

MASTER

Staying in touch over distance an exploration of the concept of connectedness

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STAYING IN TOUCH OVER DISTANCE

**An Exploration of
the Concept of Connectedness**

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**Masters Thesis
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PREFACE

The last i is dotted and the last t is crossed. Now only two things remain before I can say: "I did it!", this report has to be printed and I have to present it. But at this moment it already feels like a victory. For me working on my masters' thesis has been a true search. First, I strolled to the literature looking around to get to know my field. After the collection of the data I could wander around once more, this time through the writings of my participants. I believe by now I can cite every single one of them by heart. At times my wanderings seemed to get me lost. But even these deviations kept it interesting and gave me the opportunity to grow and get to know myself. "Tiggers never get lost!" (A.A. Milne), and neither do Froukjes.

I would like to thank everyone who supported me throughout my search:

First of all, of course, my supervisors Wijnand IJsselsteijn and Panos Markopoulos for giving me the freedom to find my own way, and guiding me where I needed it.

My parents for stimulating me to walk my own path and to make my own choices. Pleun, Florus and Janne for just being there.

André for being a haven and giving me a listening ear.

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My participants for taking the effort of keeping the diary for me.

Everyone who thought along with me for sharing their stories and views on the role of communication in their lives.

And finally, all the sweet persons who helped me relax by accompanying me during my walks and my camping trips; by having dinner, going out and dancing with me; by challenging me in sports and games; by watching a movie; having tea or just talk with me; by juggling and bouncing around; ...

F.

SUMMARY

Humans are social beings, we have the fundamental need to communicate – to form, maintain and enhance social relationships. Because of this fundamental human need telecommunication industry got a change to grow. Today, many interactions are mediated by telecommunication applications. These applications are usually first developed to support work-related communication, after which they are quickly adapted for non-work related purposes. But, these applications do not fit non-work related communication needs adequately. Lately, telecommunication research and development is paying more attention to non-work related communication. As a result of this shift to the non-work related context, researchers are looking for new ways of theorizing on, designing for and evaluating mediated communication. Where in the work-related context usability criteria are sufficient, non-work related communication asks for additional criteria. Applications developed for leisure use should meet human needs. With the purpose to give insight in the additional criteria for design and evaluation of telecommunication applications, this research project looks into human communication needs and the related theoretical concepts of social presence, social awareness and connectedness. Social presence is shortly defined as the sense of being together. Social awareness concerns the unconscious monitoring of and the conscious search for information about a person's whereabouts, activities and well-being. And connectedness is the emotional appraisal of (the communication within) ongoing social relationships.

With the objective to contribute to the development of a theory of the concept of connectedness, and to the development of criteria for the design and evaluation of connectedness supporting technologies, the empirical part of this research project explored the concept of connectedness within the context of geographical distance. For this purpose two qualitative studies are performed – an email questionnaire and a diary study.

The results of these studies show that contact moments can be categorized into practical, social, emotional and attentive contacts. To the concept of connectedness the latter three contact types are of importance. Social contacts maintain relationships, and emotional and attentive contacts enhance them by increasing the sense of connectedness. The main goals of social contacts are merely maintaining contact and keeping each other informed of things happening in life. Where social contacts are usually light-hearted, emotional contacts are more intimate. During these contacts people discuss deep thoughts and feelings, share personal problems and provide social support. Attentive contacts are characterized by an attention flow from one person to another person. Basically, attentive contacts can have two forms – doing effort for another, and just having contact regardless of the content. This second form of attentive contacts communicates that one person is thinking of another person.

The results of the email questionnaire and the diary study also show that basically there are three types of connectedness feelings – feelings of being part of each other's lives, psychological closeness feelings, and feelings of being important to another person. Social contacts usually evoke feelings of being part of each other's lives; psychological closeness feelings often result from emotional contacts; and attentive contacts make people feel important. However, this distinction is not as clear as it seems. Table 6.1 summarizes the main communication activities resulting the two studies and shows which connectedness feelings these activities evoke. Geographical distance shifts the importance of the various communication activities and connectedness feelings. Compared with remote, primary social relationships, within geographically close, primary social relationships, social contacts are often taken for granted, because these contacts are embedded in normal day to day life. At a distance it is harder to

establish these kinds of contacts. Therefore it is particularly important to maintain a feeling of being part of each other's lives. One way of accomplishing this is keeping each other informed about the things happening in life – especially the little things. Also the sharing of experiences seems to be important as well as looking into each other's worlds.

Within remote social relationships emotional contact often result in mixed feelings. Emotional contacts ask for physical proximity, so non-verbal comforting methods can be employed. Today's commercially available telecommunication applications are not capable of supporting this, resulting in feelings of helplessness by the user. Nevertheless, emotional contacts are valued in remote social relationships, and increase the sense of connectedness.

In the context of geographical distance attentive contacts are especially helpful in reassuring that a person is still important to the other and part of this person's life.

From the results of email questionnaire and the diary study some guidelines for design and evaluation of connectedness supporting technologies were derived. The literature showed design efforts were already aiming at the development of connectedness supporting applications – e.g. awareness technologies like the digital family portrait (Mynatt, Rowan, Craighill, & Jacobs, 2001) or the pin board (Markopoulos, IJsselsteijn, Huijnen, Romijn, & Philopoulos, 2003), and applications that facilitate attentive communication, like the White Stone (Tollmar, Junstrand, & Torgny, 2000) or the Feather, Scent and Shaker (Strong & Gaver, 1996 in Gaver, 2002). This project provides some empirical evidence for the value of these kinds of applications. It also identifies some other interesting focus points for the research and development of telecommunication technologies within the non-work related context. For example, the present commercially available telecommunication applications do not support emotional communication, the sharing of experiences, or the communication of effort very satisfactory.

Keywords: connectedness, diary study, email questionnaire, human communication needs, social awareness, social presence, qualitative research

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INTRODUCTION

Humans are social beings, we have the fundamental need to communicate – to form, maintain and enhance social relationships. Because of this fundamental human need telecommunication industry got a change to grow. Today, many interactions are mediated by telecommunication applications. These applications are usually first developed to support work-related communication, after which they are quickly adapted for non-work related purposes. But, these applications do not fit non-work related communication needs adequately. Lately, telecommunication research and development is paying more attention to non-work related communication. As a result of this shift to the non-work related context, researchers are looking for new ways of theorizing on, designing for and evaluating mediated communication. Where in the work-related context usability criteria are sufficient, non-work related communication asks for additional criteria. Applications developed for leisure use should meet human needs. With the purpose to give insight in the additional criteria for design and evaluation of telecommunication applications, this research project looks into human communication needs and the related concepts – especially the concept of connectedness.

Chapter 1 provides a theoretical framework of human communication needs, and positions the concept of connectedness in this framework. Next to a theoretical framework of human communication this project provides empirical exploration of the concept of connectedness. Because, nowadays many friends and families live geographically separated, we have chosen to limit the scope of this project to social communication in the context of geographical distance. Chapter 2 explains the research question further.

The empirical part of this project consists of two studies – an email questionnaire and a diary study. The used methods and research design will be addressed in chapter 3, and chapter 4 and 5 will discuss the results of respectively the email questionnaire and the diary study. Chapter 6 combines the empirical findings to a conceptualization of the concept of connectedness and illuminates the design and evaluation implication. This report will be concluded with a general discussion of this project and the implications for further research, in chapter 7.

1 THEORETICAL FRAMEWORK

According to Aristotle, we are not made to live alone. However, as a consequence of technological development our world gets bigger. Because people can easily travel to the other end of the world, families and communities have become scattered over the face of the earth. Therefore, an increasing amount of people live geographically separated from their friends and family. Through the emerging of telecommunication technologies – like telephony, Internet communication and video communication – these distances fade away, and people everywhere in the world can be in touch. This context of geographical distance provides a different perspective on human communication.

This chapter presents a theoretical framework of human communication and human communication needs. It addresses communication theory, identifies three complementary non-work related communication and discusses the associated concepts, of which the concept of connectedness is one.

1.1 COMMUNICATION THEORY

Communication has been subject of research for many years and in various disciplines. Claude Shannon, a research mathematician at Bell Telephone Laboratories, formulated the first communication theory in 1948. He described human communication by a linear model consisting of three basic elements - a sender or information source, an information-transmitting medium, and a receiver (Mattelart & Martelart, 1998, ch3). But communication is not only about information exchange, especially in a non-work related context it is about human relationships as well. Shannon's theory is a purely structural approach towards human communication and lacks every social and psychological aspect, like the perceptive and cognitive processing of, the affective and behavioral reaction to, or the form, meaning, intention and interpretation of the message. The numerous other definitions of communication all focus on different aspects of communication, which are important for the discipline in which the definition is used. The Blackwell Encyclopedia of Social Psychology gives a more general definition of communication as "a process of exchanging messages in a social environment entailing cognitive activity, affective states and behavioral outcomes" (Manstead & Hewstone, 1996, p. 109). Not only the social environment is of importance in human communication. The physical environment also can influence a person, and therefore the communication this person is engaged in. Extracted from the social environment the relationship between the two communicating parties and its history provides an additional context in which human communication should be placed.

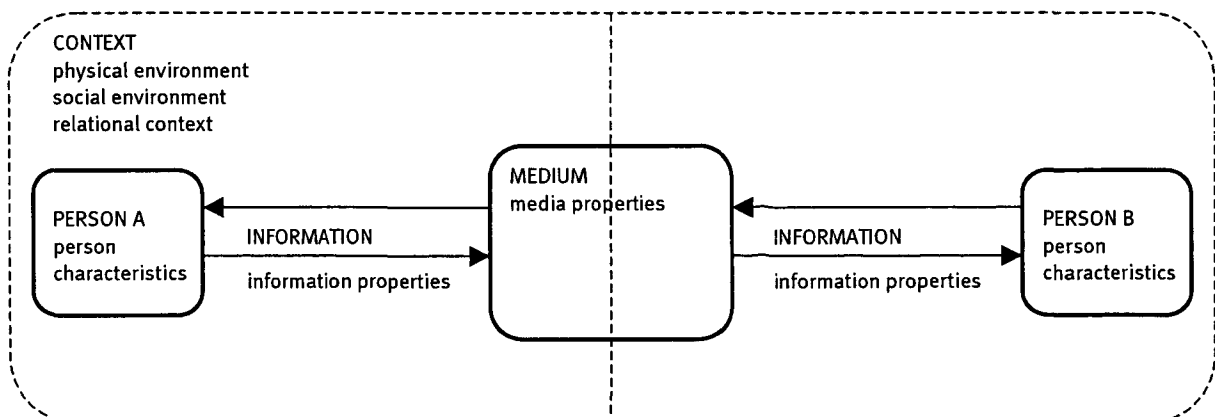


Figure 1.1: A communication model

Looking at *dyadic communication*, the communication between two people, we can define the following elements (see Figure 1.1): two persons interact by means of a telecommunication medium – or no medium in the case of face-to-face contact – in the context of their physical and social surroundings and their relational context. Both persons are sender and receiver of the information they transmit intentionally and unintentionally to each other. All elements in this model have their own characteristics, which influence the communication process. For instance, the interacting individuals have experiences, knowledge and expectations in general but also regarding each other, their relationship and their communication activities. The transmitted information can be verbal or nonverbal and have a visual, auditive, haptic or olfactory nature. Medium properties are, for instance connected to the modalities the medium supports and the quality and realism of the information it transmits.

