Reid & Reid, 2005) it was predicted that those who preferred texting as opposed to talking on their mobile phones would be significantly more socially anxious and lonely.

6.2. Study 5

The first study was ran as a pilot for the main study. From this study, changes to the experimental procedure could be made.

6.2.1. Method

6.2.1.1. *Participants*

Thirty male and 110 female University of Plymouth psychology undergraduates took part in the study, as part of a course requirement. On arrival at the laboratory, participants were paired at random, resulting in 24 male-female pairs and 46 same-sex pairs. Participants' ages ranged from 18 to 41, with a mean of 19.9 years.

6.2.1.2. Design

The study comprised seven between-participants conditions. Participants took part in two consecutive ten-minute dyadic interactions. Dyads were randomly assigned to one of seven conditions, unaware of the condition they were to be in. In the first condition, participants interacted both times face-to-face (FTF). In the second condition participants, in different rooms, interacted both times via text messaging (SMS). In the third condition participants interacted first face-to-face and then via SMS. The fourth condition was the counterbalance of this with participants interacting via SMS first and then face-to-face. In these first four conditions participants were aware that the person they were communicating with on both occasions was the same person. In the remaining three conditions, participants were led to believe that they were interacting with two different people whereas in reality they were communicating with the same person. The fifth condition involved SMS both times, the sixth condition was SMS followed by face-to-face and the final condition was face-to-face followed by SMS.

6.2.1.3. Materials and Procedure

The handsets used for the study were four identical Nokia 5110 models, ensuring that every participant had the same interface to work with. The phone has a backlit black and white display, and has a 3cm x 2cm display screen, allowing the user to see five lines of text at once. It allowed for 10 messages to be saved in the memory at any one point in time. The text limit was 160 characters per message. As there was no predictive text facility on the phone, participants used the standard 'multi-tap' method for mobile keypads. For example, in typing the word 'CAT', one would have to tap the key with the number '2' on three times to obtain the letter 'C',

wait for a brief delay then tap once for the letter 'A', and then tap the number '8' once to obtain the letter T.

The sign up-sheets informed participants that they needed to sign up with people they did not know. This was the only requirement of the study. Upon turning up for the experiment, participants were led to different rooms so they had no visual contact with each other before the experiment took place. On entering the laboratories, participants completed a questionnaire that probed for demographic information (age and gender).

They were also asked questions on the way they used their mobile, i.e. whether they preferred talking or texting on their mobile and the reasons for this, the length of time they had owned a mobile phone, the average number of texts and calls made per month, the proportion of their bill spent on texting and the number of people that they text on a regular basis. Individual differences in user orientation were assessed by the 10-question abbreviated UCLA Loneliness scale (Russell, 1996) and the 15-question Interaction Anxiousness Scale (Leary, 1983), both of which are discussed in Chapter 4. They were also asked questions on real self expression, developed based on McKenna *et al.*'s concept (see Reid & Reid, 2005). These included the following items: 'do you say things in text that you would not feel comfortable saying face-to-face or in voice calls' (yes or no), 'to what extent would your family and friends be surprised if they read the text messages you sent?' (1= not very surprised, 2= moderately surprised, 3 = very surprised) and 'do you feel better able to express your true feelings in text-messages, voice calls or face-to-face conversations?'

Having completed the questionnaire, participants who were texting were then given the handsets and instructed on how to use them. They were then told the

number of the handset (1-4) of which they were to text and the phone number for this handset was programmed into the handset memory so they could retrieve it easily after their texts were written. Those participants interacting face-to-face were brought into another room together and sat opposite one another. All participants were then given the briefing which was basically 'to get to know one another', as in McKenna *et al.*'s (2002) study. Participants were asked not to share their real names in their interactions. This was so that in the condition where participants were interacting with the same person but were unaware of this they would be less likely to guess it was the same person.

6.2.1.4. Ethical Justification

This study involved deception in that in three conditions (5-7) as participants were led to believe that they were communicating with two different people in the two interactions, where they were actually communicating with the same person. This deception was necessary to test differences between conditions whilst controlling for differences between communication partners. The deception was judged not one that might reasonably cause any harm, and participants were informed of the deception at the end of the experiment, and received a full explanation of why it has been used.

6.2.1.5. Dependent Measures

After the first interaction, participants were given a questionnaire that measured the quality of the interaction. This included 14 items from Parks & Floyd (1996) Relationship Development Scale which measures the depth, breadth and intimacy of the interaction, e.g. 'I have told this person things about myself that he or she could not get from any other source' and 'once we got started we moved easily

from one topic to another'. These items were on a five-point rating scale from 1 (strongly disagree) to 5 (strongly agree). As in McKenna *et al.*'s (2002) study, participants were asked to rate their degree of liking for their partner on a 14-point scale that ranged from -7 (strongly dislike) to +7 (strongly like). Participants were also asked to rate the ease of which they found it to conduct the conversation and how much they enjoyed engaging in the conversation (5-point scale from not at all to extremely). Upon completion of the questionnaire, participants then engaged in the second interaction. They were given the same briefing 'to get to know one another' and those in the 'different person' conditions were further asked not to talk about the person they had just communicated with for 'confidentiality purposes' (as McKenna briefed, email correspondence, October, 2003).

After the second interaction participants filled out the quality of interaction questionnaire again. They were then debriefed and asked not to disclose the nature of the study with anyone else so as not to jeopardise the validity of the experiment. In the debriefing, care was taken to tease out whether or not those participants who were in conditions where they were interacting with the same person but were meant to think they were interacting with different people did actually believe that this was the case. The face-to-face conversations were recorded by tape recorder. The text messages were copied into a spreadsheet exactly as they appeared on the mobile screen.

6.2.2. Results

6.2.2.1. Descriptive Analyses

Each dyad communicated for the full time allotted - ten minutes for each interaction. The average number of texts sent in the text conditions was two texts per participant, four texts overall. Each text was on average 74 characters long, using

46.3% of the available character limit. Examples of typical text exchanges are shown in excerpts 6.1. and 6.2. below. As can be seen, if these were read aloud they would take very little time to convey. However to think about such exchanges only in terms of the number of characters and words in comparison to face-to-face communication would be misleading, as what is important is the content within the messages, and the message construction processes that lie behind them. In face-to-face communication the discourse is often packed out with redundant elements, and is far more wordy than is needed (Chapanis, 1975). Chapanis found that interpersonally lean modes of communication, such as written and keyboard messaging, typically contained 13 times fewer words than voice only interactions, despite achieving comparable levels accuracy and understanding in communication tasks. The implication here is that direct comparisons between the amount of communication taking place in these two conditions may not be indicative of actual communication outcomes.

Excerpt 6.1.

Participant 62: hi how are you I am studying my first year in psychology

Participant 63: IM STUDYING MY FIRST YEAR TOO. WHERE ABOUTS R U FROM

Participant 62: i live in ivybridge so i travel from home each day are you in the uni dorms if so where are you originally from are you enjoying plymouth

Participant 63: IM FROM LONDON SO IM STAYING IN THE UNI HALLS.CANT COMPLAIN.PLYMOUTH IS A CHANGE FROM LDON BUT CLEANER AND CHEAPER

Excerpt 6.2.

Participant 84:HELLO HOW ARE YOU?IM FEMALE I HAVE A HALF BROTHER AND A HALF SIS A LOT OLDER THAN ME WHAT ABOUT U I AM LEARNING TO SING TOO WHAT DO U LIKE DOING

Participant 85: HEY.IM FEMALE.I COME FROM BRISTOL. I HAV ONE BRO.I LIKE TO GO TO CLUBS AND DRINK.WHAT SORT OF MUSIC DO U LIKE?

Participant 84:UM WELL NETHING REALLY A BIT OF THE DARKNESS COLD THE BLOODHOUND GANG ANYTHING

Participant 85: I REALLY LIKE COLDPLAY AND THE DARKNESS TOO!WENT TO SOME FESTIVALS THIS SUMMER & SAW THEM.U BIN TO ME?

Before commencing analysis, preliminary data checks were carried out. First, we need to recognise the impact of social interaction and influence processes that are unique to dyad pairings that affect how participants interact together (Walther & Burgoon, 1992). If there are significant dyad effects for certain variables then it would be misleading to analyse the data at the level of the individual, as the data are not independent, but rather dependent either on the other member of the dyad, or on emergent characteristics of the dyad as a unit. Because of this, dependent variables were either analysed at the level of the dyad or the level of the individual depending on whether the variance of the former was significantly more than the latter. As it turns out, there were no significant differences in variance for any of the dependent variables ($p < .05$ for all tests), so the data was analysed using the individual as the unit of analysis. The analysis will now proceed by applying the hypotheses generated in McKenna *et al.*'s work, and by Hyperpersonal theory, to the current experiment.

6.2.2.2. Hypothesis 1

In line with McKenna *et al.*'s research, it was predicted that those who met for the first time through SMS would show greater liking for partners than those who met for the first time face-to-face. To allow for a more powerful test, an independent samples *t*-test was performed on the data to compare SMS interaction at time 1 with

face-to-face interaction at time 1. Before this was performed, independent samples *t*-tests were carried out to check that there were no significant differences between those who expected the same partner at time 2 and those who thought they were going to be communicating with a different partner. There were found to be no significant differences due to expectation between quality of interaction or liking measures for either SMS or face-to-face conditions, so the data was collapsed into just 2 groups; SMS and face-to-face.

Those who communicated face-to-face at Time 1 liked their partner significantly more ($M = 4.72$; $SD = 1.45$) than those who communicated via SMS ($M = 2.48$; $SD = 1.76$), $t(138) = 8.2$, $p < .01$. These results are in the reverse direction to that predicted. It should be noted that both scores for liking were significantly greater than zero on the 14-point scale ranging from -7 (strongly dislike) to +7 (strongly like) ($t(59) = 25.18$, $p < .001$ and $t(79) = 12.54$, $p < .001$ for face-to-face and SMS respectively).

6.2.2.3. Hypothesis 2

The second hypotheses to arise out of McKenna *et al.*'s work was that liking for partner would be greater for those in the SMS:FTF condition than for those in the FTF:FTF condition even after the final meeting where gating features were now present in both conditions. There was no significant difference in liking between FTF:FTF ($M = 5.10$; $SD = 1.17$) and SMS:FTF ($M = 4.85$; $SD = 1.81$, $t(38) = 3.39$, $p < .05$), so this hypothesis is not supported.

6.2.2.4. Hypothesis 3

The comparison between FTF:FTF and SMS:SMS conditions at Time 2

should in theory approximate more closely to McKenna *et al.*'s (2002) Time 1 measures, as they used 20 minutes face-to-face or 20 minutes CMC per interaction. So it is expected that liking will be higher for those in the SMS condition than in the face-to-face condition. However, results showed there was no significant differences in liking at Time 2 between the FTF:FTF condition ($M = 5.10$; $SD = 1.16$) and the SMS:SMS condition ($M = 3.85$; $SD = 1.87$; $t(38) = 2.54$, $p > .05$).

There were significantly different rates of change in liking between the SMS:SMS (Mean change in liking = 1.05) and FTF:FTF (Mean change in liking = .40) over the two times of testing, $t(38) = -2.40$, $p < .02$. These results are consistent with the idea that over time, liking ratings in the SMS condition may eventually 'catch up' with those in the face-to-face condition, perhaps even exceeding liking scores than those in the face-to-face condition given sufficient time. This is as predicted by Walther (1995).

6.2.2.5. Hypothesis 4

McKenna *et al.* found that the same person was liked significantly more when they interacted via the Internet than face-to-face when participants thought they were conversing with two different people. However in the present study this was not found to be the case. Liking for partner was significantly greater at Time 2 ($M = 4.55$, $SD = 1.00$) than at Time 1 ($M = 2.30$, $SD = 1.63$, $t(19) = -6.49$, $p < .01$) in the SMS:FTF condition. The same pattern arose in the FTF:SMS condition, liking for partner was significantly higher at Time 1 ($M = 4.90$, $SD = 1.65$) than at Time 2 ($M = 2.20$, $SD = 1.99$, $t(19) = 9.58$, $p < .01$).

In the SMS: SMS condition, there were no significant differences in Liking across Time 1 and Time 2 ($M = 2.55$, $SD = 1.82$; $M = 3.35$, $SD = 1.53$ for Time 1 and

Time 2 respectively, $t(19) = -3.24, p > .05$). The mean liking scores for each condition are shown in Figure 6.1.

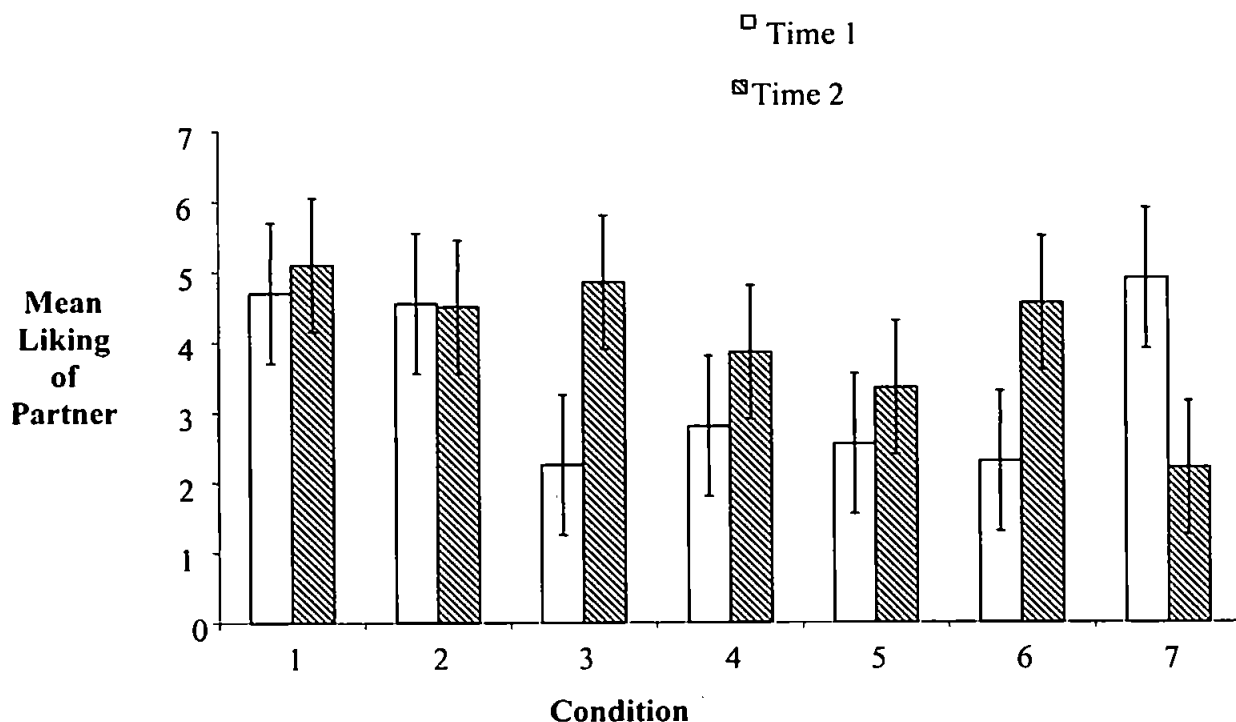


Figure 6.1. Liking of partner for Time 1 and Time 2 across conditions (1= FTF:FTF; 2= FTF:SMS; 3= SMS:FTF; 4= SMS:SMS; 5= SMS:SMS (think different partners); 6= SMS:FTF (think different partners); 7= FTF:SMS (think different partners).

However, it seems the length of these interactions are a significant factor here - as was found earlier, after 20 minutes of text messaging there was no significant difference between SMS and face-to-face. This will have to be investigated further. It can be seen from Figure 6.1. that 10 minutes seems to be enough time for those in the FTF conditions to reach a fairly stable judgement of liking that further 10 minute interactions through FTF or SMS add little to. For the SMS conditions however 10 minutes is not enough, and a further interaction through SMS or FTF helps develop the impression at a greater rate.

6.2.2.6. Quality of Interaction

The ratings for quality of interaction for each medium are given in Table 6.1. This was examined to determine whether the perceived quality of interaction impacted on liking scores. It can be seen that those participants who communicated face-to-face were significantly more likely to report their conversation to be less limited in scope; that their conversation had ranged over a variety of topics; that they moved easily from topic to topic; that they felt close to their partner; that they did not try to keep personal judgements to themselves when they disagreed with their partner; that they felt more able to confide in their partner; that they told their partner things about themselves that they could not get elsewhere; that there was more depth in their conversation; that they felt more certain what their partner was really like; that they felt more confident that they could predict their partners attitudes; and that they felt they knew their partner more. They also rated the medium as being easier and more enjoyable, compared to those participants who interacted via SMS at Time 1.

6.2.2.6.1. Relation Between Liking and Quality of Interaction Ratings

McKenna *et al.* (2002) suggested that because face-to-face meetings were based upon superficial gating features such as appearance, ratings of liking for one's partner after interacting face-to-face should not be as highly correlated with quality of conversation ratings as those who were interacting via CMC as those in the latter condition would have little else to base their liking on. This was indeed found to be the case for the quality of interaction measures used in their experiment. The same should hold true for the SMS condition in the current experiment as like CMC, SMS lacks the visual medium which may impact on liking ratings as participants only have the information.

Table 6.1. Mean responses to quality of interaction measures

Question	<i>M_T</i>	<i>SD</i>	<i>t</i> (138)‡
1. Our communication was limited to just a few specific topics			
<i>FTF</i>	2.43	1.00	-9.7**
<i>SMS</i>	4.10	1.01	
2. Our communication ranged over a wide variety of topics			
<i>FTF</i>	3.73	1.01	12.6**
<i>SMS</i>	1.80	.80	
3. Once we got started we moved easily from one topic to another			
<i>FTF</i>	4.17	.87	8.2**
<i>SMS</i>	2.90	.94	
4. I told this person exactly how I feel			
<i>FTF</i>	3.40	1.12	2.9
<i>SMS</i>	2.79	1.38	
5. I feel quite close to this person			
<i>FTF</i>	2.68	.95	6.9**
<i>SMS</i>	1.64	.85	
6. I try to keep my personal judgements to myself when this person says something with which I disagree			
<i>FTF</i>	2.58	.83	-3.3*
<i>SMS</i>	3.11	.99	
7. I have told this person what I like about him/her			
<i>FTF</i>	1.53	.70	2.5
<i>SMS</i>	1.26	.55	
8. I feel I could confide in this person about almost anything			
<i>FTF</i>	2.10	1.07	3.7**
<i>SMS</i>	1.48	.90	
9. I would never tell this person anything intimate or personal about myself			
<i>FTF</i>	2.83	1.24	-1.9
<i>SMS</i>	3.23	1.21	
10. I have told this person things about myself that he or she could not get from any other source			
<i>FTF</i>	2.40	1.25	4.2**
<i>SMS</i>	1.60	.95	
11. Our communication never went into any topic in depth			
<i>FTF</i>	2.68	1.03	-9.9**
<i>SMS</i>	4.33	.91	

Table 6.1. (cont.).

†Critical value of Bonferroni-*t* for 138 degrees of freedom and 17 comparisons at the

12. I am very uncertain about what this person is actually like	2.67	.82	-9.0**
<i>FTF</i>	4.09	1.06	
<i>SMS</i>			
13. I can accurately predict what this persons attitudes are			
<i>FTF</i>	2.67	.82	6.3**
<i>SMS</i>	1.73	.91	
14. I do not know this person very well			
<i>FTF</i>	3.55	.89	-4.0**
<i>SMS</i>	4.26	1.17	
15. How easy was it to conduct the conversation?			
<i>FTF</i>	4.22	.69	5.0**
<i>SMS</i>	3.54	.93	
16. How much did you enjoy engaging in the conversation?			
<i>FTF</i>	4.00	.61	6.4**
<i>SMS</i>	3.29	.70	

.05 level=3.07 and at the .01 level= 3.55

* $p < .05$, ** $p < .01$

† Mean questionnaire rating (1=Strongly Disagree, 5= Strongly Agree)

their partner conveys to them through their text messages on which to base their liking judgement.

To test this idea, correlations were calculated between liking for partner and quality of interaction measures at Time 1 for those who interacted via SMS and face-to-face. Surprisingly, correlations between liking and the quality of interaction measures were stronger for those in the face-to-face condition than those in the SMS condition. This may be due to the greater number of items used to test the quality of interaction compared to McKenna *et al.*. For those who interacted face-to-face, liking was found to be negatively correlated with the following statements (a) Our communication was limited to just a few specific topics ($r = -3.6, p = .01$); (b) Our communication never went into any topic in depth ($r = -.30, p = .02$); (c) I am very uncertain about what this person is actually like ($r = -.48, p < .01$); and (d) I do not

know this person very well ($r = -.47, p < .01$). Liking was positively correlated with the following statements (a) Our communication ranged over a wide variety of topics ($r = .37, p < .01$); (b) Once we got started we moved easily from one topic to another ($r = .44, p < .01$); (c) I told this person exactly how I feel ($r = .32, p = .01$); (d) I feel quite close to this person ($r = .56, p < .01$); (e) I feel I could confide in this person about almost anything ($r = .52, p < .01$); and (f) I can accurately predict what this persons attitudes are ($r = .31, p = .02$). Positive correlations were also found with enjoyment ($r = .57, p < .001$) and ease of communicating ($r = .35, p < .01$).

For those participants who interacted via SMS at Time 1, positive correlations were found between liking and the following statements: (a) I feel quite close to this person ($r = .47, p < .001$); (b) I feel I could confide in this person about almost anything ($r = .44, p < .001$); and (c) I can accurately predict what this persons attitudes are ($r = .34, p < .01$). The following statements were negatively correlated: (a) I am very uncertain about what this person is actually like ($r = -.31, p < .01$); (b) I do not know this person very well ($r = -.18, p = .10$). Positive correlations were also found with ease of communication ($r = .34, p < .01$) and enjoyment ($r = .40, p < .001$).

So clearly, quality of interaction mattered as much to participants in the SMS condition as it did to those in the face-to-face condition. The differences between the magnitude of these correlation coefficients obtained were tested for significance (Edwards, 1960), but no significant differences were found ($p > .05$).

A number of regression models were tested to examine whether the interaction measures explained a greater proportion of the variance of the liking measure for the SMS condition as opposed to the face-to-face condition. A model with the questionnaire measures of quality of interaction as the predictor variables of liking at time 1 produced a model with an R^2 of .55 for the face-to-face condition ($F(16,59) =$

3.32, $p = .001$) and an R^2 of .42 for the SMS condition ($F(16, 79) = 2.83, p = .002$), suggesting quality of interaction explained marginally more of the liking measure for face-to-face dyads than for SMS.

6.2.2.7. *Loneliness and Social Anxiety*

McKenna *et al.* found that those individuals who reported being better able to express themselves on the Internet than face-to-face were more likely to develop closer relationships with those that they meet online. Social anxiety and loneliness were the two key determinants of such people.

In the present study we asked participants what they preferred using their mobile for - texting or talking - and checked whether these groups differed in loneliness and/or social anxiety. Table 6.2. shows these results. In regards to social anxiety, it was found that those who preferred text messaging on their mobile had significantly higher scores on the social anxiety scale than those who preferred talking ($t(134) = -3.2, p = .002$). There was no evidence of a significant difference on the loneliness scales ($t(134) = -1.2, p > .05$). It should be noted that by no means are the lowest mean score indicative of clinical levels of social anxiety and loneliness.

Table 6.2. *Mean scores on Loneliness and social anxiety scales.*

Scale	Medium Preferred	<i>M</i>	<i>SD</i>
Loneliness	Texters	24.3	5.5
	Talkers	23.2	5.1
Social Anxiety	Texters	40.9	9.4
	Talkers	35.7	9.7

The effect of loneliness and social anxiety on the liking measures at time 1 and time 2 were then examined by carrying out ANOVA's testing for possible 2- and 3-way interactions between these variables and condition. A median split was used to classify participants on the two measures. Those who scored at the median value of 23 or less on the UCLA scale were classed as low in loneliness and those who scored at the median value of 39 or less on the interaction anxiousness scale were classed as low in social anxiety. None of these tests were significant ($p > .05$).

For the quality of interaction measures, models with social anxiety and loneliness added as predictors resulted in $R^2 = .57$, $F(18,59) = 3.03$, $p = .002$ for the face-to-face condition and $R^2 = .42$, $F(18,79) = 2.49$, $p = .004$, for the SMS condition, neither of these were significant improvements to the earlier models.

6.2.3. Discussion

This study was conducted as a pilot extension of McKenna *et al.*'s (2002) paradigm to SMS text messaging. However, none of the hypotheses generated by McKenna *et al.*'s work were supported by the current data. The question of why this is the case is one that needs to be investigated further. Time seems to be an obvious limitation. It may be the case that ten minutes interacting is not quite long enough to be able to develop impressions of one's partner, especially in the limited cue medium of text messaging. Text messaging is slower than other forms of mediated communication - compared to Instant Messenger for example which is more similar to real-time interaction. Participants sent an average of four text messages in ten minutes, and as there is a 160 character limit per text, it may have impacted on the ability of participants to obtain enough information to make a satisfactory estimate of liking for their partner. As was discussed in the introduction, Hyperpersonal theory

posits that impressions will develop to a greater extent than face-to-face communication but the rate of impression formation will be a lot slower. This was confirmed in Walther's early experiments (e.g. 1994, 1997) where impressions took longer to develop via computer mediated communication than face-to-face. Text messaging is a very slow medium to communicate through and is more asynchronous by its nature than IM used by McKenna and colleagues so the ten minutes of interaction may not have been long enough.

Walther's early experiments investigating the impact of time on impression formation showed that groups do develop positive impressions as long as they are given enough time to do so (Walther & Burgoon, 1992). This is the first time text messaging has been studied in the impression formation context so finding exactly how much time is needed for the medium to be equal to face-to-face is quite hard to speculate. The next experiment will look at increasing the time by twice that of face-to-face as this is a formula found to work in some of the CMC research (e.g. Hiltz, Turoff & Johnson, 1989).

Indeed, in the conditions whereby participants interacted using the same medium on both occasions (SMS:SMS and FTF:FTF), the liking for partner was the same after the second interaction in both face-to-face and SMS conditions. This suggests that by allowing an extra ten minutes of interaction in the SMS condition allowed the participants in the SMS condition to 'catch up' with those in the face-to-face condition in terms of liking for partner. This indicates that over time, the reduced social cues and channels of communication may be compensated for in SMS as they are not affecting the impressions developed. Examining the rates of change in liking, those in the SMS condition demonstrated a higher rate of change in their liking scores than those in the face-to-face condition. This suggests that given even more time,

SMS may even surpass face-to-face in liking for partner, producing hyperpersonal communication. This would be consistent with Walther's (1996) Hyperpersonal Model, which predicts that over time the impressions formed should be relatively similar between CMC and face-to-face, if not superior in CMC.

As it stands there seems to be evidence for impressions formed after SMS being equivalent to face-to-face communication after 20 minutes of interaction. However it is not clear whether more time would lead to more hyperpersonal impressions being formed. Nevertheless, this study has shown that for these participants, given enough time, liking levels can equal face-to-face.

Amongst the results it was found that after interacting face-to-face, participants rated the quality of conversation higher than after interacting through text. One reason for this may be due to the handsets that were used. Several participants commented on how outdated the handsets were compared to modern devices, and this may have impaired their quality of experience using the medium.

The personality measures of social anxiety and loneliness showed that those who preferred SMS were significantly more socially anxious than those who preferred face-to-face communication. This is consistent with our previous research (Reid & Reid, 2005; Reid, D.J. & Reid, in press). A possible reason why those who are more socially anxious prefer texting is that they can lose some of their interaction anxiety as they are not physically co-present with their conversation partner and therefore have time to compose and reflect upon their messages (Stritzke, Nguyen, & Durkin, 2004).

Analysis of liking using median social anxiety and loneliness splits as predictors revealed no significant differences between low and high scoring individuals on these individual differences ($F(2,135)=1.00, p > .10$; and $F(2,135)$

=1.20, $p > .10$, for loneliness and social anxiety respectively) and the impact on impression formed of their partner in terms of liking.

However this may be because the levels of the two groups formed on these variables are not located at or near the extremes of these scales. The mean loneliness score was 24 (ranging between 14-39) out of a possible 50, and the mean social anxiety score was 39 (ranging between 18-65) out of 75. The median split for loneliness was 23 and for social anxiety was 39.

6.3. Study 6

Having identified the potential limitations discussed above, the study was replicated with significant changes intended to address these limitations. Firstly the timings of the interaction were changed so that participants interacted for 20 minutes in each of the two phases. Secondly the handsets were changed (Nokia 3510i models were used) to provide more recent handset technology that mobile phone users might be more familiar with using. These handsets were less bulky and more responsive in their text input. Finally, the “trading places” conditions were dropped leading to four conditions being tested: SMS: SMS, face-to-face: face-to-face, SMS: face-to-face and face-to-face: SMS. The same questionnaire measures and experimental protocol were used as were employed for the pilot study.

6.3.1. Method

6.3.1.1. *Participants*

Fourteen male and 66 female University of Plymouth psychology undergraduates took part in the study, as part of a course requirement. On arrival at the laboratory, participants were paired at random, resulting in 10 male-female pairs,

two male:female pairs and 28 female-female pairs. Participants' ages ranged from 18 to 53, with a mean age of 20.0 years.

6.3.1.2. Design

The study had four conditions and was between subjects. Participants took part in two consecutive 20-minute dyadic interactions. Dyads were randomly assigned to one of the four conditions and were unaware of the condition they were to be in. In the first condition, participants interacted both times face-to-face. In the second condition participants, in different rooms, interacted both times via SMS. In the third condition participants interacted face-to-face to begin with and then via SMS. The fourth condition was the counterbalance of this with participants interacting via SMS first and then face-to-face. In all four conditions participants were aware that the person they were communicating with on both occasions was the same person.

6.3.1.3. Materials and Procedure

The handsets used for the study were Nokia 3510i models. Four handsets were provided, all of which were the same model so that every participant had the same interface to work with. The phone has a backlit colour display, and has a 3cm x 2cm display screen, allowing the user to see five lines of text at once. It allowed for 100 messages to be saved in the memory at any one point in time. The text limit was 160 characters per message.

The sign up-sheets informed participants that they needed to sign up with people they did not know. This was the only requirement of the study. Upon turning up for the experiment, participants were led to different rooms so they had no visual contact with each other before the experiment took place. On entering the

laboratories, participants were given the same questionnaire as used in the previous study (See section 6.2.1.4.).

Having completed the questionnaire, participants who were texting were then given the handsets and instructed on how to use them. They were then told the number of the handset (1-4) of which they were to text and the phone number for this handset was programmed into the phones memory so they could retrieve it easily after their texts were written. Those participants interacting face-to-face were brought into another room together and sat opposite one another. All participants were then given the briefing which was basically 'to get to know one another', as in McKenna *et al.*'s (2002) study. Unlike the last study, participants were not instructed to withhold their names, as they did not have to interact with the same person under the pretence they were communicating with someone different.

6.3.1.4. Dependent Measures

As in Study 5, after the first interaction, participants were given a questionnaire measuring the quality of the interaction (see section 6.2.1.4.). After the second interaction participants filled out the quality of interaction questionnaire again. They were then debriefed and asked not to disclose the nature of the study with anyone else so as not to jeopardise the validity of the experiment.

The face-to-face conversations were recorded by tape recorder. The text messages were copied into a spreadsheet exactly as they appeared on the mobile screen.

6.3.2. Results

6.3.2.1. Descriptive Analyses

Each dyad communicated for the twenty minutes allowed for each interaction. The average number of texts sent in the text conditions was six texts per participant, so 12 texts overall. Each text was on average 96 characters long, using 60.0% of the available character limit. Examples of typical text exchanges are shown in excerpts 6.3. and 6.4. below, along with the time they were sent.

Excerpt 6.3.

45 Hi.Im kim (9.14.42)

44 Im leanne (9.15.38)

45 Dont know what 2 say!Where r u from? (9.16.44)

44 Where do u live? (9.17.03)

44 Im from wales,how r u finding plymouth? (9.18.13)

45 In a flat on mutley plain while here but im from staffs.U? (9.18.30)

45 I really like it.Took sum gettin used 2 though! What do u think of it? (9.20.10)

44 I live in halls called st teresa,it is a mature studen block and very boring (9.20.47)

45 R u a "mature" student? U could throw a party n kick off the fun (9.23.08)

44 Yeh i like plymouth especially the barbican (9.23.25)

45 Barbican is v nice.Dead now winters here.Where av all the people gone! (9.24.53)

44 No not mature student yet im 20 so one of the youngest there (9.25.41)

45 How come ur not in normal halls? (9.27.37)

44 Yes very tru i think most of plymouths population is students at the mo (9.28.50)

45 What do u think of the course so far? (9.29.13)

44 I asked for robbins but they said there was no room (9.30.14)

45 There may be later if people leave (9.31.23)

44 Its a lot to do but i think im gunna enjoy it once i get used to how everything has to be done here (9.32.10)

45 I know what u mean. So many deadlines n a v different way of doin work (9.33.53)

Excerpt 6.4.

59 Hello PHOne 4 i soo can't use this so who r u (12.08.04)

62 Helo wat r u caled, im tom (12.08.10)

59 I'm luisa hehe soo tell me bout urself (12.09.15)

62 Wel, i am studing psychology with criminology and from cormwal, u (12.11.12)

59 Well i do psych from reading. Live in halls and this is my first year im 19 so should b 2nd yr
really (12.13.33)

59 So what music u in2 (12.14.51)

62 That cool, r u enjoying the course? im wat hals r u stayin in? I am staying in unite in mutley
plaine, it iz a long walk! (12.16.38)

59 I am into anything, i like hip hop and rnb, dance, indie, and rock, definitely not pop! Do u hav any
hobbies? (12.18.37)

59 Mutley god thats miles away i nearly died walkin there well i'm in robbins just round the
corner takes bout 2 mins. The course is good bit borin u like it (12.19.03)

62 It iz boring at the moment, but it wil get betr, lukiing forward to abnorml psychology, wat music
do u like? (12.20.49)

59 I'm the same with music. Just got into snowboardin though am crap. My hobby is socialisin
(12.21.40)

62 Gud choice of sport, i used to surf, but gave up cause i waz crap! So wat hapened in mutley?
(12.23.08)

59 Snowboardin after party quite good stole a pineapple hehe. So u goin home 4 readin week? I
tink i m c my gorg nephew (12.25.14)

62 I mite, i dnt kow yet! it wud be nice to se family. (12.28.09)

As in the last study, the dependent variables were examined to see whether they were to be analysed at the level of the dyad or the level of the individual depending on whether the variance of the former was significantly more than the

latter. As it turns out, there were no significant differences in variance for any of the dependent variables looked at (i.e. the questionnaire measures; $p < .05$ for all tests) so the data can be analysed treating individuals as the unit of observation. The analysis will now proceed by applying the hypotheses generated in McKenna *et al.*'s work, and by Hyperpersonal theory, to the current experiment.

6.3.2.2. Hypothesis 1

In line with McKenna *et al.*'s research, it was predicted that those who met for the first time through SMS would show greater liking for partners than those who met for the first time face-to-face. By allowing those in the text condition more time to interact in this study compared to Study 4, it was hoped that this result would be replicated. However, at the end of the first 20 minutes there were found to be significant differences in liking for partner. As in the last study, those participants who met their partner face-to-face at time 1 were found to have greater liking for their partner ($M = 4.75$, $SD = 1.17$) than those who met them via SMS ($M = 3.18$, $SD = 1.95$; $t(64) = 4.4$, $p < .001$). This is in line with our previous results but is different to the results found by McKenna *et al.* where there were found to be no significant differences after 20 minutes between CMC and face-to-face conditions. However, the liking for partner was greater after 20 minutes of text interaction in this study than it was for after 10 minutes of text interaction in the previous study ($M = 2.48$). There was little difference for the face-to-face conditions though, with the previous study having an average liking rating of 4.72.

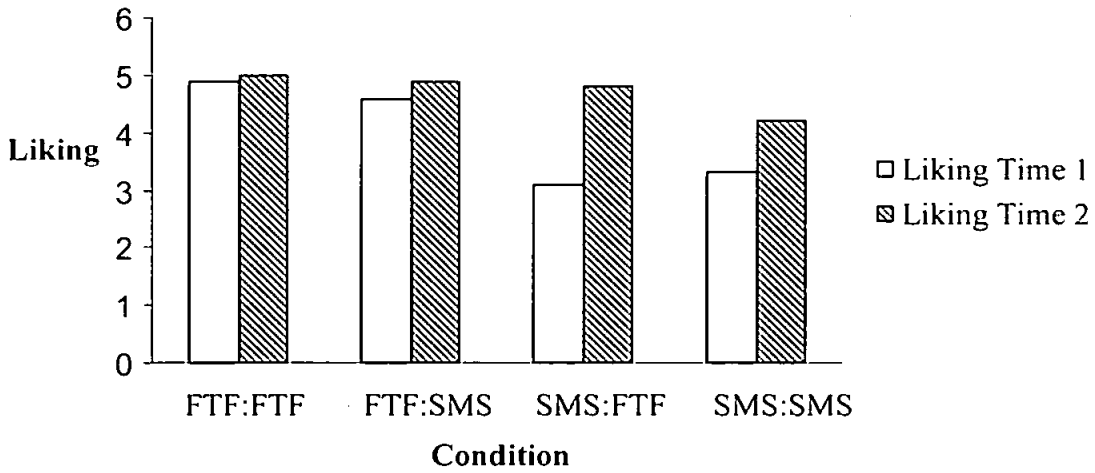


Figure 6.2. Mean liking for partner after time 1 and time 2, over the four conditions.

6.3.2.3. Hypothesis 2

The next hypothesis to be tested was that liking at time 2 would be higher for those in the SMS:SMS condition than the FTF:FTF condition. It was seen in Study 5 (see section 6.2.2.4.) that the rate of change was faster in the SMS:SMS condition so allowing more time might allow those in the SMS condition to surpass the liking levels of the face-to-face condition. When liking at time 2 was examined however there were no significant differences found between any of the conditions ($F(3,76) = 1.2, p > .10$). Those in the FTF:FTF condition reported a mean liking rating of 4.80 ($SD = .35$) and those in the SMS:SMS condition reported a mean liking rating of 4.15 ($SD = .35$).

As can be seen from Figure 6.2., liking for one's partner increased to similar levels across all of the conditions. To look at whether the differences in liking were significant within each condition, a within-subjects ANOVA was conducted.

Significant differences between time 1 and 2 liking were found in the SMS: face-to-

face condition ($F(1, 19) = 18.87, p < .001$) and in the SMS: SMS condition ($F(1, 19) = 12.93, p = .002$).

6.3.2.4. Quality of Interaction Measures

The participant's ratings of quality of their first and second interactions were examined to see whether it affected levels of liking of partner.

6.3.2.4.1. *Time 1*

It can be seen from Table 6.3. below that there were several differences in the rated quality of interaction between those participants who interacted via SMS and those who interacted face-to-face. Compared to those who interacted face-to-face, participants who interacted via text were more likely to agree that their communication was limited to a few topics, that they felt close to their partner, that their communication never went into any depth, and that they were uncertain what their partner was like. They were more likely to disagree with the statement that they would never tell their partner anything intimate or personal about themselves. Those who interacted through SMS were also more likely to disagree with the statement that they told their partner things about themselves that they could not have otherwise obtained elsewhere, and that they could predict their partner's attitudes. Those interacting face-to-face were more likely to agree that their communication ranged over a variety of topics.

Table 6.3. Mean responses to quality of interaction measures at time 1

Question	<i>M</i> _F	<i>SD</i>	<i>t</i> (78) [‡]
1. Our communication was limited to just a few specific topics			
<i>FTF</i>	2.7	.94	-3.7***
<i>Text</i>	3.6	1.13	
2. Our communication ranged over a wide variety of topics			
<i>FTF</i>	3.6	.81	4.8***
<i>Text</i>	2.5	1.20	
3. Once we got started we moved easily from one topic to another			
<i>FTF</i>	3.8	.78	1.6
<i>Text</i>	3.4	1.01	
4. I told this person exactly how I feel			
<i>FTF</i>	3.1	1.03	.8
<i>Text</i>	2.9	1.24	
5. I feel quite close to this person			
<i>FTF</i>	2.5	.88	2.9**
<i>Text</i>	2.9	.83	
6. I try to keep my personal judgements to myself when this person says something with which I disagree			
<i>FTF</i>	1.6	.96	-.3
<i>Text</i>	1.5	.76	
7. I have told this person what I like about him/her			
<i>FTF</i>	2.0	.74	.4
<i>Text</i>	1.7	.82	
8. I feel I could confide in this person about almost anything			
<i>FTF</i>	2.7	.90	1.1
<i>Text</i>	3.5	.96	
9. I would never tell this person anything intimate or personal about myself			
<i>FTF</i>	2.4	.94	-3.2**
<i>Text</i>	1.6	1.30	
10. I have told this person things about myself that he or she could not get from any other source			
<i>FTF</i>	2.40	1.20	3.6**
<i>Text</i>	1.60	.99	
11. Our communication never went into any topic in depth			
<i>FTF</i>	3.1	1.08	-4.2***
<i>Text</i>	4.0	.86	

Table 6.3. (cont.).

12.I am very uncertain about what this person is actually like			
<i>FTF</i>	2.7	.85	-3.7***
<i>Text</i>	3.5	1.03	
13.I can accurately predict what this persons attitudes are			
<i>FTF</i>	2.5	.93	3.0**
<i>Text</i>	1.9	.92	
14.I do not know this person very well			
<i>FTF</i>	3.4	.90	-3.5**
<i>Text</i>	4.1	.98	
15.How easy was it to conduct the conversation?			
<i>FTF</i>	3.8	.86	1.0
<i>Text</i>	3.6	1.10	
16.How much did you enjoy engaging in the conversation?			
<i>FTF</i>	3.6	.67	1.1
<i>Text</i>	3.4	.75	

* $p < .05$, ** $p < .01$, *** $p < .001$.

6.3.2.4.2. Time 2

Results for the measures taken at time 2 are shown in Table 6.4. Only four of the measures that were significant after time 1 were significant with those interacting via text reporting more limited communication, less of a range of topics discussed, less depth of communication and less ability to predict their partners attitudes. Three new differences were found with those in face-to-face: finding it easier to shift discussion topic, easier to communicate and more enjoyment interacting.