1.2 NON-WORK RELATED COMMUNICATION NEEDS

Today many of our interactions are mediated by various telecommunication applications. Most of these applications were first developed to support work-related communication, after which they were quickly adopted for non-work related purposes. However, these technologies do not fit non-work related communication purposes adequately. Lately a shift has taken place in telecommunication research and development and more attention is paid to communication in *non-work related contexts*, like the home environment (e.g. Bouwhuis, 2000; Chang, Resner, Koerner, Wang, & Ishii, 2003; Greef & IJsselsteijn, 2001; Heeter et al., 2001; Hindus, Mainwaring, Leduc, Hagström, & Bayley, 2001; Markopoulos, IJsselsteijn, Huijnen, Romijn, & Philopoulos, 2003; Patrick & Metcalf, 2003; Sawhney & Gomez, 2000)

With this shift to the non-work related context, researchers are also looking for new ways of theorizing on, designing for and evaluating mediated communication. In a work-related context usability measures – focused on efficiency, effectiveness and satisfaction during the performance of a task – are appropriate. In a non-work related context these usability measures are not sufficient, because maximizing efficiency and effectiveness is not the ultimate goal of designing leisure products.

Jordan (1999) already identified pleasure as a complementary product evaluation criterion. However looking at mediated communication in the non-work related context pleurability does not seem to be a sufficient criterion. In evaluating mediated communication in a non-work related context, it is important to look at human communication-related needs, and at the feelings communication moments can evoke. Without trying to be complete, we can identify three complementary communication needs – the need to be together, the need to be informed and the need to belong. These needs are, respectively, linked to the concepts of social presence, social awareness and connectedness. This chapter will explore these concepts further, and discuss the relation between them.

Theories and measurements of these concepts co-exist and complement usability theory and measurements. Depending on the context – e.g. work related or non-work related – and the communication goal one or more of these theories will be appropriate. Also these concepts will give rise to additional criteria for the design of new telecommunication technologies, which will fit human communication needs better. Criteria rising from the different theories can inform the design of one application, or produce a series of applications.

1.2.1 Social presence – the need to be together

Where telecommunication applications were designed to overcome geographical distance and time, most research efforts were directed at simulating a feeling of physical proximity between people who are at geographically distant sites. This feeling of physical proximity, or the feeling of being together, is called social presence. Social presence theory (Short, Williams, & Christie, 1976) addresses how successfully media convey a sense of the participants being physically together, using face-to-face communication as the standard for the assessment (Preece, 2000). Because social presence is a multidimensional concept there are several approaches towards this concept. A distinction can be made between social presence as the subjective experience of the physical proximity of the other and social presence as the medium quality that facilitates this

subjective experience (e.g. Connell, Mendelsohn, Robins, & Canny, 2001; Heeter, 1998; Preece, 2000; Connell et al., 2001). Usually, when the term social presence is used the first approach is meant; the latter is also referred to as the social richness of media or media richness.

Media richness theory of Daft and Lengel (1986 in Preece, 2000) describes the media's capacity for immediate feedback, how many and in which ways the senses are involved, and the sensory realism of the transmitted information. So, the richness of a medium depends on whether the medium supports unidirectional or bi-directional communication; whether it involves multiple modalities; the detail of the information conveyed, etc. Face-to-face contact is seen as the richest form of communication, and written communication as the least rich form.

Richer media may depend on multiple modalities. These media transmit video and audio information next to possibly haptic or even olfactory information. Visibility refers to the ability to see each other. This is among other things important for communicating emotion through, for instance, body language and facial expressions (Clark and Brennan, 1993 in Preece, 2000). Audibility concerns the ability to hear one another, which is very effective for conveying factual information, moreover the voice tone also provides cues about the emotional state (Clark and Brennan, 1993 in Preece, 2000). Beside visibility and audibility, physicality plays an important role in interpersonal communication. According to Brave, Ishii and Dahley (1998) touch is often recognized as a fundamental aspect of interpersonal communication. Whether a strong handshake, a hug, a poke for attention, or a gentle brush on the shoulder, physical contact can convey a vitality and immediacy (immediacy will be discussed in the next paragraph) at times more powerful than language. Also olfactory information can evoke emotional or even physical responses.

Richer media transfer information more realistically. This involves, among other things the quality, dimensionality, size and detail of the information.

Richer media facilitate synchronicity, simultaneity and sequentiality. Through synchronous media information is received immediately. Simultaneity means that the interacting persons can send and receive at once and simultaneously. Sequentiality involves turn taking in which turns cannot be out of sequence. (Clark and Brennan, 1993 in Preece, 2000)

The richer the medium, the higher the subjective experience of social presence is. But social presence is not influenced by media richness alone. Non-verbal intimacy and immediacy behavior are also relevant to the experience of social presence. According to Argyle and Dean (1965, in Short et al., 1976) during interaction people are both attracted and repelled to one another. To reach equilibrium between this attraction and repulsion these persons will adjust factors that affect the overall level of intimacy – physical distance, eye contact, smiling, intimacy of conversation topic, etc. Wiener and Mehrabian (1968 in Short et al., 1976) describe the concept of immediacy – the psychological distance people put between themselves and their listeners. Immediacy is affected by the choice of words, the appearance of people, physical proximity, facial expression, but can also be affected by the choice of medium. Immediacy will be larger when a richer medium is chosen to facilitate the interaction, for more details about immediacy see Richmond, McCroskey and Payne (1991), ch.11.

Biocca and colleagues (Biocca, Burgoon, Harms, & Stoner, 2001; Biocca & Harms, 2002) concentrated their research efforts at developing a comprehensive theory and measurement of social presence. Biocca and Harms (2002) identified three levels of social presence. Level 1 – the perceptual level – is related to the sensorial detection and awareness of the mediated body of the other. Level 2 – the subjective level – focuses on the sense of awareness of and access to the attentional engagement, emotional state, comprehension and behavioral interaction of the other. Level 3 – the intersubjective level – deals with the interactional component of social presence and is referred to as symmetry. This third level focuses on the perception one individual (A) has of the sense of social presence another individual (B) has of him/her (A), and the degree to which this perception is mutual.

In short, social presence is defined as the sense of being together with another person. This subjective experience can, among other things, be influenced by the social richness of the used medium, and intimacy and immediacy behavior. Biocca and Harms (2002) show that the concept of social presence can be approached from three levels.

1.2.2 Social awareness – the need to be informed

Although most telecommunication research is directed at social presence, researchers are starting to get aware of the fact that in imitating face-to-face interactions, also the limitations of these physical encounters are copied (e.g. Hollan & Stornetta, 1992). Clark and Brennan (1993 in Preece, 2000), for instance, identify a number of communication opportunities, of which not all are available in face-to-face interactions.

The concept of social awareness incorporates a complementary way of looking at human communication. This concept concerns the unconscious monitoring of and the conscious search for information about the context of people in an individual's physical and social environment. It involves information exchange about people's whereabouts, activities and well-being. The literature shows a dichotomy in social awareness technologies. One set of technologies transmits information about people at a specific location, other technologies convey information about a specific person regardless of his/her location.

Location-bounded social awareness technologies deal with questions like "What is happening at this remote location?", "Who is around?", and "Who is available for communication?". Often the research in this area focuses on the work environments (e.g. Bly, Harrison, & Irwin, 1993), but this interpretation of social awareness is also used in non-work related situations, for instance in home environments (e.g. Hindus et al., 2001). Person-bounded social awareness technologies focus on questions like "Where is a this person?", "What is he/she doing" and "How is he/she doing?". A difference with location-bounded social awareness technologies is that person-bounded technologies require at least a mobile information capturing device. Among others Markopoulos et al. (2003) approach social awareness from a person perspective.

The concept of social awareness is linked to attention processes. According to Pedersen and Sokoler (1997) we constantly monitor our physical surroundings unconsciously. Our preattentive processes almost instantaneously detect changes in our environment. A serial attentive process will shift focal attention to any of the objects detected by the preattentive processes. The concept of calm technology (Weiser & Brown, 1995) takes up this human skill of reading the environment. Calm technology should allow people to maintain and constantly update a sense of their social and physical environment, and at the same time keep people from information overload.

Following Weiser and Brown calm technology should be one that engages both the center and the periphery of our attention, it will move easily from the periphery of our attention to the center and back. One application that makes use of this phenomenon is media spaces (Bly et al., 1993). "A media space is an electronic setting in which groups of people can work together, even when they are not resident in the same place or present at the same time. In a media space people can create real time visual and acoustic environments that span physically separated areas" (Stults, R., 1986 in Bly et al., 1993, p. 30). The use of media space for peripheral awareness was its most powerful use. "... sounds from the other location giving clues about the ongoing activities there ... Being aware of such activities required no response; it provided an overview of who was around and what was happening" (p. 34).

So continuous audio and video connections – between people or locations – are important enablers for the concept of social awareness. They facilitate the unintentional monitoring of the physical and social environment. Researchers are also looking at less intrusive options to provide presence information. For instance, The AROMA project (Pedersen et al., 1997; Pedersen, 1998) searched for a symbolic way to represent presence and activity information of people at a remote location.

More asynchronous technologies can also be of use in providing social awareness. Applications like Portholes (Dourish & Bly, 1992 in Bly et al., 1993) or Telepresence Client (Buxton, 1997), in which a door state – open, half open, closed or locked – symbolizes someone's availability,

support intentional awareness of presence and availability information. Also Instant Messaging services support this. Applications like the pin-board (Markopoulos et al., 2003) or ScanBoard (Hindus et al., 2001) facilitate information exchange of people's whereabouts, activities and well-being in an asynchronous manner.

Recapitulating, the concept of social awareness concerns the unconscious monitoring of and the conscious search for information about people in a person's physical and social environments. Awareness applications provide information about the whereabouts, activities and well-being of persons at specific locations, or of persons regardless of their location.

1.2.3 Connectedness – the need to belong

Non-work related communication has various faces, many purposes, and evokes a range of feelings, thoughts and behaviors. Because humans are social beings one of the most basic needs related to communication is the need to belong, to feel connected with the persons we communicate with and to avoid feelings of loneliness. This need and these feelings are incorporated in the concept of connectedness. Only recently, the concept of connectedness is appearing in the communication literature. So, until now little research looked into this view on communication.

The term connectedness is defined as the state of being connected. From a telecommunication perspective the medium makes the literal connection of two persons possible. But this is not what the concept of connectedness is about, the concept of connectedness deals with the connection between two persons on an emotional level, and can be defined as a positive emotional appraisal of ongoing social relationships. The concept can be looked at from two perspectives, which we refer to as the overall feeling of connectedness and the momentary feelings of connectedness. The overall feeling of connectedness is approached from a social relational perspective. It is linked to the psychological closeness between two persons and gradually changes over the course of the relationship between those persons. This approach is founded in the field of social psychology.

The momentary feeling of connectedness concerns the positive emotional appraisal of the communication within ongoing social relationships. It is related to the feelings that occur before, during and right after a communication moment. Momentary feelings of connectedness are among other things influenced by the overall feeling of connectedness. On the other hand all momentary connectedness feelings together define the course of the overall connectedness feeling within a social relationship. Figure 1.2 shows a possible visualization of this relation between overall and momentary connectedness.

For now we will leave the overall feeling of connectedness. This project will focus on the contact moments within social relationships and the momentary connectedness feelings they evoke. When henceforth the concept of connectedness is mentioned, we are referring to these momentary connectedness feelings.

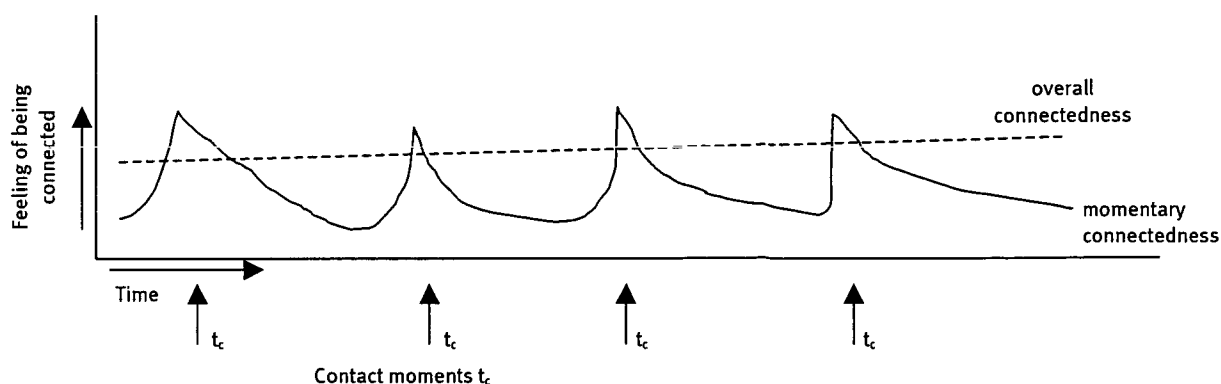


Figure 1.2: Overall and momentary feelings of connectedness

Not many researchers have considered the concept of connectedness until only recently. Most researchers who are considering this concept, approach it from a social awareness point of view. At the Eindhoven University of Technology, for instance, the ASTRA project has been launched. This project wants "to show that although computer mediated communication cannot replace face-to-face communication it can help people to maintain and even strengthen their social relationship" (Ijsselsteijn, Baren, Romero, & Markopoulos, 2003, p. 5). They are looking into the concept of connectedness as a new way of evaluating mediated communication in a non-work related context.

Where social presence and social awareness refer to the form of the communication, connectedness addresses the intimacy of the communication, and the nature of the relationship between the communicating parties as well. Below a number of issues in human communication will be discussed, which can be related to the concept of connectedness.

Psychological closeness, intimacy and immediacy behavior

The concept of connectedness refers to the emotional tie or the psychological closeness between two persons. Kreilkamp (Kreilkamp, 1960) performed an exploration of psychological closeness from the perspective of psychological distance. This exploration showed there are at least three conditions for psychological closeness. First, two persons should form a unit together, this is related to the commonalities on which relationships can be based, like common interests or experiences. According to Patrick et al. (2003) shared experiences are important for maintaining long-distance relationships. The second condition encompasses the intimacy of the communication between two persons and the sense that they reveal themselves to each other, which is regulated by intimacy behaviors (see section 1.2.1). According to Kreilkamp feelings of understanding are important here. The third condition seems to be linked to immediacy behavior, as discussed in section 1.2.1, the psychological distance people place between themselves and another. So, factors influencing intimacy and immediacy behavior are also relevant to the concept of connectedness.

Communicating and evoking emotions

As stated before the concept of connectedness refers to the emotional tie between two persons and is influenced by intimacy and immediacy factors. Contact moments that involve the communicating and evoking of emotions are more intimate and immediate. Emotional states are conveyed both intentionally as well as unintentionally. Because "words are a poor way of expressing emotions" (Dunbar, 1999, p. 25) emotion is usually expressed non-verbally. The nature of the emotion is expressed through facial expressions, the intensity of the emotion is communicated by body language (Jones & Bodtker, 2001).

Gaver (2002) discusses a number of applications that evoke or communicate emotions. He emphasizes that a distinction should be made between applications that communicate emotions, and applications that evoke emotions. Emotions can be evoked in various ways. According to a study of Sawhney et al. (2000) voice communication is preferred over written communication, because it gives emotional support. Dunbar (1999) mentions that people can react very emotionally to realistic images and that in really intimate situations they revert to physical contact. Also Richmond, McCroskey and Payne (1987, p.139) state that "tactile communication is an effective means by which we communicate message of emotion." So, physicality seems closely linked to emotional communication. A number of designers use touch in combination of light signals or vibrations for emotional communication. (e.g. Chang et al., 2003; Hindus et al., 2001; Tollmar, Junestrand, & Torgny, 2000)

Meta content – having contact

To evoke emotions and in order for two persons to feel connected the content of the information exchanged is not always the most relevant aspect of the contact moment. Kuwabara, Watanabe, Ohguro, Itoh and Maeda (2003) discriminate between content-oriented communication and connectedness-oriented communication. Where content-oriented communication aims at exchanging meaningful information, connectedness-oriented communication targets at

maintaining and enhancing human social relationships. Thus in connectedness-oriented communication the content of the message itself is not as important as the communication activities. Patrick et al. (2003) also found that the content of the information is not always the most important aspect of a communication moment. Short Messaging Service (SMS) forms an example of this. Research of Longmate and Baber (2002) shows SMS is often more about contact than about content. The very act of sending and receiving messages is important, regardless the content of these messages. They refer to this as the meta-content of the communication. Another way of looking at transmitted information is the emotional content of communicated messages. The emotional content lies in the traces of presence people leave behind in the real world – like fingerprints, a scent, or the emotional content of the interplay of the lines of a handwritten message. The use of a telecommunication system diminishes the presence of emotional content. According to (Ishii, 1998) "the digital world is a dry one", because the emotional content is trimmed away. Although these traces of presence cannot all be replaced, technology can add other forms of emotional content to communication. An example is the vibrating mobile phone, which allows people to communicate by squishing the phone to transmit vibrations along with their spoken words (www.newscientist.com).

This section explored some issues that are of influence to the concept of connectedness. We defined this concept as the emotional appraisal of (the communication within) ongoing social relationships. During a contact moment the sense of connectedness is, among other things, influenced by the psychological closeness of the communicating parties, the intimacy of the communication and the emotions that are evoked by the communication. Lately, design efforts are increasingly directed at connectedness-oriented communication, resulting in the evaluation of design concepts and working prototypes (e.g. Chang et al., 2003; Hindus et al., 2001; Tollmar, Junstrand, & Torgny, 2000). However, most telecommunication technologies, which are commercially available nowadays are still specifically designed to support content-oriented communication.

1.3 SOCIAL PRESENCE, SOCIAL AWARENESS AND CONNECTEDNESS AS OVERLAPPING AND COMPLEMENTARY CONCEPTS

The concept of connectedness refers to psychologically close, social relationships. Within this context of psychologically close, social relationships this concept is closely related to the concepts of social presence and social awareness. We hypothesize that the sense of social presence and a sense of social awareness of an psychologically close other evoke increased connectedness feelings. Below, we present a hypothetical view on the relationships between the three concepts (see figure 1.3).

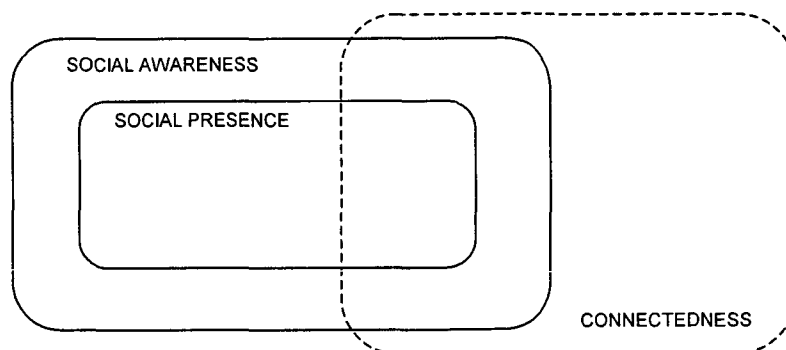


Figure 1.3: The relationship between the three concepts

Biocca and Harms (2002) defined social presence as "the moment to moment *awareness* of the co-presence of a mediated body and the sense of accessibility of the other being's psychological, emotional and intentional states" (p.14). So, when a contact moment results in high social presence – i.e. communication through a synchronous rich medium, for instance through tele-immersion (Lanier, 2001) – it will evoke a sense of social awareness as well. Accordingly,

whenever a person senses the social presence of another, he/she probably is socially aware of the momentary whereabouts and activities of this other as well. On the other hand, a sense of social awareness is not always accompanied by a sense of social presence. Especially when information about another person is offered asynchronously through a medium with low media richness – for instance through applications like the Telepresence Client (Buxton, 1997), or Scanboard (Hindus et al., 2001) – the communication will evoke a low sense of social presence accompanied by a high sense of social awareness.