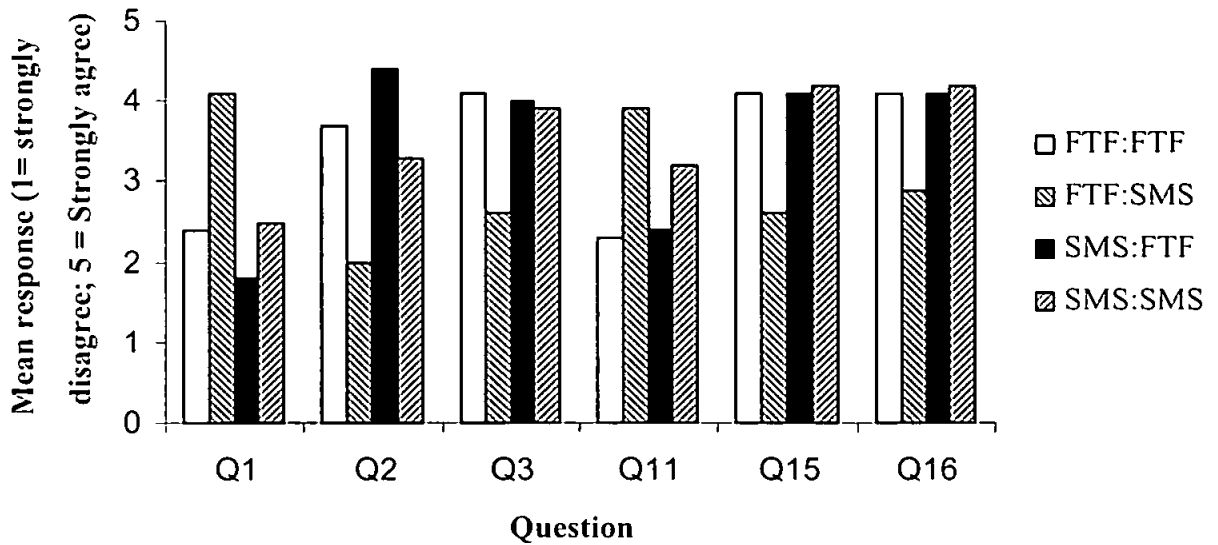


Figure 6.3. Time 2 responses, split by condition

It seemed that there was an effect of condition on some of the Time 2 interaction measures. This is demonstrated in Figure 6.3. For question 1, ‘our communication was limited to just a few specific topics’, this seemed to be most strongly agreed with by those participants who had met face-to-face in time 1 and through texts at time 2. This was significantly different from those who interacted face-to-face both times and those who interacted using SMS both times ($p < .05$). Conversely those who interacted via SMS followed by face-to-face were more likely to disagree that their communication was limited.

Question 2 (‘our communication ranged over a wide variety of topics’), question 3 (‘once we got started we moved easily from one topic to another’), question 15 (‘how easy was it to conduct the conversation?’) and question 16 (‘how much did you enjoy engaging in the conversation?’) showed a similar pattern, with those who were in the FTF:FTF and SMS:SMS conditions showing no significant differences, and those who were in the SMS:FTF condition showed the greatest

Table 6.4. Time 2 quality of interaction measures

Question	<i>M_f</i>	<i>SD</i>	<i>t</i> (78) _‡
1.Our communication was limited to just a few specific topics			
<i>FTF</i>	2.1	1.01	-4.9***
<i>Text</i>	3.3	1.18	
2.Our communication ranged over a wide variety of topics			
<i>FTF</i>	4.0	.88	6.5***
<i>Text</i>	2.6	1.08	
3.Once we got started we moved easily from one topic to another			
<i>FTF</i>	4.0	.89	3.8***
<i>Text</i>	3.2	1.07	
4.I told this person exactly how I feel			
<i>FTF</i>	3.2	1.03	.5
<i>Text</i>	3.0	1.21	
5.I feel quite close to this person			
<i>FTF</i>	2.7	.92	.5
<i>Text</i>	2.6	.93	
6.I try to keep my personal judgements to myself when this person says something with which I disagree			
<i>FTF</i>	2.7	.79	-.8
<i>Text</i>	2.9	.86	
7.I have told this person what I like about him/her			
<i>FTF</i>	2.1	.96	.5
<i>Text</i>	2.0	.81	
8.I feel I could confide in this person about almost anything			
<i>FTF</i>	2.2	.98	-1.0
<i>Text</i>	2.4	.87	
9.I would never tell this person anything intimate or personal about myself			
<i>FTF</i>	2.9	1.14	-.7
<i>Text</i>	3.0	1.19	
10.I have told this person things about myself that he or she could not get from any other source			
<i>FTF</i>	2.6	1.30	1.6
<i>Text</i>	2.2	1.17	
11.Our communication never went into any topic in depth			
<i>FTF</i>	2.3	.92	-5.3***
<i>Text</i>	3.6	1.13	

Table 6.4. (cont.).

12.I am very uncertain about what this person is actually like			
FTF	2.7	1.00	-1.2
Text	2.9	.97	
13.I can accurately predict what this persons attitudes are			
FTF	2.8	.91	2.2*
Text	2.4	.89	
14.I do not know this person very well			
FTF	3.0	.95	-1.8
Text	3.4	.98	
15.How easy was it to conduct the conversation?			
FTF	4.1	.90	2.7**
Text	3.4	1.30	
16.How much did you enjoy engaging in the conversation?			
FTF	4.1	.69	2.9**
Text	3.5	1.04	

* $p < .05$, ** $p < .01$, *** $p < .001$.

agreement, and those in the FTF:SMS the greatest disagreement. In each case, participants in the FTF:SMS condition were significantly lower in their response than the other three conditions.

The other question that showed significant differences was question 11- 'our communication never went into any topic in depth'. Here, those in the FTF:SMS condition were significantly more likely to agree with this item than in the other three conditions. The second highest agreement came from participants in the SMS:SMS condition, and this was significantly higher than the SMS:FTF and FTF:FTF conditions

This is worth bearing in mind as this may be due to some comparison of media - participants in these conditions may be rating one medium in comparison to the other. For this reason time 1 quality of interaction measures may be a better indicator of any significant differences.

6.3.2.5. Preference for Text or Talk

Preference for text ($n = 44$) or talk ($n = 34$) on the mobile phone had a significant effect on liking at time 1 ($F(1, 78) = 9.0, p < .01$). Those who preferred texting showed significantly higher levels of liking for their partner after interacting through text ($M = 4.00, SD = 1.41$) than did those who preferred talking ($M = 2.2, SD = 2.11; t(27) = 3.0, p < .01$). There was no evidence of a significant difference after the face-to-face interaction ($M = 4.9, SD = 1.15$ and $M = 4.7, SD = 1.17$; for those preferring texting and talking respectively). There were not found to be any significant differences between Texters and Talkers in liking at time 2.

When the data was examined more carefully, in terms of Texters and Talkers, several interesting results were found. Looking first at the Texters, no significant differences in liking at time 1 or at time 2 were found between those who interacted face-to-face and those who interacted via SMS. Liking scores varied between 4 and 5. When Talkers were examined however several differences arose. People who prefer Talking on their phone had less positive liking for their partner when they interacted through SMS than when they interacted face-to-face ($F(3, 30) = 5.87, p < .01$). The average liking for those in conditions where they met face-to-face first was 4.6, compared to 2.2 for those who met via SMS first. There were no significant differences at time 2 as liking increased in the SMS conditions.

When within-condition liking differences were examined for Texters and Talkers, it was found that both groups showed significant differences in the SMS:FTF condition, showing more liking after face-to-face than after SMS ($p = .01$ for both Texters and Talkers), however it was only Talkers who showed a significant increase in liking in the SMS:SMS condition ($F(1, 7) = 12.75, p = .01$). Texters showed no evidence of a significant difference ($F(1, 10) = 4.81, p > .05$).

When the responses to the quality of interaction measures were examined taking into account the Texter/Talker distinction, four questions were found to show a main effect of text/talk preference at Time 1. These were: 'once we got started we moved easily from one topic to another' ($p = .03$), whereby Texters showed little change in their evaluation in either condition ($M = 3.8$ and $M = 3.7$ for face-to-face and SMS respectively), but Talkers agreed with this statement less after the SMS condition ($M = 3.7$ and $M = 3.0$ for face-to-face and SMS respectively). A similar pattern arose for the item 'I feel quite close to this person' ($p = .03$), where Texters showed little difference, regardless of medium ($M = 2.6$ and $M = 2.2$ for face-to-face and SMS respectively), but Talkers agreement was lower when interacting via SMS than face-to-face ($M = 2.3$ and $M = 1.7$ for face-to-face and SMS respectively). For question 13, 'I can accurately predict what this persons attitudes are' ($p = .01$), both groups reportedly agreed with the statement less after SMS interaction, and it was Texters who showed the biggest difference between the 2 conditions ($M = 2.8$ and $M = 2.0$ for face-to-face and SMS respectively) compared to Talkers ($M = 2.1$ and $M = 1.6$ for face-to-face and SMS respectively). Finally, in terms of enjoyment communicating ($p = .04$), Texters showed relatively little difference between the two conditions ($M = 3.6$ and $M = 3.7$ for face-to-face and SMS respectively), whereas Talkers reported slightly less enjoyment after text ($M = 3.6$ and $M = 3.1$ for face-to-face and SMS respectively).

6.3.2.6. Loneliness and Social Anxiety

In this particular sample there were no differences in loneliness or social anxiety measures between those who preferred texting ($M = 25.1$, $SD = 5.8$; $M = 42.4$, $SD = 9.1$) and those who preferred talking ($M = 24.6$, $SD = 5.5$; $M = 40.5$, $SD = 7.8$),

although the relative differences were as expected with those who were more socially anxious and lonely than those who preferred talking.

A median split of loneliness (Median = 24) and social anxiety (Median = 41) revealed that these variables were not significant predictors of liking for one's partner ($F(1,72) = 4.24, p = .20$; $F(1,72) = 6.67, p = .11$ for loneliness and social anxiety respectively). Nor was there evidence of a significant interaction between these variables ($p = .05$).

6.3.2.7. Relation Between Liking and Quality of Interaction Ratings

McKenna *et al.* (2002) suggested that because face-to-face meetings were based upon superficial gating features such as appearance, rating of partner liking for interacting face-to-face should not be as highly correlated with quality of conversation ratings as those who were interacting via CMC as those in the latter condition would have little else to base their liking on. This was indeed found to be the case for the quality of interaction measures used in their experiment. The same should hold true for the SMS condition in the current experiment.

To test this idea, correlations were calculated between liking for partner at Time 1 for those who interacted via SMS and face-to-face. As predicted by McKenna *et al.*, none of the correlations proved to be significant for those who interacted face-to-face, it appears liking was not related to the quality of interaction measures that we tested. Those people who interacted via text on the other hand showed significant correlations between liking and items 3 (moved easily from topic to topic; $r = .51, p < .01$), 4 (told how feel; $r = .37, p < .05$), 5 (feel close; $r = .72, p < .001$), 7 (told what like about partner; $r = .36, p < .05$), 8 (could confide; $r = .63, p < .01$), 9 (could tell intimate things; $r = -.32, p < .05$), 11 (deep communication; $r = -.35, p < .05$), 15

(ease of communicating; $r = .50, p < .01$) and 16 (enjoyment; $r = .72, p < .001$). So it seems disclosing personal things to one's partner, feeling close to them, and ease and enjoyment of the conversation determined liking. This is consistent with McKenna *et al.*'s postulation that 'in face-to-face interactions it is the more superficial gating features that dominate liking and overwhelm other interpersonally important factors' (p.28).

These correlations were examined in greater depth to see if there were any notable differences between medium preferred and correlations between liking and quality of interaction. Interestingly, different profiles of correlations were found for each of the subgroups. When liking was based on the face-to-face interaction, neither Texters nor Talkers showed any significant correlations between liking and the quality of conversation measures. When the interaction was text, those who preferred texting showed significant correlations between liking for their partner and quality of conversation items 5 ($r = .55, p < .01$), 8 ($r = .51, p < .05$), 10 ($r = .48, p < .05$), 11 ($r = -.47, p < .05$), 15 ($r = .46, p < .05$) and 16 ($r = .71, p < .001$). Those who preferred talking showed significant correlations between liking for partner and items 3 ($r = .76, p < .001$), 5 ($r = .81, p < .001$), 8 ($r = .78, p < .001$), 13 ($r = .53, p < .05$), 15 ($r = .52, p < .05$) and 16 ($r = .66, p < .01$).

6.4. General Discussion

The studies discussed in this chapter were designed to extend the work of McKenna *et al.* (2002) by extrapolating their results from computer instant messaging to mobile phone text messaging in aiming to test the applicability of Hyperpersonal theory to mobile phone text messaging. As text messaging shares many of the

properties of CMC it was expected a similar pattern of results would arise when compared to face-to-face interaction, as was found in McKenna *et al.*'s research.

Studies 5 and 6 have shown that given enough time, text messaging on mobile phones can lead to the same amount of liking as interaction face-to-face, indeed, this is exactly what Walther predicted would occur in CMC interactions in his social information processing model. The text message medium however is even more restricted than general CMC in that it often takes longer to write a text message on the small cramped keypad that many phones are equipped with, often on a multi-tap basis. This is generally going to be much slower than typing in a message using the standard full sized qwerty keyboard. Another limitation that text message users are presented with is the limited number of characters a text messages allows them to include. This means that users have to be a lot more concise and to the point when it comes to engaging in these conversations. Despite these limitations however, after 40 minutes of interaction, liking for one's partner was no different after face-to-face as it was after SMS. In spite of not being able to physically see the other person, those who interacted through SMS both times showed no significant differences in liking after the 40 minutes compared to those who interacted face-to-face both times, partially supporting Hyperpersonal theory. The impressions formed did not seem to surpass that of face-to-face communication however, so this seems to be more in support of the earlier social information processing model of Walther's, in that impressions are equal in SMS as face-to-face given enough time. Still more time may be needed for SMS impressions between strangers to be more hyperpersonal than face-to-face communication.

Significant differences in some of the quality of interaction measures were found between the face-to-face and SMS communication media. Compared to SMS,

face-to-face was rated as less limited communication and more in-depth. SMS was more likely to result in higher ratings of feeling closer to one's partner, being able to share intimate and/or personal details and of being able to predict partner's attitudes. The finding that quality of the interaction only correlated with liking for those who interacted via SMS is exactly as predicted, and also provides further support for Hyperpersonal theory. These individuals have little else to base their liking on as they cannot see their partner physically. Yet they felt better able to be more intimate in their communication and felt better able to predict their partner attitudes. Participants who interacted face-to-face showed no correlation between liking for their partner and these measures, suggesting that liking is based on other things rather than the quality of the interaction. It may be based for example purely on appearance, or other gating features. This is exactly what McKenna *et al.* (2002) found in their experiment. This may not have been found in Study 5 as ten-minute interactions typically produced only two texts per participant which may not have been sufficient for participants to rate their quality of interaction with any precision.

One result which was not as predicted, but that was replicated in our pilot study is that after the first interaction those in face-to-face conditions showed significantly more liking than those in the SMS conditions. In McKenna *et al.*'s study, liking was equal in the computer mediated interactions and the face-to-face interactions. Perhaps liking was greater in time 1 for face-to-face and not as predicted for text messaging because 20 minutes is not long enough in text to form the same impressions as face-to-face. It is a lot quicker to speak words than to write them so a greater amount of verbal information can be exchanged through face-to-face than is possible in the same time through SMS. Similarly, in comparing CMC and SMS, it is

often quicker to type a message in CMC than it is in SMS, and the latter is more asynchronous than Instant Messenger applications of CMC that are near real-time.

McKenna *et al.* also found in their study that people liked one another better if they met via CMC first and then face-to-face rather than both times face-to-face. In the present study interacting by SMS first did not result in greater liking after the second interaction compared to face-to-face, but rather an equalisation in the degree of liking across the conditions.

In examining differences in liking between times 1 and 2, a significant improvement in liking occurred for those in the SMS:SMS and SMS:FTF conditions. So it appears after interacting through SMS for 20 minutes, a further interaction via SMS or face-to-face enhances liking for one's partner. McKenna *et al.* had a similar condition to the SMS:FTF condition here, whereby participants interacted via CMC and then by face-to-face, the same result emerged.

The fact that those in the SMS:SMS condition showed a significant increase in liking after the second interaction to similar levels to those in the other three conditions seems to be in accordance with Walther's Social Information Processing Model in that he postulated that liking would increase over time using mediated communication such as CMC. The FTF:FTF condition failed to show any further significant increase in liking suggesting that participants in this condition had already reached an opinion of their partner and this did not really change despite a further interaction.

The finding that an asynchronous, limited medium such as texting can obtain comparable levels of interpersonal liking as face-to-face however is an important one. It shows that despite the reduced social cues inherent in the medium, users can overcome this and extract from the limited information they have opinions on the

other person. Although liking was not greater in SMS compared to the face-to-face condition, it did equal it after 40 minutes, suggesting support for the weaker theory of social information processing as it shows that liking can equal face-to-face, despite the seriously reduced cues. This result does not support Hyperpersonal communication however as this theory would predict deeper, more intense impressions to be formed through text, so more liking than face-to-face would be expected. However quality of conversation measures showed participants in the SMS condition rated communication more intimately and felt closer to their partner, providing partial support for the theory.

It may be that Hyperpersonal theory has a 'weak' and 'strong' version. The weak version being the case where SMS can achieve the same levels of interpersonal communication as face-to-face communication (Social Information Processing theory), which seems to apply in the current studies, and a strong version where the SMS medium surpasses face-to-face communication. It may be that for most people the weaker version applies but for some specific groups, the stronger version is more explanatory.

The Texter-Talker distinction found in previous research (e.g. Reid & Reid, in press; Reid, D.J. & Reid, 2005) produced some interesting results in this respect. When the data was examined at the finer level of those participants who reported a preference for Texting on their mobile ('Texters') and those who preferred Talking on their mobile ('Talkers'), Texters reported significantly higher liking through text message interaction than did the Talkers. There were no significant differences in liking at Time 1 for Texters regardless of medium they used to communicate suggesting they were more able to get the most from the medium in terms of relationship development/impression formation. Talkers on the other hand were

significantly more likely to like their partner to a greater extent after face-to-face than SMS. At time 2, neither Texters nor Talkers showed any significant differences in liking between the media. So it appears Talkers 'catch up' with Texters over time. In relation to the quality of interaction, Talkers were more likely to rate the quality of interaction as lower on several measures compared to Texters and they reported less enjoyment of texting. This adds support to the initial model shown in Figure 5.2. at the end of this chapter, where individual differences can lead to different preferences for a medium that can effect the social and relational outcomes of using it.

So it may be that impression formation through texting is to some degree associated with individual differences in preference for texting and talking, which may explain why the current results are not consistent with McKenna *et al.*'s. This is reinforced by Utz (2000) who found that those individuals who do not rate CMC that highly were less likely to use the medium and therefore were less likely to benefit from it relationally. The effects of a communication medium on liking and quality of conversation may be dependent on individual difference in media preference. It seems that those who prefer texting on their mobiles are less affected by the use of this medium in getting acquainted and forming impressions of others, whereas those preferring voice calls struggle the most with the lack of cues inherent in the text medium. However it is unclear from these findings as to whether this sensitivity will disappear over time as they habituate to the medium. It may be the case that there are cognitive factors at play that mediate medium/communication preference. This needs to be followed up in future research.

The lack of more robust differences between Texters and Talkers may be because they were given a social task in being asked to get to know one another. This is more likely to result in ceiling levels on some of these variables than if the task had

been less focussed on one's partner (Hancock & Dunham, 2001). This may show that the participants adhered to the task given to them, which was primarily a social task. They were required to get to know one another and from the results it appears that is exactly what they tried to do.

6.4.1. Limitations and Directions for Future Research

One argument is that liking for one's partner could influence the ratings on the quality of interaction scales, however if this was the case then one would expect significant correlations between liking and the interaction measures in all the conditions, however this was only the case in the SMS conditions and not face-to-face, making this argument less tenable.

The form of electronically-mediated communication used by McKenna *et al.* was Internet Relay Chat (IRC). This works in real-time and is nearly synchronous in terms of communication style. One reason why our study showed a different pattern of results may be due to fundamental differences between the SMS and IRC media. Although both media incorporate text-only communication, there are significant differences in terms of temporal factors. SMS texting is more asynchronous, the timing of message exchange less predictable and less 'conversation like' than IRC. From the corpus of text messages collected in previous studies (e.g. Chapters 4 and 5) it can be seen that texts often contain more information than what would normally be expected in a simple face-to-face conversation turn, for example several questions may be posed to the recipient as well as several answers to preceding questions, i.e. the messages seem to be multi-functional, resembling the strategies evolved by email users to adapt to asynchronous message exchange (Hutchby, 2001). IRC, like other forms of IM, is often used in a more conversational manner resembling face-to-face

discourse, and as a result is characterised by shorter and more frequent turns than in SMS texting (Flanagin, 2005).

Because there may be more in a text message turn than in an IRC turn, and also because of the limited keyboard on a mobile handset compared to the standard computer keyboard, the time composing a text message may be considerably longer than in IRC. This may mean that the receiver has to wait longer to receive messages. These factors in turn may affect judgements of liking, especially when interaction time is short and people are adjusting to using the medium. Bearing this in mind, it would also be useful to compare alternative communication technologies in terms of the relative times taken to form similar levels of impressions.

It should be noted that this was an interpersonal judgement task, which as Hancock & Dunham (2001) suggested, may lead to ceiling effects on measures. They used a 'task-oriented interaction (describing tangrams) to support more moderate levels of impression formation especially in the face-to-face condition' (p334). It will be necessary to repeat the experiment with a task-oriented dimension to determine whether more variation in the measures between those interacting via SMS and those interacting face-to-face.

The Texter-Talker distinction has emerged yet again as an important determinant of text messaging interactions. Texters seem to be capitalising on the affordances of texting to get something out of the medium that Talkers do not. Previous research has identified interactive and expressive affordances of texting to be those most sought after by Texters (see Chapter 5 and Reid, F.J.M. & Reid, in press). In this previous research, young, single, and socially anxious mobile phone users were found to be predisposed to discover and take advantage of the social functionality of SMS, enabling them to enrich their personal relationships in ways that might

otherwise be denied to them. The implication is that the social functionality of SMS must first be mastered before the relational benefits of SMS can be realized - some mobile phone users may come to prefer texting because it allows them to disengage from the demands of immediate interpersonal contact and express themselves more authentically, even to people they know well. Such a conclusion is entirely compatible with the Hyperpersonal Model: communicators learn to take advantage of the physical isolation and absence of interpersonal cues of electronic media to individuate themselves and their communication partners, and achieve levels of sociality and intimacy they could not achieve as rapidly, if at all, in comparable face-to-face settings.

6.5. Summary

To conclude, this chapter has demonstrated that, given enough time, the limited cue medium of text messaging can equal face-to-face communication when it comes to forming impressions of a complete stranger. For those who interacted through text, the quality of the interaction was more important in determining liking of one's partner, whereas this did not have an effect for those in the face-to-face condition, consistent with McKenna *et al.*'s finding that it is gating features that dominate this type of interaction and which subsequently determine liking levels.

It is understandable, therefore, why text messaging may become a viable medium for friendship development and maintenance for certain groups of people. Those who preferred text messaging as opposed to voice calls on their mobile seemed to get more from the medium, reporting better quality of interaction and higher liking

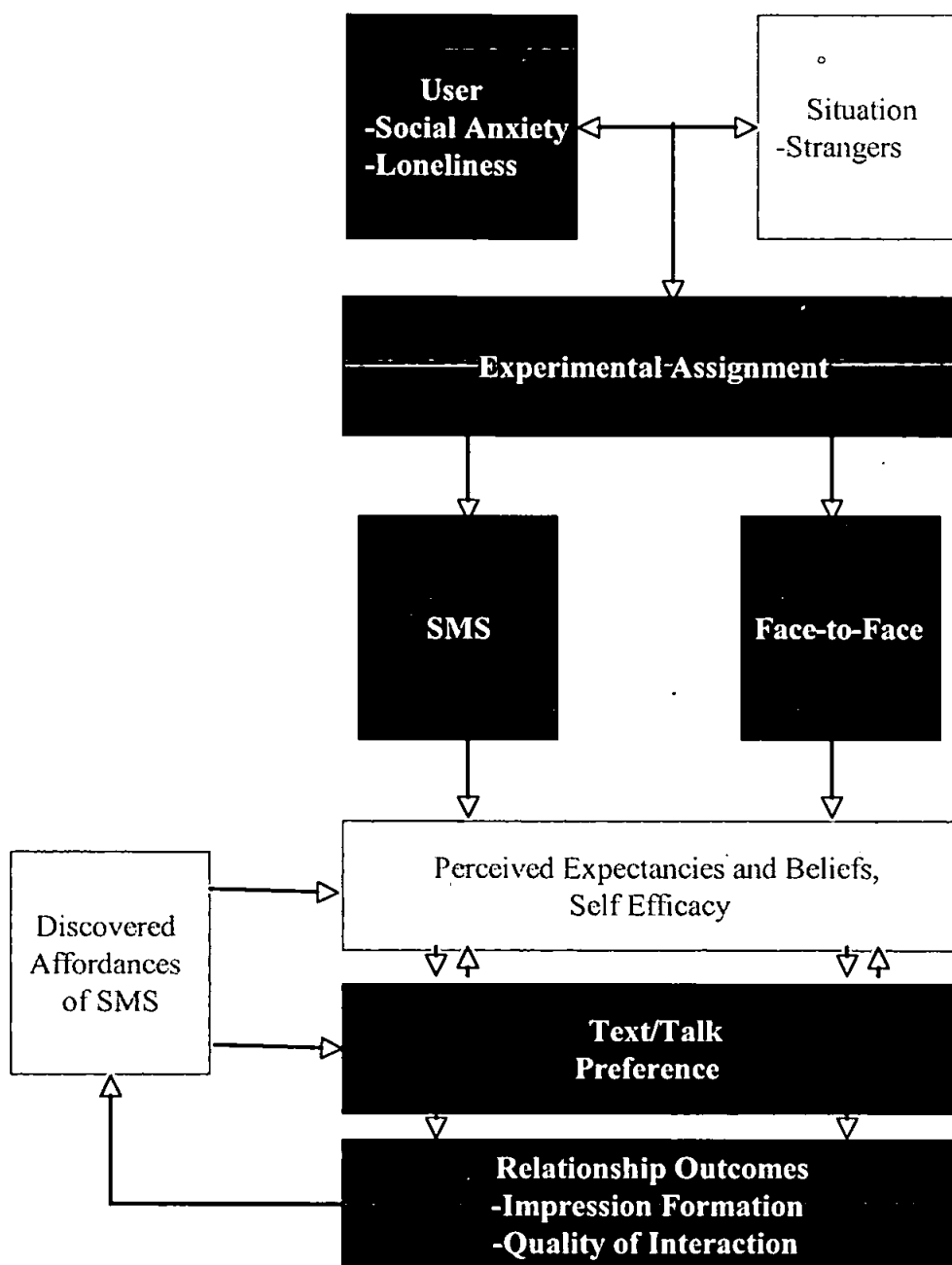


Figure 6.4: Model developed

levels earlier on than those who preferred voice calls. In relation to model development, these findings allow for further elaboration. This updated model is shown in Figure 6.4. It shows that communication preference can affect the outcome of an interaction, in this case liking for one's partner. The preference for texting or talking can lead to perceived expectancies and beliefs around using the

medium, which in turn can impact on relationship outcomes. Experience of these outcomes can then feed back into discovered affordances of SMS texting, which can be seen to feed the preference for text/talk and the perceived expectancies and beliefs of using texting. Quality of interaction measures showed that liking tended to be based on quality of interaction more in the text condition than in the face-to-face condition, and that those participants in the former felt closer to their partner, suggesting support for Hyperpersonal communication through text. However liking was no greater through text messaging after 40 minutes of interaction. More time may be needed to examine this further to see if a greater time interacting can lead to more intense liking levels in the SMS condition to help provide more evidence for the applicability of Hyperpersonal Model to mobile phone text messaging.

It was suggested the weaker version of Hyperpersonal theory - social information processing theory - may be better suited to explain the results as this forecasts over time mediated communication catches up with face-to-face. The failure to find significantly greater liking in SMS after 40 minutes tends to support this, it may be that given more time the differences will surpass face-to-face, supporting the stronger version of the theory.

The next chapter turns to a series of experiments that address some of the issues raised here. As it examines a wider range of partner attributes and separates out the effects of communication medium on both the breadth and depth of impressions formed, it provides a more focussed test of Hyperpersonal theory. The chapter also goes further to examine whether impressions formed are a sender or a receiver effect, or a combination of the two, a critical question raised by Hyperpersonal theory yet to be examined.

Chapter Seven:

Studies 7 & 8: Comparing impression formed through text messaging compared to impressions formed through face-to-face communication: A quasi-signal-detection approach

7.0. Overview

The McKenna *et al.* (2002) paradigm utilised in Chapter 6 had served its purpose in showing that affiliative contact between strangers is possible through text messaging at least to the same level as face-to-face, and beyond this for users who have developed a preference for using their mobile phones for text messaging rather than voice calls. Our model was therefore augmented to include a mediating role for acquired beliefs concerning the social functionality of SMS.

However, a number of questions arose from these experiments. First, it was thought that the instructions and task given to participants (to 'get acquainted') may have resulted in ceiling effects so that any potential differences between the conditions could not be seen. Also the timing of the interactions - 20 minutes for each - may not have been long enough for any differentiation between the communication media to occur. A new experimental paradigm was therefore employed in the present chapter to probe even deeper into this effect, adapted from the paradigm developed by Hancock and Dunham (2001) to examine the breadth and depth of impressions formed via CMC. These authors conducted a study with findings consistent with hyperpersonal theory, in that people interacting through Instant Messenger formed deeper, but narrower impressions than those interacting through face-to-face communication. The studies reported here examine whether this effect extrapolates to SMS text messaging.

However, alongside this, perhaps the most significant aspect of this chapter is the novel use of a quasi-signal detection methodology to take Hancock and Dunham's

original analysis a step further. Specifically, the present chapter addresses a key question left open by hyperpersonal theory - whether such differences in impression formation were the result of the participant adapting to the lean medium of CMC by *selectively self-presenting* personal characteristics, or whether the difference lies with their partner *over-attributing* characteristics to the participant based on the sparse interpersonal cues available in CMC. In other words, the deeper but narrower impressions observed in CMC by Hancock and Dunham might be the result of a *sender effect*, a *receiver effect*, or a combination of the two. This chapter sets out to untangle these two processes using a modified signal detection approach.

Another question this chapter aims to investigate is the distinction between strong and weak versions of hyperpersonal theory. As discussed in the previous chapter, hyperpersonal theory may take two forms. In the strong version, people are assumed to use the text medium to express themselves more effectively and to form deeper more intense relationships than would be possible for them face-to-face, whilst in the weak version, it is assumed that given sufficient time, the medium is at least as effective as face-to-face communication, with similar outcomes. The weaker version is more in line with Walther's original Social Information Processing theory (Walther, 1992), in which he stated that given enough time, levels of impression formation will equal those of face-to-face communication. The hypothesis explored here is that for the majority of mobile phone users, the weaker version of the theory applies, leading to the general conclusion in Chapter 6 that liking levels following brief FTF and SMS interactions were about equal. However, Study 6 also indicated that some mobile phone users – in particular, those that have developed a preference for texting - get more out of the medium. For these people, the stronger theory of hyperpersonal

communication applies: their communication intimacy and involvement surpasses face-to-face.

A further question investigated here therefore is whether other differences between users moderate this effect. One of these groups for whom the stronger version may apply may be those who are higher in social anxiety, as discussed in earlier chapters. This group has been found to prefer SMS to face-to-face communication, and to report being better able to express themselves through text compared to face-to-face (Reid, 2002). The studies reported here will determine whether there are significant differences between impressions conveyed through SMS and face-to-face, and whether these impressions differ for socially anxious and less anxious participants.

Two experiments investigating these questions were conducted, Study 7 a pilot, informing the design of Study 8, the final experiment in the series.

7.1. Introduction

In everyday interaction we form impressions of others. There are thought to be two general factors involved in this process (Hancock & Dunham, 2001), the first of which are the direct and indirect information available during the interaction (e.g. appearance, language cues), and then the inferential heuristics and/or strategies that also have an effect on the impression formed, e.g. stereotypes (Fiske & Taylor, 1991) and schemas.

These factors were developed as a result of analysing face-to-face communication. The advent of mediated communication has forced researchers to re-examine the factors assumed to be important in impression formation. Many of the early theorists pointed to the reduced cues in text-only communication as a major

drawback of the medium, leading to cold interactions lacking any social depth (e.g. Sproull & Kiesler, 1986). However later findings that not only can impressions be formed but that in fact deeper impressions are possible than what may be the case face-to-face challenge the beliefs of which particular cues and sources of information are important in impression formation (Hancock & Dunham, 2001), as many of those previously believed to be important (e.g. physical appearance) are often not available in CMC.

Walther's Hyperpersonal approach argues that over time, impressions become more developed in CMC because the pace of impression-relevant cue exchange is slower than face-to-face. It recognizes that the deindividuated nature of text-only communication combined with the lack of cues can lead to more intense, exaggerated 'hyperpersonal' attributions as due to the relative absence of individuating and potentially disconfirming information, a process of over-attribution occurs (Walther, 1997). Also, CMC affords the opportunity for participants to selectively self-present themselves, giving them more control over how their partner comes to perceive them. Furthermore, a process of behavioural confirmation can arise whereby the impression given out is taken on by the partner in the interaction and reciprocated. Overall, then, in face-to-face interaction, participants are confronted with more information to process as cues are continuously presented to them, whilst in text-only communication, the intermittent and controllable exchange of cue releases cognitive resources to for participants to more effectively manage impression formation and self-presentation (Walther, 1997). In summary, more exaggerated impressions in text-based communication can be the result of the message receiver over-attributing characteristics to their partner and/or the message sender presenting a certain self-image that is then amplified by feedback from the receiver.

Hancock and Dunham (2001) conducted a study to examine if this was indeed the case, or whether the prediction of earlier theories that reduced cues lead to poorer impressions held true. Pairs of participants interacted either face-to-face or through synchronous, text-based CMC, following which each rated their partner's personality. According to CFO approaches, after a single interaction with a previously unknown partner, impressions in CMC should lack both the breadth (the number of personality characteristics participants feel comfortable rating their partner) and the intensity (the magnitude of the impression formed) of face-to-face interaction. The Hyperpersonal Model however would predict that because interaction is time-limited, breadth may indeed be expected to be less than face-to-face interaction, however the tendency of the sender to express cues selectively or for the receiver to exaggerate the cues that are available will lead to more intense attributions on these characteristics than may be the case face-to-face. The results showed that breadth was indeed limited in CMC, and intensity on the items that were rated was significantly greater, which is consistent with the Hyperpersonal Model.

To test this effect and to check whether it extends to mobile phone text messaging, the present study aimed to replicate the experiment. As the actual differences in the original study were quite small in terms of absolute differences on the 5-point rating scales, the results as they stand may be seen as fairly precarious and in need of further support to strengthen their claims. The present study also looked to go a step further than Hancock and Dunham, and tackle a key question in hyperpersonal theory in trying to distinguish whether any greater intensity of impression found was the result of over-attribution by the receiver, or selective self-presentation by the sender. Hancock and Dunham's study had failed to differentiate

between these two alternative explanations. A novel quasi-signal detection approach was utilised to try to examine this question (see section 7.1.1).

In replicating the study, some changes to the original design were made. The task used by Hancock and Dunham was a figure matching task, where one partner described a series of 12 tangrams and the other had to identify which one was being described out of a choice of 16 possibilities. The rationale behind using this task was that it avoids ceiling effects that often occur in social judgement tasks. In the previous studies we conducted on liking (Chapter 6), a ceiling effect in the ‘getting to know you task’ may have occurred, as this task is overly social in that by asking people to get to know one another, they would be highly focussed on the task at hand which could heighten their sensitivity to personality cues. For the present experiment, a compromise was achieved between using an overly task-oriented interaction versus an overly social one by using a task by Hancock in another study, called the ‘disgusting foods task’ (Hancock, 2004).

In Hancock and Dunham’s study, participants rated their partner’s personalities using the 60-item NEO-Five Factor Inventory (Costa & McCrae, 1992), a questionnaire designed to assess a person’s personality on the widely recognised Big 5 personality factors of neuroticism, extraversion, openness, agreeableness, and conscientiousness. However, the present study used items from Goldberg’s (1999) factorially robust and freely available 100 item International Personality Item Pool (IPIP) Big 5 questionnaire. A key issue addressed in the use of the IPIP questionnaire concerned “trait visibility” – the degree to which evidence on which to base inferences concerning people’s personality traits are readily observable in normal social interaction (Watson, 2000). In the context of a brief face-to-face interaction between strangers, the 100 IPIP items would clearly differ in their visibility. For example some

IPIP items such as “a person’s willingness to tidy their room”, are not as directly observable in face-to-face interaction as others, for example their “use of difficult words”. These differences are likely to be especially noticeable across a communication medium in which interactants are visually isolated. In the present studies, IPIP items were screened, and only those deemed observable in the context of brief text-based exchanges by two independent raters were used.

7.1.1. Signal-Detection Theory (SDT)

The basic idea of SDT concerns the detection of signals by observers. ‘SDT quantifies the sensitivity, or discriminability, of a person making a judgement about the presence or absence of....some item or quality of interest’ (Stillman & Jackson, 2005, p582). The ‘item’ is known as a ‘signal’ in SDT. The roots of the paradigm lie in cognitive psychology, where it was used to look at the detection of auditory and visual signals during World War Two (Stillman & Jackson, 2005). The paradigm allows researchers to look at typical response tendencies of observers, to examine whether they are more liberal in their judgement, detecting more signals as potential threats for example (more risk-taking behaviour), or were more conservative, being less likely to jump to conclusions that the signals were potential threats (less risk taking). Anything that is not the signal but that observers may mistakenly judge to be a signal was termed as ‘noise’. So in a typical experiment the observer would have to judge over a large number of observations whether what they were seeing/hearing was a ‘signal’ or just noise. The better observers are at discriminating between the signal and the noise, the better their overall judgement.

Stillman and Jackson (2005) sum up the focus of SDT quite nicely:

‘SDT focuses on the internal impressions created in the mind of an observer by the events about which a judgement is requested. When making a judgement individuals are effectively deciding whether their momentary perceptions arise from a signal superimposed upon an ongoing background of noise, or merely constitute a sample of noise’ (p583).

In a given situation, there are four possible outcomes depending on whether the signal is there or not, and whether the observer identifies it as being present or absent (Macmillan & Creelman, 1991). If the signal is present and the observer correctly identifies it as such, this outcome is called a hit. If it is present and the observer classifies it as absent, this is known as a miss. If the signal is absent and is identified as absent, this is classified as a correct rejection. If on the other hand they identify it as being present then this is known as a false alarm. Discriminability and bias can be revealed by examining the proportion of hits against the proportion of false alarms.

A quasi-signal detection method was used by Gable, Reis and Downey (2003) in their analysis of daily interactions between close relationship partners, examining the congruence of their own behaviours and their partners perceptions of their behaviours and vice versa. They justified their use of the quasi-signal detection paradigm because ‘unlike in the classic method, neither the frequency nor the strength of the stimulus was experimentally controlled’ (p101).

Similarly, in the studies discussed here, the use of a quasi-SDT paradigm is necessary because the personality attributes (taken as the ‘signal’) are subjective self-ratings, and are not objectively controlled. Two considerations are relevant here. First, IPIP items may not actually capture personality judgements reliably, with the result that ratings vary randomly and signal detection rates are correspondingly poor.

However, there is evidence of *high levels of consistency* in self-other ratings of Big 5 factors, particularly for more observable traits (Watson, Hubbard, & Wiese, 2000). Whether this consistency reflects agreement on objective personality characteristics is of course a moot point. Second, people's self perceptions may be biased, so they believe that the self they present is more favourable than the self their partners actually observe. An introverted person may think they are behaving in an outgoing, sociable fashion and rate themselves as such, but may be rated accurately as introverted by the observer. In fact, the evidence available is that both participants and observers form judgements of the participant's personality by drawing inferences from the cues in the participant's observable behaviour (Gosling, John, Craik & Robins, 1998).

Having recognised these limitations, personality attributes can provisionally be taken to be the signals in this study, and it should be possible to see whether the onus of the effect (the reported personality attribution) lies on the side of the receiver or the sender. Is the receiver reading much more into the sender's behaviour than the sender believes they are signalling? That is, are they biased towards reporting a characteristics as present when they are uncertain as to whether it is present or not? Or is it the case that the sender is selectively projecting a personality that the receiver is detecting? The way this can be tested is by treating each of the personality items used as a separate observation and determining what 'signal' the sender believes they are sending out (indicated by their rating on that item) compared to what the receiver is picking up (indicated by the receivers rating of the sender on that item). Table 7.1. demonstrates these possibilities using with the example of perceiving the attribute of "conscientiousness", using terms (hit, miss, false positive, correct negative) that are familiar from the signal detection domain.

Table 7.1. Example of signal detection theory terminology

Senders believed projected personality (i.e. action)	Receivers perception of the personality of the sender (i.e. Detection)	
	Conscientious	Not conscientious
Conscientious	Hit	Miss
Not conscientious	False Positive	Correct Negative

The two classical detection measures that arise from using this method are:

1. D-prime (d'): the discriminability index, used to describe how discriminable a signal is from a non-signal. This is a measure of signal strength - the higher the value of d-prime, the higher the signal strength.
2. Criterion c : a measure of response bias, the higher (or more liberal) the value of the criterion, the greater the number of signals correctly identified, but the greater the number of false alarms. The lower (or more conservative) the value of the criterion, the fewer the signals correctly identified, but also the smaller the number of false alarms.

As in Winton, Clark and Edelman (1995), sensitivity (d') was computed using the formula: $d' = z(\text{hit rate}) - z(\text{false alarm rate})$ and response bias (the criterion) was calculated using the formula: $c = -.05 [z(\text{hit rate}) + z(\text{false alarm rate})]$.