We defined connectedness as the positive emotional appraisal of (communication within) on going social relationships. The sense of connectedness is, among other things, influenced by the psychological closeness of the relationship between the communicating parties, the intimacy of the communication and the emotions that are evoked by this communication. Where the communication involves a sense of social presence and a sense of social awareness of a psychologically close other, and this sense of social presence and sense of social awareness evoke positive emotions, it can increase the sense of connectedness to this other. Especially where social presence involves intimacy and immediacy behavior and social awareness concerns meaningful, private information they increase the sense of connectedness.

Conversely, a sense of connectedness can be evoked by communication that does not create a sense of social presence or a sense of social awareness. For instance, asynchronous, emotion-evoking communication without a meaningful content, through a medium with low media richness – e.g. communication through application like the White Stone (Tollmar et al., 2000) – will result in a high sense of connectedness, but will not evoke a sense social awareness or social presence of the sender.

Even without having contact – so, without creating a sense of social presence or social awareness – connectedness feelings can be evoked. For instance Tollmar and Persson (2002) observed that common artifacts or pictures can often exhibit a link between individuals, by reminding one person of another.

To detailed emotional communication through synchronous, rich medium, or during a face-to-face encounter all three concepts will apply. The detailed emotional communication will provide well-being information and evoke connectedness feelings. And because of the use of a synchronous rich medium a sense of social presence will be experienced.

In addition applications like the 6th Sense (Tollmar et al., 2002) or the FamilyPlanter (Kuwabara et al., 2003) also try to involve all three concepts. The 6th Sense is a light sculpture, which responds to a remote flow of electricity, water or movement. And the FamilyPlanter consists of rotating and illuminating optic fibers, which respond to human motion at a remote location. Applications like these are designed to be used by remote family members. They provide presence information of persons at a remote location, creating a sense of social awareness. But also try to evoke a sense of social presence. Changes in these objects remind people of their remote family members, which raise connectedness feelings. Some of these applications provide the additional opportunity to send a signal to the other location – The FamilyPlanter, for example, converts a touch at one location into a sound at the other location. The use of this feature will also increase connectedness feelings.

1.4 THIS PROJECT

Research efforts have been directed mainly at social presence. Where Short et al. (1976) started theorizing on this concept in the 1970s, Biocca and colleagues (Biocca et al., 2001; Biocca et al., 2002) are elaborating this and other work by developing a comprehensive theory and measurement of this concept. The concept of social awareness and especially the concept of connectedness still lack a theoretical framework. This graduation project will aim at the latter, and will contribute to the development of a theory, measurement and design criteria of the concept of connectedness.

2 RESEARCH QUESTION

This graduation project will contribute to the development of a theory of the concept of connectedness, and to the development of criteria for the design and evaluation of connectedness technologies. We are not aiming at developing a comprehensive theory, but at providing a first exploration of this concept. Therefore we limited the scope of this project to dyadic communication within primary social relationships – i.e. intimate relationships like close friendships and family ties – in the context of geographical distance.

2.1 OBJECTIVE

The objectives of this graduation project are threefold. It focuses on the operationalization of the concept of connectedness, and on providing guidelines for the design and evaluation of connectedness supporting technologies.

- To operationalize the concept of connectedness in the context of dyadic communication within remote, primary social relationships.
- To list guidelines for the design of technologies, which facilitate these connectedness feelings in the context of dyadic communication within remote, primary social relationships.
- To explore ways of evaluating the concept of connectedness in the context of dyadic communication within remote, primary social relationships.

In these objectives lies the scientific relevance of this graduation project. The operationalization and development of evaluation guidelines contribute to the knowledge and understanding of the concept of connectedness. This embodies the social relevance of this project. For the successful development of tools that support the feeling of connectedness it is necessary to understand what connectedness means to people, and what the user's needs and requirements are. By listing guidelines for the design of technologies that facilitate the connectedness feelings, the technological relevance is embodied.

2.2 PROBLEM DEFINITION

Like the objective of this graduation project, the problem definition is threefold, and also focuses on the operationalization, evaluation and design.

- How can the concept of connectedness be operationalized?
 - What does connectedness mean to people in general and within remote, primary social relationships?
 - Which terms do people use when talking about connectedness in general and within remote, primary social relationships?
 - Which feelings are incorporated in the concept of connectedness in general and within remote, primary social relationships?
 - Which communication activities evoke connectedness feelings in general and within remote, primary social relationships?

- Based on which guidelines should a connectedness technology be designed?
 - Which communication activities contribute to connectedness feelings in general and within remote, primary social relationships?
 - How are currently available communication media used within primary social relationships?

- How can further connectedness technologies be evaluated?
 - Which terms do people use when talking about connectedness in general and within remote, primary social relationships?
 - Which feelings are incorporated in the concept of connectedness in general and within remote, primary social relationships?

3 METHODS, RESEARCH DESIGN AND DATA ANALYSIS

This project will be an exploration of the concept of connectedness. It will try to capture the way people think about communication and the role of communication within their primary social relationships; the way they think and feel about connectedness; how they would describe this concept and which terms they use themselves; and how they use available communication media to satisfy their communication needs. Because the participants' own interpretation of connectedness is of importance in this research project, the project will have a qualitative nature. No attempt will be made to collect quantitative data. Merely triggering people to think about their close relationships and their communication activities, and capturing these thoughts can provide interesting insights. A number of more or less traditional interview methods can be used to trigger and capture these thoughts.

3.1 INTERVIEWING METHODS

Interviewing is the method for collecting data about attitudes, opinions or thoughts. However some disadvantages concern this method as well. A number of factors influence the validity of the collected data. First of all, people are not always aware of their feelings regarding, and the way they look at a specific topic. Next to this, social desirability and interviewer bias can distort the data. In addition, non-response can be a problem, because it creates selective samples (Baarda & de Goede, 1997, ch. 8)

In this project we want to trigger the participants, but not guide their thinking, so the used method should have an open structure. However we do not want the participants thoughts to wander in any direction, so we should provide some structure. We want to capture the thoughts of the participants in their own words, as complete as possible. We want to make participants conscious of their communication activities and the feelings that these activities evoke. In addition, close relationships and social communication can be a sensitive topic for some participants, this can make it harder for them to express their thoughts about this topic. We want to avoid social desirable answers and create a feeling of intimacy and privacy or anonymity. With these requirements in mind, some appropriate interview methods will be discussed.

3.1.1 Written versus oral interviews

Basically, there are two ways of interviewing – oral and written interviews. Both approaches have their own advantages and disadvantages, which will be discussed briefly in this section. Written interviews need a clearer structure than oral interviews. Ambiguous, abstract and open questions can be troublesome, because they can evoke short and vague answers. In an oral interview the interviewer can clarify these questions and ask respondents to extend or illustrate their answers. So for complex matters, questions or tasks oral interviews are more appropriate. However, by the presence of the interviewer, an oral interview can be more receptive to social desirability and interviewer bias. A written interview, on the other hand, can create an atmosphere of anonymity.

For written interviews non-response is an issue. The presentation and introduction of the questionnaire should invite the respondents to participate in the study. It cannot contain unclear or too many questions, otherwise respondents can drop out, resulting in non-response or an incomplete response.

Compared with oral interviews, written interviews are less time consuming and cheaper, because more respondents can be reached in one time. Moreover, oral interviews are sometimes hard to

organize. And to make the most of oral interviews skilled interviewers are required, who know how to stimulate respondents without guiding them. (Baarda et al., 1997, ch. 8; Segers, 1999, ch. 8)

Next, two special formats of a written interview are discussed – email questionnaires, and diary studies.

3.1.2 Email questionnaire

The Internet not only facilitates communication between people in a work or non-work related context, it also can be used as a medium to reach research participants. An email questionnaire is an ordinary written questionnaire, with the exception that it is sent to the participants by email. Looking at this medium in a research context, we see the same characteristics as evaluating email from a communicative perspective.

First of all, only respondents that have access to the Internet can be reached. The amount of people who have access is becoming of less influence to the selectivity of the sample, because the Internet is available to an increasing amount of people – today 63,7 % of the Dutch population has access to the Internet.

Through email – like through regular mail – a lot of respondents can be reached at the same time. Depending on the nature and topic of the questionnaire, even more people can be reached if respondents are asked to forward the questionnaire to their acquaintances. In addition, an email questionnaire is even less cost and time intensive than a mail questionnaire, for instance costs and effort are made in copying the mail questionnaire are not made. For the respondents participating in an email questionnaire is also easier. Compared with a regular mail questionnaire, it is less time consuming to respond.

Email – like mail – is an asynchronous medium, therefore it is less intrusive and respondents can respond at a time convenient for them. If desired respondents can even fill in the questionnaire in stages, and take the time to think about the questions. But this characteristic also means that little control can be exercised on the response. However, if the participants agree upon, it is easier than with regular mail questionnaires to follow up participants and ask them to clarify their answers.

Email is also a medium with low medium richness, this evokes a low social presence of the interviewing party, which is beneficial to the avoidance of social desirable answers and can create an anonymous atmosphere. Provided the researcher strives to maintain confidentiality and informed consent, privacy and anonymity are also easier guaranteed, because on forehand little information of the participant is needed – only his/her email address is needed, and no name or home address.

Because you are relying on people's willingness to participate, the email questionnaire cannot be too time consuming. An email containing too many questions will most likely yield a low response.

Recapitulating, an email questionnaire is quick and cheap way to pose written questions to a large number of respondents.

3.1.3 Diary study

A major drawback of using regular interviewing methods for this kind of research is that people are not always aware of their immediate behavioral and affective reactions regarding the research subject – in this case the personal communication within their social relationships. A diary study – a special format of a written interview – can overcome this problem. It supports the data gathered by observation or interviewing in the field. In a diary study participants are asked to record their daily activities on a preprinted log form. The activities are usually recorded in the participants' own words. Typically a diary study is supplemented by interview, to discuss the log entries and addressing a term longer than the diary study covers.

Assuming perfect compliance of the participants, a diary study provides several kinds of data. It records data on frequent behavior, for instance data on a usage pattern, the time spent on every activity category, or – of more interest in this project – a participant's immediate reaction to specific activities. Because data on every activity is recorded directly after the occurrence of this

activity, a diary study provides more reliable data than reported by a participant in an interview about a recent period in the past. A diary study provides further evidence for the statements collected during an interview, because it allows participants to add relevant information, which was not probed or reported during an interview. Moreover, the contextual nature of the diary will allow for more timely relevant feedback to the researcher. In addition, a diary study provides an opportunity for the researcher to interact with a number of users in their natural environment. Thus allowing some informal ethnographic observations on location. (Rieman, 1993; Segers, 1999, ch. 8)

Rieman (1993) points to some aspects, which are important to keep in mind during the design and performance of a diary study. First, participants should be convinced to make a considerable effort. Valuable data can only be collected when participants keep the diary directly after the activity occurred, and record the data in sufficient detail. Second, participants can focus their logs, or even adjust their activities, to emphasize areas that they think are of interest to the researcher. Thirdly, performing a diary study is quite effortful for the researcher too, because participants should be debriefed frequently. Finally, because it takes a day or two to for a participant to become comfortable with the process, it is a good idea to start participants on different days of the week.

3.2 RESEARCH DESIGN

After discussing some appropriate interviewing methods, below a choice is made to utilize a combination of these methods in the studies that are performed in this project. The research design of this project will be explained here, but the exact procedures used are explained in the chapters that discuss the separate studies – i.e. chapter 4 and 5.

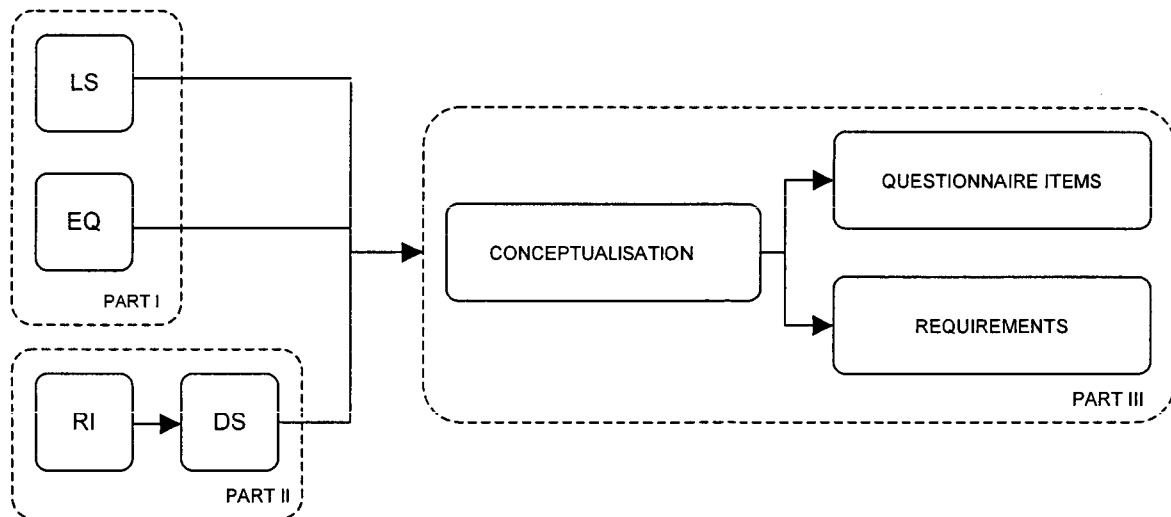


Figure 3.1: Research design

This project will consist of three parts – see Figure 3.1. In part I efforts are made to get an overall sense for the concept of connectedness. For this purpose a literature study (LS) and an email questionnaire (EQ) are performed. The results of the literature study have already been discussed in chapter 1. Through the email questionnaire respondents are triggered to think about the concept of connectedness, about their primary social relationships, the communication activities in these relationships, and the feelings this communication evokes. Because the questions posed will be very broad and open, a written questionnaire is not the most appropriate method. However, an email questionnaire is a quick and easy way to reach a lot of respondents. It is expected that at least some of them will provide some interesting insights to the concept of connectedness.

In part II more specifically will be looked at the concept of connectedness in the context of remote primary social relationships compared with the context of geographically closer primary social

relationships. For this purpose a group of foreign respondents and a comparative group of Dutch respondents participated in a relationship interview (RI) followed by a diary study (DS).

In the relationship interview respondents were asked to describe their primary social relationships and the communication within this relationship. Next to this they were asked to draw a relationship diagram to illustrate the changes in contact frequency and connectedness feelings towards the other person over the course of the relationship.

Through the relationship interview participants became more conscious of their primary social relationships and feelings within these relationships. However, it was thought that an interview could not capture all feelings and activities related to connectedness. During the interview participants are capable of expressing general feelings and of giving an overview of the communication activities within their primary social relationships. Nevertheless, it is possible that they forget to describe a specific activity that could be of interest. Also, they probably will have trouble to recall specific connectedness related feelings, and link these feelings to specific activities. To circumvent this, a combination of the relationship interview and a diary study is used. The relationship interview provides background information about relational context in which the diary entries occurred. The diary study complements the interview, because it was set up to capture respondent's momentary thoughts and feelings, regarding and evoked by specific communication activities with close friends or relatives.

During the final part of this project the results of part I and II will be translated in a conceptualization of the concept of connectedness. In this conceptualization, connectedness in the context of geographically distant relationships will be highlighted against a framework of overall connectedness. From this conceptualization questionnaire items and functional requirements will be deduced, which can be used for the design and evaluation of future connectedness supporting telecommunication applications.

3.3 DATA-ANALYSIS

The email questionnaire, relationship interviews and diaries capture participants' thoughts, feelings and stories regarding the concept of connectedness in their own words. So, the data collected in this project consists of words, sentences, phrases, statements, anecdotes, stories, etc. The content of this semantic data has to be analyzed. Below methods that can be used to analyze this kind of data will be discussed.

3.3.1 Content analysis

After the transcription of tape-recorded interviews and handwritten questionnaires and diaries, content analytic procedures operate directly on these transcripts. The central idea of content analysis is that the many phrases of which a text consists are classified into fewer content categories (Weber, 1990). The phrases in each category will have the same meaning or can be associated with each other.

Roughly text can be categorized in two ways – inductive and deductive (Berg, 1995). The inductive approach starts by exploring the text, in order to identify meaningful phrases, which are categorized subsequently. Afterwards these categories can be categorized further, or relations between these categories can be determined. In the deductive approach a precomposed categorization schema, suggested by a theoretical perspective, is used to assess a hypothesis. Often a combination of inductive and deductive analyses is employed. Hence, the inductive approach is used to develop hypotheses, which are tested using the deductive approach. So, content analysis starts with an inductive analysis, also called open coding – i.e. the carefully word-for-word reading of the transcripts to determine categories that fit the data. During this phase the affinity diagram method can be useful. An affinity diagram organizes individual phrases into a hierarchy revealing common issues and themes (Beyer & Holtzblatt, 1998). After the inductive phase rough hypotheses should be formed, which are tested by a thorough search for phrases that do not support these hypotheses – i.e. negative cases. If a negative case is found, the hypothesis is either rejected or reformulated. When all relevant cases are examined practical certainty is obtained (Berg, 1995).

However, content analysis is susceptible to analyzer bias (Berg, 1995). Analyzers can assume the relevance of a variable or a relationship between variables before the data shows it is relevant. Moreover, they can read this relevance in the data. Phrases can also be interpreted in an incorrect manner, or can be taken out of their context. Analyzer bias affects the reliability of the analyses. In order to overcome this the data should be analyzed by the same person more than once, and by multiple persons (Weber, 1990). When multiple analyses by the same person result in the similar outcomes, the analysis is stable. Inter-analyzer reliability refers to the reproducibility of the analysis.

Recapitulating, content analysis starts with in inductive analyses in order to identify categories and relationships between these categories. The inductive phase is followed by the forming of hypotheses, which are tested deductively. In order to safeguard the reliability of the analysis, the analysis should be performed by multiple persons more than once.

4 EMAIL QUESTIONNAIRE

To get a general insight in the concept of connectedness we designed an email questionnaire to trigger respondents to think about this concept in the context of the communication within their primary social relationships. In this chapter the method and results of this email questionnaire are discussed.

4.1 METHOD

4.1.1 Respondents

Thirty-five persons were emailed the request to help think about the concept of connectedness, by answering a couple of questions. Some respondents forwarded the email to some of their friends and family. After a month a total of 17 respondents had replied to the email questionnaire. 13 respondents were female, 4 of them were male. 6 respondents were in their fifties, the rest of the respondents was in their twenties.

All respondents were of Dutch nationality. At the moment the email questionnaire was sent and answered, 6 of them were living abroad. Two respondents are living abroad permanently, the others temporarily as part of their education program. In addition 3 respondents have stayed abroad for a longer period in the past, also as part of their educational program. Finally, the son of one respondent was currently living abroad as part of his educational program.

The details of the respondents can be found in Table 4.1.

Table 4.1: Details of the respondents of the email questionnaire

Resp.	Gender	Age	Remarks
R1	F	23	Past abroad experience in Denmark for educational purpose
R2	F	23	
R3	M	23	
R4	M	28	
R5	F	23	Currently living in USA for educational purpose
R6	M	22	Currently living in Aruba (The Netherlands Antilles) for educational purpose, son of R9
R7	F	24	Past abroad experience in Denmark for educational purpose
R8	F	26	Brother is currently traveling abroad, sister and partner have past abroad experience
R9	F	50	Mother of R6
R10	F	55	
R11	F	24	Currently living in USA for educational purpose
R12	M	50+	Permanently living in Sweden
R13	F	50+	
R14	F	24	Currently living in Sweden for educational purpose
R15	F	50+	Permanently living in Portugal
R16	F	24	
R17	F	50+	Past abroad experience in South- Africa for educational purpose

4.1.2 Materials

Through email a few questions were posed to trigger respondents to think about the concept of connectedness in the communicational context of their primary social relationships. Because we only wanted to trigger the respondents to think of the concept of connectedness, but did not want to guide their thinking too much, it was important to pose only a few open questions. Moreover a small amount of questions would be less likely to scare respondents off, and make them more willing to participate.

To help respondents answer the general question – “How would you describe this concept?” – first two questions were posed to guide their thinking to their primary social relationships and the communication within these relationships. The next two questions were focused at needs and activities related to connectedness and connectedness feelings.

In addition, three questions were posed within the context of geographical distance.

Respondents, who were living abroad at the time of the email questionnaire, were triggered to think about their relationships in this particular context. These questions concentrated on the activities and needs related to the communication within their primary social relationships while being abroad and their satisfaction of this contact. The questionnaire – in Dutch – as emailed to the respondents can be found in Appendix A.