These measures are key to understanding whether or not any effects found in terms of differences in impression formation are the result of over-attribution and/or selective self-presentation. High D-prime values would indicate that the signal the

sender is sending is strong enough for the receiver to be able to distinguish it from noise and would indicate that the sender is in control of what is being perceived by the receiver so selective self-presentation would be implicated. High criterion values would indicate that the receiver is biased towards classifying non-signals as signals, suggesting they are over-attributing characteristics to their partners. Either or both of these may be the case. These are orthogonal measures based on different comparisons: criterion measures are based on the proportion of hits to misses and d-prime measures are based on the proportion of hits to false-positives (Macmillan and Creelman, 1991)

D-prime is basically a discriminability index, and reflects the observer's ability to discriminate between attributes that are present in the sender's behaviour from attributes that are absent. In the present approach, however, the signal is itself a judgement, in this case the sender's belief that such attributes are present in or absent from their behaviour. Because of this, discriminability can be thought of more accurately in this quasi-signal detection paradigm as an index of agreement—corrected for chance—between the judgements of the sender and the judgements of the observer on attributes the sender believes are or are not exhibited in their behaviour. Figure 7.1 depicts this special interpretation of the signal detection paradigm.

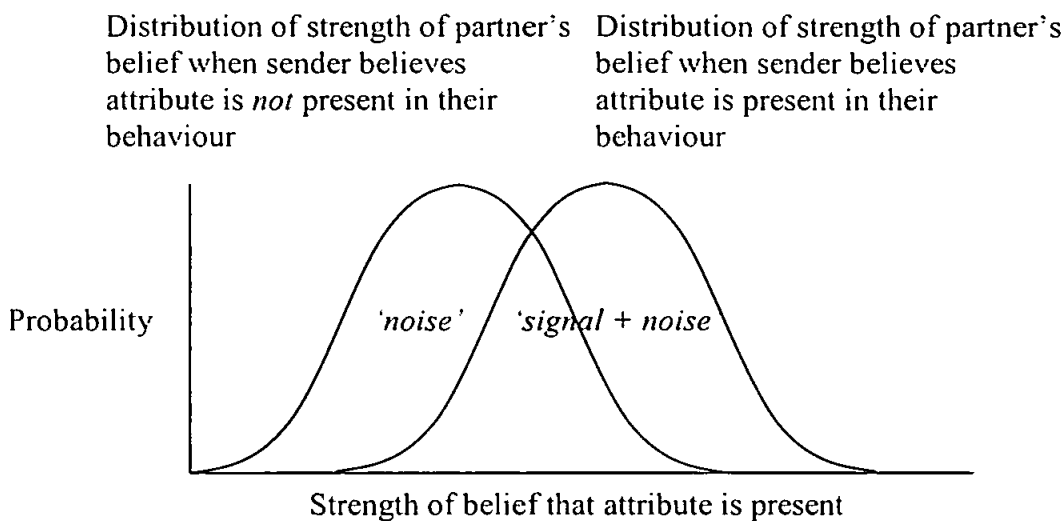


Figure 7.1. Example of signal strength distribution

Figure 7.2. shows a high discriminability example. So this is a situation where the same separation between the curves occurs but there is less spread and barely any overlap. The d-prime here will be a high positive number.

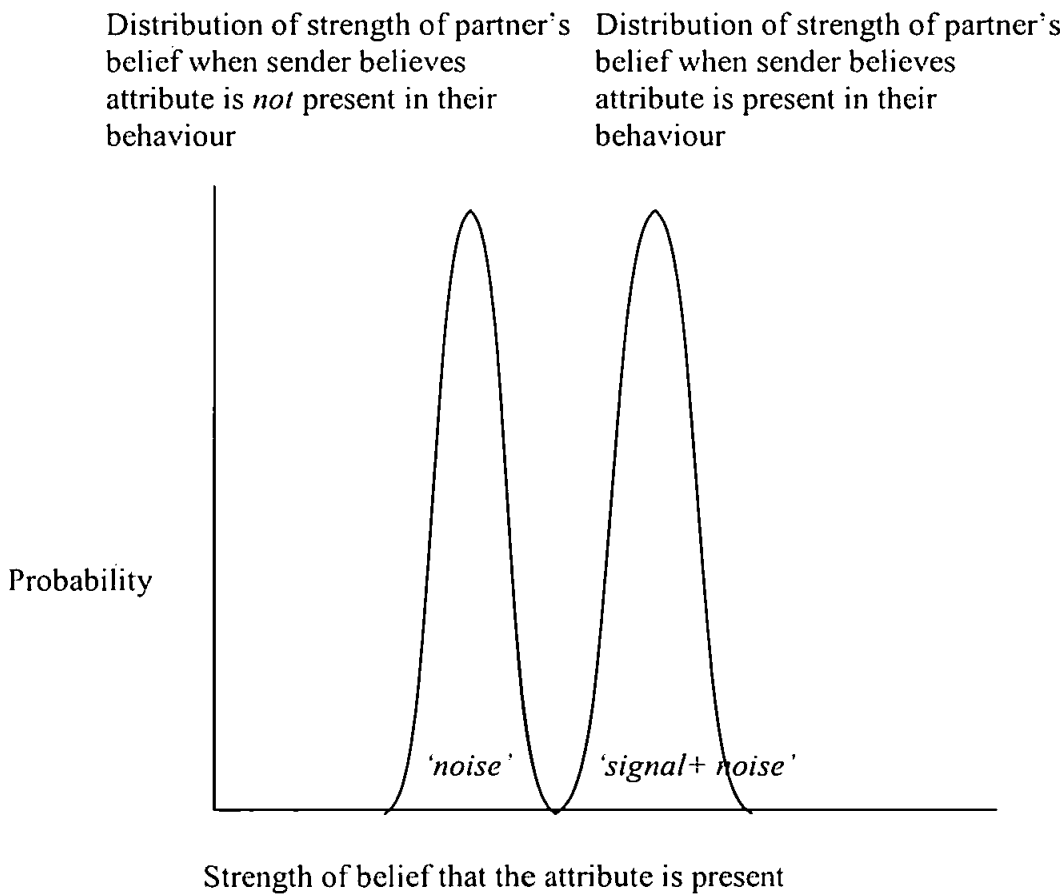


Figure 7.2.: Example of highly discriminable signals

Figure 7.3 Shows the situation where there is poor discriminability with high spread. This is where the partner fails to be able to distinguish between identifying whether an attribute is present or not. The d' -prime here will be close to zero.

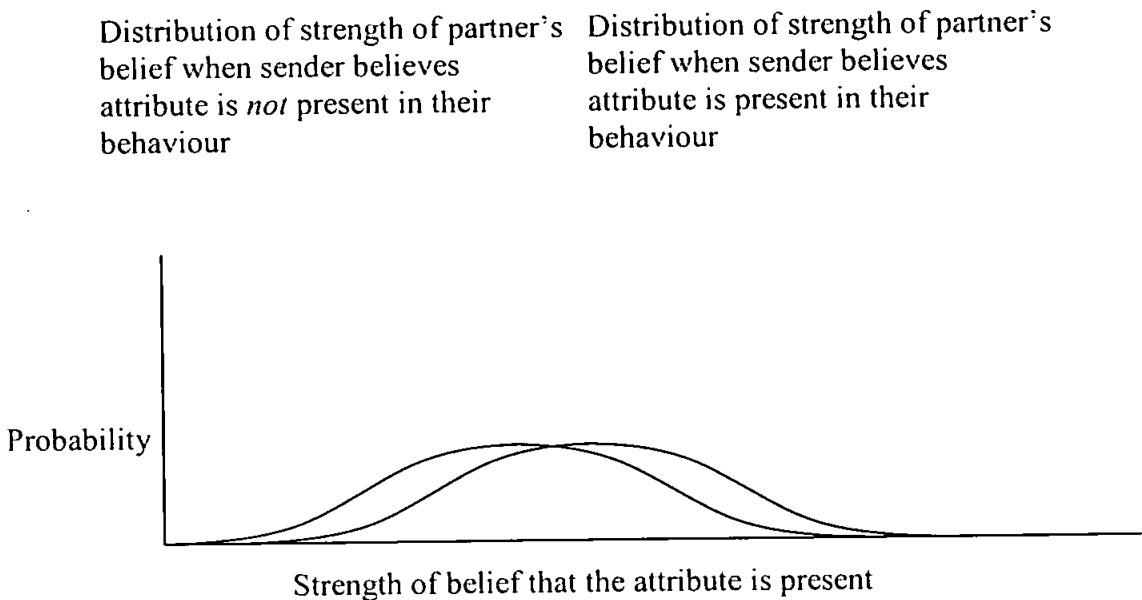


Figure 7.3. Example of lower discriminable signals

The Criterion c measure on the other hand is the partner's response bias. Figure 7.4 demonstrates an example of where an individual's criterion lies for whether a trait is present or not in the sender's behaviour. The more to the left this line falls, the more liberal the partner's judgement i.e. the more hits the partner will have (correctly reporting a trait is present that the sender also believes is present) when making a present-absent judgement. However more false alarms (reporting a trait is present when the sender believes it is not) are also inevitable. The number of misses and correct rejections will be reduced.

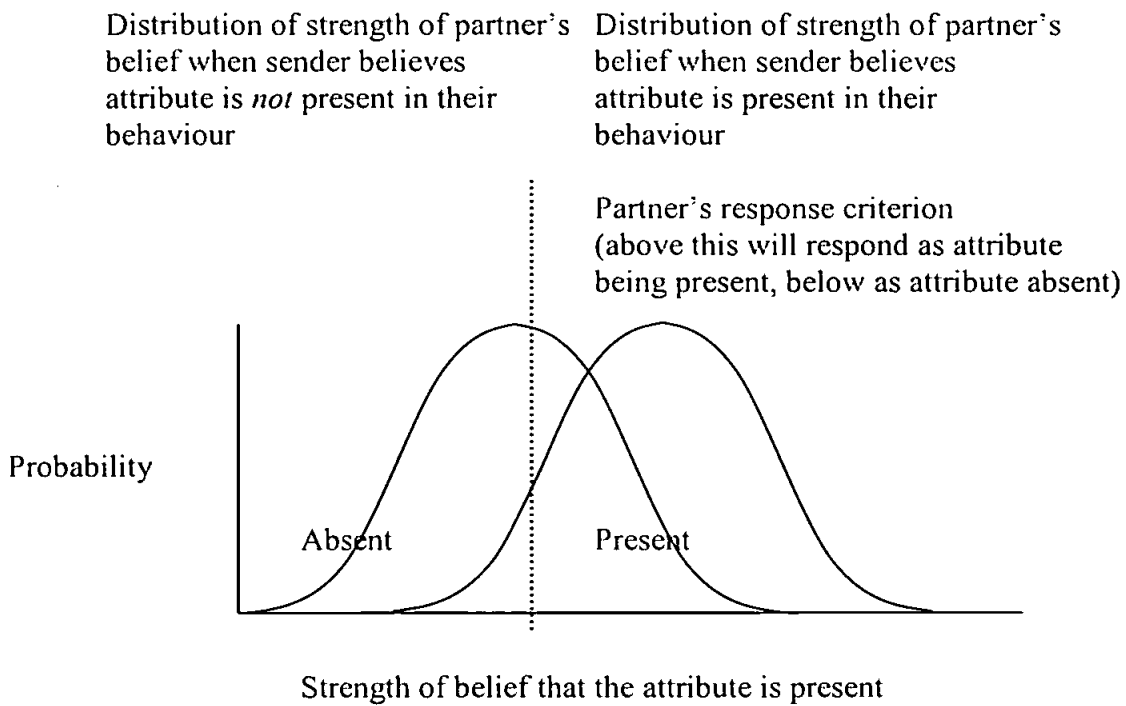


Figure 7.4.: Example of partners response criterion, slightly biased to the left

If the partner's response criterion lies more to the right as in Figure 7.5, the opposite would be the case with the partner's judgements being more conservative resulting in more correct rejections but also more misses and fewer hits and false positives.

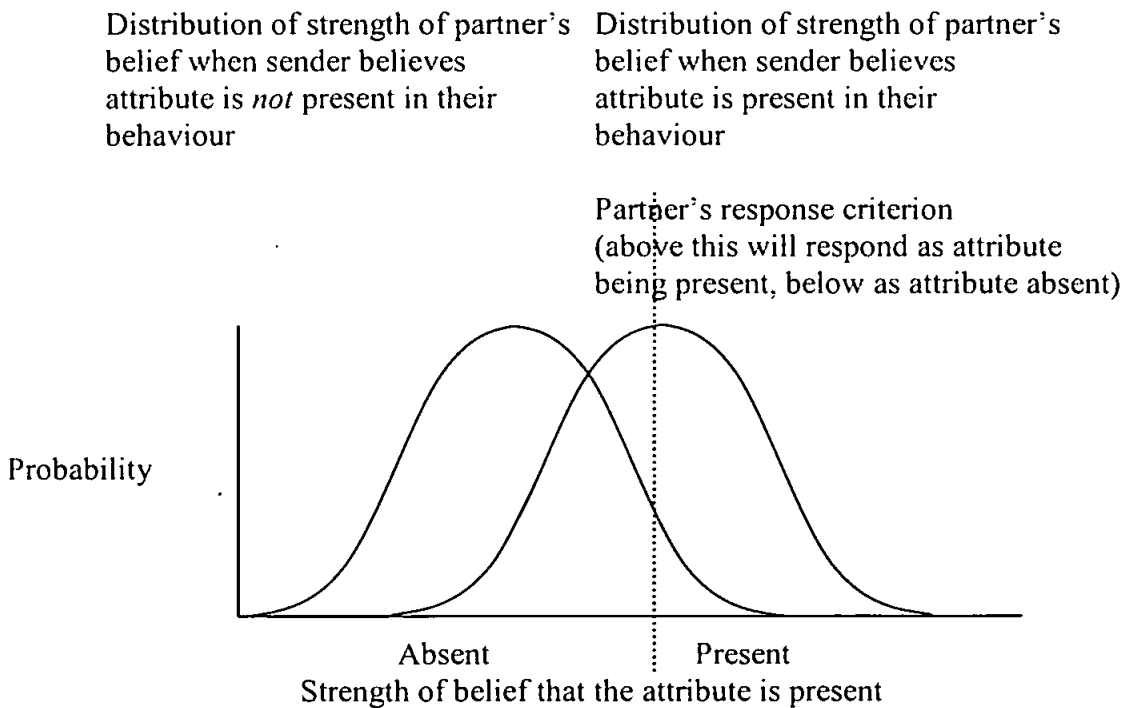


Figure 7.5. Example of partners response criterion slightly biased to the right

The results of these two measures can be demonstrated as follows. For example, the message sender may have identified 50 traits as being present, and 50 traits as being absent. Their partner may have correctly identified these traits exactly the same way, producing the results in Table 7.2, and Figure 7.6.

Table 7.2. Maximum discriminability and minimum observer bias

Cues sender reports as present	Attributes partner detects in senders behaviour	
	Yes	No
Yes	50	0
No	0	50

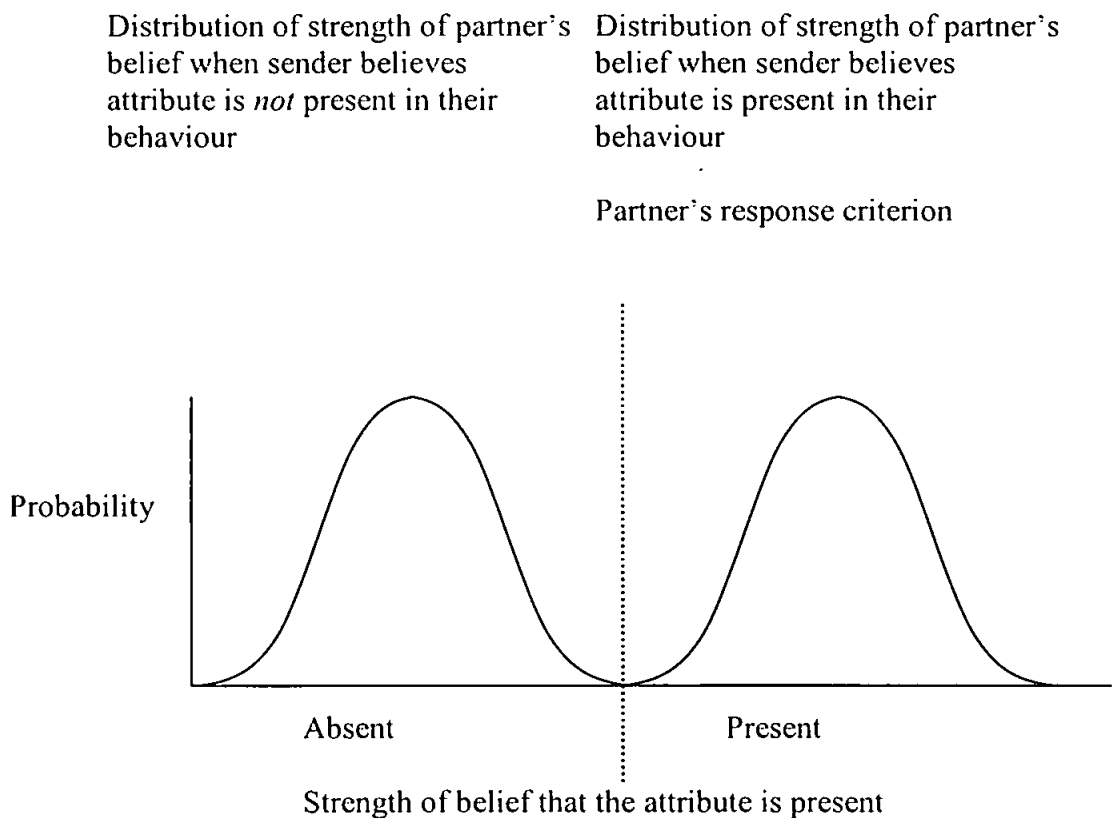


Figure 7.6.: Example of highly discriminable signals and minimum response bias

Calculations of the hit rate and false alarm rate (using an adjustment to avoid zero's and one's) gives values of .995 and .002 respectively. The d-prime value is a maximum of 4.63 and the minimum criterion c is -0.26. This is the situation of

maximum discriminability and minimum observer bias. From a Hyperpersonal perspective, in the current studies this would indicate the attributions made by ones partner as being influenced entirely by the signal given out by the sender, so if more intense attributions were made this would imply the contribution of selective self-presentation.

An example of the results that show minimum discriminability and minimal observer bias are shown in Table 7.3 and Figure 7.7. Here both the hit rate and false alarm rate is 0.5. D-prime and criterion c are both 0. There are problems therefore with both the signal strength given off by the sender as well as the partners observation and criteria for assessing the signal.

Table 7.3. Minimum discriminability and minimum observer bias

Cues sender reports as present	Attributes partner detects in senders behaviour	
	Yes	No
Yes	25	25
No	25	25

Distribution of strength of partner's belief when sender believes attribute is *not* present in their behaviour

Distribution of strength of partner's belief when sender believes attribute is present in their behaviour

Partner's response criterion

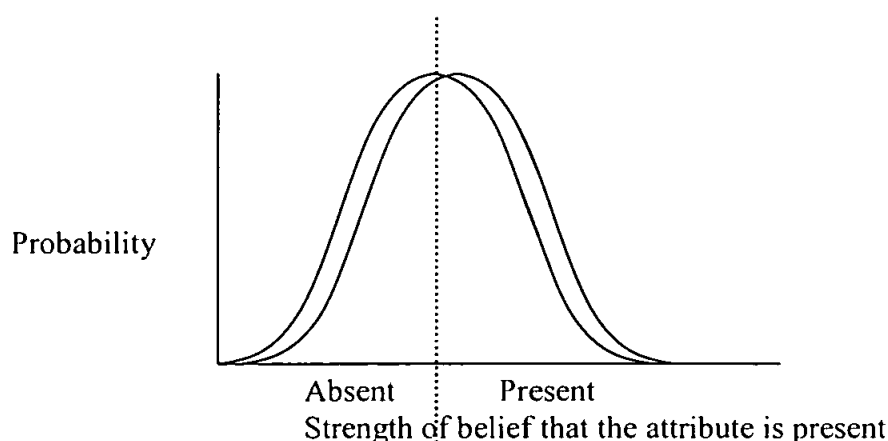


Figure 7.7. Example of low discriminable signals and low criterion bias

Table 7.4 demonstrates a situation of maximum discriminability and maximum observer bias. Here the hit rate is .995 and the false alarm rate is .995 also as there is little discriminability between the strength of signal of the attribute being present or the attribute being absent and the partner has an overly-liberal response criterion labelling all attributes as present. This results in a d-prime of 0 and criterion c of -2.58. The partner is being overly biased in attributing personality characteristics to the sender.

Table 7.4. Minimum discriminability and maximum observer bias

		Attributes partner detects in senders behaviour	
		Yes	No
Cues sender reports as present	Yes	50	0
	No	50	0

Finally, Figure 7.4 and Table 7.5 demonstrates a condition where there is moderate discriminability and moderate observer bias. The hit rate is .995 and the false alarm rate is .50. D-prime is 2.58 and criterion c is -1.29. This shows that the main problem here lies with the receiver who has a tendency to rate characteristics that are not present as present 50% of the time.

Table 7.5. Moderate discriminability and moderate observer bias

		Attributes partner detects in senders behaviour	
		Yes	No
Cues sender reports as present	Yes	50	0
	No	25	25

In summary, Hancock and Dunham's study produced results consistent with hyperpersonal theory, in that interaction through IM produced more intense interpersonal impressions than face-to-face interaction. However a key question not addressed by the authors, or indeed by hyperpersonal theory in general, is whether

this result may be explained by those in the IM condition being more biased to over-attributing traits to their partner, or whether it is that they are accurately detecting personality cues more selectively presented in the CMC than in the face-to-face condition. The use of a quasi-signal detection theory will hopefully untangle these alternative hypotheses.

7.1.2. Model to be Tested

In relation to the overall model to be tested, the studies reported in this chapter are designed to examine the final box of the proposed model of text messaging the 'Communication outcomes', so like the studies in Chapter 6, this chapter is concerned with the outcome of interacting through text messaging on impression formation- specifically the effect on breadth and depth of impressions and whether this effect can be explained by over-attribution, selective self-presentation or a combination of the two.

7.1.3. Summary

In summary, the main interest in the present chapter is to investigate impression formation through text messaging, examining both the sender's perspective and the receiver's perspective. In two studies, we will determine whether the effect found by Hancock and Dunham can be replicated and whether it transfers over to the text messaging medium i.e. whether or not impressions formed through text messaging are more intense, although they may lack breadth, compared to face-to-face communication. In Study 7, an IM condition was also included to be sure that the effect was reliable and could be replicated. The study goes a step further than its

predecessor in employing a quasi-signal detection paradigm to try to untangle on which side the effect lay- the sender or the receiver.

7.2. Study 7: The pilot “design a disgusting menu” experiment

This was the first of two studies based on this experimental paradigm. Having ran this first study changes were made to help improve the sensitivity of the measures and the procedure to the research questions that were posed.

7.2.1. Method

7.2.1.1. Participants

Participants were 60 first year psychology undergraduates from the University of Plymouth who participated for course credits. They were instructed to sign up for one of a list of times and to make sure that if someone else had already signed up for that time, that they did not know that person. This was to ensure that all the participants were meeting with people they were not already acquainted with. To double check this, participants were asked again at the end of the experiment as to whether or not they knew their partner beforehand: none reported this as being the case.

Because of the low numbers of males enrolled on the psychology course, this experiment only used female participants. To increase reliability, it also asked for participants who were competent in texting. Participants were informed in the experimental advertisement that it would involve working with a partner on a task and that they may be interacting through text, Instant Messenger or face-to face communication.

7.2.1.2. *Design*

The study used a between subjects design in which participants were randomly assigned in pairs to one of three conditions of interaction; face-to-face (FTF), Instant Messenger (IM) or mobile phone text messaging (SMS). All participants had the same task to complete.

7.2.1.3. *Materials and Measures*

The mobile phones used for the SMS condition in both studies reported in this chapter were provided by orange. These were four Nokia 3510i models. The phone has a backlit colour display, and has a 3cm x 2cm display screen, allowing the user to see four lines of text at once. The phone allows for concatenated text messages, with a maximum of 761 characters per message. The phones did have a predictive text facility, however to control for differing levels of competence in using this feature, all participants were instructed to use the manual method of text input, involving multi-tapping keys to input the letter that they want.

A condensed version of the 100-item International Personality Item Pool scale was used for personality ratings (see Appendix G). This was condensed because certain characteristics are obviously more observable than others, for example 'avoids difficult reading material' would be very hard to observe in this particular task, whereas 'does not have a good imagination' may be a lot more appropriate to comment on. To screen items for observability, the items were grouped independently by two independent coders into those that were likely to be directly observable in the context of brief text-based exchanges and those that were not. Any disagreements were then resolved through discussion. The initial reliability was $k = .75$, this was increased to 1 after discussion of the items. Having coded the items in this way, the

final scale consisted of the 52 items consensually agreed as observable. Because some factors are more observable than others, this led to a different number of items representing each of the five factors. Factor one (extraversion) had 11 items (four negative, seven positive), factor two (agreeableness) had 12 items (six negative, six positive), factor three (conscientiousness) had eight items (three negative, five positive), factor four (emotional stability) had seven items (six negative, one positive), and factor five (intellect) had 14 items (five negative, nine positive). Each item had five responses 'very inaccurate', 'moderately inaccurate', 'neither inaccurate nor accurate', 'moderately accurate' and 'very accurate'.

As in Hancock and Dunham's study, the intensity of impression formed was measured by the deviation from the mid point on the response scale.

Instructions that the participants were given, read as follows:

Firstly for the self-rating scale:

On the following pages, there are phrases describing people's behaviours. Please use the rating scale below to honestly describe how you portrayed yourself to your partner during the interaction

Then they rated their partner:

Now please fill out the same scale again, this time using the rating scale below to describe how accurately each statement describes how your **PARTNER** portrayed them self during the interaction.

Having rated both themselves and their partners, participants then completed a series of questions based on the quality of the interaction. They were asked how satisfied they were with the decisions reached with their partner (1= Very dissatisfied, 5= very

satisfied), how confident they were in the accuracy of the impression they formed of their partner (1= Not very confident, 5= very confident), how confident they were in the impression their partner had formed of them (1= Not very confident, 5 = very confident), how easy it was to conduct the conversation (1= Very difficult, 5= very easy), How much they enjoyed engaging in the conversation (1= Not at all, 5, very enjoyable), how much they would like to know their partner better (1= Definitely not, 5= very much) and the 15 point liking scale used in our previous research (-7= Strongly dislike, +7= strongly like).

Demographic information was recorded, including age of the participant and the average number of texts they sent, and voice calls they made, per month. Participants were also asked to indicate on a 15 point scale their preference for texting versus talking on their mobile (-7= always prefer texting, +7= always prefer talking).

7.2.1.4. Procedure

Participants were led separately to the laboratories they were to do the experiment in, ensuring no contact was made between them prior to the task. Participants in all three conditions were given a written briefing that outlined the collaborative task that they were to complete.

This task was one used by Hancock (2004) called the ‘disgusting foods’ task. Participants were instructed to devise a light-hearted and entertaining menu for a five course meal (i.e. a starter, soup, salad, main course, dessert and a drink) of disgusting foods for someone they both disliked. This could be someone who was a film or TV personality, pop star, or other celebrity. They were asked to discuss each course in turn, coming to a final agreement on each one before moving on to the next. A table in which to record their answers was given to each participant to write down their

final, agreed choice for each course. Participants were given a maximum of 40 minutes to complete this task. The task was complete when the participants had written down a suggestion for each course. Because interacting through text-based media can take longer than face-to-face, the task was piloted beforehand to check the task was achievable in this amount of time in the SMS condition. This was found to be sufficient time.

Those in the face-to-face condition were taken into a room and seated on opposite sides of a table facing one another. Those in the IM condition were sat at computers with partitions between them. Displayed on their computer screen was a private conversation window within which they could communicate with their designated partner. Ten people were ran at a time in this condition, and visual contact was prohibited by having each participant in an individual cubicle in the room. Those participants in the text condition were led to different rooms and given the phone number of the person they were to collaborate with in the task.

Face-to-face conversations were recorded using a tape recorder, IM conversations were automatically logged by the computer, and text message conversations were stored in the mobile phones. When the participants had completed the task, having filled in all the necessary boxes on the task sheet, they were told to inform the experimenter who then made note of the time this took.

On completing the task participants were then asked to complete two IPIP questionnaires - one for themselves as they believed they had portrayed themselves to their partner during the interaction, and one rating their partner. They then filled out measures relating to the quality of the conversation, and also rated how much they liked their partner, and whether they would like to get to know them better. Information on mobile phone behaviour (texts sent/received per month etc.) was also

gathered at the end of the questionnaire. Those in the face-to-face condition were placed in separate rooms whilst filling out these questionnaires to maintain confidentiality.

As in Hancock and Dunham (2001), to minimize individuating cues, participants were instructed not to reveal their name or age during the interaction.

7.2.2. Results

7.2.2.1. Scale Reliabilities

Examining the five factors within the scales produced the alpha reliability coefficients shown in Table 7.6.

Table 7.6.: Alpha coefficients for factors in the IPIP scale

Factor	Alpha Coefficient	
	Self	Other
1. Extraversion	.59	.85
2. Agreeableness	.72	.50
3. Conscientiousness	.56	.73
4. Emotional stability	.76	.83
5. Intellect	.77	.84
All factors	.71	.66

To rule out potential confounds, total factor scores were tested to check for personality confounds within the different conditions, there were none found ($p > .10$).

7.2.2.2. Interaction Time

The time taken to complete the task varied as expected, with participants in the FTF condition completing it fastest ($M = 723.5s$, $SD = 173.76$), followed by IM ($M = 1743.40s$, $SD = 357.44$) and SMS ($M = 2101.10s$, $SD = 371.00$). There were no significant correlations between the majority of the dependent variables and the time

it took to complete the task. Accordingly, an ANCOVA using time as a co-variate was not deemed appropriate.

Time did however correlate significantly with liking ($r = .26, p < .05$) and with enjoyment ($r = .33, p < .01$). However using time as a covariate in analysing these variables showed no evidence of a significant difference between the communication conditions.

7.2.2.3. *Confidence in Ratings*

There was a significant difference found in participants confidence in the impression they formed of their partner ($F(2, 57) = 4.05, p = .02$). Post-hoc tests revealed this difference lay between the IM and SMS conditions ($p < .01$). Those participants in the SMS condition reported significantly more confidence ($M = 3.7; SD = .86$) in their impressions than those in the IM condition ($M = 2.8, SD = 1.24$). The difference between the SMS and FTF ($M = 3.35, SD = .88$) conditions was in the same direction but failed to reach significance ($p = .09$). Likewise, participant's confidence in the impression their partner formed of them showed the same pattern. Those participants in the SMS condition ($M = 3.2; SD = .70$) showed significantly more confidence in the impression that their partner formed of them than those in the IM condition ($M = 2.6, SD = 1.14; F(2, 57) = 2.22, p = .05$). The FTF condition failed to differentiate between the two ($M = 3.0, SD = .72, p > .10$).

7.2.2.4. *IPIP results*

The sums of each factor were compared across conditions for both self-rated and partner-rated IPIP's. The only significant differences found on the average IPIP ratings were with two of the factors when rating partners. These were factor 3

(conscientiousness) where those in the SMS condition ($M = 3.7$), showed a significantly higher average IPIP score than face-to-face ($M = 3.3$), and IM ($M = 3.4$; $F(2,59) = 4.32, p = .02$); and factor 1 (extraversion), where the SMS condition ($M = 3.8$) again demonstrated a significantly higher average score than both the face-to-face ($M = 3.5$), and IM conditions ($M = 3.4$; $F(2,59) = 3.91, p = .03$).

There were found to be no evidence of significant differences across the communication conditions in the number of times participants used the midpoint answer of '3' on IPIP items for each factor ($p > .05$), ruling out the possibility that some factors were easier to rate than others after certain communication interactions.

7.2.2.5. *Breadth of Impressions*

In Hancock's study, the number of responses was assumed to index breadth. However in the present study there was no 'cannot answer' option given and so the option 'neither accurate nor inaccurate' ('3') was taken to index a lack of breadth in the judgement of that characteristic. As there were an unequal number of items per factor, to calculate breadth, the number of questions not coded as 3 was converted to a proportion. So the higher the proportion, the more breadth was shown within the scale.

When participant's ratings of their partner were examined using a 3 (condition) by 5 (factor) ANOVA, there were found to be no significant differences in breadth between the conditions for any of the factors ($p > .05$). Although there seemed to be a general pattern of SMS having greater breadth than face-to-face with IM having the least breadth but none of these results were statistically significant (see Table 7.7 below). There was no evidence of a significant interaction between condition and trait, nor a main effect of condition.

Examining self-ratings for differences in breadth unveiled no significant differences between the conditions ($p > .05$). Again there was found to be no interactions or a main effect of condition.

Table 7.7. Proportion of responses not rated as 3

Condition	Factor	<i>M</i>	<i>SD</i>
FTF	1	.77	.04
	2	.73	.07
	3	.63	.06
	4	.56	.06
	5	.69	.05
IM	1	.71	.04
	2	.60	.07
	3	.60	.06
	4	.46	.06
	5	.69	.05
SMS	1	.77	.04
	2	.71	.07
	3	.69	.06
	4	.59	.06
	5	.72	.05

7.2.2.6. *Intensity of Impressions*

To examine intensity of impressions, the IPIP ratings were recoded to give ratings of 1's and 5's a score of 2, ratings of 2's and 4's given a 1, and 3 ratings, taken earlier as indicating a lack of breadth, a score of 0. Looking firstly at the intensity of impressions formed of ones partner, no significant differences were found between the conditions ($F(2,57) = .91, p = .40$), although interestingly a similar pattern of differences arose over the five factors with SMS being more intense in all but emotional stability where it was superseded by face-to-face. IM was the lowest intensity in all but intellect where it was found to lie in the middle of SMS and face-

to-face. No significant effect of condition ($M = .96$; $M = .89$, and $M = .81$ for SMS, face-to-face and IM respectively), nor a trait-condition interaction was found ($p > .05$).

No significant differences were found in participant's intensity ratings of themselves either ($p > .05$). And again the general pattern seemed to show the SMS and face-to-face conditions showing more intensity than the IM condition. There was found to be no significant main effect of condition ($M = .92$, $M = .92$, and $M = .87$ for SMS, face-to-face and IM respectively) and no significant trait-condition interaction.

When rating of self/other was added in as a repeated measure, a significant interaction between this and personality factor was found ($F(4, 228) = 10.73$, $p < .001$). For ratings of self, the general pattern was for extraversion and agreeableness to be ranked most intensely, followed by intellect, emotional stability and then conscientiousness. For ratings of one's partner, agreeableness and emotional stability resulted in higher intensities than extraversion and intellect, and as was the case in ratings of self, conscientiousness was rated least intensely. This is inline with Gosling *et al.* (1998) who postulated that some factors are more observable to others than to one's self. This was taken into account in the next study by taking into account observability of factor in the analyses by including a measure of 'cannot make judgement' into the questionnaire.

7.2.2.7. *D-prime and Criterion Results*

Having discovered some intensity effects the next stage was to try to uncover whether these were due to selective self-presentation on behalf of the sender or an over-attribution effect on behalf of the receiver. The quasi-signal detection paradigm was used at this point.

D-prime and criterion scores were calculated using the formula shown in Appendix H. A signal (the personality attribute) was classified as present if participants rated an IPIP item as either a 4 or 5. Ratings of 1, 2 and 3 were classified as signal absent. A repeated measures analysis (using factor as the within subjects variable and medium as the between subjects variable) showed there to be no significant difference between the conditions in d-prime scores ($F(2,57) = 1.06, p = .36$). There was a significant effect of factor (see Table 7.8) $F(4, 228) = 2.73, p = .03$, with intellect agreeableness and extraversion demonstrating more discriminability than conscientiousness and agreeableness.

Table 7.8. Mean D-prime values for each factor

Factor	D-prime	
	<i>M</i>	<i>SD</i>
1. Extraversion	.36	.79
2. Agreeableness	.42	.87
3. Conscientiousness	.19	.86
4. Emotional stability	.14	.87
5. Intellect	.57	.86

When the criterion scores were compared (Table 7.9) there seemed to be evidence of significant differences between conditions ($F(2, 57) = 4.54, p = .02$). On closer inspection, this difference was between the SMS and IM conditions ($p = .01$). This seemed to be evidence of a strong response bias in the SMS condition, which was absent in the IM and face-to-face conditions. The mean criterion score for SMS was significantly more biased towards false negatives ($M = -1.07, SD = .39$) than it was in the IM condition ($M = -.53, SD = .72$), with the face-to-face condition lying in between ($M = -.85, SD = .54$ respectively).

Again there was a main effect of factor ($F(3.5, 228) = 5.33, p = .001$) with intellect and emotional stability showing the lowest criterion scores demonstrating

they are more biased to respondents claiming a trait is present. Extraversion, agreeableness and conscientiousness resulted in a lot less bias in participants attributions as to whether a signal was present or not.

Table 7.9. Mean criterion c values for each factor

Factor	Criterion c	
	<i>M</i>	<i>SD</i>
1. Extraversion	-.18	.66
2. Agreeableness	-.03	.68
3. Conscientiousness	-.03	.61
4. Emotional stability	-.30	.64
5. Intellect	-.34	.56

There was no overall effect of medium ($F(2,57) = 2.6, p = .08$) on criterion c. However a post hoc analysis revealed there to be significant differences between the IM and SMS conditions ($p = .03$). On closer analysis this difference lay in the criterion measures of extraversion ($p = .04$), whereby those in the SMS condition were more likely to over-attribute characteristics to their partner ($M = -.40, SD = .58$) than those in the IM ($M = -.02, SD = .67$). It should be noted that this pattern of SMS being more likely to over-attribute was repeated on all the other factors too, although none of those differences were statistically significant. This seems to show there is some evidence that receivers in the SMS condition are more biased to assigning a personality characteristic as present than those in the FTF condition.

7.2.2.8. Other Measures

To examine whether a preference for text or talk affected personality attributions, this was added as a between subject factor (preference coded as ratings of -7 to -1 = text, and +1 to +7 = talk) no significant differences between these preferences were found for intensity of impression formed ($F(1, 51) = .80, p > .10$), nor for breadth of impression formed ($F(2, 51) = 1.78, p > .10$). When the degree of

text/talk preference was split into five categories: -7 to -5 (heavy text preference), -4 to -2 (moderate text preference), -1 to +1 (no preference), +2 to +4 (moderate talk preference), +5 to +7 (heavy talk preference); to see if this would provide a more sensitive test no significant differences were found between any of these five in either intensity ($F(4, 45) = .19, p > .50$) or breadth ($F(4, 45) = .14, p > .50$).

No evidence of significant differences between Texters and Talkers were found for overall d-prime ($F(4, 59) = .55, p > .50$) nor for overall criterion ($F(4, 59) = .27, p > .50$) when looking at the five classes of texter/talker preference. However, none were expected. This study specifically recruited participants who used their phone to text, so 'Talkers' would have been excluded at this stage.

7.2.2.9. *Social Desirability*

To look at the effect of social desirability, the IPIP scores were converted to Z scores based on the mean and standard deviations of participants self ratings over all three conditions (to control for differences between the items in variation around the mean) as an index for social desirability- the higher the average score the more participants were inclined to assign a particular personality characteristic to themselves/their partners. According to the IPIP developers (Goldberg, 1999), the index can be calculated by computing the mean response for each item across all the participants, and then correlating each participant's response with those item means across the total set of items to get social-desirability correlations.

To see how social desirability influenced participants self ratings, correlations between self ratings and the overall average self rating were examined. Also, to see how it may influence participants ratings of their partners, the correlations between

partner ratings and average partner ratings were examined. Neither of these were found to be significant ($F(2, 59) = .08, p > .50$; $F(2, 59) = .61, p > .50$ respectively).

7.2.3 Discussion

The finding that those in the SMS condition showed a slight response bias towards making attributions of greater intensity about their partners personality combined with the other results discussed earlier may be interpreted as demonstrating that when interacting through text messaging, participants over-attribute IPIP traits to their partners, such that in signal detection terminology, false alarms levels in SMS exceed correct rejections compared with the other two conditions. This would be supported by the higher average partner ratings also found, which was significant even when social desirability was partialled out. The lack of a significant difference in the intensity of attributions rules out the alternative interpretation of participants simply demonstrating an extremity effect in the text message condition. Also, the lack of any significant differences in the self ratings seems to be against the interpretation that there is an overall rating bias in the SMS condition. Finally support may also be seen from the fact that those in the SMS condition were also significantly more confident in their ratings of their partner's personality than in the other two conditions.

It may be that the communication media differed in the way that information about one's partner is carried across. For example it may be that those who interact through SMS remember more about their self-presentation, as it was more deliberate, in that they had to selectively present information in a concise manner due to the keypad and other constraints inherent to the medium. Because they would have to plan what they were going to say more, this may explain the finding that those in the

SMS condition were significantly more confident about how they came across to their partner compared to the other two conditions. The asynchronous nature of the medium may have reduced cognitive demands apparent in face-to-face and IM whereby the participants have to attend to the information presented a lot faster than in SMS as the communication is more 'real time'. In a future experiment this may be tested by using recall measures of aspects of the communication to see if there is greater accuracy in SMS than in face-to-face or IM.

The IPIP items used were selected as those that intuitively were rateable/observable. To provide a further check on this, two independent observers were asked to rate the items on their observability this produced results in accordance with the author's. Kappa values were both over .85, and items that were not rated the same were discussed and agreement made. The actual factors were not really important here as it was the overall signal detection levels that were the variables of interest as opposed to the detection of particular factors and their differences. Obviously some factors were going to be more observable than others, as reflected in the differing number of observable items that were selected for each of them. The next study partitioned the factors into two categories - high observability, and low observability based on a discriminant analysis using the added response item of 'cannot make judgement' to define observability. This was to make a more powerful test of the differences between the conditions.

One potential problem is that it is possible that participants are rating their partners as 'average' using the midpoint of 3. Because this study failed to have a separate response option of 'cannot respond' it is unclear as to whether participants used the midpoint option to record an 'average' impression or rather use it as an option to indicate that they did not feel confident enough to judge that aspect of their

partner's personality. This has obvious implications for the breadth measure, as the lack of difference could be due to the fact that many of the items coded as 3 may be items that normally would be left as 'cannot respond'. Therefore, a replication of this study with the added option of 'cannot respond' for each item is needed to look into this further.