4.2 RESULTS

The affinity diagram method – as discussed in section 4 – was used, for analyzing the content of the returned email questionnaires. During this process the main focus is on quotes regarding feelings, communication activities, needs and contact moments. The quotes used to support and illustrate our conclusions are literal translations from the Dutch quotes.

4.2.1 General descriptions of connectedness

A number of respondents made some general remarks about the concept of connectedness, and how they would describe it. These general descriptions of connectedness are related to feelings activities and needs.

Connectedness is related to basic feelings as trust, safety and friendship between two persons, or “a feeling of being connected” [R9] and “being at the same wavelength” [R1]. However the concept of connectedness is not only linked to feelings, but is also related to a number of activities. This can be illustrate by the brainstorm session that respondent 9 send in as response to the email questionnaire. In this brainstorm feelings and activities alternate each other:

“...paying attention to each other; have/maintain contact; a feeling of being connected; being important to each other; do things for each other; miss each other; touch; be attentive.”

These activities require all a certain effort or attention directed at the other person.

Also, respondents link connectedness to the concept of social awareness. Social awareness, created by the exchange of information about each other’s well-being en things happening in each other’s lives, evokes feelings of being part of each other’s lives. Respondent 13 and 6 illustrates this:

“To me staying in touch stands for being present in each other’s lives. I.e. you know what is happening in each other’s lives; major things like marriage, birth, and death, but also work, residence, health, or even a new book, or a nice movie, etcetera.” [R13]

“...staying informed of the well-being of others and of what is happening in their lives, and letting others know what is happening in your live and how you are doing.” [R6]

Most importantly a feeling of connectedness requires the *"maintaining of contact, i.e. having some form of contact on a frequent base"* [R8]. All respondents mention this. To illustrate this respondent 10 used the metaphorical description:

"...An nice image I think is that you, just like plants, have to water your friends on time to grow."

Having contact is important, but connectedness feelings can also be evoked without literal contact, by just thinking of the other.

"Actually, to me staying in touch stands for thinking of someone once in a while. Maybe I can say that I talk to the other in my head, for a moment." [R17]

Next to feelings, activities and needs related to the concept connectedness some participants also commented on the context in which the communication takes place:

"In my opinion, the meaning of staying in touch is dependent on the person, the situation (time, place, environment, focus), the objective and the topic." [R4]

Also respondent 8 comments on factors of influence on connectedness feelings:

"I think the relationship is more of influence to this feeling than the medium used. With some persons I can feel I am very much in touch through email, with others even not live."

4.2.2 Connectedness related activities

Connectedness is about connecting through a number of activities. Activities like talking and listening, sharing stories and emotions, doing things for each other, being there in times of need, and having fun together can evoke connectedness feelings.

Respondents think *"it is important to be able to talk about yourself and about others"* [R7], *"to share stories"* [R2] *"to be able to say your piece"* [R1]. Not only talking is of importance, listening is equally important. Respondent 2 illustrates this, by writing:

"What I find particularly pleasant is that there is being listened from both sides..."

She especially values talking in difficult situations where social support is needed:

"A tie becomes more real if problems and difficult topics are discussed, or advises are asked and given..." [R2]

However, it is also important to have fun together as respondent 10 indicates by describing connectedness feelings, among other things as:

"Also [a feeling] of having fun together"

Next to this, connectedness is associated with attention. Quotes like *"paying attention to each other"*, *"being attentive"*, and *"being interested in the other"* [R9] illustrate this, or like respondent 4 wrote:

"The feeling of being in touch occurs when the concentration that is brought up, is directed completely towards the other person."

In addition, activities related to social awareness and social presence are associated with connectedness. In a primary social relationship it is important to be informed of the things happening in each other's lives and of each other's well being. By this *"exchange of life stories, ... you become part of the other's life"* [R14].

Some respondents need to be together or spend time together to experience a feeling of connectedness. To respondent 13 mediated communication is not a satisfactory substitute for real contact.

"Using the phone or the newest trend: email can be satisfactory for a while, but it should not be too long before you see each other again."

She elaborates on the advantages of being together, like having enough time to listen to each other, tell your own stories. And she concludes with:

"So only if I spend time with someone, I get the feeling of really being in contact with each other."

4.2.3 Connectedness feelings

Feelings associated with the concept of connectedness can be categorized. Respondents mentioned general feelings that describe the tie between two persons, feelings of confirmation of this tie, feelings of being part of someone's life and feelings regarding contact moments themselves. Connectedness feelings are linked to general feelings, like feelings of trust, safety, security, friendship and love; but also feelings of familiarity, relaxation, respect and acceptance. Without these feelings the relationships would not be characterized as psychologically close. Confirmation of this psychological closeness, that exists between two persons, gives rise to increased connectedness feelings. Like respondent 14 writes about her relationship with her sister:

"...to know for sure that we will maintain our closeness and will not grow apart."

This confirmation also rises from feelings of understanding and recognition. Respondent 2 made the remark about sharing stories, that

"It is important that the type of stories resemble each other, so you will understand what the other is talking about."

And respondent 4 puts it in this way:

"The arousal evoked by a feeling of recognition, the discovery that you are really in touch is nice."

Connectedness is about the feeling of *"being part of the each other's lives"* [R13], by letting each other know you think of the other, you care for the other, that you *"are important to each other"* [R9], and *"miss each other"* [R9], etc. This can be illustrated by the writings of respondent 7 and 14. They write about how the feeling that someone thinks or cares for you can give you the feeling you're not alone in this world.

"The feeling is that you think of the other and the other thinks of you, and that you let this know. It is a nice feeling of not being alone in this world" [R7]

"The feeling of being in touch gives certainty, a bond with someone. It can give you the safe feeling of being surrounded by other people (at a distance or nearby). It evokes the feeling that someone cares for you and that is a nice feeling" [R14]

Next to confirmation of psychological closeness and feelings of being part of each other's lives, connectedness is also associated with feelings regarding the contact moment between two closely related persons. To evoke connectedness feelings a contact moment should be evaluated as relaxed and complete.

"If during and after the contact with someone, I have a feeling of being relaxed, and that the contact was complete, I can say I am, and maintain to be, in touch. If someone gets me emotionally touched, this applies too. ... If, however, something seems to be missing, a tension is build that I don't experience to be positive, I think I'm not in touch enough. ... A contact should succeed naturally..." [R4]

Moreover, contacts within primary social relationships should be balanced and symmetrical.

"The contact will be lasting, if it is reciprocal, but that probably goes without saying." [R2]

Both persons should take initiatives, both should be able to tell their stories, there should be talking and listening from both sides. Respondents 1 and 15 take this up. To feel connected respondent 1 needs a:

"...nice contact, that comes from both sides, when someone is listening to you and you are listening..."

Respondent 15 writes about connectedness related needs:

"show interest in the other and yourself back and forth ... the feeling that the other is seeing and hearing you, and you are seeing and hearing the other."

4.2.4 Geographical distance

Going abroad, creating a geographical distance in relationships that formerly were less remote changes things. For instance, like respondent 14 notices:

"At a distance you start to value the people who were once nearby."

The relationship between two persons itself can change, the contact moments within the context of the relationship will change, and distance changes the focus on different feelings within the relational context.

The person who goes abroad starts a new life, with different people and experiences, which are not shared with the persons who stay behind. This can make it harder to maintain relationships.

"You decide to go abroad and to build a new life. Many people can't understand why you are doing this, and feel left behind. ... You are going to live a new life with different experiences, which aren't shared by people who stay behind. Because of this contacts can disintegrate."
[R12]

Not only the people who are left behind need to be reassured, also people who travel abroad, especially when temporarily, are scared to *"disappear from the lives of people back home"*, like respondent 14 writes. She also writes about this topic:

"I always have the tendency to want to be at 3 places at the same time. I find it hard to know that I'm missing out on all the life in the Netherlands."

And continues with:

"So, to me it is important to hear a little bit of how other's are doing, what is happening in their lives, what is happening in 'my other' social environment while I'm gone."

Hence, it is important to keep each other informed of what is happening in your life, share your experiences and let the other look into your world. In this context the sending and receiving of digital pictures can be helpful, as respondent 7 and 5 point out. Respondent 7 remarks that it is nice

"that he [boyfriend] sent pictures of himself, which he'd made with his web cam."

Respondent 5 also likes to receive pictures from her boyfriend:

"I also send him a lot of pictures, but I would like to see pictures from his world, because he is doing an internship in London at the moment..."

Not only pictures can make you part of someone's world, sharing information about the little daily things of life is also important, as respondent 14 indicates. She likes

"to hear the little things too, just the basic daily things, which don't seem special, but which can bring you closer"

It also is important for both sides – abroad or left behind – to keep thinking of the other and communicating this. Respondent 6 describes the feeling of connectedness in the context of geographical distance as the feeling *"that you think of them and that you know they are thinking of you."*

In addition, just having contact once in a while, receiving messages and replies can maintain a feeling of connectedness at a distance. At the question what they needs to evoke a feeling of connectedness while being abroad, respondent 5 and 8 write:

"Once in a while receiving a message, email or phone call from home and receiving replies on the emails I sent." [R5]

"I'm not abroad any more, but email helped!" [R8]

Through geographical distance contact moments, which used to be non-mediated become mediated. Mediation changes these contacts in a number of ways. Mediation changes the way of

expression yourself. Respondent 14 mentions this in writing about her relationship with her boyfriend during her stay abroad:

"When you are at a distance, you hope this will influence your relationship in a positively, because you have to express yourself in a different manner, and writing down your feelings can be more profound than in conversations. So, I really like to write to boyfriends. At this time it didn't work, because he can't commit to paper and I didn't get any replies."

Also respondent 11 talks about mediated expression skills. While being abroad, she tries

"to call some people once in a while, because I find this more personal and I can express myself better than by mail..."

Moreover, mediation lacks physical contact, respondent 5 misses this, she would rather meet in person:

"I'd rather just meet with people..., especially with P. [her boyfriend], because I really miss him (talking by phone succeeds nicely, but physical contact is hard)."

Mediated communication seems to bring obligations as well.

"I have to say that by [the existence of] email I can feel obliged to stay in contact with people. I really like to email people who I know really well, but people I normally don't speak to very often, now expect email frequently." [R11]

Knowledge of the situation influences the expectations regarding the amount of contact. Respondent 7 tells us about her sister and her boyfriend when they were staying abroad. When her sister was abroad she tried to support her sister by sending a lot of postcards and letters. This communication was mostly one-way, but it was enough for her.