The finding that the differences between IM and face-to-face did not replicate those found by Hancock and Dunham (i.e. that IM produced greater intensity but less breadth of impression) needs further investigation. The SMS condition was more in line with these expectations, being significantly different from IM and face-to-face on some of the measures discussed. It may be that the version of IM used in the present experiment was functionally dissimilar to the version used by Hancock and Dunham. They used a chat program that was conversationally more synchronous than that used in the present study, to the extent that each participant instantaneously read what their partner was typing on a character-by-character basis. This differs from the majority of online chat programs and IM services which typically display partner's contributions only after they have typed in their contribution and pressed the 'enter' key (although some display a message to the effect that the partner is typing a reply). Participants would therefore be able to see their partner's mistakes in typing, rewording, etc., and this may have given them deeper insights into their partner's self-presentation strategy. Also, because they may be focussed on attending to what their partner was typing, they may not have had time to reflect on their own messages.

Hancock and Dunham's study did not take into account the observability of traits. Their 'cannot make judgement' response to certain items may have been more apparent in the IM condition as those particular personality attributes were not as observable through IM as they were face-to-face. Indeed on looking at the items

included in their inventory (Hancock, email correspondence), some of them were more observable to the face-to-face than the IM condition. It may be that in the face-to-face interaction, some personality ratings were based on social context cues, such as appearance of the partner (e.g. items based on physical appearance such as tidiness), rather than behaviour during interaction. This obviously would be limited in IM and SMS.

Another reason for some of the differences between the present study and Hancock and Dunham's may be that because their task was very task based with participants describing shapes to their partner so they could identify them. This task-focussed nature of the interaction may have resulted in not enough individuating information being generated to allow participants in the CMC condition to learn more about each other. Hence participants may not have felt confident enough to rate their partner on all aspects of their personality. The present task was more social so more cues to personality may have been available.

According to Gosling *et al.* (1998), observability, social desirability and big five factor can all influence levels of agreement between self and other ratings. The present study tried to tackle observability by omitting IPIP items that were considered less observable in the context of text messaging. Social desirability was factored into the analysis and effects were found even when this was factored in. Items were looked at independently as well as within the factor they were part of so the factor itself should not have a big impact here.

One key finding in the present study was the discovery of the receiver effect – using the quasi-SDT measures. There were found to be no changes detectable in the behaviour of the sender. Rather it seems entirely the result of partners' more extreme judgements, not the participant sending a sharper, more distinct signal. The lowered

criterion bias displayed by receivers suggested they were biased to assigning personality traits as present even when the sender indicated they were not. This is contrary to Hancock & Dunham's claim that differences between their conditions was due changes in self-presentation strategy of the senders. Further investigation is imperative to evaluate this conclusion, as it is a key component of hyperpersonal theory and can help tighten the theory.

A puzzling question is why there were no differences between the IM and face-to-face conditions. And even more puzzling is why does SMS show a difference compared to face-to-face but IM does not? The greater synchronicity of IM compared to SMS may be a problem in impression formation. However this latter idea fails to explain why in Hancock and Dunham's study there was a difference between the face-to-face and IM conditions because as already discussed, the version of IM used was more synchronous than that used here. A tentative reason for differences between the conditions may be that there is less time for disconfirming evidence/feedback in SMS compared to face-to-face and IM where the pressure to respond immediately is greater. SIDE theory may be appropriate here as it could be that SMS results in more feelings of similarity with one's partner through SMS, as there are fewer disconfirming cues (a facial expression in face-to-face, or a long delay in IM for example). The present data reveal that those interacting through SMS showed higher correlations between self and other ratings, indicating that they perceive themselves as more similar to their partners in the SMS compared with other conditions. This fits in neatly with the SIDE framework: participants perceive greater similarity between themselves, and as a result converge on more extreme norms, rating each other more intensely on IPIP items.

One potential reason for the difference between SMS and the IM and face-to-face conditions is that the former were physically isolated, whereas those in the face-to-face and IM conditions were in the same room, although in this case participants were unaware of which particular participant they were interacting with. They may have felt more accountable for their actions, or felt that they were more identifiable than they actually were, making the medium more akin to face-to-face than SMS.

The actual process of texting may be perceived as more personal/relational. It is often reported how users see their mobile as an extension of self (Ling, 2004). The same cannot be said of computer chat or a face-to-face interaction with a stranger. This may result in more intense attributions of partner as the interaction through text may feel automatically more personal.

The findings of this study add to the disconfirming evidence regarding the CFO approach to mediated communication. It has shown how people can make personality attributions through text-only interaction that are similar to face-to-face attributions, despite the limited cues that are available through text messaging.

Obvious limitations of the experimental series and others in the literature, are that the majority are limited to interactions between strangers. As Walther (1992) points out mediated communication often supplements existing communication methods of people who see each other on quite a regular basis. Ideally a longitudinal study would be conducted to follow impression development from early relationship development onwards. Also, longer periods of interaction need to be used to see how impressions may change over time.

The use of personality ratings may be questioned for a number of reasons. It is widely cited in the literature that retrospective reports of behaviour are not as accurate as those done at the time (Gosling *et al.*, 1998), however giving participants the

questionnaire to fill out during the interaction could have led to social desirability effects and distraction from the problem task used. It is also acknowledged that self-reports are vulnerable to biases of self-enhancement and social desirability. However these biases should affect all the conditions equally so any differences between conditions should be due to the medium.

This experiment was treated as a pilot and a number of alterations were made to make it a more robust test of the earlier paradigm and the applicability of hyperpersonal theory to mobile phone text messaging.

7.3. Study 8: The Final “Design a Disgusting Menu” Experiment

7.3.1. Introduction

The failure to find the predicted intensity and breadth differences between face-to-face and the SMS and IM conditions in the last experiment led to a replication with some changes to see whether or not a more sensitive study could uncover any differences between texting and face-to-face communication in line with Hancock and Dunham’s original findings. In this final study participants were required to take part for a longer period of time as more measures and tasks were incorporated. Also the Instant Messenger (IM) condition was dropped so as to focus on the two key communication media of interest: text messaging and face-to-face. The IM medium had failed to differentiate in any useful way in the last experiment and differed functionally from the system employed by Hancock & Dunham, so there was no advantage in keeping it in the present experiment.

The previous experiment suggested that participants did not differ in the strength or distinctiveness of the personality they projected to their partners across the different media conditions. To try to see if this strategic aspect of self-presentation

could be manipulated, the variable of anticipated future interaction (AFI) was added in the replication of the experiment. This variable has been linked to affiliation processes in the literature (e.g. Walther, 1994; Berger & Douglas, 1981; Tice *et al.*, 1995; Kellerman, 1986), with the general finding that the expectation of future interaction leads to an increase in uncertainty reducing behaviour, causing self-presentation to be more salient, which in turn results in greater investment in the relationship, and an increase in liking and intimacy for one's partner (Berger & Calabrese, 1975).

Walther (1992) found that CMC groups interacting over extended periods did not differ significantly in levels of intimacy or sociality in their initial meetings when compared to equivalent face-to-face groups. However short-term CMC groups showed a significant difference, with lowered intimacy and affiliation. To explain this finding, Walther hypothesised that the expectation of future interaction may affect affiliation processes used by those communicating in an interaction: 'anticipation of future interaction may actually be greater and more of a constant in any face-to-face interaction, regardless of time frame, although lower and more variable in CMC' (1994, p478).

In past research it has been found that telling participants that there would be no future interaction after a meeting face-to-face still resulted in slightly elevated scores of anticipated future interaction, indicating residual expectations that they may nonetheless see the person again (Douglas, 1987). This may of course be because student participants may expect the other person to be enrolled on the same course as them, or at least be at the same university, so it may be likely that they would meet them at some point again in the future. Although in contrast to face-to-face, in

mediated communication where one's partner is visually anonymous, one would not know what their partner looks like so these concerns may not be apparent.

AFI has been shown to increase biographical and demographical information shared between partners (Berger & Calabrese, 1975), to increase feelings of similarity with one's partner, and for people to present themselves more positively (Berger & Douglas, 1981). Indeed AFI has also been used to explain why one-shot interaction studies have found CMC groups to be significantly lacking in liking/intimacy when compared to face-to-face.

Plausibility, audience gullibility and fear of disconfirmation can cause more modesty in self-presentation (Tice *et al.*, 1995). It may also be presumed that communication media and expectation of future interaction may affect this, for example meeting someone through text and not expecting future interaction may lead to less modesty than meeting someone through text and expecting future interaction or meeting someone face-to-face where there are potentially more contra-indicative cues to the personality one may be trying to present.

According to Greenberg *et al.* (1985): 'social anxiety occurs in social situations in which people are insecure about the impressions that others are forming of them' (p1). In their study of face-to-face communication in conjunction with social anxiety and anticipation of future interaction as determinants of self-presentation, Greenberg *et al.* found that those individuals who were low in social anxiety (LSA) responded to anticipation of future interaction by increasing the favourability of their self-presentations. Those high in social anxiety (HSA) did not increase their impression favourability. It was reasoned that because HSA individuals perceive themselves as less able to successfully present their desired image, they were less motivated to present themselves positively during the initial interaction. In contrast,

LSA individuals are more motivated to present themselves more positively as they believe they can do so successfully, having generally more expectations of positive social outcomes than if they were not expecting to meet again. Indeed they found this was indeed the case - low social anxious individuals in their study modified their self-presentations to convey a more positive image when anticipating future interaction. High socially anxious individuals did not, leading the authors to conclude that 'the effect of anticipating future interaction depends on the individuals dispositional level of social anxiety' (p8). In the present study, it can be postulated that because SMS offers a less threatening and more controllable environment, the possibility of making a favourable impression increases, and HSA individuals will be as motivated as LSA individuals to present a positive self image.

In the previous study there was no way of knowing whether participants' presented self correlated with their perceived actual self. In the present study this was rectified by asking participants to fill out a questionnaire on their baseline personality at the start of the experiment, prior to any other instructions or information being given. This was to determine whether or not a person's 'actual' self differed from their 'presented' self. This was considered to be a useful addition as it not only permits comparison between the detection of actual and presented self images, but also exploration of potential differences in the projective, constructive and identity play aspects of personality, as has been observed in identities presented online (Turkle, 1995).

The signal detection paradigm was employed as in the previous experiment, with the aim of distinguishing between conditions in terms of the sender giving out a certain personality or the receiver over-attributing personality characteristics to their

partner, conclusions that Hancock and Dunham had failed to differentiate between in their original study.

The same 'disgusting foods' task was used as before. However this time participants were first required to complete it on their own, and then to collaborate with a partner on it. This was so as to promote greater discussion of the different choices, as a potential concern in the last experiment was that participants may have just acceded to each other's ideas with little discussion. It was thought that if participants had already formulated ideas on their own, then they would have more arguments to exchange as well as a greater commitment to their ideas when working on the task in collaboration with their partner.

We have argued elsewhere that due to the reduction in social context cues, text messaging imposes a lighter cognitive load than face-to-face communication, resulting in more control over the interaction, what is said, when it is said, and more control over how to respond. It may also result in participants remembering more about the content of the interaction itself than if they had interacted face-to-face as they may not have to worry about the physical presence of the other person, the body language cues they are giving off, etc. Also they are less distracted by the other person themselves. To test this idea, at the end of the study, participants were given a recall task of the menu they devised together. This was added to test for any differences between conditions in task focus, for example, participants interacting face-to-face may be less focussed on the task and more concerned with self-presentation and managing all the interpersonal cues they are having to deal with. In contrast, participants in the text condition have fewer cues to focus on, and this lowered cognitive load may allow them to focus more on the task itself, and as a result recall more items.

In this experiment, participants were given as much time as they needed to complete the collaborative task. This was so participants in the text condition were not disadvantaged by having to communicate by a slower medium.

Once again, only females were recruited, due to problems in recruiting sufficient number of males. It was also required that participants knew how to text on mobile phones, for reasons stated in the pilot experiment, and because there was insufficient time to train them comprehensively.

In summary then, this experiment is a replication of the last study with a number of critical additions and improvements in methodology. The most notable of these are the addition of the anticipated future interaction independent variable, and the deletion of the Instant Messenger condition.

7.3.1.1. Main Hypothesis Tests

In addition to the two hypotheses related to depth and breadth of impression formed, the use of a baseline measure of self along with the measures of presented self and ratings of partner allows for two important hypothesis tests depicted in Figure 7.8. These tests relate to *consistency of self-presentation* (the comparison of baseline self ratings with presented self ratings), and the *detection of presented self* (the comparison of presented self ratings and partners ratings of self).

The detection of presented self will be examined using signal detection theory, using the d-prime and criterion c measures, as was the case in the previous study. Self-presentation consistency will be examined by comparing the meta-ratings of self presented to partner with the baseline measure of self, focusing on the proportion of IPIP ratings that remain unchanged compared to those that become more/less intense, or unrated due to lack of information.

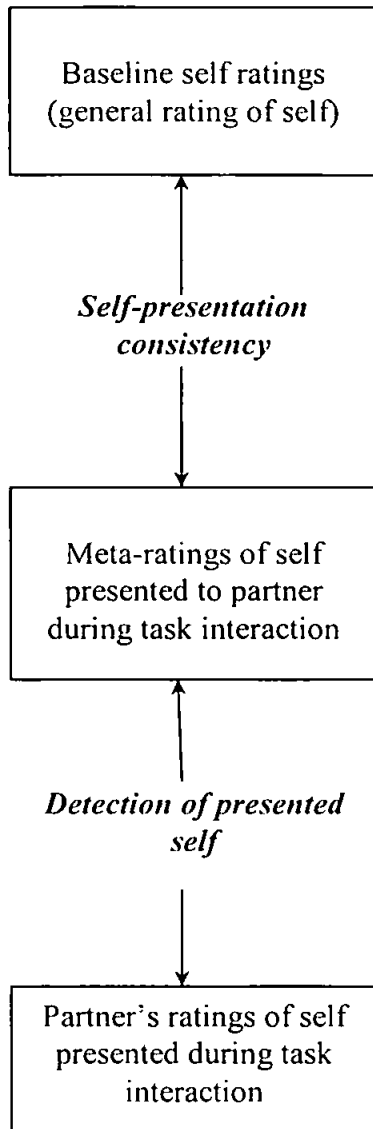


Figure 7.8. Model of some of the hypotheses to be tested

The additional variables of anticipated future interaction and social anxiety also lend themselves to important predictions. Overall it is predicted that those in the SMS condition will report greater intensity of impressions, although breadth may be decreased. Low social anxiety and anticipated future interaction are predicted to lead to more intense impressions than high social anxiety and no anticipated future interaction in face-to-face settings as high social anxiety may lead participants to worry how they may maintain their self-presentation (Greenberg, Pyszczynski & Stine,

1985). This anxiety is expected to be reduced in SMS as it becomes safer to express oneself, so overall a 3-way interaction is expected.

For self-presentation consistency, no anticipated future interaction combined with SMS may allow for more identity play, allowing participants to construct self images that are less inhibited by the concerns that constrain their 'everyday' self images. Differences in personality attributions between senders' own perceptions and receivers' attributions can be examined further in a larger sample capable of supporting a more sensitive test of over-attribution and selective self-presentation effects.

7.3.2. Method

7.3.2.1. *Participants*

Participants were 130 undergraduates from the University of Plymouth who participated for course credit or for money. One pair was discarded as one of the dyad was unable to use mobile text messaging. There were 16 pairs assigned to each of the four conditions – AFI/SMS, NAFI/SMS, AFI/FTF, and NAFI/FTF. To double check participants had not known each other beforehand, each were asked again at the end of the experiment as to whether or not they knew their partner beforehand: none reported this as having being the case.

An advert was placed across the university campus for participants to take part in a study involving a few decision-making tasks carried out through face-to-face or mobile phone text messaging. It informed participants that they would work both individually and with a partner for certain parts of the study. The advert also informed potential participants that some of the participant pairs would be randomly selected to meet up for a further three sessions together after the initial meeting, and that they

would be advised on the day as to whether they were selected to take part in this. In fact, there were not any future sessions planned, this was just to lead participants to anticipate a future interaction if they were told they had been ‘randomly selected’. There were three prerequisites for participation, firstly that participants did not know the person that signed up in the same time slot, secondly that they were female (this was due to problems in past studies whereby there has typically always been a problem in recruiting enough males) and finally that participants knew how to use mobile text messaging (so that any differences found between conditions were not just due to incompetence using the technology). These prerequisites were used so as to lower the variance and make sure that any differences that may be found were not due to these being potential covariates. Those who met these criteria and were interested were asked to sign up for a time slot. The condition each pair got was randomly selected by the experimenter.

7.3.2.2. Design

The study was ran as a 2 x 2 (AFI vs. medium) between subjects study with pairs of participants randomly assigned to one of four interaction conditions: anticipated future interaction/text messaging (AFI/SMS), anticipated future interaction/face-to-face (AFI/FTF), no anticipated future interaction/SMS (NAFI/SMS), and no anticipated future interaction/FTF (NAFI/FTF).

7.3.2.3. Measures

The study required participants to complete a number of tasks. They were given each new task as they completed the one prior to it. Descriptions of each of the tasks, in the order they were presented are given below.

Task 1: The first task was a questionnaire containing social anxiety and International Personality Item Pool (IPIP) items, and questions tapping into communication preferences. For the social anxiety items (Leary, 1983), participants were asked to indicate the degree to which each of 15 statements were characteristic or true of them, for example 'I feel nervous even in casual get-togethers'. The five possible responses were: 'not at all', 'slightly', 'moderately', 'very' and 'extremely' characteristic. Four of the 15 items were negatively valenced. Following the social anxiety items, participants were presented with 52 IPIP items, with the following standardised instructions:

On the following pages, there are phrases describing people's behaviours. Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future. Describe yourself as you honestly see yourself, in relation to other people you know of the same sex as you are, and roughly your same age. So that you can describe yourself in an honest manner, your responses will be kept in absolute confidence. Please read each statement carefully, and then circle the number that corresponds to the response on the scale OR If you feel that you cannot rate an item, circle the 'cannot make judgement' option.

The IPIP scale used was the same condensed 52-item version of the original 100 item scale discussed in section 7.2.1.4. Each item, for example 'I have a rich vocabulary', had a 5-point response scale of 1 (very inaccurate) to 5 (very accurate). If participants felt they could not make a judgement, the alternative response of 'cannot make judgement' was provided.

Participants were asked general questions about their communication preferences and mobile phone ownership, like the length of time they had owned a phone, the average number of text messages they sent and mobile phone calls they

made per month, their average monthly mobile phone bill. They were also asked to rate their preference for face-to-face, texting and voice call communication, each against one another on a 15 point scale, for example:

Please indicate on the scale below your preference for face-to-face conversation versus talking on your mobile phone. If you always prefer face-to-face to voice calls, circle -7. If you always prefer voice calls, circle +7. If your preference falls between these two extremes, indicate this by choosing an appropriate number in between.

(Face-to-face)		(Voice calls)
-7 -6 -5 -4 -3 -2 -1 0 +1 +2 +3 +4 +5 +6 +7		

It was decided to change the response for the question regarding text or talk preference from a simple 'text', 'talk' or 'no preference', to a 14 point scale of -7 (always prefer voice calls) to +7 (always prefer text messaging). This was to allow a more sensitive test of the preference as it was recognised that preference for texting or talking may lie more on a continuum than a straightforward dichotomous preference.

On completing this first questionnaire, participants were then given the briefing for task 2.

Task 2: The second task was Hancock's (2005) disgusting food task. Participants were asked to devise a light-hearted and entertaining menu for a five course meal (i.e. a starter, soup, salad, main course, dessert and a drink) of disgusting foods for someone they disliked. They were given a form to fill out with who they had chosen, why they had chosen that person and then a table to fill out each course planned and any comments they had about each one. Participants were given up to 10 minutes to complete this task. Who the participant picked, whether or not they gave a reason, the number of courses and the number of additional comments were all recorded.

Task 3: On completion of task 2, participants were then given the briefing for task 3. The instructions varied somewhat depending on the condition that participants were in. All participants were informed that they had to collaborate with their partner on the same task (to devise a light-hearted and entertaining menu for a five course meal of disgusting foods for someone they *both* disliked), discussing each course in turn and coming to a final agreement on each one, writing this down on a sheet provided. Participants were also told not to reveal their name or age to their partner. Half of the participants received instructions that this collaboration would take place face-to-face, the other half through text messaging. The anticipated future interaction manipulation was again reemphasised here- those in the AFI condition were told that they would be working with their partner face-to-face in three future interactions, and that these would be discussed again later. Those in the NAFI conditions were told that they would not be working again with their partner after that session. Those in the NAFI text condition were also told that they would not have to meet their partner face-to-face, and that the only interactions would take part through text.

Having read and understood the briefing, one member of each of the pairs in the face-to-face conditions was led into the room where their partner was. Once they were seated, the task commenced. The conversations were recorded by audio cassette. Those in the text condition were given mobile handsets and shown how to use them to send and receive text messages. When they were comfortable with using them they then began the task. Participants were asked not to delete any of the text messages they received as they would be kept for later analysis.

All of the participants were asked to inform the experimenter when they had finished the task. Timing for this phase was left open as pilot studies had revealed that

those in the text messaging condition were typically finished within 40 minutes. Participants were told they had as long as needed to complete the task. As in Hancock and Dunham (2001) participants were instructed not to reveal their name or age during the interaction, so as to minimize individuating cues and to optimize deindividuation.

Task 4: Having completed the interaction task, participants in the face-to-face condition were once again separated, and those in the SMS condition turned their mobiles off. Participants were briefed that this next phase of the experiment involved them answering some questions on the interaction. The first section had instructions as follows:

On the following pages, there are phrases describing people's behaviours. Please use the rating scale below to rate how accurately each statement describes YOUR PARTNER, as she seems to you on the basis of the interaction you have just had. Your responses will be kept in absolute confidence. Please read each statement carefully, and then circle the number that corresponds to the response on the scale. If you feel that you have insufficient evidence about your partner to make a particular judgement, then circle the 'cannot make judgement' option.

The next section of the questionnaire required participants to fill out the same scale, this time in relation to how they felt their partner had rated them. The wording here was changed from the last study (section 7.2.1.4.) from asking participants how they portrayed themselves to their partner to the following:

Now please fill out the same scale again, this time using the rating scale below to describe how you think your partner has rated YOU on the basis of the interaction you have just had together. Your responses will be kept in absolute confidence. Please read each statement carefully, and then circle the number that corresponds to the response you think

your partner has given on the scale. If you feel that your partner had insufficient evidence about you to make a particular judgement, circle the 'cannot make judgement' option.

This was so that participants did not simply report their baseline personality as in the first task, but rather they thought more about their self-presentation in the current task. The final section concerned general outcome measures of the interaction- satisfaction with the decisions reached, confidence in impressions formed of partner and that partner had formed of them, ease of conducting the conversation, enjoyment in conducting the conversation, and how much participants wanted to get to know their partner better. The responses for these items were a 5-point scale from negative to positive (e.g. 1 = very dissatisfied, 5 = very satisfied). Participants were also asked how much they liked their partner. As with our previous experiments this variable was rated from -7 (strongly dislike) to 7 (strongly like). There were a few open ended questions included too. These asked whether or not there was anything that would have helped participants to carry out the task more effectively and if so for them to explain. Participants were also asked what they thought was the purpose of the study and if they had any further comments.

Task 5: The last thing participants were asked to do was a simple memory recall task. Participants were given a blank menu worksheet and asked to fill in as much as they could remember about the menu that they developed with their partner. The researchers noted down whether or not participants had accurately remembered the person the menu was for, the reason for choosing this person, how many correct courses were remembered, and how many additional comments were recalled. As soon as participants were finished they were debriefed and asked not to discuss the

nature of the experiment with those who had not yet participated so as not to jeopardise the nature of the experiment.

7.3.2.4. Procedure

Participants were led to the laboratories they were to do the experiment in, ensuring no contact was made between them prior to the task. Participants in all four conditions were given a written briefing that outlined the study. They were told there would be a series of tasks to complete, some on their own and some in collaboration with their partner. Participants were informed in the initial briefing whether or not their pair had been selected to participate again. Those in the AFI conditions received the following instructions:

This study involves a few simple decision making tasks. You have been randomly selected for the multiple task study. This means you will be working face-to-face with your partner another 3 times after today on similar collaborative tasks. That is, after today's session, we will be arranging a further 3 sessions for the two of you to work together face-to-face. I will explain more about this at the end.

Those in the NAFI condition were given the following instructions:

This study involves a few simple decision making tasks. You have been randomly selected for the single task study. This means that you will not have to interact with your partner after today. So you will be taking part only in today's session and will NOT be working again with the partner assigned to you today.

7.3.2.5. Dependent variables

The key dependent variables of interest in this study were intensity and breadth of impression. As in Hancock and Dunham's (2001) study, the intensity of

impression formed was measured by the deviation from the mid point on the response scale. The number of items that were responded to on the 1-5 scale of the IPIP was taken as an indicator of breadth, i.e. those items that participants did not respond 'cannot make judgement'

The quasi-signal detection paradigm applied in this experiment led to the two dependent measures of d-prime and criterion. High d-prime values were an indication that participants were more sensitive to identifying whether or not a personality trait was present in their partner. A low criterion score indicated that participants were biased to assigning personality traits as present when they were not, i.e. that they were over-attributing traits to their partner. D-prime and criterion values for both the partner's perception of the sender's real-self and their presented self were calculated. For consistency of impression, the sender's baseline personality measure was compared with their presented self measure.

Other variables of interest were the quality of interaction/outcome measures, including liking of partner, satisfaction with decision made, ease of conversation, enjoyment of conversation, desire to get to know their partner better, and confidence in impression formed of their partner and that their partner had formed of them.

In terms of the paired task itself, the number of the participants original menu choices were counted as well as new ones and combined choices. Whether or not participants picked a new person for their meal or whether they chose their original/partners choice was also examined for differences across conditions. The menu recall measure was initially hoped to see if in certain conditions participants were too focused on self-presentation/partner presentation to focus on the task, however it became apparent early on in data collection that this measure was too easy, as the majority of participants had no difficulties in recalling their menus, causing a

ceiling effect. Ideally a greater period of time between the tasks may have been more insightful; however this was not possible given the restrictions on participants' times.

7.3.2.6. Independent variables

As well as the two key variables of medium and anticipated future interaction, social anxiety was included as a potential moderating variable. This was measured using Leary's Interaction Anxiousness Scale (Leary, 1983) (See Appendix B).

Measures of preference for using mobile phones for texting or talking were included only as check variables in the present study. Social anxiety scores within the sample were split at the median of 42, with 64 high social anxiety participants (HSA) classed as scores of 42 and above ($M = 48.9$, $SD = 7.19$), and 64 low social anxiety participants (LSA) classed as scores of less than 42 ($M = 35.1$, $SD = 4.65$).

7.3.3. Results

7.3.3.1. Level of Analyses

Because participants were interacting in pairs for part of the study, it was important to rule out whether or not the main source of variance on each dependent variable was attributable to the dyad or to the participant, and to analyse the data accordingly. Satisfaction, liking, and wanting to get to know partner better were found to have significant dyad effects and so these variables were analysed at the level of the dyad. All the other variables were analysed at the individual level.

7.3.3.2. Descriptive Analyses

Descriptives for the background and demographic information for the current sample are given in Table 7.10.

Table 7.10. Descriptives for background and demographic information

	<i>M</i>	<i>SD</i>
Age (years)	19.6	3.4
Social Anxiety score	42.0	9.2
Time owned mobile (months)	56.7	20.3
Average Texts sent (per month)	224.5	212.5
Average Voice calls made (per month)	45.8	77.5
Average monthly phone bill (£)	29.04	21.6

There were no significant differences between the conditions on these variables, ruling out these variables as possible sources of extraneous variation. To check there were no personality confounds between the conditions, scores on the actual self IPIP ratings were compared. There were no significant differences between the groups at either factor or total score level. There were two items that were significant at the actual score level for the AFI conditions (item 11(NAFI>AFI) and item 50(AFI>NAFI), however out of a total of 52 items, this was not deemed to be a problem.

7.3.3.3. *Reliability checks on scales*

Leary's social anxiety scale was highly reliable with a Cronbach's alpha rating of .89. The IPIP scales showed high reliability too, with Cronbach's alpha at .90.

7.3.3.4. *Interaction Times*

As expected, those in the face-to-face conditions completed the tasks significantly faster ($M = 728.6s$, $SD = 294.3$) than those in the text messaging conditions ($M = 2570.6s$, $SD = 439.7$; $F(1,116) = 230.9$, $p = .04$). There was no evidence of an effect of AFI on time to complete task. Time significantly correlated

with satisfaction with decision made, ($r = .18, p = .04$), so this was also used as a covariate in analysing this variable.

7.3.3.5. *Social Anxiety*

In previous research (e.g. Reid & Reid, 2005), social anxiety had proven itself to be an important variable in the preference for text or talk on the mobile phone, with individuals who rated themselves as higher in social anxiety generally preferring text messaging as a method of communication compared to face-to-face and voice calls. More specifically, individuals who are higher in social anxiety tend to benefit more from the anonymity of the medium, allowing them to develop relationships they may not otherwise have the opportunity to in face-to-face communication. In looking at this variable here, the participants were classified into two groups, defined around the median of 42. Those with scores of 42 and above were termed as high socially anxious (HSA) and those with scores below this were termed as low socially anxious (LSA). It should be noted here that by no means were those termed HSA clinically socially anxious.

There were no significant differences in social anxiety across medium or anticipated future interaction, nor any evidence of an interaction amongst the two ($p > .10$ in all three cases).

Correlational analyses of social anxiety with the dependent variables produced the following results. As in our previous research, those higher in ratings of social anxiety (HSA) showed a greater preference for text messaging as opposed to face-to-face communication ($r = .25, p < .01$) on the check measures included here. HSA participants were also less likely to feel confident in the impression that they believed

their partner had formed of them ($r = -.31, p < .01$), and found it less easy to communicate ($r = -.32, p < .01$).

7.3.3.6. Task Differences

Performance on task was examined for potential differences between the conditions. The experimenter looked through each response and recorded the number of courses planned by the participant on their sheet, the number of additional comments written on the comments section, the number of new courses that were not on the original lists of either participant, the number of new comments that were not on the original list of either of the dyad, the number of courses and comments that were on one of the participants original lists (noting whether this was from the participant or their partner), the number of combined menu items from the dyads original lists and the number of inaccuracies between the participants and their partners menu's.

A MANOVA revealed significant effects of medium were found on some of these measures ($F(10,115) = 4.95, p < .001$). These were on the number of new courses that were not on the original lists of either participant ($F(1, 124) = 7.33, p < .01$) with face-to-face dyads coming up with more new menu items that were not on their original lists ($M = 2.72, SD = 2.13$) than those interacting via SMS ($M = 1.78, SD = 1.90$). The SMS dyads were more likely to stick with their original courses ($M = 1.63, SD = 1.32; F(1, 124) = 19.23, p < .001$) than those interacting face-to-face ($M = .77, SD = .81$) and likewise use their original comments ($F(1, 124) = 4.67, p = .04; M = .08, SD = .32$ and $M = .31, SD = .83$ for face-to-face and SMS respectively).

There were no significant differences on any of the task measures between those participants who expected future interaction and those who did not ($F(11, 108)$

= 1.23, $p > .10$). Nor was there a significant effect of social anxiety ($F(11, 108) = 1.19, p > .05$). There was evidence of a significant medium by AFI interaction ($F(11, 108) = 3.37, p < .01$). This was for two variables. Firstly, the number of new courses that were not on the original lists of either participant ($F(1, 124) = 8.04, p = .005$). This was highest for face-to-face AFI ($M = 3.25, SD = 2.11$) than face-to-face NAFI ($M = 2.19, SD = 2.04$). So participants were more likely to work together to come up with new ideas if they thought they were going to meet up again in face-to-face. SMS NAFI showed around the same amount as face-to-face NAFI ($M = 2.25, SD = 2.14$). However SMS AFI showed the lowest levels of new ideas ($M = 1.31, SD = 1.51$) suggesting this group was more reserved.

The other variable showing this interaction was the number of original participants comments ($F(1, 124) = 4.24, p = .04$). The SMS group had more courses that were based on their partner's original comments than face-to-face. Especially when expecting future interaction (SMS AFI: $M = .50, SD = 1.08$, SMS NAFI: $M = .13, SD = .42$). Those in the face-to-face condition were less likely to go with their original comments, especially when anticipating future interaction (face-to-face AFI: $M = .03, SD = .18$, face-to-face NAFI: $M = .13, SD = .42$).

7.3.3.7. Outcome Measures.

Analysing these outcome variables at the level of the dyad did not alter the significance of these variables. On the outcome measures, a significant effect of medium upon ratings of the ease of conversation was found ($F(1, 116) = 6.51, p = .01$), with participants reporting SMS ($M = 4.30, SD = .75$) as easier than face-to-face ($M = 3.94, SD = .97$). There were no significant differences in any of the other outcome measures, including satisfaction with task outcome (FTF: $M = 4.08, SD =$

0.11; SMS: $M = 4.36$, $SD = .11$) and liking for partner (FTF: $M = 4.05$, $SD = .23$; SMS: $M = 4.06$, $SD = .24$).

Anticipating future interaction showed a significant effect on how much participants wanted to know their partner better ($F(1, 116) = 7.7$, $p = .006$). Unsurprisingly, those in the AFI condition wanted to get to know the person better ($M = 3.95$, $SD = .74$) than those in the NAFI condition ($M = 3.46$, $SD = .79$).

Social anxiety proved to be a significant variable on the confidence participants had in the impression they believed their partner had formed of them ($F(1, 116) = 7.3$, $p = .008$), with participants with low ratings of social anxiety reporting greater confidence ($M = 2.77$, $SD = .81$) than those with higher ratings of social anxiety ($M = 2.35$, $SD = .90$). The same pattern arose for ratings of ease of conversation: ($F(1, 116) = 7.5$, $p = .007$; $M = 4.31$, $SD = .75$; $M = 3.92$, $SD = .96$ for LSA and HSA respectively) with high socially anxious participants finding the conversation harder.

Table 7.11. Ratings of liking (scale of -7 to +7, with more positive indicative of greater liking) and how much participants wanted to know their partner better (scale of 1(not very much)-5(very much))

	Anticipated future interaction	Social anxiety	M	SD
Liking	AFI	LSA	4.09	1.93
		HSA	4.19	1.66
	NAFI	LSA	4.61	1.65
		HSA	3.36	2.11
Want to know better	AFI	LSA	3.88	.78
		HSA	4.03	.71
	NAFI	LSA	3.81	.65
		HSA	3.33	.85

There was a significant 2-way interaction between anticipation of future interaction and social anxiety on liking ($F(1, 116) = 4.45$, $p = .04$) and how much they wanted to get to know their partner better ($F(1, 116) = 5.30$, $p = .02$). The highest levels of liking were found by those low in social anxiety who were not expecting to meet their

partner again. Highly socially anxious participants showed the least liking for their partner when they did not expect to meet their partner again (see Table 7.11).

7.3.3.8. Summary

The main conclusions to be drawn from the descriptive analyses so far include the fact that liking levels were around the same level after both text messaging and face-to-face interaction, supporting the findings of the last chapter.

AFI has been shown by Berger & Douglas (1981) to increase feelings of similarity with ones partner, and No AFI was shown by Walther (1992) to result in lowered intimacy and affiliation. Consistent with this literature, anticipating future interaction made participants want to get to know their partner better than those who thought the interaction was a one-off.

Those who were rated as high in social anxiety had less confidence in the impression their partner had formed of them and also found the interaction harder, as may be expected from having this trait.

There was also an interaction of AFI and social anxiety for both liking for partner and how much participants wanted to know their partner better. Participants who anticipated future interaction and were high in social anxiety wanted to get to know their partner better more than those who did not expect future interaction and were highly socially anxious. This is what one may expect as they are more worried about interaction than their LSA counterparts and unlike the NoAFI they have the impression that they will have to meet their partner again so they are more likely to want to get to know them better. In contrast those who were highly socially anxious and who were not expecting future interaction had the lowest levels of wanting to get

to know their partner better out of the four groups. Again this is as one may expect as typically those who are socially anxious avoid social situations.

Those participants low in social anxiety were indifferent to the AFI manipulation, showing little difference in the degree they wanted to get to know their partner better, as one may expect as these are a group that do not mind social interaction.

There was also evidence of differences in approaching the task, with face-to-face groups tending to come up with more new ideas than SMS groups. This was especially the case when they were expecting future interaction. SMS groups on the other hand seemed to stick more with their own or their partner's original ideas and this was more so when anticipating future interaction. The concise nature of the SMS medium may have meant participants were more likely to agree with a menu idea than spend lots of time reviewing or changing it.

Having examined the descriptive statistics, analysis now followed to look at the key variables of interest: breadth and intensity of impression, and d-prime and criterion measures. The analysis ensuing was based on 3 independent variables, leading to a 2 (medium) by 2 (AFI) by 2 (social anxiety) model. The time participants had reported owning a mobile and their average monthly bill were taken as covariates for the proceeding analyses.

7.3.3.9. *Breadth*

The number of items where participants felt able to make a personality judgement on the presented-self and impression of partner IPIP scales was taken as an index of breadth of impression presented/formed for self/partner respectively.

Hancock and Dunham predicted that those in the face-to-face conditions should have

a greater breadth of impressions formed of their partner than those in the SMS conditions. However the previous study showed that there were no differences in breadth and it was postulated this may be due to the lack of a 'cannot make judgement' response. The replication here with the option of 'cannot make judgement' will help determine which of the two alternative predictions stands.

Also, the addition of the anticipated future interaction variable leads to the prediction that those in the AFI conditions will have more breadth in their impressions formed as they actively seek out more information about their partner in anticipation of future interaction. Similarly, they should also feel that they have demonstrated a wider range of attributes in their own behaviour.

A 2 (medium) by 2 (AFI) by 2 (social anxiety) ANOVA was conducted (see Table 7.11 and Table 7.12). There was no evidence of a significant difference between conditions in either breadth of presented self or breadth of one's impression of partner ($p > .05$), nor was there evidence of significant interactions between the conditions ($p > .05$).

It should be noted that this was not a ceiling effect: for presented self, breadth of impression ranged from 68.7-76.0% of items, and for ratings of partner, around 67.9-74.0% of items were rated across the four conditions.

A repeated-measures analysis showed there were no significant differences in the breadth of impression participants believed they were presenting and the breadth that partners perceived them as presenting ($F(1,120) = .02, p > .10$).

The finding of no difference between SMS and FTF interaction on breadth of impression formed replicates the findings of Study 7, and stands in opposition to Hancock and Dunham's previous findings.

Table 7.11. Breadth of impression for presented self ratings

	FTF or TM	AFI or NAFI	Social anxiety median split (42)	<i>M</i>	<i>SD</i>
Number of items rated for presented self	FTF	AFI	LSA		
				39.12	9.58
			HSA	36.27	10.87
			Total	37.78	10.14
		NAFI	LSA	40.29	9.64
			HSA	38.67	8.44
			Total	39.53	8.99
		Total	LSA	39.71	9.48
			HSA	37.47	9.64
			Total	38.66	9.55
	SMS	AFI	LSA	35.50	8.21
			HSA	35.88	9.93
			Total	35.69	8.97
		NAFI	LSA	36.92	13.57
			HSA	34.94	8.61
			Total	35.73	10.69
		Total	LSA	36.11	10.63
			HSA	35.38	9.12
			Total	35.71	9.76
	Total	AFI	LSA	37.36	8.99
			HSA	36.06	10.22
			Total	36.73	9.55
		NAFI	LSA	38.90	11.33
			HSA	36.64	8.61
			Total	37.69	9.95
		Total	LSA	38.08	10.10
			HSA	36.36	9.35
			Total	37.21	9.72

Table 7.12: Breadth of impression for ratings of partner

	FTF or TM	AFI or NAFI	Social anxiety median split (42)	<i>M</i>	<i>SD</i>
Number of items rated for partner	FTF	AFI	LSA	39.94	8.71
			HSA	36.87	10.48
			Total	38.50	9.55
		NAFI	LSA	37.76	9.97
			HSA	39.93	8.92
			Total	38.78	9.40
		Total	LSA	38.85	9.29
			HSA	38.40	9.69
			Total	38.64	9.40
	SMS	AFI	LSA	35.13	6.25
			HSA	35.56	8.29
			Total	35.34	7.22
		NAFI	LSA	36.75	10.16
			HSA	34.61	8.27
			Total	35.47	8.97
		Total	LSA	35.82	8.03
			HSA	35.06	8.16
			Total	35.40	8.05
	Total	AFI	LSA	37.61	7.89
			HSA	36.19	9.28
			Total	36.92	8.55
		NAFI	LSA	37.34	9.88
			HSA	37.03	8.85
			Total	37.18	9.27
		Total	LSA	37.48	8.80
			HSA	36.63	9.00
			Total	37.05	8.88

7.3.3.10. Intensity of Impressions

There were no significant differences in intensity of actual self ratings ($p > .05$) between the conditions reducing the possibility of this variable as a potential confound. However, significant differences were found between media in the intensity of both presented self attributions ($F(1,125) = 4.86, p = .03$), and attributions of ones partner ($F(1,125) = 7.74, p = .006$) in the direction expected (see

Table 7.14.). Those in the face-to-face condition rated their presented self and their partners presented self less intensely than those interacting via SMS .

Table 7.13. Intensity ratings for FTF and SMS communication

	Medium	<i>M</i>	<i>SD</i>
Average presented self intensities	FTF	.77	.25
	SMS	.87	.28
Average partner intensities	FTF	.89	.26
	SMS	1.02	.31

Whether or not participants were anticipating future interaction had a significant effect on the intensity of impression that they believed they presented ($F(1, 125) = 6.15, p = .02$), with those participants not expecting future interaction rating their personality traits more intensely ($M = .88, SD = .27$) than those expecting future interaction ($M = .76, SD = .25$). There was no such effect on the intensity of impression that they formed of their partner ($F(1, 125) = 1.75, p = .18$)

Table 7.14. Average intensity ratings for AFI and NAFI conditions

	AFI or NAFI	<i>M</i>	<i>SD</i>
Average presented self intensities	AFI	.76	.25
	NAFI	.88	.27
Average partner intensities	AFI	.94	.28
	NAFI	.97	.28

There was no evidence of there being a significant effect of social anxiety ($p = .42$), nor were there significant interactions between the independent variables ($p > .50$).

A repeated measures analysis showed that participants rated their partners ($M = .96$, $SD = .29$) significantly more intensely than they rated their presented selves ($M = .82$, $SD = .27$; $F(1, 120) = 37.31$, $p < .001$). This suggests that they are over-attributing characteristics to their partners rather than over-presenting themselves.

As expected there was no evidence of a significant main effect of, or interaction between, any of the independent variables on actual self ratings ($p > .10$), suggesting that there were no personality confounds between the conditions.

Participants ratings of their presented self showed a significantly lower mean intensity than their ratings of their actual self ($M = .93$, $SD = .18$; $F(1, 120) = 31.87$, $p < .001$). This suggests that participants do not think they are exaggerating the personalities that they are projecting, and potentially suggests that the intensity effect is indeed a receiver as opposed to a sender effect, as was suggested in the previous study.

7.3.3.11. Summary

In summary, the results of the breadth and intensity of impression analysis have indicated that there was no significant differences in breadth between SMS and face-to-face conditions, however there was a significant difference in intensity of impressions with SMS rating themselves and their partners more intensely. This finding of increased intensity of partner attributions is exactly as Hancock and Dunham predicted.

For the anticipation of future interaction variable, those who were in the AFI condition rated their personality traits more intensely than those in the No AFI condition. This is in accordance with Berger and Douglas (1981) who found that participants expecting future interaction rated themselves more positively.

There was no significant effect of social anxiety on the intensity of impressions, which was contrary to the expectation that those higher in social anxiety would have less intensity in their ratings of their own attributes compared to those lower in social anxiety (Greenberg *et al.* 1985).

Finally it was suggested that the findings of a lower mean for presented self than actual self, and a higher mean for ratings of partner than presented self, could be evidence for a receiver effect

To clarify whether this is the case the next stage of analysis utilised the quasi-signal detection paradigm. A higher intensity of impression could be because the sender is giving out stronger signals or that the receiver is biased in interpreting those signals. Hancock and Dunham were unable to untangle which of these were the case in their study. It was hoped that the application of the quasi-signal detection paradigm using d-prime and criterion measures would help distinguish between these in the following analyses.

7.3.3.12. The Quasi-Signal Detection Paradigm: D-prime & Criterion Measures

The detection of presented self was examined using signal detection theory measures of d-prime and criterion c, as was the case in the previous study.

Participants' ratings of their presented self (their ratings of how they thought their partner had viewed them) was taken to be the 'signal' element of the paradigm. So as an example, an IPIP item rated as a 4-5 can be taken to represent cues that the

participant believes their partner would have observed in their behaviour (in SDT terminology this can be taken as the 'signal plus noise' distribution). Statements rated as 1-3 were taken as cues the participant believes their partner would rate as uncertain or absent in their behaviour (the 'noise only' distribution).

The partner's ratings of that participant form the detection element of the paradigm as these are a reflection of the cues that the partner is detecting in the participants behaviour during the interaction. So IPIP items rated as 4-5 were taken to represent the cues that the partner believes were actually present in the participant's behaviour, and items rated 1-3 were taken to be those about which the partner was uncertain or believed to be absent.

The impact of factor that was noted in the last study was also examined, and it was found through a repeated measures ANOVA that the five factors could be clearly dichotomised in terms of their 'observability'. This was measured by looking at the proportion of items partners rated as they could not judge. $F(4, 480) = 110.52, p < .001$. The high observability factors were extraversion (14.3%), imagination (26.9%) and conscientiousness (22.4%). The low observability factors were agreeableness (42.9%) and emotional stability (55.6%). The finding that these factors can be dichotomised in such a way confirms previous findings (e.g. Zillig, Hemenover & Dienstbier, 2002) that extraversion and conscientiousness are factors associated with more observable behaviours, whilst emotional stability is more related to inferred cognitive/affective states and agreeableness is inferred by reference to both observable and inferred behaviour. For the d-prime and criterion c analyses the effect of factor was also examined to see whether the dependent variables had different effects on the different domains. For example d-prime scores may be lower for less

observable factors than for more observable factors as they may be harder to detect, particularly in the SMS conditions.

7.3.3.12.1. The Detection of Presented Self by Partner

D-prime and criterion c values were examined to investigate whether there were any significant differences in signal (personality) detection between the conditions. The partners ratings were taken as the 'detection' element and the senders ratings of how they thought they presented themselves to their partner were taken to be the 'signal'. The observability of factors (high or low) was taken to be another independent variable.

D-primes indicate the discriminability of the signal, so high values of d-prime would indicate more discriminable signals. This may indicate that participants are engaging in selective self-presentation carefully presenting how they come across to their partner.

Criterion values are a measure of potential over-attribution by partners. High values of criterion c indicate more stringent criteria as to whether the receiver rates a signal as present or not. Lower values of criterion c would indicate more of a bias towards attributing a signal (personality characteristic) as present as opposed to absent, so receivers would be more liberal in their decisions.

7.3.3.12.2. Results of D-Prime Analysis : Testing for Selective Self-presentation

The main effects of factor observability, medium, social anxiety or anticipated future interaction were all found to be nonsignificant ($p > .05$). Although there did seem to be differences between the SMS and FTF conditions for both high observability factors (FTF: $M = 1.22$, $SD = 2.67$; SMS: $M = 1.14$ $SD = 1.75$) and low

observability factors (FTF: $M = 1.38$, $SD = 3.81$; SMS: $M = 1.99$, $SD = 3.50$) with SMS showing greater discriminability on the latter, these differences were not significant ($p > .05$).

However, a significant interaction between factor observability and social anxiety was observed ($F(1, 116) = 4.91$, $p = .03$), with d-primes being higher for LSA senders on low observable factors for senders ($M = 2.15$, $SD = 3.87$) than on highly observable factors ($M = .98$, $SD = 2.07$), with little difference between the two types of factors for those rating themselves higher in social anxiety ($M = 1.21$, $SD = 3.40$, $M = 1.38$, $SD = 2.41$). One interpretation of this effect is that low socially anxious participants send out more discriminable 'self-image signals' on low observable factors, as they are less affected by the attentional demands of social interaction, and have the reserve of cognitive resources to focus on presenting behavioural evidence for normally less observable aspects of the self. Highly anxious participants seem to be sending out more discriminable self-image signals relevant to more observable traits rather than less observable traits. This may be because they are preoccupied about how they are coming across to their partner and as a result spend more cognitive energy 'getting it right' with the easily observable and hence more readily manipulated and controllable traits.

There was also a near-significant 3-way interaction between factor observability, medium and anticipated future interaction ($F(1, 116) = 3.64$, $p = .059$). This is best explained through looking at Figures 7.9 and 7.10 below. Here it can be seen that for those in the SMS condition, d-primes were highest for low observability factors (agreeableness and emotional stability) and these were slightly higher for participants who did not expect future interaction with their partner. For FTF interactions, as in the SMS conditions, d-prime was higher for low observability

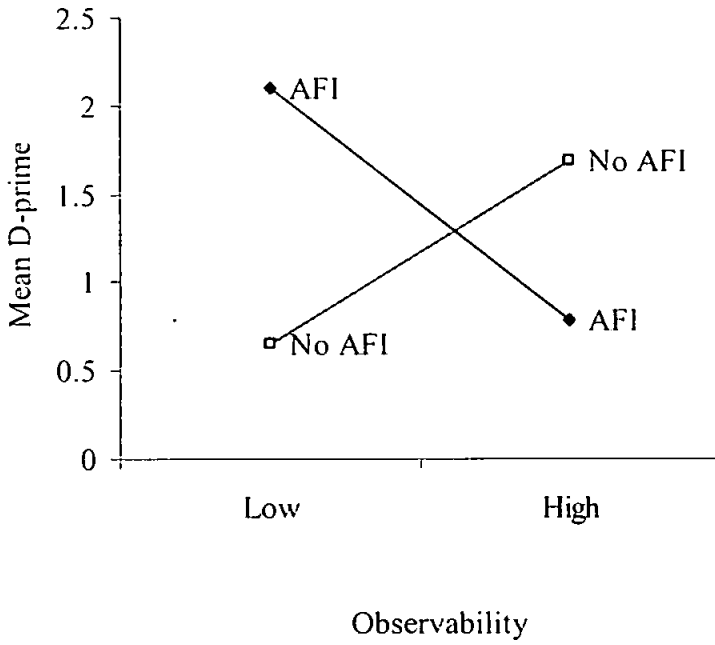


Figure 7.9. Mean d-prime values for participants in the face-to-face condition, split by anticipated future interaction and factor observability

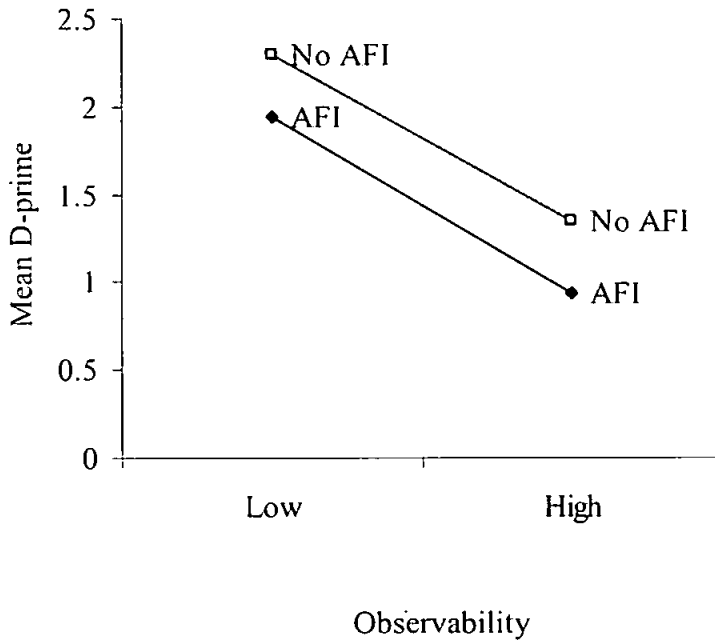


Figure 7.10. Mean d-prime values for participants in the SMS condition, split by anticipated future interaction and factor observability

factors than high observability factors if participants expected future interaction, but this pattern was reversed for participants not expecting future interaction, with d-prime being higher for high observability factors.

So it appears that for participants using SMS and for those interacting FTF but expecting future interaction, lower observability factors were more discriminable as self-image signals than high observability factors. For FTF participants not expecting future interaction these signals seemed to be poorly discriminable.

To understand this interaction, consider FTF NoAFI as the baseline condition, as the typical scenario most people face when interacting with a stranger they will never interact with again. In this situation, highly observable characteristics are most discriminable with the low observability characteristics being more clouded. As participants are unlikely to meet their partner again they are unlikely to invest cognitive effort in trying to get across their full personality and in particular those aspects that are not obviously apparent. However, if participants expect future interaction, this completely reverses the pattern, with more effort being directed towards getting across the less observable personality characteristics with the more observable characteristics becoming less discriminable.

But people interacting via SMS present more discriminable self-image signals in relation to less observable characteristics, regardless of anticipation of future interaction. Once again the unique affordances of SMS provide an explanation. Because SMS is less attentionally demanding than embodied, real-time face-to-face interaction - participants do not have to worry about how they appear to their partner, and can take time to formulate and edit a suitable response – cognitive resources can be reallocated to other needs, in this case how best to present aspects of ones personality that are less easily observed, but which participants are eager to communicate. This complex pattern of results is therefore consistent with the Hyperpersonal Model.

7.3.3.12.3. Results of Criterion C Analysis: Testing for Potential Over-attribution Effects

For criterion c measures, a significant effect of factor observability was found ($F(1, 116) = 9.45, p < .01$). Low observability factors had a higher criterion ($M = 1.53, SD = 2.53$) than high observability factors ($M = .60, SD = 1.50$), suggesting partners were biased towards over-attributing high observability factors, identifying these traits as present more readily than low observability factor attributes. There were no other significant main effects or interactions ($p > .05$).

There was a marginally significant interaction between medium and factor observability ($F(1, 116) = 2.76, p = .09$). Further analysis revealed a just-significant effect of observability for those in the SMS condition ($F(1, 116) = 3.92, p = .05$) with higher observability factors showing more over-attribution bias than low observability factors. (see Table 7.15).

Table 7.15. Criterion C results for high and low factor observability items

Medium	Factor	<i>M</i>	<i>SD</i>
	Observability		
FTF	Low	1.34	.32
	High	.78	.19
SMS	Low	1.70	.33
	High	.41	.19

This points to a greater over-attribution bias in SMS for high observability factors, with a corresponding under-attribution bias in SMS for low observability factors. These results confirm the over-attribution effect of SMS communication predicted by the Hyperpersonal Model.

7.3.3.13. Self-Presentation Consistency

Another test of selective-self-presentation utilised in the present study was the examination of the differences between participant's actual self ratings and ratings of their presented self. Selective self-presentation would be indicated by a lack of consistency between these two measures. So do participants change their presented personality when they are interacting with others, and if so is this change greater in SMS than in FTF conditions? Put another way, does the 'self-image signal' change more in SMS than FTF?

Self-presentation consistency was examined by comparing the meta-ratings of self presented to partner with the baseline measure of self, calculating the percentage of IPIP ratings that remained unchanged compared to those that became more or less intense, or were rated as "cannot judge".

Table 7.16. Consistency of ratings from real self to presented self ratings (percentages).

	Factor observability	<i>M</i>	<i>SD</i>
Rated attribute to blank	Low	47.62	25.31
	High	17.96	14.59
Consistent across real and presented self ratings	Low	31.50	19.57
	High	46.20	13.02
Decrease in rating intensity	Low	8.77	11.27
	High	12.26	10.75
Increase in rating intensity	Low	12.11	11.38
	High	23.57	14.27

Firstly, ANOVAs were conducted to examine differences in the proportion of items that changed from being rated in participant's ratings of their actual self to

being unrated in their ratings of their presented self. This analysis examined whether participants felt that there was sufficient evidence in their behaviour during the interaction for their partner to make certain personality attributions.

There was found to be a significant effect of factor observability ($F(1, 116) = 30.93, p < .001$), and of medium ($F(1, 116) = 4.38, p = .04$) with less observable factors being less likely to be rated for the presented self, as expected. There was a significant effect of medium, with participants in the SMS condition being more likely to leave a previously rated item as unrated ($M = 36.20, SD = 2.39$) than those in the FTF condition ($M = 29.20, SD = 2.34$), again as expected.

However, a near significant interaction between factor observability and medium was found ($F(1, 116) = 3.79, p = .054$), shown in Table 7.17 with both SMS and FTF showing a greater proportions of ratings left unrated for low observability factors than high observability factors, and SMS consistently being greater than FTF for both types of factor.

Table 7.17. Percentages of ratings left unrated after interaction

Medium	Factor Observability	<i>M</i>	<i>SD</i>
FTF	Low	42.33	3.17
	High	16.06	1.87
SMS	Low	52.53	3.25
	High	19.87	1.91

Next differences in the number of items that were rated consistently across the real and presented self were examined. There was found to be a significant effect of observability of factor ($F(1, 116) = 7.69, p < .01$), as may be expected with less observable factors being more likely to not be as consistent. Social anxiety also proved to be a significant factor ($F(1, 116) = 5.10, p = .03$). Those participants rated as lower in social anxiety had a greater proportion of ratings that were consistent in

their perceptions of their real self compared to their presented self ($M = 41.82$, $SD = 1.75$) than those who were rated as higher in social anxiety ($M = 36.27$, $SD = 1.72$).

For high observability factors, those lower in social anxiety again were more consistent than those who were higher in social anxiety. However this difference decreased considerably when participants were expecting no future interaction with their partner. Here those lower in social anxiety were less consistent in their ratings than those higher in social anxiety and the opposite was true of those rated as high in social anxiety.

In examining the number of attributes that decreased in their intensity of rating from real self ratings to presented self ratings, ANOVA's revealed a significant effect of observability ($F(1, 116) = 4.75$, $p < .05$) and medium ($F(1, 116) = 4.48$, $p < .05$). As can be seen from Table 7.16 high observability factors were more likely to be rated less intensely than low observability factors. Participants interacting via FTF were more likely to report a decrease in intensity of ratings ($M = 12.27$, $SD = 1.14$) than those interacting through SMS ($M = 8.81$, $SD = 1.17$).

Interactions were found to be significant between factor observability and social anxiety ($F(1, 116) = 4.75$, $p < .05$), where those rated as lower in social anxiety showed a wider difference between low and high observability factors with a greater proportion of ratings being lowered for high observability than low observability. Those more socially anxious participants showed little difference across factors (see Table 7.18).

Finally differences between conditions in the proportion of ratings that were more intense in presented self ratings than real self ratings were examined. There was a significant effect of social anxiety ($F(1, 116) = 8.55$, $p < .01$) with those participants rated as higher in social anxiety having a greater proportion of ratings that

Table 7.18. Interactions between social anxiety and factor observability for percentage of ratings decreasing after interaction

Social anxiety	Factor Observability	<i>M</i>	<i>SD</i>
LSA	Low	8.19	1.46
	High	14.29	1.37
HSA	Low	9.21	1.43
	High	10.49	1.34

increased in intensity ($M = 20.47$, $SD = 1.32$) than low socially anxious participants ($M = 14.96$, $SD = 1.35$). There was found to be significant interactions between factor observability and social anxiety ($F(1,116) = 9.84$, $p < .01$), shown in Table 7.19. Here it can be seen that the greatest difference between LSA and HSA participants is in relation to the number of high observability factors. Both HSA and LSA participants show greater proportions of high observability factors as rated more intensely than low observability factors but the difference is greater for high observability factors ($M = 28.15$ for HSA and 18.67 for LSA).

Table 7.19. Interactions between social anxiety and factor observability for percentage of ratings increasing after interaction

Social anxiety	Factor Observability	<i>M</i>	<i>SD</i>
LSA	Low	11.26	1.46
	High	18.67	1.76
HSA	Low	12.80	1.43
	High	28.15	1.73

These results suggest that trait observability was a major factor in consistency of presentation from real to presented self. Low observability traits were more likely to be left unrated than more observable traits, as may be expected. One may assume that highly observable traits are more obvious to partners and so less effort has to be placed on getting those features across.

Low socially anxious participants having greater consistency across their real and presented self ratings is again as may be expected as high social anxious participants may have worried that they were not presenting themselves as they really are. Those who were high in social anxiety were more likely to have increased intensity than low social anxiety participants, which may be an implication of them trying to get across the personality they want to their partner. This suggests those who are high in social anxiety are more likely to engage in selective self-presentation, as they are less consistent in their actual and real-self ratings and more likely to increase the intensity of certain attributes.

Overall there was little evidence for selective self-presentation being different in SMS as it was in face-to-face interaction. The SMS condition did have more attributes left unrated for presented self than the FTF condition, however there were no differences in consistency or increased/decreased intensity. The findings of greater intensity of partner impressions therefore seems to be more related to the partner over-attributing than the sender self-selecting.

7.3.4. Discussion

The main purpose of this study was to attempt to replicate and extend the results found by Hancock and Dunham with respect to mobile phone text messaging in order to test a central feature of Hyperpersonal communication: that impressions formed can become more intense through text messaging than face-to-face communication. The first replication in this chapter had failed to find the results and it was hoped a more refined sensitive experiment may be more successful. Anticipated future interaction was an additional variable added into the study to try to see whether

or not it had an effect on any of the measures. AFI is often cited as being a key variable in Hyperpersonal communication (e.g. Walther, 1997).

As expected it took longer to complete the task through the use of text than through face-to-face communication. It worked out that the former took around 3.5 times as long. However this is not really that much longer when one takes into account the limited characters in a text message and the asynchronous nature of the medium.

There was no effect of medium or AFI on breadth of impression formed. In all the conditions around 75% of the personality traits listed were judged as rateable by participants for both their presented self and their impressions of their partner. The fact that around a quarter of items were not rated suggests that this was not a ceiling effect.

Narrower impressions in SMS were expected due to the temporal and bandwidth constraints of this medium: however none were found in either of these studies. This may partly be due to interactions in the SMS condition taking longer to complete than those in the IM condition in Hancock and Dunham's study, and this increase in time may have led participants to feel that they could rate more IPIP items. The finding that there were no significant differences in the breadth of impression formed between the different media is quite impressive as it shows that despite limited cues in text messaging, participants still feel comfortable in making the same number of personality inferences through the medium of texting as they do through face-to-face interaction. In fact, participants unexpectedly rated themselves as more confident in the impressions they formed of their partners through text messaging. This is entirely contrary to Hancock and Dunham's results. However the items in the present studies were specifically picked for their observability, so as to remove any

unfair advantage face-to-face interaction has over SMS in being able to infer characteristics from appearance. This is an important difference between the present studies and Hancock and Dunham's study.

There were no differences in breadth of impression between participants who expected and did not expect future interaction, providing no evidence to support the idea that AFI may lead to more information seeking about one's partner.

Earlier studies prior to Hancock failed to find any evidence of significant differences in intensity between face-to-face and SMS (e.g. Matheson and Zanna, 1988; Lea & Spears, 1991). However, the present study found strong support for Hancock and Dunham's results. As predicted, those in the SMS condition developed more intense impressions of their partner than those in the face-to-face condition. This is supportive of Hancock and Dunham's results, and of hyperpersonal theory which postulates that mediated communication leads to more intense attributions formed of one's partner. Those in the SMS condition also rated their presented self more intensely than those in the face-to-face condition. So this seems to indicate a sender effect when communicating via text.

The reason that that intensity effects were not found in Study 7 may be due to participants not having the option to not provide individual ratings of their partner. As a result they may have used the mid point of '3' when they were unsure or not confident enough in their judgement, which would have the effect of diluting the mean intensity and covering up any intensity effects that may have otherwise been identifiable.

For anticipated future interaction, those in the NAFI condition rated their presented self as more intense than those in the AFI condition, but not for ratings of their partner. One potential explanation for this is that in AFI the sender may try to be

more neutral: given they are to meet again, it would be understandable if participants were more worried about their self-presentations. Perhaps in AFI participants have to think more about how their partner sees them. Equally, they do not want to come over too intensely on any particular trait until they have worked out what their partner is like as an individual. More research is needed to understand how this variable affects self-presentation and social interaction.

No effect of social anxiety on intensity of either presented self or ratings of partner was detected. A repeated measures analysis showed that participants rated their partners significantly more intensely than they rated their presented self images. This suggests that differences in intensity are due to the receiver's interpretation of their partner's personality as opposed to the personality senders are projecting.

The intensity of ratings of participants actual self and of one's partner were not significantly different, however presented self showed a significantly lower mean intensity than actual self. This suggests that participants do not think they are exaggerating the personalities that they are projecting, and again potentially suggests that the intensity effect is indeed a receiver as opposed to a sender effect.

D-primes and criterion measures were calculated to investigate whether a quasi-signal detection paradigm could shed light on whether the differences in intensity were due to senders sending out more discriminable self-image signals in SMS, or whether receivers were more biased towards reporting a characteristic as present through SMS. Preliminary analysis confirmed there were two categories of factor in the ratings - those that were more observable and those that were less observable. These were treated as another independent variable to make the analysis more sensitive to potential effects.

Overall, higher d-prime values were found for SMS, indicative of the greater discriminability of personality characteristics through this medium, although the difference was non-significant. This may be because in SMS senders have more control over what cues they present and are more observant of those cues themselves, whilst their partners must rely on the cues senders select. This contrasts with face-to-face interaction, in which senders have much less control over self-presentation as well as a higher cognitive load, which may detract attention away from personality detection.

In general, d-prime values were higher for low observability factors, suggesting that these factors were more discriminable than those that were more observable. One possible interpretation for this is that receivers are looking out for evidence of these factors as they are aware that they are not as easily noticed. More research needs to be carried out to examine the effects of factor observability on impression formation. For example, a qualitative study asking participants to explain their ratings may be insightful.

In examining criterion c, testing for evidence of over-attribution effects, there was a significant effect of factor observability, with low observability factors having more stringent criteria for being judged as present than high observability factors. This difference was more noticeable in SMS interaction. This suggests that any over-attribution occurring is for highly observable factors rather than less observable factors. Those in the SMS condition were found to be more biased in noting a high observability characteristic was present than those in the face-to-face condition and less biased in noting a low observable characteristic was present. This may be because it is harder to get across low observability characteristics so the criteria for rating

them are more stringent. Again, more work needs to be done to examine the detection of personality cues based on observability.

There were no significant *d*-prime or criterion differences for AFI - whether participants expected interaction or not there was no change in sensitivity to self-image signals or evidence of any bias in detecting these signals.

In examining consistency between the ratings of real self and ratings of presented self (participants ratings of how they believed their partner had seen them), participants interacting via SMS were shown to be more likely than those interacting via face-to-face to have items left as unrated, which is what may be expected from a more limited cue medium. High observability factors were found to be more consistent across ratings than low observability factors, again as may be expected as they are less visible, and there was an effect of social anxiety with low socially anxious participants reporting more consistency across ratings. Face-to-face interactions were more likely to result in a decrease in the intensity of ratings than SMS. High observability factors were more likely than low observability factors to show a decrease in their intensity ratings. The greater reduction in intensity of both low and high observability factors in face-to-face are supportive of a sender effect in explaining the difference in partners ratings of the sender.

One question posed at the start of this chapter was whether there was a strong and weak version of hyperpersonal theory. It was suggested that some groups of people may get more out of using the SMS medium, one such group being socially anxious. In the current study there was found to be more intense impressions formed of their partner in SMS for both high and low socially anxious participants with no significant difference between the two. This suggests that all the participants got the same outcome from the text condition, which was more intense impressions than in

face-to-face, evidence for a strong version of hyperpersonal theory. Using a clinical sample of socially anxious participants would be a useful follow up to look for differences between groups.

It was found that highly socially anxious participants were more likely than low socially anxious to report greater intensity in their ratings of presented self compared to their real self, especially on high observability factors. One tentative explanation is that those who are socially anxious work extra hard on their self-image presentation, focusing on this more than LSA participants.

In analysing the task itself there were found to be some differences between the media in the way participants approached the combined task, with those in the text condition being more likely to generate a menu based on their previous individual ones compared to face-to-face who would tend to generate new ideas. Those participants who interacted via text and anticipated future interaction were most reserved. This could be because in face-to-face one can see the person and can get direct feedback on how they are being received and can adjust their behaviour accordingly whereas in SMS the feedback channel is greatly reduced so they may 'play safe' by not trying to assert themselves too much, for by example sticking with original comments as opposed to coming up with new ones or rating themselves lower in intensity.

In terms of outcome variables, texting was rated as being significantly easier to communicate than face-to-face. Yet again there were no significant differences in liking for ones partner- a common theme in the experimental series. Despite the limited cues SMS does not prevent liking developing or constrain it. So text communication can be at least as personal as face-to-face, contradicting the CFO approaches to such mediated communication.

Those in the AFI condition reported wanting to get to know their partner better. This may be a reason why they were more conservative in their impressions formed, because they wanted to find out more about their partner before they rated them. This result serves also as a manipulation check; the fact that there were significant differences between AFI and NAFI conditions shows that manipulation of AFI/noAFI was believed by the participants and that it was not just the case that participants thought they would meet these people again outside of the experiment or that they thought the instructions were designed to be deceptive.

The social anxiety variable showed to be an interesting one. There were found to be quite a few differences between low and high socially anxious participants. These included HSA showing less consistency between their real and believed-presented self-presentation than LSA and having less confidence in the impression they believed their partner to have formed of them, which is what may be predicted from Greenberg *et al.*'s (1985) paper.

The highest levels of liking were found for participants who anticipated future interaction and were high in social anxiety, they reportedly wanted to get to know their partner better more than those who did not expect future interaction and were highly socially anxious. This is what one may expect as they are more worried about interaction than their LSA counterparts and unlike the NoAFI they have the impression that they will have to meet their partner again so they are more likely to want to get to know them better. In contrast those who were highly socially anxious and who were not expecting future interaction had the lowest levels of wanting to get to know their partner better out of the four groups. Again this is as one may expect as typically those who are socially anxious avoid social situations.

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As mentioned at the outset, one potential problem in using the quasi-signal detection paradigm is that the baseline ‘signal’ is itself subjective - it is based on the sender reporting that they presented a characteristic during interaction. There are obvious potential problems with accuracy which have already been discussed, and unlike traditional signal detection experiments where the experimenter can have control over the ‘signal’, no such control exists in the present studies. Even accepting the subjective nature of the baseline signal, a further shortcoming is that the ‘presented self’ may differ in unpredictable ways from the actual self participants report in their baseline ratings. This may happen because people take greater risks with the self they present in the less threatening SMS context—just as they do in CMC (Hamburger, Wainapel & Fox, 2002). This might be amenable to experimental control in a role-playing paradigm similar to that used by Paulhus and co-workers

(Paulhus, Graf, & van Seist, 1989) in which senders are asked to act out a personality that contrasts with their own.

The sample of participants used should be discussed. This particular group were all female, and all knew how to use text, indeed these were pre-requisites of the experiment. In looking at the descriptives it was apparent that the group had a high frequency of text messaging use, with the mean being around 225 texts sent per month. The sample was also weighted slightly more in favour of a preference for texting than voice calls, although overall the preference was for face-to-face communication.

A matter of note is that these experiments have specifically been interactions amongst strangers, however obviously most interpersonal interaction occurs between people who know one another. The earlier studies utilising panel data however assure that texting is used for more close, interpersonal communication

Future research questions include whether intensity differences will continue over time as during an interaction one can expect an increase in individuating information and resulting breadth. This may reduce intensity of impressions, or it may but increase intensity due to processes like behavioural confirmation and the resulting selective presentation loop. More longitudinal work needs to be carried out on this. Investigations like this can also help validate the social-information processing model, which assumes that over time mediated communication catches up with face-to-face in terms of its social impact e.g. on liking, and look for patterns to determine the length of time that is required for communication to go beyond that to become hyperpersonal.

As mentioned earlier, in the present study, social anxiety type was defined by a median split: Those above the median were labelled as high in social anxiety and those below the median were labelled as low in social anxiety. It should be highlighted that by no means were the sample of highly socially anxious participants clinically social phobic. As a result it must be acknowledged that higher levels of social anxiety may provide a different set of results. Replication of this study with participants who are clinically diagnosed with social anxiety is a potential direction for future research which may prove to be an interesting extension to this study.

7.3.4.1. Conclusions

To sum up, this experiment has marked the end of the experimental series in which it has been tried repeatedly to gain evidence that an effect of texting corresponding to Hancock and Dunham's (2001) results with desktop computer IM, whereby mediated communication led to deeper, more intense attributions of ones partner than the face-to-face alternative. The aim has been to determine whether this effect extended to text messaging and to untangle whether or not the effect, if present, was a sender or receiver effect by utilising a quasi-signal detection paradigm. The finding that mediated communication led to more intense attributions was indeed replicated. Although the finding that there was less breadth of impression was not reproduced. This is reasoned to be due to the fact that Hancock and Dunham's questionnaire did not factor in for the effect of observability with some of the personality items used being more suited to face-to-face communication than CMC.

This study utilised a quasi-signal detection paradigm to try to uncover whether the effect was due to the sender sending out more discriminable signals or whether it was down to the receiver being more biased in their judgements of whether an

attribute was present or not. The former would provide evidence for selective self-presentation, and the latter for over-attribution of personality characteristics by the partner

There were no significant main effects of medium on d-prime values, suggesting that the strength of the personality 'signal' given out did not differ across the two conditions. This initially implies that the greater intensity of impression formed by those in the SMS condition was not due to sender effects, but was probably a result of an over-attribution bias in their partners' judgements.

There did appear to be a significant interaction between social anxiety and factor observability in d-prime values, with highly anxious participants presenting equal strength signals for low and high observability items, and low anxious participants putting greater effort into presenting low observability factors and less into presenting high observability factors. This may be due to a concern amongst anxious participants to convey all aspects of their personality, whilst those participants low in social anxiety have more cognitive resources available to focus on getting across the less observable aspects of their personality. This suggests that there are self-presentation differences between high and low socially anxious participants. However this affects both SMS and face-to-face conditions, and therefore is not indicative of a sender effect producing the elevated intensity scores after SMS interaction.

There was evidence of a selective self-presentation effect elsewhere, however. This evidence emerged from a three-way interaction between medium, factor observability and anticipated future interaction. Those in the SMS condition showed 'stronger' personality signals on low observability factors than those in the face-to-face condition, regardless of whether or not they anticipated future interaction. For

those in the face-to-face condition, however, signals on low observability factors were stronger when they expected future interaction than when they thought it was just a one-off meeting, and this pattern was reversed for the high observability factors.

One possibility is that this arises because more cognitive effort is needed to control highly observable cues in face-to-face interactions, leaving fewer resources to convey lower observability cues. The anticipation of future interaction may make those interacting face-to-face try harder at getting across these low observability cues. However, if they are not likely to meet again, they are unlikely to invest the extra effort required. In contrast, those in the SMS condition already have decreased the demands on their cognitive resources because they are interacting through an informationally lean medium, allowing them to carefully think about how they present themselves. Regardless of anticipated future interaction, SMS participants are more able to direct their effort to getting across less observable cues.

So it appears that there is a difference in discriminability of signals between the SMS and face-to-face media, with participants in the the former condition showing greater 'strength of signal' for low observability cues regardless of anticipation of future interaction, and face-to-face participants giving more emphasis to low observability cues if anticipating future action, otherwise giving more emphasis to high observability cues. This suggests there is some difference in self-presentation strategies across the medium and gives partial support to the explanation that senders are selectively self-presenting.

There did seem to be evidence of a receiver effect as well though, suggesting both a sender and receiver effect were in operation. This was evidenced by the greater bias those in the SMS condition had for attributing a high observability trait as present than the face-to-face condition, and that participants were generally judging their

partners more intensely than their partners were rating themselves. So there was evidence for over-attribution effects.

There was an interesting effect of social anxiety- for those participants who were rated as high in social anxiety, their real selves were more disparate compared to their presented selves suggesting they were behaving differently through text than what they would otherwise have done face-to-face. This may be indicative of hyperpersonal theory applying more strongly to certain groups, with SMS communication having more of an impact on their self-presentation and subsequent relations. Further research into this variable using a clinical sample would be insightful in examining individual differences in the social impact of texting.

This final study was hoped to lay some concrete foundations in the application of hyperpersonal theory to communicating through text messaging i.e. that the deindividuation caused by mediated text based communication will lead to more Hyperpersonal impressions based on limited interpersonal cues available. And indeed the present results seem to provide support for the theory, based on limited cues that are available in SMS, participants still developed deeper impressions of their partner. Whether this effect was due to a sender or receiver bias was examined via a quasi-signal detection paradigm. This revealed that the receivers were more sensitive to the cues given out by their partner through text than through face-to-face, and for highly observable factors they were more likely to over-attribute characteristics compared to face-to-face. So it seems both a sender and receiver effect are apparent in impression formation, both of which are helped by the affordance of text messaging allowing for selective self-presentation and over-attribution.

The more intense, exaggerated impressions developed by those interacting through text messaging are presumably based on minimal cues in the absence of

contradictory/individuating information available. This minimisation/lack of cues may allow those interacting to focus more on self-presentation, impression management and message composition. It may lead them to form more intense impressions of their partner than face-to-face as the lowered demand on cognitive resources may result in more attention being available to be able to focus on ones partner and what they are saying in their messages. So impressions are more intense because receivers over attribute and are also more sensitive to the cues given out by their partners as opposed to solely the senders being selective in their self-presentation.

Future studies should look at using observability as an independent variable in its own right to see whether this was in fact the reason for why Hancock and Dunham found breadth differences and the current study did not. The use of factor observability as a variable in the current analysis revealed some interesting differences between low and high observability factors, with low observability factors generally being less consistent in their ratings between the real and presented self but resulting in more discriminable signals. More research needs to be done on this to investigate why this may be the case, for example it may be that senders are focusing on getting across highly observable aspects of their personality where as receivers are more interested in the less observable aspects of their partners personality.

This study adds to the growing opinion that cognitive processes are important in impression formation and impression management in mediated communication. It is not simply just the filtering out of social context cues that is the explanation for many of the differences between media that have been reported. The explanatory advantage of the hyperpersonal, social information-processing, and SIDE models is

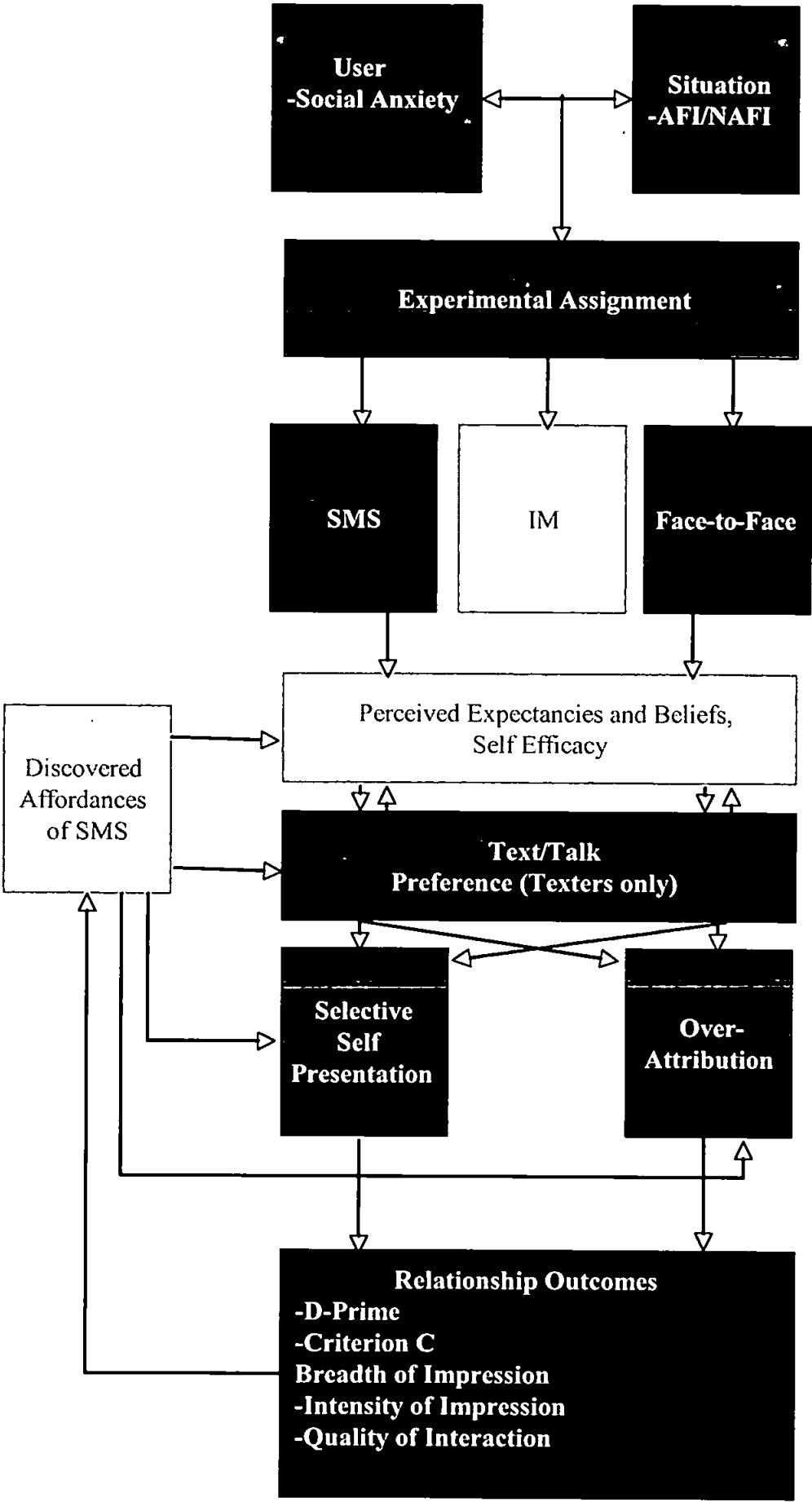


Figure 7.11. Resulting model of text messaging use

derived directly from their consideration of the cognitive strategies (e.g., information seeking, selective self-presentation) and heuristics (e.g., social identity and stereotyping) involved in the formation of impressions' (Hancock & Dunham, 2001, p344).

In relation to the model development, looking at Figure 7.11, it can now be shown that differential outcomes flow from the choice of medium - text or face-to-face - on impression formation. This experiment has demonstrated that, whilst liking for ones partner was unaffected by medium, impressions formed through text messaging can be more intense than those formed via face-to-face communication, and that this intensity results from a combination of the sender and receiver effects predicted by hyperpersonal theory. The model also allows for the impact of individual differences such as social anxiety as well as situational variables like AFI.

The next chapter aims to assimilate the thesis and to discuss the model in more detail.

Chapter 8. Discussion

8.0. Overview

This thesis has aimed to describe the phenomenon of mobile phone SMS text messaging and examine two key theories that help to explain the increasing popularity of this medium for personal relationship development and maintenance. The broad aims of this series of studies, set out in Chapter 1, has been to explore how SMS texting is being used, the impact it has on the formation and maintenance of interpersonal relationships, its attraction to particular groups of mobile phone users, and the applicability of two key theories, generating contrasting hypotheses, to the explanation of these phenomena.

These studies have gone some way in answering the questions that were asked in the introduction. Whilst more work is needed to fine tune some of the ideas and theory generated, the current thesis has contributed to our understanding of how and why texting has become such a popular medium for interpersonal relationship development and maintenance.

The emphasis of the current thesis has been on the psychology behind mobile text messaging. So rather than focussing purely on the features of the technology itself (e.g. the text based nature allowing for selective presentation), as a technology determinist approach, or purely on the user (e.g. social-cultural norms and values surrounding the mediums use), as a sociologist approach, the emphasis has been on investigating the motivations behind using the mobile, the affordances the mobile can offer and the individuals who seem to benefit/capitalise on these affordances for positive benefit.

Instead we have proposed that there are psychological processes (such as perceived uses, gratifications and affordances, preference for texting) that need to be taken into account and that these may mediate between the social and technical factors and the decision to text and the resulting outcomes of that medium choice. This relationship is depicted in Figure 8.1 below.