"She didn't have the opportunity to email a lot, because there were no opportunities for that over there. What I found most important was that once in a while she got a postcard of me, so she wouldn't feel lonely. This contact was ok, because you knew, there weren't any other ways to maintain contact."

Her boyfriend was a different story, when he was abroad

"we called once or twice a week. To me this was not frequent enough, especially because he rarely emailed. Whereas I know he sits behind his computer the whole day. So I thought we had too little contact."

Not only the ones that are left behind can be dissatisfied by the amount of contact, also being abroad you can expect more contact, like respondent 5 observes:

"it is a little bit disappointing that from some people you hardly hear anything".

Another consequence of remote communication is group email. Often, when people go abroad they maintain contact by sharing their experiences with a number of people at the same time, usually by email. Respondents commented on this form of group communication as well. Group communication can be convenient, but are also evaluated as impersonal.

"I rarely send group emails, I think this really is a bit impersonal. However it, in fact, is a way of just letting everyone know that you're doing alright." [R11]

Respondent 7 writes about this from the receiving perspective. While her brother is abroad she only gets group emails from him:

"It just seems a bit like one-way contact, because he sends group emails and no personal emails. So I find it important to, once in a while, also receive personal emails, directed at me alone."

Above, some changes related to the concept of connectedness are discussed, which can occur when a former geographically close primary social relationship gets more remote. However to respondent 12

“Being abroad is the same as being in the Netherlands. Nowadays, a distance isn’t a problem anymore. Communication has high-speed, and a new environment is quickly built. Just like being in the Netherlands, real friends are forever, and ‘friends’ drop out.”

4.3 CONCLUSION

Recapitulating, the concept of connectedness is associated with feelings that describe the tie between two persons; these feelings are incorporated in overall connectedness. Momentarily, feelings that confirm this tie can be evoked, next to feelings of being part of each other’s lives and evaluative feelings regarding the contact moment.

Although connectedness feelings can be evoked without having contact – e.g. by merely thinking of the other – respondents indicate that maintaining contact, i.e. having contact on a frequently base is essential to maintain a feeling of connectedness. Many respondent write about the importance of talking and listening during contact moments. Some respondents need contacts to be face-to-face. In order to feel connected they want to spend time together and share experiences. More important are the reciprocal exchange of life stories, and the self-revelation and social support during emotional communication. Finally, connectedness is associated attention directed at the other person and the ability of having fun together.

In addition respondents reported evaluative feelings regarding contact moments themselves. In order to elicitate increased connectedness feelings contact moments should be relaxed, complete and symmetrical.

In remote social relationships the concept of connectedness seems to be associated mostly with feelings of being part of each other’s lives. In order to feel connected with a remote friend or relative respondents indicate they need to be reassured that they are still part of the other’s life. Therefore, in remote relationship it is important to look into each other’s worlds and to communicate that you are thinking of each other. Respondents mention two ways of looking into another person’s world – by exchanging descriptive and pictorial information. To let the other look into your world it is important to keep him/her informed of the things happening in your life – not only of the mayor events but also of the little daily things. In this context, also the communication of emotions and well-being is valued, next to a literal peek in the other’s social and physical environment by the sharing of for instance pictures.

Table 4.2 summarizes the results of the email questionnaire. It shows the various communication activities mentioned by the respondents and the connectedness feelings these activities evoke.

4.4 METHODOLOGICAL DISCUSSION

This email questionnaire was set up to be triggering but not too guiding, therefore only a few open questions were posed. Some respondents felt the questions posed, were too vague or too broad.

“I’d like to answer your questions, but I think they are rather broad” [R5]

They didn’t know how to respond to these questions, and responded with very short answers or question marks. Other participants did not follow the questions, but responded with a more free writing exercise, in which they incorporated the question topics. One respondent responded with the results of a brainstorm regarding the concept of connectedness.

Another remark about this study refers to the terminology used. When we entered this project we were using the terms 'staying in touch', and the 'feeling of being in touch' when talking about the concept of connectedness. Staying in touch is closely related to connectedness, but has just a slight different meaning. Staying in touch is commonly associated with a more literal connection between to persons, i.e. having and maintaining contact, where connectedness refers to the emotional tie between two persons. By using the term 'staying in touch' in the email questionnaire the validity of this questionnaire was subverted. The use of this terminology could have triggered the respondents in a slightly off way. However, respondents still thought about the communication and feelings related to their primary social relationships, so their writings are still valuable.

5 DIARY STUDY

The purpose of the second part of this research project is to look at the concept of connectedness more specifically from the context of geographical distance. Therefore the thoughts, feelings and activities regarding the concept of connectedness within the primary social relationships of a group of foreign participants are compared with these of a comparable group of Dutch participants. To capture these thoughts and feelings a combination of an interview and a diary study is used.

During the interview participants will be asked to describe their primary social relationships and the communication activities and feelings within these relationships. In addition they are asked to draw a relationship diagram in which they set out the contact frequency pattern over the course of the relationship and the development of connectedness feelings over the same period. The relationship interview and the relationship diagrams will capture more general feelings and thoughts regarding primary social relationships and the communication activities within these relationships. To capture more specific feelings linked to specific communication activities participants are asked to keep a diary. In this diary participants had to answer some questions directly after every contact moment with a close friend or relative, who is mentioned in the relationship interview. The diary questions address the contact moment and the feelings the moment evokes. In this chapter the method and results of this second study will be discussed.

5.1 METHOD

5.1.1 Participants

Foreign participants were approached through emailing mailing lists of international organizations at the Eindhoven University of Technology, as well as mailing lists of educational programs, which have many foreign participants (see Appendix B). It was intended to reach foreign exchange students, TWAIO-students¹, PhD-students and employees at the Eindhoven University of Technology. In addition, participants were recruited at Philips Research Eindhoven through contacts within this company.

The foreign participants, who responded to the request, seemed to have high affinity with the topic. They all reacted enthusiastic to the participation request, like participant 10 responded:

"I'm foreign and communication that's me!",

or participant 9 wrote in his email:

"very interesting topic you have chosen, just would like to meet you someday and to talk about it."

It gave them a chance to think about their close friends and relatives who were at a distance. And as we already saw in the results from the email questionnaire, thinking of those people can evoke a feeling of connectedness.

Of the foreigners who were willing to participate in this diary study, nine were available during the period of the study. All participated in the preceding interview and instruction, however one participant did not return her diary at the end of the study.

The foreign participants were between 23 and 36 years of age. This group consisted of three females, and six males. All of them were highly educated. They all came to the Netherlands for educational or professional reasons, with the exception of participant 10_F, he came to the

¹ The twaio program is a two-year full-time educational program at the Stan Ackermans Institute of the Eindhoven University, leading to the degree of Master of Technological Design.

Netherlands to play volleyball with a student volleyball team. Details of the participants can be found in Table 5.1.

An attempt was made to match the group of Dutch participants with the group of foreign participants on age, gender, and occupation or educational level (see Table 5.1). Potential Dutch participants were approached face-to-face at the Technology and Society department at the Eindhoven University of Technology, and through contacts at Philips Eindhoven. The potential Dutch participants were more hesitant at the request than the foreign participants. They felt participating in this study would interfere with their normal daily activities. They also seemed to have less affinity with the topic, a number of approached candidates responded with *"I don't communicate a lot"*, *"I'm too busy"*; *"At the moment I don't have a large active social life"*, or *"I'm not an interesting subject"*. Most Dutch participants participated because they are practicing research themselves and need participants for their own studies as well. All participated in the preceding interview and instruction, and returned their diaries at the end of the study.

Table 5.1: Details of the participants of the diary study

Foreign participants					Matched Dutch participants			
Part.	Gender	Age	Nationality	Occupation	Part.	Gender	Age	Occupation
P1 _F	M	29	India	twoio student	P12 _D	M	29	PhD student
P2 _F	M	25	India	employee Philips	P5 _D	M	29	employee Philips
P3 _F	F	36	USA	twoio student	P16 _D	F	34	researcher TU/e
P4 _F	M	25	Spain	graduation student	P15 _D	M	26	graduation student
P6 _F	M	29	Poland	employee Philips	P13 _D	M	36	employee Philips
P7 _F	F	25	Ukraine	twoio student	P14 _D	F	25	graduation student
P8 _F	F	26	Greece	PhD student	P11 _D	F	28	PhD student
P9 _F	M	25	Ukraine	twoio student	P17 _D	M	26	PhD student
P10 _F	M	23	USA	volleyball	P18 _D	M	22	student

5.1.2 Materials

Relationship questionnaire

For the purpose of this study a relationship questionnaire was designed (Appendix C). After some general questions, participants are asked to describe their relationships with close friends and relatives. For every friend or relative, the participant wants to discuss, a separate questionnaire is used.

In these questionnaires participants were first asked to describe the relationship in their own words, to draw a relationship diagram and illustrate this diagram verbally. The relationship diagram consists of the contact frequency pattern and a pattern that reflects the changes in connectedness feelings over the course of the relationship. An example diagram can be found in Appendix C. The remainder of the questionnaire addresses the communication, connectedness feelings and used media within the discussed relationship.

Diary

The diary study was performed from the end of January until the beginning of March 2003. During this period – starting at different days – participants are asked to keep a diary of their communication activities for 10 days. Maintaining this diary would be a considerable effort for the participants, therefore the period could not be too long. However, a too short period could miss important contact moments, or communication patterns, especially because the diary study was started directly after the Christmas holidays. A 10-day period seemed suitable for the purpose of this study. At the beginning of the 10-day period participants received a collection, which contained an instruction, an example log form and 40 empty log forms. Participants are instructed to fill in a log form directly after every contact moment with a friend or relative. The log forms

contain a number of questions that address the topic and reason of the contact moment, the environment the contact was initiated or received in, the medium used, an evaluation of the use of this particular medium during the contact moment, and the feelings the contact moment evokes. It is stressed to the participants that it is important to describe the moment as extensive as possible. In order to link the descriptions of feelings evoked by a contact moment to an increase or decrease in connectedness, participants are asked to represent their feelings on a scale from 1 to 7. An example of the log form and the instruction can be found in Appendix D. To limit the amount of contacts that have to be described foreign participants were told to describe only the contact moments with close friends and family members back home. Dutch people were asked to describe only the contact moments within their primary social relationships, so not all social relationships. However, participants were free to describe any additional contact, that they felt was interesting.