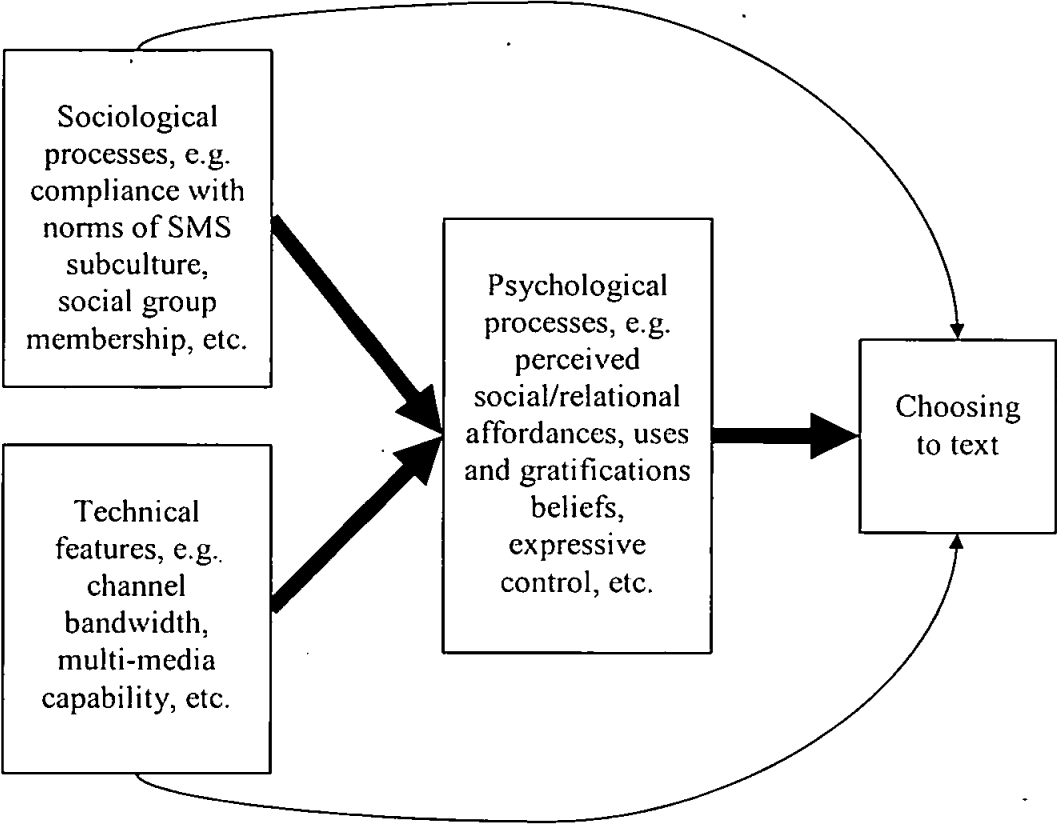


Figure 8.1. Suggested role of psychological processes in mediating between distal sociological, technical factors and the decision to text.

So the popularity of text is proposed to be due to not only the social context and technical features of text but also the psychology of the user. The process of impression formation, essential to relationship development, has been focussed on to examine the impact of text messaging on this process.

On commencing the PhD programme of work, there was little academic literature on psychological aspects of text messaging. This led to the structure of the programme of study initially being exploratory, and its direction informed by each study in turn. This thesis has aimed to test the applicability of two opposing theories of mediated communication - the Cues Filtered Out and Hyperpersonal Models. Having disconfirmed the CFO approach early on, the remainder of the thesis tested the applicability of Hyperpersonal theory to mobile phone text messaging communication. It can be concluded that the theory does seem to be able to explain some of the appeal of texting to those who use it, but there is still more work that needs to be done to the theory, specifically the examination of the specific conditions needed for communication to become hyperpersonal and further investigation into individual differences. This is needed to begin to untangle the micro-processes of communication that seem to be at work when people are choosing to use the medium to manage their interpersonal relationships.

What follows is a discussion of the conclusions from each chapter, with their implications for theory development. Then the resulting model that was developed as a result is discussed. Following this a review of the more recent literature that has been published since the research was conducted is given and integrated within the proposed framework, along with insights for future directions for research. Finally potential implications for technology development and clinical and educational settings are discussed.

8.1. Review of studies conducted

8.1.1. Part One

There were two main strands in this investigation – an exploratory strand,

discussed in part one, and an experimental strand, discussed in part two. The aim of part one was to uncover how text messaging was being used by looking at a collection of real world texts, gathered both in “snapshot” samples as well as a longitudinal study over several months.

Contrary to the Cues Filtered Out perspective of CMC, which hypothesizes that:

‘the functions served by nonverbal cues in face-to-face interaction go unmet in computer mediated communication because the nonverbal cues are absent. If no other cues can perform the social functions that physical appearance, co-presence and dynamic nonverbal behavior can, then... CMC must always be impersonal’ (Walther and Parks, 2002, p. 532)

these studies demonstrated that the reduced-cues medium of SMS text messaging can be used for social purposes, and that it is often a conscious motivation for using the medium. It was apparent from these studies that text messaging was being used for social communication as well as for practical/informational purposes, providing evidence that text messaging can indeed be used for social relational communication, in support of Hyperpersonal theory.

Having determined in Studies 1 and 2 that text messaging was being used for social purposes, the longitudinal data in study 3 allowed for investigation into the more qualitative aspects of the messages. The finding that the majority of text messages were conversational and showed evidence of social-relational content reinforced the findings of Studies 1 and 2 and was in accordance with the Hyperpersonal perspective. It was concluded from this chapter that there are several affordances of text messaging that can lead to hyperpersonal communication if they are uncovered by the user and capitalised on. These were:

1. Its *expressive* nature. The visual anonymity and asynchronous nature of the medium allows for the medium to be used not only for practical or informational purposes but for more social-relational purposes, expressing feelings and sharing thoughts and actions.
2. *Perpetual contact*. Being able to communicate as and when one feels such as it, regardless of whether the receiver is free allows users to update their communication partners as and when things happen.
3. *Extended/contracted time frames*. The frequency and pacing of the sequence of texting was another interesting finding. This is the first time this affordance had been investigated. Text messaging was found not only to be used in an asynchronous way, over several hours or days, but also in rapid near-synchronous text conversations, implying that it is not just a medium to use when a reply is not needed straight away. Many of the texts were conversational in nature, asking questions of the recipient or demanding some sort of reply, suggesting the conversational nature was what interactants were seeking. The near-synchronous nature of some of the text messaging conversations provided interesting theoretical insights. As reading a message can take at least a few minutes, to interpret, compose a reply, and send it on so quickly suggests that participants may be more highly involved in the conversation than first thought. Rather than text messaging being something that is done in the background whilst engaged in other activities, people are extending their involvement in the conversation by spending long periods of time engaging in the crafting, editing and reading of texts as they converse through the medium.

This suggests that although text messaging is good for multi-tasking and communicating asynchronously, some users actively seek out the medium for conversational purposes. It would of course be faster to converse through face-to-face communication or by voice call. However the protracted nature of communicating through text has the advantage of making communication longer and more drawn out so personal contact is lengthened – so texting is acting as a social glue (Ling & Yttri, 2002) . An in-depth diary study to investigate communication choices and purposes is needed to look into this further.

4. *Shared consciousness*: the ability to share thoughts, feelings and actions as they are experienced allows for a shared consciousness between the sender and the receiver, sharing aspects of their lives, strengthening the relationship bond between them.

5. *Micro-coordination*: The mobility of the medium allows for hypercoordination, or microcoordination, whereby users can coordinate and renegotiate plans on the move, and inform others of what they are doing at the present moment in time. Ling and Yttri (2002) argued that this led to hyperpersonal communication due to the opportunity for perpetual contact and the constant refreshment of contact between communicators.

6. *Gifting*: There were numerous examples of ‘gift’ texts, as found by Taylor and Harper (2002). Such texts were phatic in nature, for example the ‘night night’ or ‘I love you’ texts. These texts allow the receiver to see that someone is thinking about them and is a unique feature of text messaging due to the perpetual, discrete contact the medium affords combined with the conciseness leading to very succinct, to the point, communication. Such phatic

communication is important in maintaining and developing relationships (Malinowski, 1923). and is a key affordance of texting in relationship outcomes. The evidence of social-relational and gift texts indicates that text messaging is being used for highly social relational, expressive and intimate purposes, providing support for hyperpersonal communication.

7. *Its concise nature*: This seems to be a unique niche of the text messaging medium - the ability to send a quick text without having a whole set procedure around doing so, waiting for the other person to be available, exchanging pleasantries etc. (Grinter & Eldridge, 2001). So text communication has no time boundaries.

8. *Its malleability* to communication needs: from reminders and planning to expression of feelings. These could all potentially allow for communication that goes beyond that possible face-to-face. These affordances of text allow for a medium that can offer new communication opportunities, independent of time or distance limitations. The use of text for such diverse purposes shows how malleable and generic the medium can be. This malleability is another unique and important affordance of text messaging and allows it to be a medium that can be used across a variety of situations.

The perceived motivations behind text messaging were examined in Study 4 by using a uses and gratifications approach, testing the reported uses and gratifications as potential mediators for text messaging usage. The results of this study supported the findings of Studies 1-3 by finding evidence that relationship development/maintenance was a key motivation for choosing to use the medium. This

provides further support for Hyperpersonal theory as it shows the medium is actively being selected to accomplish relationship goals.

8.1.1.2. The Texter/Talker Dichotomy

It appeared that preference for texting may be an important moderating variable of whether communication became hyperpersonal as this group were more likely to capitalise on the social-relational affordance of expressivity, demonstrated by their higher likelihood of self and other feeling content. The preference for text/talk was linked to social anxiety, with those rated as higher in social anxiety being more likely to prefer texting. There may be other individual differences that predict preference for text/talk, and these need to be investigated in further research to discover whether certain characteristics can pre-empt users to discover the affordances of text messaging.

There were found to be several interesting effects related to the preference for texting or talking on the mobile within the current studies. As was found in previous research (Reid & Reid, 2005), Studies 1-3 found evidence that Texters reported sending and receiving more text messages, as one would expect from a group who preferred text to talking on their mobile. Study 2 also found Texters send longer text messages than Talkers.

One-shot studies showed that the sample text sent by Texters was more likely to have content related to combined plans than texts sent by Talkers. There were no other differences apparent however one limitation of this study is that participants, despite being asked to record their most recent sent and received messages, may have self-selected texts that they thought would be more interesting to analyse, those that were longer for example so the content would not necessarily be representative of

their general communication. Study 3 dealt with this problem by looking at a longitudinal collection of text messaging. This study found that there was strong evidence of predictive effects of text/talk preference on several measures of content-self feelings, other feelings and self information, suggesting that Texters may be more attuned to the social-relational affordances of text messaging.

This tentative hypothesis was supported by the findings of Study 4 which found evidence that Texters were significantly more likely to report texting for relationship development and maintenance, affection, sociability and convenience. Talkers were more likely to use it as a last resort when no other methods of communication were possible. So it appears that these groups may perceive different affordances of using the medium, or certainly prioritise these affordances differently.

It is postulated that this variable may be related to self-efficacy in that those individuals who have learned how to capitalise on the social-relational affordances of the medium are the people who have the potential to develop hyperpersonal communication. It is known from the literature on Internet self-efficacy that people who have low self-efficacy are less likely to use the medium (Eastin & LaRose, 2000) and as a result are less likely to discover potential affordances and their benefits. The same may be true of text messaging. Earlier research had found that Texters reported being able to better express themselves through text messaging than through voice calls or face-to-face communication (Reid & Reid, 2005) suggesting that they were getting more out of the medium than Talkers. Analysis of Study 5 has shown how Texters report more social-relational motivations for using the medium, whereas Talkers are more likely to use it as a last resort if no other methods are available, suggesting that they have not learnt to exploit these affordances.

Texters also reported using the medium more. Suler (2003) reported, in relation to email use, that the more one used email, the more relationships would develop and the more one would email as a result. Similarly, Utz (2000) found the same with regards to online gaming, with those who spend more time gaming spending more time on the activity and more likely to identify with their fellow gamers. So this seems to be the case for Texters too.

These results are in accordance with a social shaping approach to texting (Ellison *et al.*, 2006), in which Texters are assumed to be better able to recognise the hyperpersonal affordances of the medium and capitalise on them as their needs arise. Those who prefer texting were found to be more socially anxious than those who preferred talking on their mobile so individual differences appeared to be an important contributor to preferences for texting and talking and therefore perceived uses and gratifications. This is discussed more in the following section. Qualitative studies based on interviewing Talkers and Texters may give more insight into what they think text messaging can add to their relationships and may help uncover whether self-efficacy is an important moderator in hyperpersonal interaction.

8.1.1.3. Uses and Gratifications

The first three studies examined the content of text messages, with the overall finding that texting could indeed be used for social purposes, refuting the CFO hypotheses. Study 4 aimed to start to extend the inquiry into whether texting was used for hyperpersonal purposes by investigating individual differences and the motivations behind using texting.

It was discovered in this study that certain individual differences pre-disposed users to recognise the social affordances of SMS. For example those who were rated

as higher in social anxiety may be more inclined to seek out and notice the advantages of the medium for reducing cognitive load, providing visual anonymity and allowing time to carefully reflect on and edit what they want to text, than people who do not experience social anxiety.

Lonely people however were more likely to prefer voice calls to texting. This was postulated to be due to this group seeking affordances from a medium that text could not offer but that voice calls could- specifically the immediacy and real-time nature of voice calls.

The mediational approach taken in Study 4, revealed that certain uses and gratifications identified mediated between individual differences and preference for text or talk on the mobile. Lonely people who had identified using text only as a last resort preferred talking to texting, whereas lonely people who had identified text as useful for relationship development and convenience, and who tended to be rated higher in social anxiety were less likely to prefer talking to texting

This would suggest that the potential for hyperpersonal communication would only be experienced by users who were predisposed to discover these affordances of text messaging and who were motivated to use the medium due to the social and relational affordances it offered.

8.1.1.4. Summary

So at the end of Part One, it was concluded that the evidence was more in favour of the Hyperpersonal Model than it was in the Cues Filtered Out approach. The evidence from the gathered text messages that text messages were being used for social-relational purposes, and that these were intentional (as reported by users in Study 4) was contrary to the CFO prediction of a cold, restricted medium. However,

evidence pointed to the need for theory to incorporate processes through which affordances of media are discovered and exploited for relational and other purposes, and the role that enduring psychological orientations, such as social anxiety, play in predisposing mobile phone owners to recognise, actively seek out, and adapt the affordances of SMS to achieve key interpersonal outcomes.

Study 4 revealed that the individual differences of loneliness and social anxiety predisposed users to recognise the social affordances of texting, with those rated as higher in social anxiety more likely to identify the social-relational affordances of text and to prefer texting to talking on their mobile, whereas those rated as higher in loneliness were less likely to identify these social affordances, preferring voice calls and using text as a last resort.

At this point the available evidence has shown only that text messaging could be equivalent to face-to-face communication, in that both social-relational and task/informational purposes are accommodated by the medium, supporting the weaker version of Hyperpersonal theory - the Social Information Processing perspective. For the stronger Hyperpersonal Model to hold, then evidence for deeper, more intense communication through SMS text messaging would be required. Study 4 had hinted that there was the potential for hyperpersonal communication, having highlighted the affordances that could lead to this however it was unclear whether only certain groups of users would capitalise on these affordances to engage in hyperpersonal communication (e.g. the Texters), or what conditions were needed.

8.1.2. Part Two

Part two of the thesis aimed to examine whether communication could indeed become hyperpersonal. The experimental series has shown that when interacting with

a stranger, given enough time, those who interact through text can form just as detailed impressions through text as they can through face-to-face communication. The studies showed that given enough time, liking for ones partner was not compromised by the text medium despite the severe restriction in cues. The faster rate of positive liking change in text messaging conditions suggested that given more time, liking could actually surpass face-to-face. Preference for text or talk had a significant effect on liking at time 1 in Study 6 where it was found that Texters significantly rated liking their partner more than Talkers, suggesting that they are more at ease using the medium earlier in their interactions with strangers. Also Texters rated the quality of interaction to be as good as face-to-face whereas Talkers struggled with predicting partners' attitudes and agreement in texting, felt less close to their partner and enjoyed texting less. These results fit in with the self-efficacy line of reasoning discussed earlier.

Text messaging resulted in higher ratings of closeness to partner, a better ability to share intimate personal details and being able to predict partners attitudes more confidently. In addition to these results, participants ratings of quality of interaction correlated with liking for those in the text condition but not in the face-to-face condition. This is in line with Hyperpersonal theory as interactants have no cues other than those conveyed by SMS on which to base their liking for their partner, unlike face-to-face where visual cues may take more prominence.

In Studies 7 and 8 it could be seen that those in the SMS conditions actually developed more intense impressions, supporting Hancock and Dunham's (2001) results and suggesting preliminary evidence for hyperpersonal communication. The novel use of a quasi-signal detection paradigm was utilised to uncover whether this greater intensity of impression was down to selective self-presentation by the sender

or rather was a result of over-attribution by the receiver, two processes that the Hyperpersonal Model had assumed occurred but had not directly tested which one, or combination of both resulted in hyperpersonal communication.

The findings of Study 8 suggested that a combination of both these processes was likely although further research needs to be carried out to test the robustness of this effect. A significant 3-way interaction was revealed between medium, factor observability and anticipated interaction whereby participants in the SMS conditions showed greater 'strength of signal' for low observability cues regardless of anticipation of future interaction, whilst face-to-face participants gave more emphasis to low observability cues only if anticipating future action, otherwise giving more emphasis to high observability cues. This suggests there is some difference in self-presentation strategies across the medium and gives partial support to the explanation that senders are selectively self-presenting.

A receiver effect was also evidenced in the data. Those in the SMS condition had a greater bias for attributing a high observability trait as present than the face-to-face condition, and that participants were generally judging their partners more intensely than their partners were rating themselves, suggesting both a sender and receiver effect were in operation.

One potential explanation for these findings is that face-to-face requires more cognitive effort to control highly observable cues, leaving fewer resources to convey lower observability cues. However the anticipation of future interaction may make those interacting face-to-face try harder to get these low observability cues across. Conversely, if they are not likely to meet again, they are unlikely to invest the extra effort required. In contrast, the cue-lean medium of SMS may automatically decrease the demands on interactants cognitive resources, allowing them to carefully think

about how they present themselves, so regardless of anticipated future interaction, SMS participants are more able to direct their effort to getting across less observable cues.

Despite the potential for participants in the text messaging condition to play with their self-presentation, there were no significant differences between their baseline and perceived self-presentation. This may of course be due to inaccurate self-reports with baseline selves being more exaggerated, however if this was the case it is not clear why people would want to exaggerate about this as it was anonymous. The reliability of self-perception/personality questionnaires is of course an issue, and is something that has been highlighted in personality research (e.g. Huizinga & Elliott, 1986). Future research could tackle this by using a participants existing friend to rate them and to compare this with the strangers evaluation.

8.1.2.1. Social Anxiety and Loneliness

Returning back to the summary of part one, a theoretical issue that all the models neglect concerns individual differences in media use. Chapter 2 laid out the individual differences that would be investigated in this thesis. Social anxiety is believed to occur in situations where an individual is motivated to make a positive impression on others, but where they expect to be unsuccessful and that a negative impression will result (Schlenker, 1982). It was hypothesised that the affordances of text messaging that allow for selective self-presentation and greater control of involvement in the interaction may be more appealing to people who are rated higher in social anxiety. Indeed, Earlier findings (e.g. Reid & Reid, 2005) had indicated that Texters were more likely to be rated higher in social anxiety.

The results of the studies discussed in this thesis also seemed to support this. Study 4 failed to replicate this result, directly however when uses and gratifications were used as a mediator variable, Study 4 revealed that the effect of social anxiety on preference for text or talk was mediated by certain uses and gratifications. Socially anxious people who identified the use of text for relationship development or ease/convenience were more likely to prefer texting. As expected those rated as lower in social anxiety were likely to report making and receiving more voice calls. Studies 5 and 6 provided further support, showing that those rated as higher in social anxiety were more likely to prefer texting.

In chapter 7 it was found that presented self ratings for those participants who rated themselves higher in social anxiety were more disparate from their real self ratings than those who were lower in social anxiety. This suggests that they presented a different self image through the text medium than the image they would otherwise have presented face-to-face. This may be indicative of Hyperpersonal theory applying more strongly to certain user groups, with those who are socially anxious having more to gain with SMS communication. Further research into this variable using a sample with a wider range of social anxiety scores would be insightful in examining these individual differences in the social impact of texting.

On the whole these results seem to support the preposition that the opportunity to manage self-presentation and involvement through text interactions is particularly appealing to individuals who are rated as more socially anxious.

Turning to loneliness, it was highlighted in Chapter 2 that although loneliness and social anxiety are positively correlated, they are very different psychological states (Leary, 1983). Loneliness can occur as a direct result of social anxiety however that is not to say that every lonely person is socially anxious – for some loneliness

may just be a temporary state caused by a change in social situation, such as moving house, for others it may be a more chronic factor.

In earlier research it had been found that people who preferred text messaging on their mobiles were more lonely than those who preferred talking. However the current analysis suggested the opposite. The effect of loneliness on preference for text or talk was found to be mediated by the reported uses and gratifications of text messaging. Those who were lonely were found to be more likely to be Talkers, especially if they had reported their reason for using text as being as a last resort. The conclusion that was drawn from this result was that intimacy needs of lonely people are satisfied more immediately with a real-time voice call than by asynchronous text messaging. This may be explained by Weiss (1973) who stated that the experience of loneliness was a result of the absence of social relationships that were capable of satisfying an individuals attachment and belongingness needs. It seems that text messaging for those who reported to be higher in the loneliness factor, did not fulfil these needs, hence the preference for more cue-rich media. Loneliness failed to be a significant predictor of text/talk preference in Study 5 and 6. More examination of this variable is needed to be more conclusive about its effects.

Despite the correlation between loneliness and social anxiety (Leary, 1983) the findings of Study 4 have shown the importance of differentiating between dispositional orientations towards social interaction and their impact on media preferences. Rather than the experience of loneliness in itself, self-presentational concerns resulting from social anxiety are the better predictor for a preference for texting.

It has been widely reported in the literature that those with social anxiety are biased in their processing of social information, being more likely to identify negative aspects of an interaction than positives (e.g. Asmundson & Stein, 1994; Clark & McManus, 2002). Indeed, Pickett, Gardner and Knowles (2004) have proposed that we all have a social monitoring system that guides information processing to maintain social connectedness. This system facilitates social inclusion. However there are proposed to be individual differences in the sensitivity of this system in attending to and accurately interpreting interpersonal social cues. In their 2004 series of experiments they demonstrated the ‘need to belong’ was one of these individual differences. With participants higher in this need being more attuned to identifying interpersonal social cues, and did so with more accuracy. This suggests that there are individual differences that bias peoples perception of social information. In relation to social anxiety, this enduring predisposition to process social information in certain ways appears to make these individuals more likely to discover and report on the affordances of the text message medium, making them more likely to prefer text messaging to talking on their mobile.

8.1.2.2. Other Variables of Interest

Other variables that were investigated included gender, age and anticipated future interaction. The results of each of these are reported below.

8.1.2.2.1. Gender

It was found in Study 1 that, contrary to expectations, men sent more texts than women. However this may be down to sampling error as Study 2 showed females sent more, in line with Boneva *et al.* (2001), Grinter and Eldridge (2003b)

and Ling (2004). Study 2 revealed that females were more likely to send longer messages, supporting Kasesniemi (2002) who found boys texts to be briefer and supports the general finding that females emails are often longer than those of males (Colley *et al.*, 2004). However Study 3 failed to find this result. So this variable needs further investigation. In relation to content differences, males appeared to send more gift texts than females in Study 1, and this difference was found to be specifically males sending to females. This was similar to a finding by Colley *et al.* (2004) in relation to email correspondance where males were more affectionate with women than with men. In Study 2, it was revealed that females sent more self/other feelings, and third-party ('gossip') texts, whereas males had more texts than females related to self actions other plans and swearing. Male:male texts were found to be more likely to contain swearing (as was the case in Colley *et al.*'s (2004) research on email communication) and less likely to contain self/other feelings than mixed gender or female:female dyads.

Analysis of dyad gender in Studies 2 and 3 revealed self and other feelings were more demonstrated by males in texts sent between mixed gender dyads than by male:male dyads. Female:female dyads also sent more texts containing this content than male:male dyads. These results are supportive of the general gender differences reported in the existing literature where women have been found to be more intimate with same-sex friends than males (e.g. Derlega, 1993; Benenson *et al.*, 2003; Markovits *et al.*, 2001), and for voice calls where women were found to make longer calls, enjoy speaking more, stay in touch more, and maintain distant relationships more (Lacohee & Anderson, 2001). For email use, Colley and Todd (2002) discovered that males send more intimate emails to females than other males. So these differences may reflect general gender differences in discourse that are maintained

across media.

There was no evidence of significant gender effects in reported uses and gratifications of text messaging in Study 4, suggesting males and females were equally aware of the affordances the medium had to offer.

In past research (Reid & Reid, 2001) it was discovered that Texters were more likely to be female, however Study 2 failed to show this was the case. It may be that over time gender differences have reduced as the medium has become more popular. The biggest problem with looking at this variable was that the population sampled was heavily biased towards females. As such further work looking specifically at gender differences would be desirable. However the fact that differences were found on certain variables that were consistent with the literature suggests that in a more representative sample, these differences may even be wider.

8.1.2.2.2. Age

Age failed to be a significant variable in many of the studies conducted. This was surprising given literature suggesting teens and young adults were the most likely to use texting (e.g. Thurlow, 2003; Ling, 2002; Ling 2003). Study 4 failed to replicate Ling's (2002) finding that different age groups use texts for different purposes with the older users preferring the medium for co-ordinating and planning, and teens for expressive and conversational uses.

This may be due to the biased nature of the sample towards university undergraduates. Study 4 showed that older participants were less likely to use the medium for diversion/escape purposes. It may be that as text messaging has become more widely used, age differences may be less apparent. Future research should focus on examining differences in different age-groups to test this further.

It should be highlighted that despite the lack of age effects however there were still differential effects observed for Texters and Talkers, which suggests that given a more age-diverse sample this difference would be even bigger, and so adds strength to the current findings.

8.1.2.2.3. *Anticipation of Future Interaction*

Walther (1994) proposed that AFI leads to the development of relational norms and greater affiliation with ones partner as it prompts partners to find out more information about each other, to engage in more self-disclosure, and to be more socially oriented in communication than in face-to-face first encounters (Tidwell *et al.*, 2002). In study 8 anticipating future interaction made participants want to get to know their partner better than those who thought the interaction was a one-off. This is consistent with previous literature findings of increased feelings of similarity, intimacy and affection (e.g. Berger & Douglas, 1981; Walther, 1992). Those in the no AFI condition rated their presented self as more intense than those in the AFI condition, although there were no differences in the ratings of their partner. One potential explanation for this is that in AFI the sender may try to be more neutral: given they are to meet again, it would be understandable if participants were more worried about their self-presentations. Perhaps in AFI participants have to think more about how their partner sees them and given the prospect of future interaction, they have to be more conservative with their self-presentation. More research is needed to understand how this variable affects self-presentation and social interaction.

There were limitations with this variable however. The undergraduate psychology population may have expected some future interaction with the other participant purely through being in the same year group. They may have expected to

meet them in lessons or tutorial groups for example so although participants in the no anticipated future interaction condition were told they would not meet their partner again, they may have doubted this, meaning this may have confounded the results on this variable.

Future studies should look at better ways to manipulate this variable, perhaps by telling participants they would be interacting with a person from another university or another group they are unlikely to meet in the immediate future. However it should be noted that text messaging in a real life context would carry with it a high degree of AFI- one usually texts someone else that they have met at least once before to have exchanged numbers, and there may be that expectation of AFI which may be a key factor for its use.

8.1.2.2.4. *Instant Messenger*

The finding in Chapter 7 that Instant Messenger produced a set of results that differed from SMS text messaging was interesting in itself. There are many forms of Instant Messaging that differ in synchrony. Nowak *et al.* (2005) highlighted the importance of synchrony in impression formation being that one of the benefits of asynchronous communication is the opportunity to carefully plan and edit what one is saying. In near-synchronous media this opportunity will be lost. The IM used was virtually synchronous so it may have impacted on the results. Further work comparing different media with different synchrony characteristics would be insightful to see how asynchronous communication has to be to produce potentially hyperpersonal effects.

The synchrony of the medium also is related to the attention needed. There is more of an attentional 'contract' with the almost synchronous IM - exchanges can be

fast and responses may be expected quicker than other media- indeed Nardi, Whittaker & Bradner (2000) report one of the reasons people use it is precisely because they expect it will foster a more immediate reply than email. There is more attention required for an IM exchange where users have to monitor what their partner is saying and get back to them in reasonable enough time. This is less of an issue with SMS texting as people can send a text and generally know that they will get a reply if the receiver is available.

This attentional contract may be precisely why certain groups, such as those higher in social anxiety prefer SMS text messaging, because of the lessened pressure on the interaction itself, with less of a commitment to replying within a specific time.

8.2. Hyperpersonal Theory: Strong or Weak?

Having determined that the traditional CFO perspective was not an adequate explanation of the content or motivations behind text messaging, a more detailed probe was conducted into differentiating the Hyperpersonal theory further, into a 'weak' and 'strong' version. This maps onto Kiesler's (1997) question as to whether the impact of a technology is amplifying (the SIP approach) or transforming (the Hyperpersonal Model). The weak version corresponds to the SIP approach, claiming communication can be as social-relational as face-to-face and the stronger version whereby the former was extended to hypothesise that two elements of communication may lead to the Hyperpersonal Model being more applicable than the SIP approach. These were (1) the opportunity for selective self-presentation by the sender and over-attribution/partner idealization by the receiver, both facilitated by the asynchronicity and visual anonymity of text-only communication; and (2) feedback, which can lead to idealized impressions through reciprocation and magnification (Walther, 1996).

There was evidence from the text collection studies that text messaging was being used for a wide range of practical and social-relational purposes, and the longitudinal study looked at some of the more qualitative aspects of text messages, demonstrating several message features that could be taken as preliminary evidence for the stronger Hyperpersonal Model, for example the perpetual contact and shared consciousness attributes of the medium.

It may be the case that the majority of people can get similar outcomes via text messaging as they do from face-to-face communication. So in relation to Kiesler's (1997) distinction, text messaging may be an amplifying technology, helping people do what they already could do through other methods. However for a subset of people who have learnt to capitalise on the social-relational affordances of the medium, those who are rated higher in social anxiety for instance, texting may be transforming in that it goes beyond what people could achieve from other communication methods, helping them achieve hyperpersonal communication.

It has been demonstrated in the exploratory studies that text messaging can be used for a range of interpersonal goals, including being chosen to help relationship management, impression formation and general social-relational purposes. As hypothesized by Nowak, Watt and Walther (2005) 'people are able to utilize almost any media system to fulfill interaction goals' (p2). However the same authors go on to say: 'it is possible....that even though people are able to adapt their communication behaviors to meet the features of cue-lean media, they maintain a preference for cue rich media' (p4).

It has been found amongst the results that those individuals who report a preference for texting over talking on their mobile report more uses and gratifications for the medium and demonstrate higher liking for their partner earlier on (Chapter

6), than people who prefer talking. Further work on who is likely to prefer text messaging may give much needed insight into who exactly gets the most out of the affordances of text messaging and if hyperpersonal communication does occur, is this a product of the medium or a person by medium interaction.

As highlighted in Chapter 1, the two main problems with the SIP and Hyperpersonal Model's are that firstly, it is lacking a motivational/strategic element (Joinson, 2003). For example it assumes everyone wants to develop a significant relationship via CMC (Utz, 2000). It may be the case that people strategically pick a communication method such as text because they are avoiding lengthy conversations or awkward face-to-face interactions e.g. when terminating a relationship.

The second problem is that the theoretical links between the four components of the model (sender, receiver, channel and feedback) and the processes that the model specifies are not clear, which makes it hard to understand why an effect may or may not be present, in terms of which of the components are responsible for the outcome (Walther *et al.*, 2002). Study 4, in Chapter 5 partly addressed the first problem by looking at key motivations for text messaging in general, finding that those individuals who preferred texting had more social-relational motivations for using the medium.

The addition of a motivational element in the current thesis is a useful extension to the Hyperpersonal theory in its application to text messaging. However a more thorough analysis of situations in which people would choose to text or to make a voice call or meet face-to-face is needed as certain conditions may affect which communication medium people choose to use (Tice *et al.*, 1995). It may be for example that for initially getting to know someone, text messaging is preferred as it is less face-threatening and the asynchronous nature allows for careful planning of what,

and how, things are said and anticipated future interaction may channel attention to thinking about ones partner.

In regards to the second problem, the present investigation has tried to examine one of these aspects in more detail - Studies 7 & 8 in Chapter 7 attempt to untangle whether more intense impression formation is a sender or receiver effect. It was revealed from these studies that it is likely to be a combination of the two. More research is needed to uncover more about these variables in order to be more specific about the conditions which are required for communication to become hyperpersonal. The use of a quasi-signal detection paradigm would be recommended for this.

In summary for the strong versus weak hyperpersonal issue, the evidence assembled in this thesis suggests that some people (for instance those who are rated higher in social anxiety) are more likely to discover the social affordances of text messaging and are therefore more likely to experience hyperpersonal communication when using this medium. Study 6 revealed that those individuals who preferred texting on their mobile phone experienced greater liking for their partner than those who preferred talking. It was also revealed in Chapter 6 that liking for partner was more accelerated after text interaction than it was after face-to-face, suggesting potentially given enough time text may surpass face-to-face in terms of liking for partner.

This accelerated intimacy was also apparent in the studies in Chapter 7 with people who interacted through text showing more intense impressions of their partner than those who interacted face-to-face.

It appears therefore that there is no blanket hyperpersonal effect of text messaging, but rather under certain conditions for certain subgroups the discovered affordances of texting can lead to Hyperpersonal interaction, supporting the stronger

theory. So the strong versus weak issue is basically a conditional effect, with several factors needed to combine together in order for the stronger hyperpersonal theory to apply.

8.3. Other Theoretical Accounts

The decision to focus on Hyperpersonal theory as a potential explanation for the uptake of text messaging was justified in Chapter 1. Hyperpersonal theory is one of two dominant models in the current CMC literature. The other theory that was mentioned was the SIDE model (Lea & Spears, 1992; see Chapter 1, section 1.3.2.1). The main problem with the SIDE model is that it focuses on group- level relationships and neglects interpersonal relationships (Walther & Park, 2002). As SMS is a dyadic, one-to-one, personalised, individuating medium, the appeal of texting is difficult to reconcile with the SIDE approach which emphasises depersonalisation. Specifically, SMS is typically used in a context where the texter is engaged in a person-to-person interaction with the recipient of the text message, with whom they are acquainted, even if only briefly. The recipient is therefore more likely to be differentiated as a unique individual than as a member of a social group (such as “one of the clique”) or social category (such as “a typical male”). In other words, the personal qualities of the recipient are likely to be more salient than their category membership, and the interaction will be localised at the interpersonal rather than the intergroup pole of the social comparison dimension (Hogg & Turner, 1987). It is for this reason that the SIDE model was not the focus of study in this thesis.

The Hyperpersonal Model seemed to be intuitively the most fitting to the text messaging as it fits with Walther’s tenets of what is needed for communication to become hyperpersonal. These were: (1) interactants experience commonality; (2)

increased self-awareness; (3) physical separation; (4) communicating via a limited cues channel that enables selective self-presentation and editing; (5) one can construct/reciprocate representations of partners without being faced with 'environmental reality'; and (8) communication is asynchronous. It was therefore preferred over the SIDE model as, unlike its counterpart, it can deal with interpersonal dyadic communication- the prime use of text messaging.

A theory that has recently emerged and has potential relevance to SMS is Joinson's (2003) Strategic and Motivated users, Expected and Emergent Effects (SMEE) Model. Whereby users are postulated to have strategic and motivational factors to consider in their choice of using the Internet, and this use leads to expected outcomes as well as outcomes that were not expected. Examples of strategic uses of the Internet may including having greater control over self-presentation or to break bad news (O'Sullivan, 2000).

So, instead of the focus being purely on the technology, the emphasis in this model is shifted to the user. Joinson proposed that user characteristics influence the type and amount of Internet use and the satisfaction that results. In turn, this feeds into a self-reinforcement cycle with users who employ the medium more, and who get positive outcomes as a result, being more likely to use it again. This idea is reinforced in our own work, with people who prefer texting reporting more positive impacts on their relationships and greater frequencies of texting than those who prefer talking on the device (Reid & Reid, 2005). The concept of discovered social affordances developed in this thesis can also be mapped onto Joinson's model, with those who are discovering such affordances being more likely to use the medium again in future. Indeed it may be put forward that the model developed here for SMS texting is equivalent to the model developed by Joinson to explain the use of the Internet.

Joinson goes on to discuss some of the motivations behind the use of the Internet. These included self-enhancement, self-protection, affiliation and efficacy. Both the strategic and motivational elements of his approach stressed the importance of the role of the user in communication media choice. Taking a social shaping perspective, he also highlighted the importance of the users interaction with the medium in determining psychological outcomes.

The model was developed to cover both the emergent effects of using the Internet, as well as the predicted effects. Joinson highlights that many of the outcomes of using the Internet may have been expected by the user and part of the decision in choosing that medium. For example the visual anonymity may be a particular affordance that is appealing to those who are socially anxious so a key determinant of this group choosing to use the Internet. However as well as these predicted outcomes there are also emergent outcomes - those that are unexpected and that arise out of the interaction with the Internet (be it with other people or games/websites), for example hyperpersonal communication. These emergent outcomes can become predicted as they feedback to the user through experience, and so choices to use the medium can then be more strategic and motivated. The framework for the SMEE model is shown in Figure 8.2.

The model itself is useful in the context of the current work due to its emphasis on the role of the user. This user-centric approach was taken in the current thesis. The lack of this emphasis in dominant CMC theories has been highlighted as a major downfall, and is something that SMEE and this thesis have both tried to address. As was found with IM, outcomes of communication are postulated to not just be dependent on the medium itself but rather there is a complex interplay between the user and the technology which will determine possible outcomes (Waskul & Douglas,

1997). The idea that the motivations in using a medium depend on the interaction between individual differences in user characteristics and the situational context has been something that both the SMEE model and the model developed here have in common.

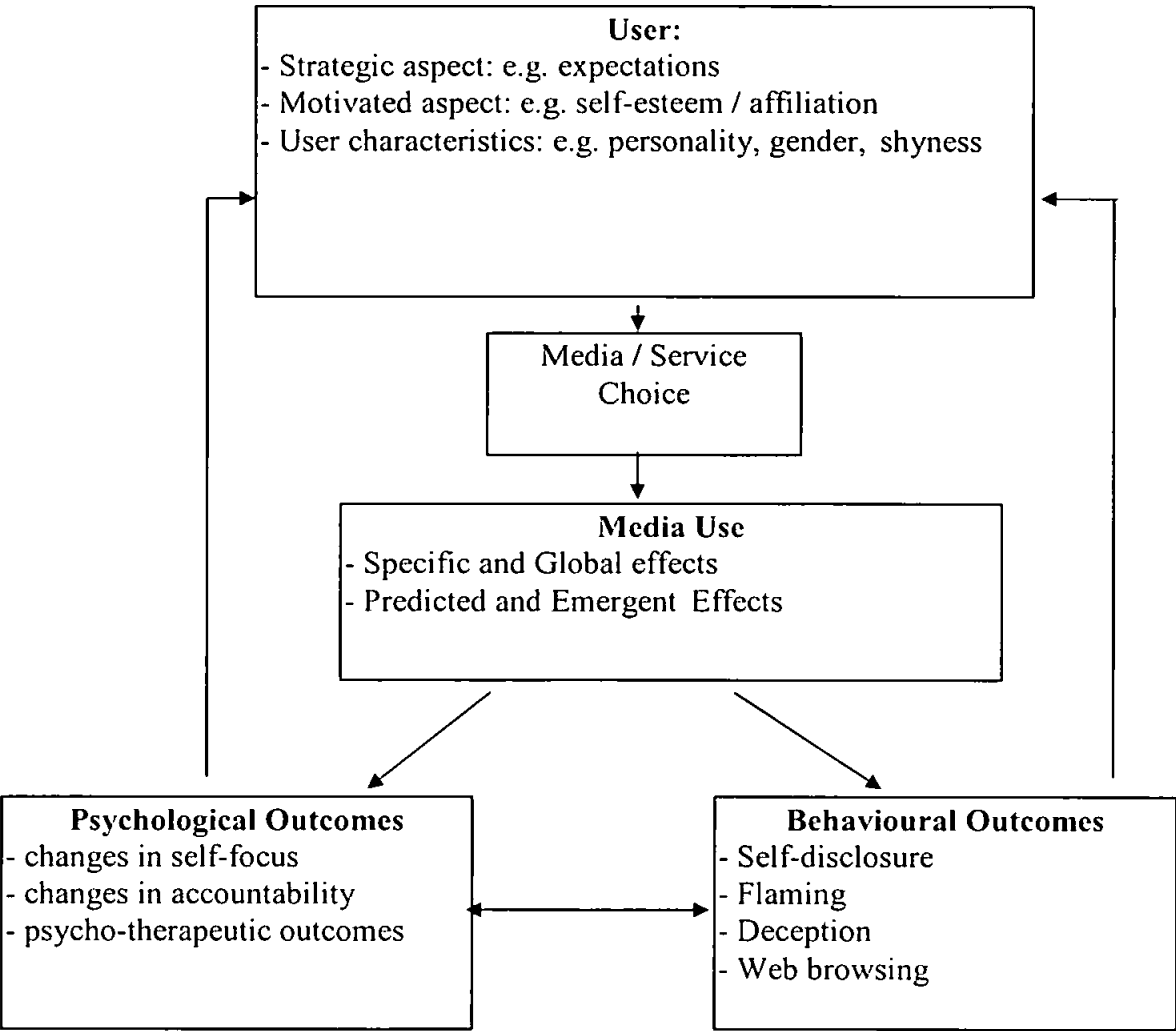


Figure 8.2. Joinson's SMEE model to explain Internet use

The overall aim of the thesis has been to develop a model to explain why text messaging may be preferred to other media for establishing and maintaining personal relationships, and how individual differences such as loneliness and social anxiety

influence the preference for texting. The resulting model, we have termed the Social Affordance Model of Text Messaging.

8.4. The Social Affordance Model of Text Messaging

A basic model to explain text message usage was proposed in Chapter 1 and this was developed and expanded over the subsequent chapters, with each experiment looking at slightly different elements of the model. Figure 8.3 shows the resulting model of text messaging developed throughout the previous chapters. This model is very similar to Joinson's SMEE model of Internet effects in that it has also considered features of the user (e.g. social anxiety, and loneliness; Studies 4-8) as well as situation (e.g. anticipating future interaction (Study 8), interacting with strangers (Studies 5-8)).

The perceived expectancies about using text messaging were proposed to be a direct outcome of the individual user characteristics and the context of the situation. This then leads to the preference for texting or talking on the mobile (Study 4), and both of these are informed by the discovered psychological affordances of the medium (Study 3), listed in section 8.1.1. earlier.

The preference for text or talk will then inform the decision as to whether to communicate through text. In turn, the decision to communicate through text can potentially lead to over-attribution by the receiver of the message and/or selective self-presentation by the sender - key psychological effects of the medium that can impact on relational outcomes (Studies 5-8).

Like Joinson's SMEE model, there was a feedback loop suggested with the relational outcomes feeding back to the discovered affordances which then inform

perceived uses and gratifications and preference for text and talk. This model shows how some

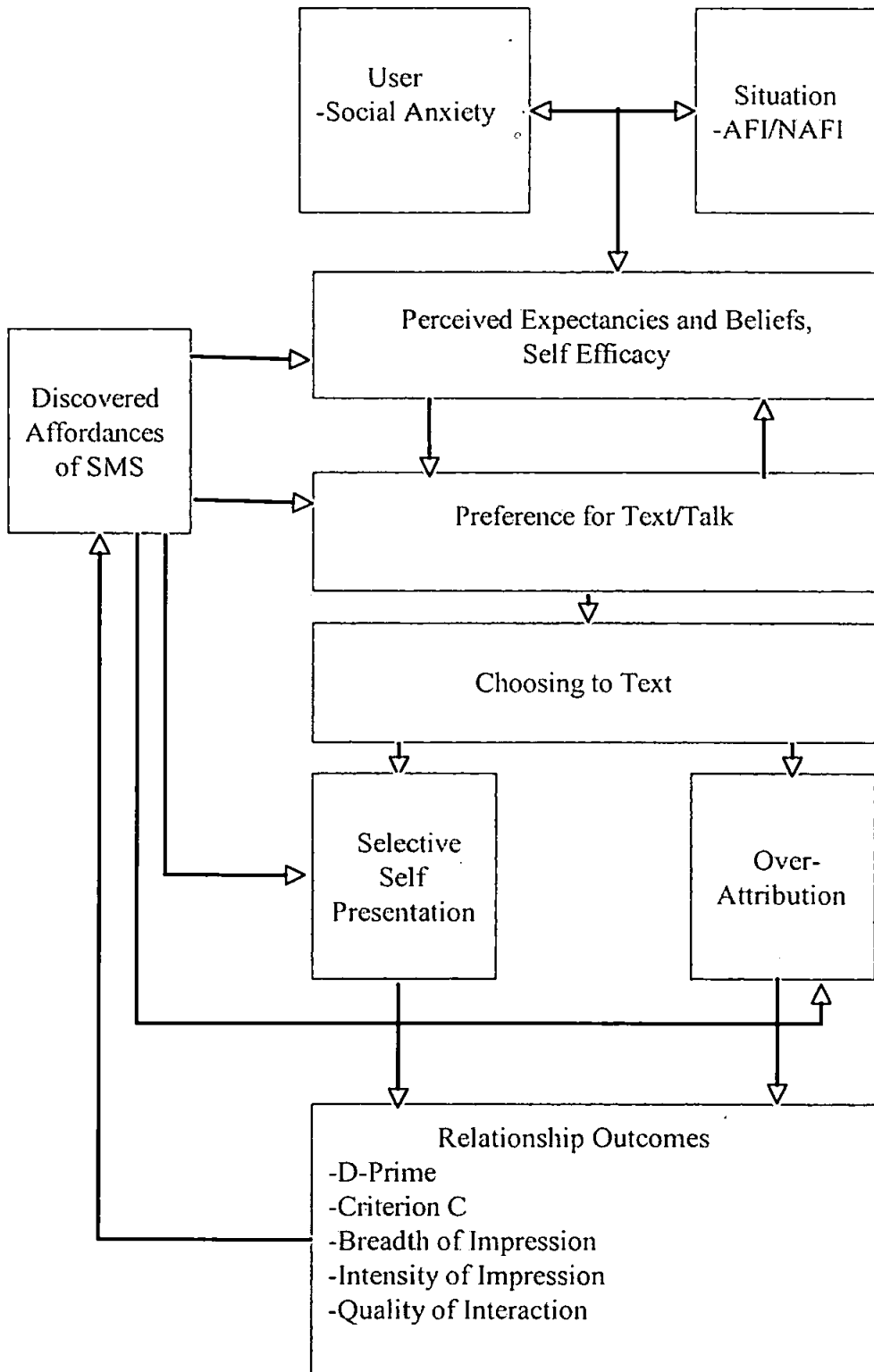


Figure 8.3. The Social Affordance Model of Text Messaging

people may get little out of text messaging, as a result their experiences will not reinforce the continued use of the medium. Other people, for example those who are more socially anxious may prefer texting due to the perceived affordances of visual anonymity and asynchronous communication, leading them to choose to communicate via this medium. This in turn may allow them to help manage their self-presentation (an expected effect) as well as discovering potential hyperpersonal effects (an emergent effect). The experience will then feed back into the learned affordances, making the medium more likely to be preferred in future.

Similarly, someone who prefers talk but acknowledges the visual anonymity of the text medium may choose to use text for different goals, for example for practical reasons such as sending a short message to save the extra time wasted on greetings in a voice call. As a result they may not experience the positive relational outcomes of the medium and so their perceived affordances will not change much so neither will their preference for text/talk.

So it is postulated that hyperpersonal communication is possible through texting but only for a subset of users who have discovered its psychological affordances, going beyond those technological affordances.

8.5. Updates to the Literature

In the context of the current literature, since this PhD was conducted there have been several other investigations that are relevant to the current thesis. One offers support for Social Information Processing theory (Ellison, Heino & Gibbs, 2007), and the other claims support for Hyperpersonal theory (Duthler, 2006) in the context of computer mediated communication.

Ellison, Heino & Gibbs (2006) have investigated self-presentation processes in an online dating environment, exploring how users manage their online presentation to attract potential dating partners. They found that the reduction of cues online compared to face-to-face led to more focus on the cues that remained in both self-presentation and evaluating the self-presentation of others. Although CMC allowed communicators control over their self-presentation, the prospect of a future face-to-face interaction meant that users had to balance their presented self with their actual self. Social Information Processing theory states that in order to form impressions and manage self-presentation in CMC, people have to adapt their behaviours to the cues available (Tidwell & Walther, 2002). Support for this approach was demonstrated by the equal importance users placed on the content of the message and the remaining cues in CMC e.g. the stylistic aspects of the message (timing, length, language used). As Ellison *et al.* did not compare their online dating environment with a face-to-face control, it is unclear whether impressions formed via the Internet would be more intense than those formed face-to-face so evidence for the stronger theory of Hyperpersonal theory is not available.

One study that did claim to find support for the hyperpersonal approach was Duthler (2006). He examined the politeness of requests made via email compared to those made by voicemail to distinguish between the competing hypotheses of Cues Filtered Out and Hyperpersonal theories. Voicemail, although asynchronous, filters less cues than email. Unlike email the acoustic channel of communication is not lost, so the cognitive demands of interaction are greater as people plan what to say, how to say it and how they pronounce words etc. The CFO theory predicts that email would be less polite than voicemail as the lesser cues in the medium leads to depersonalisation and impersonal communication, and the Hyperpersonal Model

would alternatively predict the asynchronous, anonymous affordances of email would allow greater opportunities to plan and edit communication, and to strategically self-present oneself so would allow for communication to be more polite than voicemail, which has the opportunity to plan, but not to edit, content.

In analysing the content of the messages emailed and voice-mailed, support for Hyperpersonal was found in the result that email facilitated politeness strategies. However this study failed to compare the email condition with face-to-face directly so it is unclear whether politeness surpasses that possible in face-to-face or whether it would be equal to it. Obviously the latter would imply the weaker version of Social Information Processing theory.

So both of these studies seem to demonstrate how limited cue media can at least proximate face-to-face communication, supporting Social Information Processing theory. Distinguishing between SIP and the stronger Hyperpersonal theory is something that warrants further investigation, both in CMC environments as well as for mobile phone text messaging.

Studies that have related to mobile phone text messaging have been sparse, with a literature search mainly highlighting potential uses for text messaging for therapeutic interventions and a lack of studies looking at SMS texting in relation to testing theoretical explanations for the uptake of the medium.

Igarashi and Takai (2005) examined network properties of face-to-face and SMS text-message-mediated social networks and reported that intimacy was greater between friends who communicated via face-to-face and text-messaging than through face-to-face alone.

Faulkner and Culwin (2005) also found evidence to support some of the results reported within the current thesis. Through using a questionnaire and diary

study they monitored the texting activities and concluded texting was used by a wide variety of people for a range of purposes and, like has been reported here, some people preferred texting to other forms of communication.

The most recent research has been by Madel and Muncer (2007). They found evidence that was entirely consistent with the findings reported throughout this thesis. They asked focus groups of 18-20 year olds why they chose to use text messaging, voice calls and the Internet. Amongst the results it was found that the most popular answer was the control over the interactions that such medium afforded. 'In particular, the data seemed to suggest that [compared to synchronous face-to-face or voice call interactions] participants felt that because some communication media such as email, text messaging and instant messaging can be used asynchronously as well as synchronously, they allow one time to stop and think before giving a response if this is desired, or, alternatively, allowed one to retain the conversational nature of interactions if this is preferred' (p. 137). This provides further evidence that the decision to text may be based on motivational and strategic purposes.

8.6. Critique of Methodologies used.

A variety of methods were used in the current investigation. Part one was very exploratory in nature and employed exploratory techniques such as Internet surveys and text message collection and content analysis. The text collection studies were chosen to be able to investigate what people were actually using the medium for in their day-to-day communication, with content analysis revealing the typical content of the messages.

Such field research allowed for a more reliable picture of how text messaging was being used. The one-shot text studies allowed for large numbers of text messages

to be gathered, giving insight into the content of typical messages. An obvious limitation of these studies however was that participants self-selected messages which may have led to them deliberately choosing the text they selected instead of simply recording the last text they sent or received as asked. This could obviously damage the representative nature of the sample. Participants were told that their names were not required so their text was anonymous, which should have alleviated the need for them to be as selective. Another problem with collecting one-shot messages was that the conversational context was lost. Study 3 dealt with this by using a longitudinal study, collecting all texts sent and received over a three month period. Despite the small number of participants, this method resulted in a large number of text messages and the value of this approach was to help give insight into conversational characteristics of the text messages, complementing Studies 1 and 2.

Study 3 used a combination of qualitative and quantitative approaches- looking at the content of text messages and conversational characteristics by looking qualitatively at the messages themselves, and patterns that seemed to emerge. MLWin was used to analyse the data from a quantitative stand point. The benefit of this program is that it takes into account the hierarchical nature of the data.

Study 4 was aimed to investigate the reported uses and gratifications of text messaging, and again used an Internet questionnaire. The uses and gratifications approach used by Leung & Wei's (2000) in relation to the mobile phone was applied here. This has proved to be one of the most influential theories in communication research (Lin, 1998), and is used to specifically try to uncover the social and psychological purposes for using a particular medium. It is assumed in the theory that people are aware of their underlying motivations for choosing a particular medium. This study provided a useful overview of the reported motivations behind text

messaging, although it is acknowledged that the approach has its limitations. These include the failure to take into account habit and external constraints on media use (Adams, 2000). However as an initial study, it has been very useful at highlighting potential uses and gratifications in general. More detailed research is needed on the effect of specific circumstances and situations on media choice.

Using the questionnaire in Study 4 allowed participants to give their reported motivations of using text messaging and allowed these motivations to be compared with the actual uses of texts found in the collection of real-world texts in Studies 1-3. The biggest weakness of this approach was the dependency on people being conscious of the reason they choose to use a certain method of communication, and for them to report this accurately. However the findings were validated by the analysis of an authentic sample of text messages in Studies 1-3. Here it was found that text messages were being used for social-relational and information/practical purposes as indeed people were reporting.

Part two took an experimental approach. The experimental studies although lacking the external validity of a real-life encounter through text/face-to-face interaction in terms of its artificial nature, allowed for greater control over extraneous variables to be able to examine the impact of text messaging on one element of relationship development: impression formation. Two existing paradigms in the literature of CMC were employed- McKenna *et al.* (2002) and Hancock and Dunham (2001). The latter paradigm was extended in order to examine one of the untested premises of hyperpersonal communication - whether it is due to selective self-presentation by the sender, over-attribution by the receiver or a combination of the two. A novel use of a quasi-signal detection paradigm was used to try to distinguish between these processes. This had been used successfully by Gable *et al.* (2003) in

other social research, focusing on interpretations of self- and partners behaviours in romantic relationships. Their results suggested that the enactors beliefs about his/her behaviour and the perceivers interpretation of that behaviour impacted on relationship satisfaction, with greater satisfaction occurring when both parties were in agreement. This study justified the value of considering both the enactor and the perceiver's perspective in social interaction.

This quasi-signal detection approach was used because the 'signal' of personality attributes was not something that was controllable by the experimenter. Nor was it an objective event which could be independently judged to be present or absent. However, in the quasi-signal detection paradigm used here, it was the congruence of subjective events—events in the minds of the participants and their partners—that matter. In a similar fashion to Gable *et al*'s (2003) use of SDT in the context of close personal relationships, *detection* in the present investigation can be thought of as agreement between the observer and the sender that particular cues to are present in the sender's behaviour. Such an approach is justified by the research literature which demonstrates that individuals show good inter-rater agreement on observable personality traits (Gosling *et al.*, 1998). Further investigation using the paradigm is needed however to further test for reliability and validity of the approach.

These quantitative and qualitative approaches to studying text messaging are quite complementary. As stated by Black (1954) the findings of qualitative and quantitative research are both important in order for progress in a field of enquiry to be made. And it was important to examine how the medium is being used in the 'real world' to understand how text messaging was being used.

8.7. Limitations and Directions for Future Research

One of the qualities of texting that can lead to hyperpersonal communication is the greater capacity for selective self-presentation as the asynchronous nature of the medium allows users more time to carefully select and edit texts, unlike in some versions of CMC such as IM where ones partner is waiting on the other end waiting for an almost synchronous reply. Texting has an underlying assumption that there will be some delay as people have to fit in a small amount of space what they want to say and people do not necessarily expect immediate replies. One of the limitations of the experimental work has been the restricted time period participants in the text condition were given, meaning that participants may have felt more pressure to make their communication more synchronous than they would typically do so when using the medium in a naturalistic setting. Indeed it was demonstrated in the longitudinal study that text conversations may take place over hours or days. This potentially limits the generalizability of the experimental findings and may explain why communication did not become hyperpersonal in terms of liking for partner after text messaging surpassing that of partners who met face-to-face in Studies 5 and 6. Further research is needed to examine the effects of more prolonged and extended communication as this may result in more evidence of hyperpersonal communication than has been found here.

In the current experimental series participants were interacting with complete strangers, which may have changed their behaviour in comparison to if they were texting in a more naturalistic context where they would typically have met the recipient before. It is widely reported in the literature that when interacting with strangers people automatically present themselves in a positive light, where as when interacting with friends they are more modest (Pontari & Schlenker, 2000; Tice *et al.*,

1986). The hyperpersonal affordances of SMS may change this and allow for more positive impressions with friends as well. This relates back to the interaction between situation and user characteristics and so should be tested in future studies.

The main limitation of the present investigation has been the reliance on the undergraduate student sample. Future research needs to consider different populations to be able to make more generalizations. However despite this potentially limited sample, differences were still found (e.g. between Texters and Talkers, and males and females), suggesting that a wider sample may produce even greater differences. This relates to the issue of power. Many effects found near significant or non-significant in the present studies may actually prove to be significant given a more sensitive methodology, specifically with a more representative population.

Another issue related to statistics is the potential for family-wise error as a result of multiple statistics tests. This is where the more tests that are carried out, the greater the probability of a type one error is produced. To deal with such errors in the present thesis, the Bonferroni correction was utilized when examining multiple t-tests (as highlighted in the relevant chapters). This adjusted the significance level to make the probability of a type one error lower.

The lack of hyperpersonal effects in relation to liking in studies 5-8 may be due to the relationship context itself. One can imagine that when meeting someone for the first time, or texting a new acquaintance, one has potentially more to gain and/or lose in terms of relationship investment, and as a result may be more focussed on their self-presentation. In the current series of experiments participants were strangers and although some were told they would meet their partner again, they were not actively seeking out a potential relationship so this may explain why liking levels were not

hyperpersonal through text and why, in studies 7 and 8, the sender effects were not as apparent as the receiver effects.

Studying real-world relationships as they occur would obviously provide the most valid data, however it would be hard to control the many extraneous variables that could confound the investigation.

Throughout this thesis several directions for future research have been highlighted. In looking at the applicability of the Hyperpersonal Model to text messaging, other strategies of testing for hyperpersonal communication needs to be considered. Qualitative and quantitative methods should be used in unison to help untangle the processes that are involved in Hyperpersonal communication and the exact conditions that are needed for communication via text to surpass that of face-to-face communication.

The use of the quasi-signal detection paradigm to untangle the proposed processes of hyperpersonal communication needs to be replicated with a wider sample and with conditions more realistic to the use of the medium in the real world. This middle part of the theory is urgently needing more attention to detail as to how exactly hyperpersonal communication can be achieved.

One of the main limitations of the experimental series was that these were one-shot studies. A longitudinal study would be the next step to see how these processes develop over time and whether or not senders perhaps end up self-fulfilling the impression their partner has created of them, or whether as the receiver has more time to interact their impressions of their partner get less intense and more realistic.

Another direction for research arises from Walther's (1997) critique of the theory. He argues that it is less informative about negative consequences of text-based interaction. This implies that research needs to be conducted to examine participants

relational goals when they choose to use text messaging. Study 5 began to tap into some of these reported motivations however a more systematic qualitative observation of participants communication behaviour may be useful here. A diary based study where participants write down for a day/week/month details of the situation they were in, their method of communication and why this was chosen. Similarly a scenario based study asking participants to pick which medium they would typically choose to use for each scenario may uncover differences in relational goals.

8.8. Potential Applications

The general finding that text messaging can at least emulate face-to-face communication in terms of relationship outcomes and sociability and for some users open up new opportunities for expressive communication, gives rise to a number of potential applications of the medium.

The discussed hyperpersonal benefits that the medium affords for some users are also important in that they have important implications for friendship development and maintenance.

8.8.1. Clinical Applications

There are many user groups who could potentially benefit from text messaging including those who are deaf. The ubiquitous nature of text messaging allows them potentially communicate with both the hearing and non-hearing community with greater ease. 'Text messaging has provided the deaf community with a way to overcome the geographic and linguistic barriers that they often encounter in the hearing world' (Schindler, 2003).

The use of text messaging to support certain groups of people with health problems is an area that needs further investigation. Text messaging is private and could be used to provide advice and alternatives, enhancing face-to-face and medication treatments. For example a German pilot study has found that it may be a useful aid in supporting people who suffer from Bulimia Nervosa (Textually.org, 2004c). In Australia texting has found success at helping people stop smoking (Textually.org, 2005; e-health insider, 2005), and here in the UK the application of text messaging to help people manage their diabetes has also been trialled with early signs of success (Franklyn *et al.*, 2006).

The use of text messaging to intervene in self-harm has just started to be investigated. The visual anonymity allowing people to be more expressive combined with the two way nature of the medium- to deliver messages from support teams as well as offering the opportunity for clients to send texts to supporters, is postulated to facilitate self-help processes within this client group (Owens *et al.*, 2007).

The benefits of CMC for teaching and learning has also been apparent in recent literature (Collins & Berge, 1995; Chester & Gwynne, 1998) in leading to increased equity and higher participation rates. SMS text messaging has been studied in its use for supporting university students in managing their time and activities (Stone, 2005).

8.8.2. Technology applications

The importance of text messaging for social relational communication has been highlighted in the exploratory studies in part one of this thesis. The huge volume of texts that are being sent has some practical implications for design of the technology itself.

A greater memory on the handsets would be a bonus for many users so they can store and review their sent and received messages. Indeed there are now websites where people can pay to store their valued text messages (e.g. www.treasuremytext.com)

Still it seems that SMS is underappreciated by many technologists. Jenson argues that the industry should start to look at understanding why SMS is so popular rather than producing more and more complex services (Jenson, 2004). Mobile operators seem to take for granted this medium and seem to continuously looking for ways to make it more complex, for example the creation of enhanced messaging services such as MMS. Perhaps neglecting the fact that the reason SMS may be so popular is because of its simplicity (Jenson, 2004). MMS for example is a lot more complicated than using the simple SMS tool. Also, sending a picture message may not perform the same function as typing in a standard text message. Technologists need to put more effort into understanding the value of SMS texting to individuals, and the goals users want to achieve in using the medium and then this will help them in designing more services around what users actually want as opposed to what technologists think users want. We need to start letting the users inform the technology as opposed to the technology informing the user. The sheer fact that texting was 'accidentally' discovered by the user shows how readily users appropriate and co-opt new communication technologies to suit their own agenda, which in the present case seems to be the motive to establish and maintain perpetual social contact.

It seems therefore that researchers need to focus on applications that can support text messaging. Linked to this idea, perhaps the most exciting novel application of the authors research is that of sociable interface designs to support the interconnectivity between Texters. The rise of social computing applications such as

those developed at MIT (e.g. Donath *et al.*, 1999; Donath, 2001; Donath & Boyd, 2004), whereby people can visualise their social network in terms of presence, identity, interaction and/or conversation, is reflective of this user-driven need. This is an area that will be delved into in future research (F. Reid & Reid, 2004).

Presence software on mobiles is predicted to be the next major breakthrough in SMS text messaging. As it allows communicators to be more effective in their communication and to know when others are available to text. At the time of commencing this research, Nokia had predicted that by 2006, people would prefer Instant Messaging on their mobile to that on their computer (Nokia, 2001), however this thesis is being concluded in spring 2007 and this realisation is yet to be reached. (BBC news, 2006; Grenville, 2006) again highlighting the key feature of SMS- the asynchronous nature of the medium, may be one of the key drivers of its uptake. Instant Messenger is more synchronous and needs both sender and receiver to be 'online' at the same time, this is a limitation that SMS can overcome and indeed seems to be reflected in its ever-increasing popularity.

8.9. Summary

This thesis has aimed to advance the understanding of mediated communication, with specific reference to the novel medium of SMS. Needless to say texting throughout the course of this work has continued to grow, despite industry predictions. This just goes to show how people will use technology in ways that are not always obvious to the developers and that they are obviously getting something out of the medium that they failed to get before or that was harder to get through other methods. As to the question of whether texting is a transforming (changing the way

people think about the world and their relations etc) or amplifying (allowing people to do the same as they did before but in a way that may be more economical/satisfying etc) texting probably can be seen as being one, the other or indeed both to different groups of people. It allows people who may otherwise not push a relationship further to take that extra step and text someone to demonstrate their interest, thereby cultivating relationships that may have otherwise passed them by. Similarly for other people it provides a quicker more efficient way to wish someone a happy birthday for example than sending a card or to let someone know they will be running late. So it can be argued that this technology has both amplified and transformed modern society. The most interesting thing about the medium is that it has done so entirely pushed by its own affordances, discovered accidentally but quickly capitalised on. It was not designed to be a communication method for the mass public yet that is what it has become and one that shows no signs of decreasing in its use or popularity. The failure to find any significant correlations between texting and the related technologies of Email and Instant Messenger in Chapter 5 suggests that text messaging is offering new communication possibilities distinct from those offered by these other technologies.

In conclusion this thesis has shown how the cues filtered out perspective fails to accurately predict the uses and gratifications of text messaging. Walther's Social Information Processing perspective (1992,1993,1995), the weaker precursor to the Hyperpersonal Model, argued that CMC can be as social-relational as face-to-face interactions, given enough time and message exchange. Users of CMC adapt to the medium and compensate for the reduced cues by using other features of the messages themselves. This was supported by a meta-analysis of CMC studies (Walther *et al.*, 1994).

The theory was extended in 1996 to add that communication can become hyperpersonal, i.e. can become more intimate than face-to-face. For this to be the case Walther postulated that certain conditions needed to apply, namely that communicators expect future interaction, and when no face-to-face relationship exists. The visual anonymity, physical isolation, and editability of text-only communication can encourage selective self-presentation and over-attribution effects which can lead to more intense impression formation than is possible face-to-face.

Chapter 1 posed a number of broad research questions to test the applicability of Hyperpersonal theory to mobile phone text messaging. These questions and their answers are stated as follows: (1) Whether there was evidence of more intense impressions formed via text than through face-to-face communication: studies 5-8 all showed that given enough time liking for partner was equivalent in face-to-face and text messaging conditions, failing to find evidence of hyperpersonal communication on this variable. However studies 7 and 8 both found evidence that those in the text messaging condition reported more intense impressions of their partner than those in the face-to-face condition, providing preliminary evidence for hyperpersonal communication, and (2) If so is this due to the sender selectively self-presenting or the receiver over-attributing? A quasi-signal detection paradigm showed evidence of an over-attribution effect, and a near-significant effect of sender, with text messaging having more discriminable signals given out by the sender (3) Do people use text messaging for relational purposes? Studies 1-3 all showed that text messaging was indeed being used for social purposes as well as for more informational/practical purposes. Study 5 confirmed that these purposes, identified by content coding the text messages, were conscious motivations behind text messaging, especially for those

individuals who reported a preference for text messaging over talking on their mobile phone.

In accordance with the social shaping approach, it is hypothesised that there is an interaction between the technological and psychological affordances of text messaging and the ability of individuals to recognise these and to capitalise on them when needed. It has been found amongst these results that those who are socially anxious are more likely to prefer texting on their mobile, and in turn this preference is related to more expressive content and social-relational uses and gratifications. The affordances of visual anonymity, asynchronicity and text-based communication make text messaging a very good medium for giving individuals control over their self-presentation. It follows that those individuals who are more socially anxious in face-to-face settings may capitalise on these affordances to help overcome their anxiety. As stated by Bargh and McKenna (2004), one's own desires and goals can make a significant difference on the overall effects of a medium.

In sum, this thesis has demonstrated that SMS texting is not just a medium used for its technical affordances, or for sociological reasons, but rather that there are psychological factors that also need to be considered and that these themselves are dependent on individual differences. Like SMEE, the Social Affordance Model of Text Messaging shifts the emphasis of mediated communication to the input of both the user and the medium, and highlights that this process is constantly evolving as users discover and learn new social relational and psychological affordances associated with the medium.

This suggests that the social functionality of SMS must first be mastered before the relational benefits of SMS can be realized. The conclusion drawn here speaks to the debate concerning the social nature of the Internet and interactive text-

based media more generally. The implication that some mobile phone users prefer to text because they can disengage from the demands of immediate interpersonal contact and express themselves more authentically—even to people they know well—is difficult to reconcile with the emphasis on anonymity and depersonalization at the heart of current models of mediated communication. Instead, SMS often seems to be valued as an opportunity to construct and articulate aspects of self too fragile to be expressed even to close acquaintances in normal, embodied interactions, a process more compatible with Walther's hyperpersonal perspective on mediated interaction at the theoretical heart of this thesis. According to this perspective, communicators learn to take advantage of the physical isolation and absence of interpersonal cues of electronic media to individuate themselves and their communication partners, and achieve levels of sociality and intimacy they could not achieve as rapidly, if at all, in comparable face-to-face settings. By showing how psychological factors can predispose people to discovering these affordances, which in turn impact on the decision to use the medium, the current thesis points towards the potential for hyperpersonal communication to occur through mobile phone texting, a finding that is indicative of the transforming nature of the medium.

References

- Adams, W.J. (2000). How People Watch Television As Investigated Using Focus Group Techniques. *Journal of Broadcasting & Electronic Media*, 44, (1), 78-93.
- AOL mobile (2002). *Phone Flirts*. AOL [Online]. Available: <http://mobile.aol.co.uk/redesign/gallery/flirt/flirt0.jsp>
- Applbauum, R., Anatol, K., Hays, E.R., Jensen, O., Porter, R. E., Mandel, J. E. (1973). *Fundamental concepts in human communication*. San Francisco, CA: Canfield Press.
- Argyle, M. (1965). *Social Interaction*. London: Methuen.
- Asmundson, G. J. G. & Stein, M.B. (1994) Selective processing of social threat in patients with generalized social phobia: evaluation using a dot-probe paradigm. *Journal of Anxiety Disorders* , 8, 2, 107-117.
- Atun R.A., Sittampalam S.R. (2006). *A Review of the Characteristics and Benefits of SMS in Delivering Healthcare. The Role of Mobile Phones in Increasing Accessibility and Efficiency in Healthcare*, Vodafone Policy Paper Series , 4, 18-28.
- Bakeman, R., & Gottman, J. M. (1997). *Observing interaction: An introduction to sequential analysis*. Cambridge: Cambridge University Press.
- Bamrud, J. (2002). SMS: *The human factor*. The Feature [On-line]. Available: <http://www.thefeature.com/article.jsp?pageid=15434>
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, (2), 122-147.
- Bandura, A. (1997). *Self-efficacy: The Exercise of Control*. WH Freeman & Co: New York.
- Bargh, J.A., McKenna, K.Y.A. & Fitzimons, G.M. (2002). Can you see the real me? Activation and expression of the 'true self' on the Internet. *Journal of Social Issues*, 58, (1), 33-48.
- Bargh & McKenna (2004). The internet and social life. *Annual Review of Psychology*, 55, 573-90.
- Baron, J., and Siepmann, M. (2000). *Techniques for Creating and Using Web Questionnaires in Research and Teaching*. Department of Psychology, University of Pennsylvania. Available: <http://www.psych.upenn.edu/~baron/examples/baron4.htm>.
- Baron, R.M. & Kenny, D.A. (1986). The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.

- Baumeister, R.F. (1998). The self. In D.T. Gilbert, S.T. Fiske, & G. Lindzey (Eds.), *Handbook of social psychology* (4th ed.; pp. 680-740). New York: McGraw-Hill.
- Baumeister, R.F., & Leary, M.R. (1995). The need to belong: Desire for interpersonal attachments as a fundamental human motivation. *Psychological Bulletin*, 117, 497-529.
- BBC News (2001). *Text message warning*. BBC [Online]. Available: <http://news.bbc.co.uk/1/low/health/1346511.stm>.
- BBC News (2003). *Mobile phones seen as 'essential'*. BBC [On-line]. Available: <http://news.bbc.co.uk/>
- Bee Hian, L., Li Chuan, S., Mon Kiat Trevor, T., & Detember, B. H. (2004). Getting to know you: Exploring the development of relational intimacy in computer-mediated communication. *Journal of Computer-Mediated Communication*, 9.
- Benenson J.F. & Christakos A. (2003). The Greater Fragility of Females' Versus Males' Closest Same-Sex Friendships. *Child Development*, 74, (4), 1123-1129.
- Berger C.R. & Calabrese, R.J. (1975). Some explorations in initial interaction and beyond: Toward a developmental theory of interpersonal communication. *Human Communication Research* 1, (2), 99-112.
- Berger, C. R. & Douglas, W. (1981). Studies in interpersonal epistemology: III. Anticipated interaction, self-monitoring & observational context selection. *Communication Monographs*, 48, 183-196.
- Berndt, T. J. & Hanna, N. A. (1995). Intimacy and self-disclosure in friendships. In K. Rotenberg (Ed.), *Disclosure Processes in Children and Adolescents* (pp. 57-77). New York: Cambridge University Press.
- Birnie, S. A. & Horvath, P. (2002). Psychological predictors of Internet social communication. *Journal of Computer-Mediated Communication* [On-line], 7. Available: <http://jcmc.indiana.edu/>
- Black, V. (1954). Laboratory versus field research in psychology and the social sciences. *The British Journal for the Philosophy of Science*, 20, 319-330.
- Boneva, B., Kraut, R. & Frohlich, D. (2001). Using E-mail for Personal Relationships: The Difference Gender Makes. *American Behavioural Scientist*, 9, (5), 530-549.
- Borgida, E., Sullivan, J.L., Oxendine, A., Jackson, M., Riedel, E. & Gangl, A. (2002). Civic Culture Meets the Digital Divide: The Role of Community Electronic Networks. *Journal of Social Issues*, 58, 125-142.

- Borys, S. & Perlman, D. (1985). Gender differences in loneliness. *Personality and Social Psychology Bulletin*, 11, 63-74.
- Bosnjak M. (2001). Participation in non-restricted Web surveys: A typology and explanatory model for item non-response. In U.D. Reips & M. Bosnjak (Eds) *Dimensions of Internet Science*. (pp. 193–207). Lengerich: Pabst.
- Breitbart (2005) "ur dumped"- Research shows text a popular way of ending romances. Available at:
<http://www.breitbart.com/news/2005/10/14/051014141926.agg8eqpm.html>.
- Bryant, J. A., Sanders-Jackson, A., & Smallwood, A. M. K. (2006). Instant Messaging, text messaging, and adolescent social networks. *Journal of Computer-Mediated Communication*, 11, (2). Available:
<http://jcmc.indiana.edu/>
- Byrne, R. & Findlay, B. (2004) Preference for SMS versus Telephone Calls in Initiating Romantic Relationships. *Australian Journal of Emerging Technologies and Society* 2, (1), 48-6.
- Bully online (2006). Bullying by mobile phone and cell phone [Online]. Available:
<http://www.bullyonline.org/schoolbully/mobile.htm>.
- Cady, L. (2006) Text stalking, Rant online [Online]. Available:
http://www.rantonline.co.uk/guides_health_textstalking.html
- Caldwell, M.A. & Peplau, L.A. (1982). Sex differences in same-sex friendships. *Sex Roles*, 8, 721- 732.
- Caplan, S.E. (2005). A Social Skill Account of Problematic Internet Use. *Journal of Communication*, 55, 4, 721–736.
- Carroll, J., Howard, S., Vetere, F., Peck, J., & Murphy, J. (2001). *Identity, power and fragmentation in cyberspace: technology appropriation by young people*. Australasian Conference on Information Systems, Coffs Harbour, Australia.
- Carstensen, L. L. (1995). Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science*, 4, 151-156.
- Carver, S., Kingston, R., & Turton, I. (2002). A review of graphical environments on the World Wide Web as a means of widening participation in social science research [Online]. Available: <http://www.ccg.leeds.ac.uk/agocg>.
- Cellular news (2003). Half a million children own cell phones in the UK. [Online] Available: <http://www.cellular-news.com/story/9500.shtml>
- Cellular Online (2004). New statistics. Available: <http://www.cellular.co.za/>

- Chak, K. & Leung, L. (2004). Shyness and locus of control as predictors of Internet addiction and Internet use. *Cyberpsychology and Behaviour*, 7, 559-570.
- Chapanis, A. (1975). Interactive Human Communication. *Scientific American*, 232, 34-42.
- Cheek, J.M., & Buss, A.H. (1981). Shyness and sociability. *Journal of Personality and Social Psychology*, 41, 330-339.
- Chen, Y.P., Ehlers, A., Clark, D.M. & Mansell, W. (2002). Patients with generalized social phobia direct their attention away from faces. *Behaviour Research and Therapy*, 40, 677-687.
- Clark, D.M. & McManus, F. (2001). Information processing in social phobia. *Biological Psychiatry*, 51, 1, 92-100.
- Colley, A. & Todd, Z. (2002). Gender-linked differences in the style and content of e-mails to friends. *Journal of Language and Social Psychology*, 21, (4) 380-392.
- Colley, A., Todd, Z., Bland, M., Holmes, M. Khanom, N. & Pike, H. (2004). Style and content in e-mails and letters to male and female friends. *Journal of Language and Social Psychology*, 23, (3), 369-378.
- Compeau, D.R. & Higgins, C.A. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test *MIS Quarterly*, 19, (2), 189-211.
- Crabtree, J., Nathan, M., & Roberts, S. (2003). *Mobile UK: Mobile phones & everyday life*. London: The work foundation.
- de Lussanet, M., Nordan, M. & Roitman, J.V. (2002). European Operators Milk The SMS Cash Cow. Available: <http://www.forrester.com/ER/Research>
- DeCuir, (2005) Messaging could have adverse effects. The Daily Reveille, [Online]. Available: www.lsureveille.com/vnews/display.v/ART/2005/02/02/42009019f1c2f
- Derlega, V.J., Metts, S., Petronio, S. & Margulis, S.T. (1993). *Self-disclosure*. London: Sage.
- Dindia, K. (1997). Self-disclosure, self-identity and relationship development: a transactional/dialectical perspective. In S. Duck (Es.), *Handbook of personal relationships* (pp. 411-426). Chichester: Wiley.
- Donath, J. (2001). Mediated Faces. In M. Beynon, C.L. Nehaniv, K. Dautenhahn (Eds.). *Cognitive Technology: Instruments of Mind*. Proceedings of the 4th International Conference on Cognitive Technology, Warwick, UK, August.
- Donath, J. & Boyd, D. (2004). Public displays of connection. In *BT Technology Journal*, 22, (4), 71-82.

- Donath, J., Karahalios, K. & Viegas, F. (1999). Visualizing Conversation. *Journal of Computer Mediated Communication*, 4, (4). Available: <http://jcmc.indiana.edu/>
- Döring, N. (2002). Personal Home Pages on the Web: A Review of Research. *Journal of Computer-Mediated Communication* 7 (3). Available: <http://jcmc.indiana.edu/vol7/issue3/doering.html>
- Downey, G. & Feldman, S.I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology*, 37, 1327-1343.
- Duthler, W. (2006). The politeness of requests made via email and voicemail: Support for the hyperpersonal model. *Journal of Computer Mediated Communication*, 11(2). Available: <http://jcmc.indiana.edu/>
- E-Health Insider (2005). Txtg cn help u quit cigs [Online] Available: <http://www.ehiprimarycare.com/news>
- Eastin, M. S. (2005). Teen Internet use: Regulating social perceptions and cognitive models to behavior. *Cyberpsychology and Behavior*, 8, 62-75.
- Eastin, M. S. & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Computer-Mediated Communication*, 6, (1), Available: <http://jcmc.indiana.edu/>
- Eastin, M. S. & LaRose, R. (2005). Alt.support: Modeling social support online. *Computers in Human Behavior*, 21, 977-992.
- Eldridge, M. and B. Grinter (2001). Studying Text Messaging In Teenagers. Conference of Human Factors in Computing Systems (CHI) Workshop: Mobile Communications: Understanding Users, Adoption & Design.
- Ellison, N., Heino, R., & Gibbs, J. (2006). Managing impressions online: Self-presentation processes in the online dating environment. *Journal of Computer-Mediated Communication*, 11(2), <http://jcmc.indiana.edu/>
- Etzioni, A. & Etzioni, O. (1999). Face-to-face and computer-mediated communities, a comparative analysis. *The Information Society*, 15, 241-248.
- Fiske, S. T. and Taylor, S. E. (1991). *Social cognition* (2nd ed.). New York: McGraw Hill.
- Flaherty, L. M., Pearce, K. J., & Rubin, R. B. (1998). Internet and face-to-face communication: Not functional alternatives. *Communication Quarterly*, 46, 250-268.
- Faulkner, X. & Culwin, F. (2005). When fingers do the talking: A study of text messaging. *Interacting with Computers*, 17, 167-185.
- Flanagin, A. J. (2005). IM online: Instant messaging use among college students, *Communication Research Reports*, 22, 175-187.

- Fleiss, J.L. (1981). *Statistical methods for rates and proportions*, (2nd ed). John Wiley & Sons, Inc. New York.
- Fox, S., Horrigan, J., Spooner, T. & Cater, C. (2001). Teenage life online: The rise of the instant message generation and the Internet's impact on friendships and family relationships.[Online] Available: <http://www.pewinternet.org/>
- Franklyn, V.L., Waller, A., Pagliari, C. & Greene, S.A. (2006). A randomised control trial of Sweet Talk, a text messaging system to support young people with diabetes. *Diabetic Medicine*, 23, 1332-1338.
- Frees, E.W. (2004). *Longitudinal and panel data analysis and applications in the social sciences*. Cambridge: CUP.
- Gable, L., Reis, H.T. & Downey, G. (2003). He said, she said: A quasi-signal detection analysis of daily interactions between close relationship partners. *Psychological Science* 14, 2, 100-105.
- Gabriel, S. & Gardner, W. L. (1999). Are there "his" and "hers" types of interdependence? The implications of gender differences in collective vs. relational interdependence for affect, behaviour and cognition. *Journal of Personality and Social Psychology*, 77, 642-655.
- Geser, H. (2003) Towards a sociological theory of the mobile phone [Online] Available: http://www.socio.ch/mobile/t_geser1.htm
- Goggin, Gerard (2004). Mobile Text. *M/C: A Journal of Media and Culture* 7,1. Available: <http://www.media-culture.org.au/0401/03-goggin.html>
- Goldberg, L.R. (1999). A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In I. Mervielde, I. Deary, F. De Fruyt, & F. Ostendorf (Eds.), *Personality Psychology in Europe, Vol. 7*. (pp. 7-28). Tilburg, The Netherlands: Tilburg University Press
- Goldstein, H. (1999). *Multilevel statistic models*. London: Arnold.
- Gosling, S.D., John, O.P., Robins, R.W. & Craik, K.H. (1998). Do people know how they behave? Self-reported act frequencies compared with on-line codings by observers. *Journal of Personality and Social Psychology*, 74, (5), 1337-1349.
- Green, L.R., Richardson, D.S., Lago, T. & Schatten-Jones, E.C. (2001). Network Correlates of Social and Emotional Loneliness in Young and Older Adults. *Personality and Social Psychology Bulletin*. 27, (3), 281-288.
- Greenberg, J., Pyszczynski, T. & Stine, P. (1985). Social anxiety and anticipation of future interaction as determinants of the favourability of self-presentation. *Journal of Research in Personality*, 19, 1-11.
- Grenville, M. (2006). IM: Will mobile IM really replace SMS? 160 characters [Online]. Available: www.160characters.com

- Grinter R.E. & Eldridge, M.A. (2001). y do tngrs luv 2 txt msg? Proceedings of the European Conference on Computer-Supported Cooperative Work, 16-20 September 2001, Germany.
- Grinter, R. E. & Palen, L. (2002). Instant Messaging in teen life. In CSCW'02: New Orleans, USA.
- Gross, E. F., Juvonen, J., & Gable, S. L. (2002). Internet use and well-being in adolescence. *Journal of Social Issues*, 58, 75-90.
- Gunawardeng, C.N. (1995). Social presence theory and implications for interaction and collaborative learning in computer conferences. *International Journal of Educational Telecommunications*, 1, (2), 147-166.
- Haig, M. (2002). *Mobile marketing: The message revolution*. London: Kogan Page.
- Hair, J.F., Anderson, R.E., Tatham, R.L. & Black, W.C. (1995), *Multivariate Data Analysis* (4th ed.), Englewood Cliffs, NJ: Prentice-Hall
- Hamburger, Y., Wainaper, G. & Fox, S. (2002). "On the Internet no one knows I'm an introvert": Extraversion, neuroticism and Internet Interaction. *Cyberpsychology and Behaviour*, 5, (2)125-138.
- Hancock, J. T. (2005). Verbal irony use in face-to-face and computer-mediated conversations. *Journal of Language and Social Psychology*, 23, 447-463.
- Hancock, J. T. & Dunham, P. J. (2001). Impression formation in computer-mediated communication revisited: An analysis of the breadth and intensity of impressions. *Communication Research*, 28, 325-347.
- Haste, H. (2005). Joined up texting: The role of mobile phones in young peoples lives. Nestle Social Research Programme. Nestle: UK.
- Huizinga, D. & Delbert, E.S. (1986). Assessing the reliability and validity of self-report delinquency measures. *Journal of Quantitative Criminology*, 2, (4), 293-327.
- Herring, S. C. (2001). Computer-mediated discourse. In D. Schiffrin, D. Tannen, & H. Hamilton (Eds.), *The Handbook of Discourse Analysis* (pp. 612-634). Oxford: Blackwell Publishing.
- Hiltz, S.R., Turoff, M. & Johnson, K. (1989). Experiments in group decision making, 3: Disinhibition, deindividuation, and group process in pen name and real name computer conferences. *Decision Support Systems*, 5, (2), 217-232.
- Hogg, M. A. & Turner, J. C. (1987). Social identity and conformity: A theory of referent information influence. In W. Doise & S. Moscovici (Eds.), *Current Issues in European Social Psychology, Volume 2* (pp. 139-182). Cambridge: Cambridge University Press.

- Holbert, R. L. & Stephenson, M. T. (2003). The importance of indirect effects in media effects research: Testing for mediation in structural equation modelling. *Journal of Broadcasting & Electronic Media*, 47, 556-572.
- Horstmanshof, L. & Power, M.R. (2005). Mobile phones, SMS and relationships: Issues of access, control and privacy. *Australian Journal of Communication*, 32, 1.
- Hulme, M. & Peters, S. (2002). Me my phone and I: The role of the mobile phone. CHI 2002 Workshop on Mobile Communications. April 1 -2.
- Hutchby, I. (2001). *Conversation and Technology: From the Telephone to the Internet*. Cambridge, U.K.: Polity Press.
- Ito, M. & Okabe, D. (2004). Intimate Connections: Contextualizing Japanese Youth and Mobile Messaging. In R. Harper, L. Palen and A. Taylor (Eds.), *Inside the Text: Social Perspectives on SMS in the Mobile Age*. London: Springer Verlag.
- Jackson, T., Towson, S. & Narduzzi, K. (1997). Predictors of shyness: A test of variables associated with self-presentational models. *Social Behaviour and Personality*, 25, 149-154.
- Jenson, S. (2004). Default thinking: How mobile services are setup to fail. In R. Harper (Ed.), *The Inside Text*. Springer Verlag.
- Joinson, A. (2003). *Understanding the psychology of Internet behaviour*. Hampshire: Palgrave Macmillan.
- Kasesniemi, E. L. & Rautiainen, P. (2002). Mobile culture of children and teenagers in Finland. In J.E. Katz & M. Aakhus (Eds.), *Perpetual Contact: Mobile Communication, Private Talk, and Public Performance* (pp. 170-192). Cambridge: Cambridge University Press.
- Katz, J. E. & Aakhus, M. (2002). *Perpetual contact: Mobile communication, private talk and public performance*. Cambridge: Cambridge University Press.
- Katz, E., Blumer, J.G., & Gurevitch, M., (1974). *The uses of mass communication: Current perspectives on gratifications research*. Beverly Hills, CA: Sage.
- Keller, S., 1977. The telephone in new (and old) communities. In: I. de Sola Pool, (Ed.), *The Social Impact of the Telephone*. Cambridge, MA: MIT Press, pp. 281-298.
- Kellerman, K. (1986). Anticipation of Future Interaction and Information Exchange in Initial Interaction. *Human Communication Research* 13, (1), 41-75.
- Kiesler, S. 1997. *Culture of the Internet*. Lawrence Erlbaum Associates, Mahwah, NJ.
- Kornblum, J. (2003). Tapping into text messaging. USA Today [On-line]. Available: <http://usatoday.com/tech/news/2003>

- Kraut, R., Kiesler, S., Brown, B., Cummings, J., Helgeson, V. & Crawford, A., (2002). Internet paradox revisited. *Journal of Social Issues*, 58, 1, 49-74.
- Lacohee, H. & Anderson, B. (2001): Interacting with the Telephone. *International Journal of Human-Computer Studies*, 54, 5, 665-699
- Laurenceau, J., Barrett, L.F. & Pietromonaco, P.R. (1998) Intimacy as an Interpersonal Process: The Importance of Self-Disclosure, Partner Disclosure, and Perceived Partner Responsiveness in Interpersonal Exchanges . *Journal of Personality and Social Psychology*, 74, (5), 1238-1251.
- LaRose, R., Mastro, D., & Eastin, M. S. (2001). Understanding Internet usage: A social-cognitive approach to uses and gratifications. *Social Science Computer Review*, 19, 395-413.
- Lasen, A. (2003) The Social Shaping of Fixed and Mobile Networks: A Historical Comparison. In The Digital research centre: Proceedings of the *Fourth Wireless World Conference*, The mobile Revolution- A retrospective; Lessons on Social Shaping, The University of Surrey; U.K; 17-18 July.
- Lasen, A., (2005) "History Repeating? A Comparison of the Launch and Uses of Fixed and Mobile Phones", in Hamill L. and Lasen A. (eds.) *Mobile World: Past, Present and Future*, Springer Verlag.
- Lea, M., & Spears, R. (1991). Computer-mediated communication, de-individuation and group decision-making. *International Journal of Man-Machine Studies*, 39, 283-301.
- Lea, M., & Spears, R. (1992). Paralanguage and social perception in computer-mediated communication. *Journal of Organizational Computing*, 2, 321-342.
- Lea, M., & Spears, R. (1995). Love at first byte? Building personal relationships over computer networks. In J. T. Wood & S. Duck (Eds.), *Understudied relationships: Off the beaten track* (pp. 197-233). Thousand Oaks, CA: Sage
- Leary, M. R. (1983). Social anxiousness: The construct and its measurement. *Journal of Personality Assessment*, 47, 66-75.
- Leary, M.R. (1995). *Self-presentation: Impression management and interpersonal behaviour*. Madison: Brown & Benchmark.
- Leary, M. R. & Kowalski, R. M. (1993). The Interaction Anxiousness Scale: Construct and criterion-related validity. *Journal of Personality Assessment*, 61, 136-146.
- Leary, M. R., & Schlenker, B. R. (1981). The social psychology of shyness: A self-presentation model. In J. T. Tedeschi (Ed.), *Impression management theory and social psychological research*. New York: Academic Press.

- Lenhart, A., Rainie L. & Lewis, O. (2001) Teenage life online: The rise of the instant messenger generation and the Internet's impact on friendships and family relationships. [Online]. Available: http://www.pewinternet.org/reports/pdfs/PIP_Teens_Report.pdf
- Leung, L. (2001). College student motives for chatting on ICQ. *New Media and Society*, 3, 483-500.
- Leung, L. & Wei, R. (1999). The gratifications of pager use: sociability, information seeking, entertainment, utility, and fashion and status. *Telematics and Informatics*, 15, 253-264.
- Leung, L. & Wei, R. (2000). More than just talk on the move: Uses and gratifications of the cellular phone. *Journalism and Mass Communications Quarterly*, 77, 308-320.
- Lin, H. & Zhou, Y. (2003). Game analysis: Messaging. Netlab [On-line]. Available: www.netlab.hut.fi/opetus/s38042/s03/presentations/huubin/Messaging.pdf
- Ling, R. (2004). *The Mobile Connection: The Cell Phone's Impact on Society*. San Francisco, CA: Morgan Kaufmann.
- Ling, R. (2003). Front stage-back stage: Mobile communication and the renegotiation of the social sphere. In Grimstad, Norway
- Ling, R. 2004. *The Mobile Connection: The cell phone's impact on society*. Morgan Kaufmann: San Francisco.
- Ling, R. & Yttri, B. (2002). Hyper-coordination via mobile phones in Norway. In J.E.Katz & M. Aakhus (Eds.), *Perpetual Contact: Mobile Communication, Private Talk, Public Performance* (pp. 139-169). Cambridge: Cambridge University Press.
- Liu, Y. & Ginther, D. (2001). Managing impression formation in computer-mediated communication. *Educause quarterly*, 3, 50-54.
- Livingstone, S. (2004) 'Children Online - Consumers or Citizens?' *Cultures of Consumption Working Paper Series*. ESRC/AHRB .
- Livingstone, S. & Bober, M. (2004). *UK children go online: Surveying the experiences of young people and their parents* London: Department of media and communications, LSE.
- Mabry, E.A. (2001). Ambiguous self-identification and sincere communication in CMC. In L. Andli, R. Giceri & G. Riva (Eds.) *New perspectives on miscommunication*. FI: IOS Press.
- MacMillan & Creelman, 1991. *Detection Theory: A User's Guide*. Cambridge, UK: Cambridge University Press.

- Madell, D. & Muncer, S.J. (2007) . Control over Social Interactions: An Important Reason for Young People's Use of the Internet and Mobile Phones for Communication? *CyberPsychology & Behavior* 10, (1), 137 -140.
- Malinowski, B. (1923). The problem of meaning in primitive languages. in C.K. Ogden & I.A. Richards (eds.) *The Meaning of Meaning*. London: Routledge & Kegan Paul.
- Markovits, H., Benenson, J. & Dolenszky, E. (2001) Evidence that children and adolescents have internal models of peer interactions that are gender differentiated. *Child Development* 72, (3), 879–886.
- Markus, M. L. (1994). Finding a happy medium- explaining the negative effects of electronic communication on social-life at work. *ACM Transactions on Information Systems*, 12, 119-149.
- Matheson, K. & Zanna, M. P. (1988). The impact of computer-mediated communication on self-awareness. *Computers in Human Behaviour*, 4, (3), 221-233.
- McKenna, K. Y. A. & Bargh, J. A. (1998). Coming out in the age of the Internet: Identity "demarginalisation" through virtual group participation. *Journal of Personality and Social Psychology*, 75, 681-694.
- McKenna, K.Y.A. & Bargh, J.A. (1999). Causes and consequences of social interaction on the Internet: A conceptual framework. *Media Psychology*, 1, 249-269.
- McKenna, K. Y. A. & Bargh, J. A. (2000). Plan 9 from cyberspace: The implications of the Internet for personality and social psychology. *Personal and Social Psychology Review*, 4, 57-75.
- McKenna, K. Y. A., Green, A. S., & Gleason, M. E. J. (2002). Relationship formation on the Internet: What's the big attraction? *Journal of Social Issues*, 58, 9-31.
- McCormick, N. B., & McCormick, J. W. (1992). Computer friends and foes: Content of undergraduates' electronic mail. *Computers in Human Behavior*, 8, 379-405.
- McLeod, J., & Reeves, B. (1980). On the nature of mass media effects. In B. Whitney, & R. Abeles (Eds.), *Television and social behavior: Beyond violence and children* . Hillsdale, NJ: Lawrence Erlbaum Associates.
- MDA (2007). Mobile Data Association [Online]. Available: <http://www.mda-mobiledata.org>
- Morahan-Martin, J. & Schumacher, P. (2003). Loneliness and social uses of the Internet. *Computers in Human Behavior*, 19, 659-671.
- MORI (2005). Technology tracker [online]. Available: <http://www.mori.com>
- Motorola, (2002). Summary on the mobile. Available at <http://www.motorola.com>

- Nardi, B.A., Whittaker, S. & Bradner, E. (2000). Interaction and outercation: Instant messaging in action. In: ACM Conference on Computer Supported Cooperative Work, Philadelphia, December 2nd. Available: <http://www.tcnj.edu/2003/textmessaging.htm>
- Nielsen, J. (2000). *Designing Web Usability: The Practice of Simplicity*. Indianapolis: New Riders Publishing.
- Nisbett, R., & Wilson, T. (1977). Telling more than we can know: Verbal reports on mental processes. *Psychological Review*, 84, 231-259.
- Noble, G., (1987). Discriminating between the intrinsic and instrumental domestic telephone user. *Australia Journal of Communication* 11, 63-85.
- Nokia (2002). Are you ready for multimedia messaging service: an evolutionary approach to implementing MMS. Nokia [On-line]. Available: <http://www.nokia.com>
- O'Sullivan, P.B. (2000). What you don't know won't hurt me: Impression management functions of communication channels in relationships. *Human Communication Research*, 26, (3), 403-431.
- O'Sullivan, P.B. & Flanagan, A.J. (2003) Reconceptualizing 'flaming' and other problematic messages. *New Media & Society*, 5, (1), 69-94.
- Oullette, D.M. (2001). The social network and attachment basis of loneliness. MSc dissertation, Department of Psychology, University of Virginia. Available: <http://etd.vcu.edu/theses>
- Owens, C., Farrand, P., Reid, F.J.M., Aitken, P., Emmens, T., Hewis, E. & Morgan, C. (2007). The use of text messaging (SMS) to reduce repetition of self-harm: an exploratory trial. National Institute for Health Research: Research for Patient Benefit Programme. Commencing April 2007.
- Oxford English Dictionary* (2006). Oxford: Oxford University Press.
- Paul, G. L. (1966). *Insight vs. desensitization in psychotherapy: An experiment in anxiety reduction*. Stanford: Stanford University Press.
- Parks, M. R. & Floyd, K. (1996). Making friends in cyberspace. *Journal of Personality Assessment*, 46, 80-97.
- Parks, M.R. & Roberts, L.D. (1998). 'Making MOOsic': The development of personal relationships on-line and a comparison to their off-line counterparts. *Journal of Social and Personal Relationships*, 15, (4), 517-537.
- Paulhus, D. L., Graf, P., & van Seist, M. (1989). Attentional load increases the positivity of self-presentation. *Social Cognition*, 7, 389-400.
- Pearrow, Mark. (2000). *Web site usability handbook*. Rockland, MA: Charles River Media.

- Perse, E. M. & Courtright, J. A. (1993). Normative images of communication media: Mass and interpersonal channels in the new media environment. *Human Communication Research*, 19, 485-503.
- Perse, E., & Dunn, D. (1998). The utility of home computers and media use: Implications of multimedia and connectivity. *Journal of Broadcasting and Electronic Media*, 42(4), 435-456.
- Pertierra, R. (2005). Mobile phones, identity and discursive intimacy. *Human Technology*, 1, (1), 23-44.
- Pickett, C.L., Gardner, W.L. & Knowles, M.(2004) Getting a cue: The need to belong and enhanced sensitivity to social cues. *Personality and Social Psychology Bulletin*, 30, (9), 1095-1107.
- Plant, S. (2003). On the Mobile: the Effects of Mobile Telephones on social and individual life. Motorola Report [Online]. Available: <http://www.motorola.com/mot/documents/0,1028,333,00.pdf>
- Rainie, L. & Kohut, A. (2000). *Tracking online life: how women use the Internet to cultivate relationships with family and friends*. [Online]. Available: www.pewinternet.org.
- Rasbash, J., Steele,F., Browne, W., & Prosser, B. (2004). *A users guide to MLWin, Version 2*, University of London: UK
- The Register, (2003, 7th October), Text addiction 'accident waiting to happen', The Register [Online]. Available: www.theregister.co.uk/2003/10/07/text_addiction_accident_waiting/
- The Register (2006, 22nd February). Millions suffer RSI from text messaging. The Register [Online] www.theregister.co.uk/2006/02/22/text_injury/
- Reicher, S.(1984). Social influence in the crowd: attitudinal and behavioural effects of de-individuation in conditions of high and low group salience. *British Journal of Social Psychology*, 23. 341-350.
- Reid, D.J. (2002). The social and psychological effects of SMS text messaging. MSc Dissertation, School of Psychology, University of Plymouth, UK.
- Reid, D.J. & Reid, F.J.M. (in press) Text or talk? Social anxiety, loneliness, and divergent preferences for cell phone use. *CyberPsychology & Behavior*, 10, 3.
- Reid, D. J. & Reid, F.J.M. (2004) The social and psychological effects of text messaging. *Journal of the British Computer Society*, January.
- Reid, D. J. & Reid, F.J.M. (2005) Textmates and text circles: Insights into the social ecology of SMS text messaging. In: Lasen, A. & Hamill, L., *Mobile World: Past, Present and Future*, Springer Verlag: London.

- Reid, D.J. & Reid, F.J.M. (2004). Texting in context: The conversational use of mobile phone text messaging. In : *BPS Social Psychology Conference* , University of Liverpool, 1-3 September.
- Reid, F.J.M. & Reid, D.J. (in press) The expressive and conversational affordances of mobile messaging. *Behaviour & Information Technology*.
- Reid, F.J.M. & Reid, D.J. (2004) Text appeal: The psychology of SMS texting and its implications for the design of mobile phone interfaces, *Campus-Wide Information Systems*, 21, 5, 196-20
- Reuters (2005). Men chat and women text. [Online]. Available: www.yahoo.co.uk
- Rheingold, H. (2003). *Smart mobs: The next social revolution*. Cambridge: Perseus.
- Rice, R.E. & Love, G. (1987). Electronic emotion: Socio-emotional content in a computer-mediated communication network. *Communication Research*, 14, 85-108.
- Roberts, L., Smith, L. & Pollock, C. (2000) 'u r a lot bolder on the net?: shyness and Internet use. In W.R. Crozier (Ed). *Shyness: Development, consolidation and change*. London: Routledge.
- Rubin, A. M. & Rubin, R. B. (1985). Interface of personal and mediated communication: A research agenda. *Critical Studies in Mass Communication*, 2, 36-53.
- Rubin, R. B. (2002). The uses-and-gratifications perspective of media effects. In J.Bryant & D. Zillman (Eds.), *Media Effects: Advances in Theory and Research* (2nd ed., pp. 525-548). Mahwah,N.J.: Erlbaum.
- Ruggiero, T.E. (2000). Uses and gratifications theory in the 21st century. *Mass Communication & Society*, 3, (1), 3-37.
- Russell, D. W. (1996). UCLA Loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20-40.
- Scharlott, B.W. & Christ, W.G. (1995). Overcoming relationship-initiation barriers: The impact of a computer-dating system on sex role, shyness and appearance inhibitions. *Computers in Human Behavior*, 11, 191-204,
- Schlenker, B.R. (1980). *Impression management: The self-concept, social identity, and interpersonal relations*. California: Brooks/Cole.
- Schlenker, B. R. & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization and a model. *Psychological Bulletin*, 92, 641-669.
- Schutz, W. C. (1966). *Interpersonal Underworld*. California: Science and Behavior Books, INC.

- Schein, Edgar H. 1965. *Organizational Psychology*. Englewood Cliffs, NJ: Prentice-Hall.
- Schmidt, W.C. (1997). World-Wide Web surveys research: benefits, potential problems, and solutions. *Behaviour Research Methods, Instruments & Computers*, 29, (2), 274-279.
- Schutz, W. C. (1966). *The interpersonal underworld*. Palo Alto, CA: Science and Behavior Books.
- Seeley, E. A., Gardner, W. L., Pennington, G., & Gabriel, S. (2003). Circle of friends or members of a group? Sex-differences in relational and collective attachment to groups. *Group Processes and Intergroup Relations*, 6, 251-264.
- Selnow, G.W. Sex differences in uses and perceptions of profanity. *Sex Roles*, 12, (3-4), 303-312.
- Schindler, C. (2003): More than just an add-on to cell phone plans. [Online]. Available: <http://www.tcnj.edu/~technj/2003/testmessaging.htm>.
- Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: John Wiley.
- Skog, B. (2002). Mobiles and the Norwegian teen: Identity, gender and class. In J.E.Katz & M. Aakhus (Eds.), *Perpetual contact: Mobile communication, private talk and public performance* (pp. 255-273). Cambridge: CUP.
- Sky News (2003). Losing mobile 'like death'. Sky News [On-line]. Available: <http://www.sky.com>
- Smith, C.B. (1997). Casting the net: Surveying an Internet population. *The Journal of Computer Mediated Communication*, 3, 1. Available: <http://www.ascusc.org/jcmc/vol3/issue1/smith.html>
- Spears, R., Lea, M. & Lee, S. (1990). De-individuation and group polarization in computer-mediated communication. *British Journal of Social Psychology*, 29, 121-134.
- Spears, R. & Lea, M. (1992). Social influence and the influence of the 'social' in computer-mediated communication. In: Lea, M. (Ed.), *Contexts of computer-mediated communication*, (pp. 30-65), London: Harvester Wheatsheaf
- Spears, R., Postmes, T., Lea, M., & Wolbert, A. (2002). When are net effects gross products? The power of influence and the influence of power in computer-mediated communication. *Journal of Social Issues*, 58, 91-107.
- Sproull, L. & Kiesler, S. (1986). Reducing Social Context Cues: Electronic Mail in Organizational Communications. *Management Science*, 32, (11), 1492-1512.

- Staples, D. S., Hulland, J. S., & Higgins, C. A. (1998). A self-efficacy theory explanation for the management of remote workers in virtual organizations. *Journal of Computer-Mediated Communication*, 3 (4). Available: <http://www.ascusc.org/jcmc>
- Stillman, J.A. & Jackson, D.J.R. (2005) A detection theory approach to the evaluation of assessors in assessment centres. *Journal of Occupational and Organizational Psychology*, 78, (4). 581-594.
- Stritzke, W. G. K., Nguyen, A., & Durkin, K. (2004). Shyness and computer-mediated communication: A self-presentational theory perspective. *Media Psychology*, 6, 1-22.
- Sturgeon, W. (2004). British are a nation of cowardly texters. [Online] Available: <http://www.silicon.com>.
- Suler, J. (2000). Hypotheses about online text relationships [Online]. Available: www.rider.edu/psycyber
- Suler, J. (2003). E-mail communication and relationships. Available at: www.rider.edu/uesrs/suler
- Sun, H. (2003). Exploring cultural usability: A localization study of mobile text messaging use. In Florida: CHI.
- Tajfel, H. and Turner, J. C. (1986). The social identity theory of inter-group behavior. In S. Worchel and L. W. Austin (eds.), *Psychology of Intergroup Relations*. Chicago: Nelson-Hall.
- Taylor, A & Harper, R. (2002) . Age-old practices in the 'New World': A study of gift-giving between teenage mobile phone users, *CHI 2002*, Minneapolis, ACM Press.
- Taylor, A. & Harper, R. (2003). The gift of the gab: A design oriented sociology of young people's use of mobilZe in *CSCW: an international journal*, Kluwer, Amsterdam, pp267-296.
- Textually.org (2004a). Text Culture bad for relationships. Available: <http://www.textually.org>.
- Textually.org (2004b). Cell phone turns 30. Available: <http://www.textually.org>.
- Textually.org (2004c). Texting can be bulimia aid. [Online]. Available: <http://www.textually.org/textually/archives>
- Textually.org (2005). 2day u quit: Smokers find new ally. [Online]. Available: www.textually.org/textually/archives
- Thurlow, C. (2003). Generation Txt? Exposing the sociolinguistics of young peoples text-messaging. *Discourse Analysis Online*. Available: [http://faculty.washington.edu/thurlow/papers/Thurlow\(2003\)-DAOL.pdf](http://faculty.washington.edu/thurlow/papers/Thurlow(2003)-DAOL.pdf)

- Tice, D.M., Butler, J.L., Muraven, M.B. & Stillwell, A.M. (1995). When modesty prevails: Differential favorability of self-presentation to friends and strangers. *Journal of Personality and Social Psychology*, 69, (6), 1120-1138.
- Tidwell, L. C., & Walther, J. B. (2002). Computer-mediated communication effects on disclosure, impressions, and interpersonal evaluations: Getting to know one another a bit at a time. *Human Communication Research*, 28, 317-348.
- Travis, A. (2002). Men lead mobile phone revolution. The Guardian [On-line]. Available: http://www.guardian.co.uk/uk_news
- Turk, C. L., Heimberg, R. G., Orsillo, S. M., Holt, C. S., Gitow, A., Street, L. L. et al. (1998). An investigation of gender differences in social phobia. *Journal of Anxiety Disorders*, 12, 209-223.
- Turkle, S. (1995). *Life on the screen: identity in the age of the Internet*. New York: Simon & Schuster.
- Tyler, T. R. (2002). Is the Internet changing social life? It seems the more things change, the more they stay the same. *Journal of Social Issues*, 58, 195-205.
- USA Today (2003). Linguists mixed on effects of text messaging [Online]. Available: <http://www.usatoday.com>
- Utz, S. (2000). Social information processing in MUDs: The development of friendships in virtual worlds. *Journal of Online Behaviour*, 1, (1). Available: <http://www.behavior.net/JOB/>
- Vickers, A. (2001). Text messages to usurp valentines cards (2001, February 8). *The Guardian, UK*.
- Vincent, J. (2003). Emotional attachment to mobile phones: An extraordinary relationship. In . In: Lasen, A. & Hamill, L., *Mobile World: Past, Present and Future*, Springer Verlag: London.
- Walther, J.B. (1992). Interpersonal effects in computer-mediated interaction: a relational perspective. *Communication Research*, 19, 52-90.
- Walther, J. B. (1993). Impression development in computer-mediated interaction. *Western Journal of Communication*, 57, 381-398.
- Walther, J. B. (1995). Relational aspects of computer-mediated communication: Experimental observations over time. *Organization Science*, 6 (2), 186-203.
- Walther, J. B. (1997). Group and interpersonal effects in international computer mediated communication. *Human Communication Research*, 23, 342-369.
- Walther, J. B. (2003). Impression development in computer-mediated interaction. *Western Journal of Communication*, 57, 381-398.
- Walther, J. B. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23, 1-43.

- Walther, J. B.; Anderson, J. F.; & Park, D. W. (1994). Interpersonal effects in computer-mediated interaction: a meta-analysis of social and antisocial communication. *Communication Research*, 21, 460-87.
- Walther, J. B. & Burgoon, J. K. (1992). Relational communication in computer-mediated interaction. *Human Communication Research*, 19, 50-88.
- Walther, J.B. & D'Addario, K.P. (2001). The impacts of emoticons on message interpretation in computer-mediated communication. *Social Science Computer Review*, 19, 3, 324-347.
- Walther, J. B., Loh, T., & Granka, L. (2005). Let me count the ways: The interchange of verbal and nonverbal cues in computer-mediated and face-to-face affinity. *Journal of Language and Social Psychology*, 24, 36-65.
- Walther, J.B. & Parks, M.R. (2002). Cues filtered out, cues filtered in: Computer-mediated communication and relationships. In M.L. Knapp & J.L. Daly (Eds.), *Handbook of Interpersonal Communication*. Thousand Oaks, C.A.: Sage.
- Walther, J. B., & Slovacek, C., & Tidwell, L. C. (2001). Is a picture worth a thousand words? Photographic images in long term and short term virtual teams. *Communication Research*, 28, 105-134.
- Walther, J. B. & Tidwell, L. C. (1995). Nonverbal Cues in Computer-Mediated Communication, and the Effects of Chronemics on Relational Communication, *Journal of Organizational Computing*, 5 (4), 355-378.
- Waskul, D. & Douglass, M. (1997). Cyberself: The Emergence of Self in On-Line Chat. *The Information Society*, 13, (4) , 375 - 397.
- Watson, D., Hubbard, B., & Wiese, D. (2000). Self-other agreement in personality and affectivity: The role of acquaintanceship, trait visibility, and assumed similarity. *Journal of Personality and Social Psychology*, 78, 546-558.
- Weiss, R. S. (1973). *Loneliness: The experience of emotional and social isolation*. Cambridge, MA: MIT.
- Wellman, B. (2001). Physical place and cyberspace: The rise of personalized networks. *International Urban and Regional Research*, 25, (2), 227-252
- Williams, F., Dordick, H., Jesuale, N., 1985. Focus group and questionnaire development for exploring attitudes towards telephone service. In: F. Williams, (Ed.), *Social Research and the Telephone*. Los Angeles, CA.: Herbert Dordick and Associates.
- Winton, E.C., Clark, D.M. & Edelmann, R.J. (1995). Social anxiety, fear of negative evaluation and the detection of negative emotion in others. *Behaviour Research and Therapy*, 33, 293-196.

- Witmer, D. F. & Katzman, S. L. (1998). Smile when you say that: Graphic accents as gender markers in computer-mediated communication. In F. Sudweeks, M. McLaughlin, & S. Rafaeli (Eds.), *Network and netplay: Virtual Groups on the Internet* (pp. 3-11). Menlo Park, CA: MIT Press.
- Wood, J. T. (1997). *Gendered lives: Communication, gender, and culture* (2nd Ed.). Belmont, CA: Wadsworth.
- Yates, S. J. (2001). Researching Internet interaction: Sociolinguistics and corpus analysis. In M. Wetherell, S. Taylor, & S. Yates (Eds.), *Discourse as data: A guide for analysis* (pp. 93-146). London: Sage.
- Zillig, L.M., Hemenover, S.H. & Dienstbier, R.A. (2002). What Do We Assess when We Assess a Big 5 Trait? A Content Analysis of the Affective, Behavioral, and Cognitive Processes Represented in Big 5 Personality Inventories. *Personality and Social Psychology Bulletin*, 28, 6, 847-858.

Appendix A: Press reports

Reid, D.J. & Reid, F.J.M. (February, 2005). "The Joy of Text". National and international coverage of the SMS research project, including GMTV Breakfast Show, BBC Radio Devon, BBC Radio Plymouth, BBC Radio Oxford, Daily Telegraph, Daily Mail, Daily Express, Sun, and a large number of overseas magazines (including the Weekend Australian Magazine, May 28-29, 2005), newspapers, and academic and popular science web sites.

Appendix B: Leary's scale of Interaction Anxiousness. Leary, M. R. (1983). Social anxiousness: The construct and its measurement. *Journal of Personality Assessment*, 47, 66-75.

Please indicate the degree to which each of the following statements is characteristic or true of you :

1. I often feel nervous even in casual get-togethers

not at all slightly moderately very extremely characteristic

2. I usually feel uncomfortable when I am in a group of people I don't know

not at all slightly moderately very extremely characteristic

3. I am usually at ease when speaking to a member of the opposite sex

not at all slightly moderately very extremely characteristic

4. I get nervous when I must talk to a teacher or boss

not at all slightly moderately very extremely characteristic

5. Parties often make me feel anxious and uncomfortable

not at all slightly moderately very extremely characteristic

6. I am probably less shy in social interactions than most people

not at all slightly moderately very extremely characteristic

7. I sometimes feel tense when talking to people of my own sex if I don't know them very well

not at all slightly moderately very extremely characteristic

8. I would be nervous if I was being interviewed for a job

not at all slightly moderately very extremely characteristic

9. I wish I had more confidence in social situations

not at all slightly moderately very extremely characteristic

10. I seldom feel anxious in social situations

not at all slightly moderately very extremely characteristic

11. In general, I am a shy person

not at all slightly moderately very extremely characteristic

12. I often feel nervous when talking to an attractive member of the opposite sex

not at all slightly moderately very extremely characteristic

13. I often feel nervous when calling someone I don't know very well on the telephone

not at all slightly moderately very extremely characteristic

14. I get nervous when I speak to someone in a position of authority

not at all slightly moderately very extremely characteristic

15. I usually feel relaxed around people, even people who are quite different from me

not at all slightly moderately very extremely characteristic

Appendix C: Leung's Items used in Study 4. Leung, L. (2001). College student motives for chatting on ICQ. *New Media and Society*, 3, 483-500.

I chat on icq ... : [changed to 'I use text messaging to communicate with others... :']

Entertainment

- 1 because it is fun
- 2 because it is exciting
- 3 to have a good time
- 4 because it is stimulating
- 5 because it is entertaining
- 6 because I enjoy it
- 7 because it peps me up [this item was not included in our study as it is not really a recognised saying in Europe]

Diversion (Escape)

- 8 to put off something I should be doing
- 9 to get away from what I am doing
- 10 because I have nothing better to do
- 11 to get away from pressures and responsibilities
- 12 to forget about my problems
- 13 to kill time

Affection

- 14 to help others
- 15 to let others know I care about their feelings
- 16 to thank them
- 17 to show others encouragement
- 18 because I am concerned about them

Sociability

- 19 to meet people (new acquaintances)
- 20 to make friends of opposite sex
- 21 to find something interesting to talk to my family about

- 22 to find something interesting to use in starting a conversation
- 23 to find something interesting to talk to my friends about
- 24 to feel involved with what's going on with other people
- 25 to feel closer to family and friends
- 26 to be less inhibited chatting with strangers

Inclusion

- 27 because I need someone to talk to or be with
- 28 because I just need to talk about my problems sometimes
- 29 because it makes me feel less lonely
- 30 because it's reassuring to know someone is there

Relaxation

- 31 because it relaxes me
- 32 because it allows me to unwind
- 33 because it is a pleasant rest
- 34 because it makes me feel less tense
- 35 because I am bored

Peer Pressure

- 36 to look fashionable
- 37 to look stylish
- 38 to not look old-fashioned

Appendix D: Additional items used in Study 4.

- 39 because everyone uses it
- 40 to reply to a text sent, I never/rarely initiate a text conversation
- 41 only when I cannot see that person face-to-face
- 42 only when I cannot voice call the person
- 43 only if it is the only method of communication available
- 44 when I cannot be bothered to chat face-to-face
- 45 to add extra dimensions to my relationships
- 46 to avoid face-to-face communication
- 47 to express my real feelings on a matter
- 48 because it's easier to lie
- 49 because I get a better impression of people than through other methods of communication
- 50 because other people get a better impression of me than through other methods of communication
- 51 because it's less of an effort than other communication methods
- 52 to remind others I am there
- 53 to express things I do not feel comfortable communicating via face-to-face
- 54 to deepen my relationships
- 55 to develop new friendships
- 56 to find something interesting to use in starting a conversation
- 57 to let others know I am thinking of them

Appendix E: Russell's (1996) Loneliness scale. Russell, D. W. (1996). UCLA Loneliness scale (version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment*, 66, 20-40.

Please circle the answers that apply, being as honest as you can.

1. How often do you feel that you lack companionship?

Never Rarely Sometimes Often Always

2. How often do you feel that you have a lot in common with the people around you?

Never Rarely Sometimes Often Always

3. How often do you feel close to people?

Never Rarely Sometimes Often Always

4. How often do you feel left out?

Never Rarely Sometimes Often Always

5. How often do you feel that no one really knows you well?

Never Rarely Sometimes Often Always

6. How often do you feel isolated from others?

Never Rarely Sometimes Often Always

7. How often do you feel that there are people who really understand you?

Never Rarely Sometimes Often Always

8. How often do you feel that people are around you but not with you?

Never Rarely Sometimes Often Always

9. How often do you feel that there are people you can talk to?

Never Rarely Sometimes Often Always

10.How often do you feel that there are people you can turn to?

Never Rarely Sometimes Often Always

Appendix F: Discriminant Analysis for Chapter 5

Summary of Canonical Discriminant Functions

Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.627 ^a	100.0	100.0	.621

a. First 1 canonical discriminant functions were used in the analysis.

Wilks' Lambda

Test of Function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.615	73.002	12	.000

Standardized Canonical Discriminant Function Coefficients

	Function
	1
Total texts sent and received	.467
Total voice calls made and received	-.154
Inclusion/sociability	-.161
Affection	.049
Entertainment	-.231
Diversion/escape	-.050
Peer pressure	-.195
Relaxation	.035
Relationship development and maintenance	.579
Impression management	.281
Last resort	-.652
Ease/convenience	.509

Structure Matrix

	Function
	1
Last resort	-.589
Total texts sent and received	.455
Relationship development and maintenance	.368
Affection	.348
Inclusion/sociability	.276
Ease/convenience	.244
Total voice calls made and received	-.215
Peer pressure	-.191
Impression management	.147
Diversion/escape	.111
Relaxation	.102
Entertainment	.070

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions
Variables ordered by absolute size of correlation within function.

Functions at Group Centroids

	Function
	1
Pref text/talk on mobile	
text	.860
talk	-.720

Unstandardized canonical discriminant functions evaluated at group means

Classification Statistics

Prior Probabilities for Groups

		Cases Used in Analysis	
		Unweighted	Weighted
Pref text/talk on mobile	Prior		
text	.500	72	72.000
talk	.500	86	86.000
Total	1.000	158	158.000

Classification Results^a

			Predicted Group Membership		Total
			text	talk	
Original	Count	Pref text/talk on mobile text	57	15	72
		talk	13	73	86
	%	text	79.2	20.8	100.0
		talk	15.1	84.9	100.0

a. 82.3% of original grouped cases correctly classified.

Appendix G: Condensed IPIP scale (used in Studies 7 & 8). Available online: www.IPIP.org

1. I have a rich vocabulary (please circle the appropriate response)

(Very Inaccurate)

(Very Accurate)

1 2 3 4 5

2. I do things according to a plan

3. I waste my time.

4. I am hard to get to know.

5. I catch on to things quickly .

6. I carry the conversation to a higher level.

7. I can handle a lot of information.

8. I like order.

9. I have difficulty understanding abstract ideas.

10. I am quick to understand things.

11. I am not really interested in others.

12. I make people feel at ease.

13. I get angry easily.

14. I am not interested in abstract ideas.

15. I feel comfortable around people.

16. I am full of ideas.

17. I know how to captivate people.

18. I take offence easily.
19. I do not have a good imagination.
20. I am not easily bothered by things.
21. I am indifferent to the feelings of others.
22. I panic easily.
23. I get irritated easily.
24. I feel at ease with people.
25. I have little to say.
26. I have a vivid imagination.
27. I get stressed out easily.
28. I am interested in people.
29. I will not probe deeply into a subject.
30. I have difficulty imagining things.
31. I know how to comfort others.
32. I find it difficult to get down to work.
33. I wait for others to lead the way.
34. I keep in the background.
35. I take charge.
36. I don't talk a lot.
37. I insult people.
38. I am not interested in other people's problems.

- 39. I am exacting in my work.
- 40. I start conversations.
- 41. I feel little concern for others.
- 42. I pay attention to details.
- 43. I don't mind being the centre of attention.
- 44. I have excellent ideas.
- 45. I think of others first.
- 46. I sympathize with others' feelings.
- 47. I continue until everything is perfect.
- 48. I am skilled in handling social situations.
- 49. I grumble about things.
- 50. I use difficult words.
- 51. I inquire about others' well-being.
- 52. I do things in a half-way manner.

Appendix H: Signal Detection Calculations

Signal Detection Theory

(This page is copied from the University of California, Psychology website, available: <http://psy.ucsd.edu/~kang/sdt/sdt.htm>)

Different experimental designs may require different formulas for calculating sensitivity and response bias measures. See Macmillan & Creelman (1991) for details.

The following is an example of how to use Excel to compute the measures with data collected using a yes-no paradigm.

For d prime:

Put your hit and false alarm rate data into an Excel spreadsheet. Let's say the hit rates are in column A and the false alarm rates are in column B. In cell C1, define the function $=\text{NORMSINV}(A1)-\text{NORMSINV}(B1)$. That's basically saying $z(\text{Hit})$ minus $z(\text{FA})$, and that's what d' is equal to. Once you've defined it for one particular pair of hit and false alarm rates (i.e., the ones in row 1), you can just copy and paste down column C and it will automatically do it for the remaining ones. **For beta (natural log):**

Go to cell D1 and use this formula: $=C1*0.5*(\text{NORMSINV}(A1)+\text{NORMSINV}(B1))$ where C1 refers to the d' value that is computed in that cell. Then copy and paste down column D so it will do all the rest of the beta calculations.

For beta (ratio):

Go to cell E1 and use this formula: $=\exp(D1)$

For criterion c:

Go to Column F, use this formula

$=-.5*(\text{NORMSINV}(A1) \text{ and } \text{NORMSINV}(B1))$

For normalized c':

Use this formula

$=-.5*(\text{NORMSINV}(A1) \text{ and } \text{NORMSINV}(B1))/d'$

How to deal with hit rate of 1 and false alarm rate of 0: □□ If you have any hit rates of 1.0 or false alarm rates of 0, you need to do a standard correction on those first. There is some controversy about the best way to correct hit and false alarm rates, but the "standard" method is the one described below:

Let's say that N is the maximum number of false alarms (i.e., it's the number of lures). Not counting zero, the smallest false alarm rate you have is $1/N$. If you have a measured false alarm rate of 0, you know that the true false alarm rate falls somewhere between 0 and $1/N$, so the usual strategy is to just use $1/(2N)$ instead of zero (which is the same as saying that you observed half a false alarm). So, if $N = 40$ and you have a false alarm rate of 0, use $1/80$ (.0125) instead). The same reasoning applies to a hit rate of 1.0. Instead of using 1.0, use $1 - 1/(2N)$, where N is now the number of targets.

John Wixted & Kang Lee