5.1.3 Procedure

Through email a meeting of an hour was arranged at the site of the participant for the instruction of the study and the oral part of the interview. Because one set of participants was foreign, and not all were native English speakers, an additional aim of the meeting was also to make sure participants understood the purpose of the study and what is expected of them. In the introduction the study is introduced, and the participant is being told what is expected of him/her. Subsequently, the participant is asked if he/she still is committed to participating in the study and the effort of keeping the diary. After the instruction, the general part of the interview followed by the relationship interviews is administered. These interviews were tape-recorded. The meeting is concluded by handing out the diary and a further explanation this part of the study. Considering the effort of keeping the diary, the preceding interview was kept short. As a consequence, only 2 or 3 relationships could be dealt with during the relationship interview. Therefore, participants are given some relationship questionnaires to fill in, next to the diary. For the 10-day period after this meeting, participants kept the diary. During this period, participants are contacted by phone and by email a couple of times to check if the participant encountered some problems, to give them the opportunity to pose questions, and to remind them to keep the diary properly.

5.2 RESULTS

Prior to the analyses, the tape-recorded oral interviews, and handwritten diaries and relationship questionnaires were transcribed. Like with the email questionnaire the affinity diagram method was used to analyze the content of the interviews and the diaries. The interviews and diaries were analyzed together, so the affinity diagram contains quotes extracted from relationship interviews as well as from diaries. To be able to compare statements of Dutch participants with statements of foreign participants separate diagrams were made for the Dutch and the foreign group. The quotes extracted from interviews with or diaries from Dutch participants that are used to support our findings are literal translations from the Dutch quotes. In order to be able to find individual quotes in the transcriptions, the quotes used in the below discussion of the results are labeled. These labels are explained in Appendix E. The participant numbers are also labeled. In order to distinguish foreign participants from Dutch participants, foreign participant numbers are labeled with an 'F' and Dutch with a 'D'.

Below the results of the diary study will be discussed. As the results of the email questionnaire showed the concept of connectedness is associated with a number of communication activities and can be described by various feelings. The requirements study of the ASTRA project identified four types of contact moments – social contacts, emotional contacts, contacts regarding special occasions and practical contacts (Baren et al., 2003). They described social contacts as contact in which people tell each other about their lives, or just chat about general topics. Emotional contacts provide social support. Contacts regarding special occasions happen at special occasions, like birthdays, or at Christmas. And practical contacts are dominated by information exchange, for example to arrange meetings.

The data resulting from this study follow this categorization, but elaborate the emotional contact and special occasion categories. Not only contact moments during which social support is given are emotional, but also every contact moment during which deep thoughts and feelings are shared. Contacts regarding special occasions are extended to an attentive contacts category, in which special occasions are a subcategory. These attentive moments are characterized by an attention flow from one person to another, for instance by doing effort for the other, considering the other's needs, or paying special attention to the other. In the next discussion of the results this segmentation of social, emotional, attentive, and practical contacts will be followed. For every contact category we shall discuss which communication activities it encloses, and which connectedness feelings are evoked by these activities. In addition, some other characteristics of contact moments will be discussed that are also of importance for the concept of connectedness.

5.2.1 Social communication

Most of our daily communication has a social nature. During social contact moments people tell each other about their lives, or just chat about general topics. These social contacts maintain relationships. They do evoke connectedness feelings but do not increase these feelings extremely, especially for Dutch participants. Compared with foreign participants, Dutch participants seem to take these social contacts more for granted. In remote social relationships social contacts are important to maintain a feeling of being part of each other's lives. So it is not surprising that the main communication activity reported by foreign participants is to keep each other informed about things happening in each other's lives. Dutch participants also report the sharing of life stories, however they seem to do this less consciously.

Talking – synchronous communication

The majority of the Dutch log entries and about half of the foreign log entries concerned synchronous communication. Just talking – whether face-to-face, by phone or through instant messaging – was the main synchronous activity. As participant 15_D states:

“Talking of course is always important in a relationship.” [DS15par29-1;19:30]

To Dutch participants talking seems to be a normal part of most contact moments. For foreign participants, on the contrary, opportunities to talk are not that easy to establish. Synchronous communication often is more expensive than asynchronous communication and because of the time difference between their home country and The Netherlands, many foreign participants find it hard to plan synchronous moments. In explaining how going abroad has changed his relationships, participant 10_F emphasizes on the ability to talk. By this he illustrates the importance of talking in close relationships.

“With the most intimate people, especially my girlfriend, I'm not able to talk; but with email friends, nothing really changes.” [GI10;11]

Over a distance the ability to talk is not always within reach. Because of this talking is valued more. The next two quotes of participant 2_F illustrate this.

About a phone conversation with his parents he writes:

“It's a satisfying and secure feeling to be able to talk to family a great distance away.”
[DS2mot16-1;18:00]

And after an instant messaging conversation with a friend he feels connected, because

“It was a personal talk and also 2-way in real time. The fact of being able to discuss our current issues makes me feel in touch.” [DS2Tan7-1;16:30]

Be together – social presence

In geographically close relationships talking is an important part of face-to-face meetings. Over a third of the reported synchronous Dutch contact moments concerned face-to-face contact. Participants visit each other, have dinner together, do things together, and share experiences

together. At the same time they catch up with each other. Participant 11_D illustrates this by reporting a sporting event with a friend, during which they got a change to catch up as well.

"We sported together and we're au fait again." [DS11Est20-1;19:35]

When participants are not physically together, they miss the physical presence of the other. Both Dutch and foreign participants mention this. When participants have the ability to be together in the near future, feelings of missing increase connectedness feelings. However when participants do not have this ability, the same feelings decrease feelings of connectedness. The next two quotes of a Dutch and a foreign participant will illustrate this.

Participant 11_D writes about why she feels connected with her sister:

"... When I don't see her for a while I miss her." [RI11sis10]

In contrast, participant 2_F feels – like a number of other foreign participants – his connectedness feelings would be higher without the distance.

"I could be more in touch with her if I was face to face with her." [RI2mot10]

In many close relationships described in this study communication through media with lower media richness is not seen as a substitute for face-to-face communication. To many participants this is only a temporary solution.

"We are very close and meet up quite regularly. These small contacts [IM] add a little to the relationship but not as much as face to face meetings." [DS2Ker10-117:30]

This participant has the ability to meet face-to-face with his friend. So, an instant messaging conversation evokes only positive feelings. In remote social relationships, however, communication through lower rich media can evoke mixed feelings, as the next quote will show. Participant 10_F received an email of two friends.

"I have a weird feeling of very in touch and distant at the same time like trying to recapture a closeness we used to have." [DS10wol21-1;13:00]

Some participants find their own solution in coping with the geographical distance in their relationship. They try to spend time together or share experiences in a mediated manner. Participants 3_F and 6_F provide nice examples of this. After his relationship interview, participant 6_F tells about watching a broadcast football match. At the same time his brother-in-law is watching the same game in Poland. They shared their joy and frustration about things happening in the game by SMS, which made them feel connected.

Participant 3_F describes the impact of geographical distance on her relationships, and how she copes with it.

"It really starts to make a difference in my closest relationships, my boyfriend. You notice this the most in the time that you spend together, but you are not necessarily communicating." [GI3;11]

They try to recapture this by using continuous open Internet conferencing connection, often with transmitting audio and video both-sided.

"In the weekend I have the instant messaging/ internet conferencing on all day. It's like being in the same room, doing our own things and once in a while saying something to each other." [RIPar13]

Keep informed – social awareness

As already is stated, during social contacts people tell each other about their lives, this makes them feel they are part of each other's lives. In their relationship interviews participants talk about the knowledge they have of each other, and that this knowledge makes them feel connected.

"Because you've shared your whole life and as a consequence know a lot about each other, and went through a lot together, there is a certain connectedness." [RI11fat10]

To maintain feelings of connectedness within a social relationship this knowledge should be kept up to date, therefore it is important to keep each other informed. In describing his relationship with a close friend in Belgium, participant 2_F emphasizes on the importance of sharing information about the things happening in both lives.

"We push it to the maximum to stay in touch. That she knows what is happening in my life and I know what is happening in hers. Although we are not FTF, I don't think we miss out a lot of each others lives." [R12Ker13]

Participants like to be aware of the daily things as well as special events in each other's lives. When people maintain a frequent contact they easily get to know a lot about the little things in each other's lives. The knowledge of these little things in life makes people feel part of the other's life. However compared with remote relationships, within geographically close relationships this knowledge is taken for granted more. Most comments regarding the importance of information about the little daily things are made by foreign participants, or by Dutch participants who experienced a decrease in contact frequency within a relationship.

Participant 3_F feels connected with her boyfriend in the USA

"..., because we have daily contact. We have the laundry list of what happened. How I'm feeling; how my day is going." [R13Par10]

These daily chats between this participant and her boyfriend

"... keeps that sense of being part of each others lives." [DS3par10-1;0:45]

A close friend of participant 16_D moved away. She, too, describes her connectedness feelings towards this friend in terms of sharing the little things in life.

"...And you get to know less of the little things. You share these things less by phone, you do talk about this day or this week, but you tend to forget them soon too, they are not that important. However, when we were seeing each other daily, as roommates, you do talk about these things." [R116Naj10]

In addition to awareness about the things happening in the other's life, participant report a need for awareness of the other's well-being. Especially in remote social relationships people are concerned about the other's well-being. Receiving information about the other can be reassuring.

"I got the info from her that I wanted. I had been worrying about her issues and things are better for her so am very happy to know that." [DS2Tan7-1;16:30]

Often informing the other about things happening in life gives information about well-being as well. Participant 13_D illustrates this during the relationship interview about his mother:

"You talk a lot about things that happen in her life or in mine. That are not earth-shaking things. But if you call often you talk about 'What is going on?' or 'What did you do today?' or 'What did you do yesterday?' or 'What are the kids doing?' But what is behind these questions is that you share a kind of connectedness, that you want to know how the other is doing..." [R113mot8]

However, information received from another about his/her well-being is not always trusted. To receive information about the other's well-being, participants prefer richer media that involve more senses. A comment of participant 1_F shows this.

"Want to know she's all right, she tells me on the phone, but I want to see with my own eyes. Want to know how she's appearing, what's happening." [R11mot9]

In addition to information about the well-being and life events of friends and family the data indicates a need for information about mutual known people and places. Leaving a known environment results in losing touch with this environment and with many people in it. Usually people maintain contact with only a few persons. In staying informed about things happening in their former environment and with the people in this environment, participants have to rely on those persons they still have contact with. Participant 18_D just came back from a traineeship on Aruba (The Netherlands Antilles). In his relationship interview about a close friend who was still working there, he said they often talked about Aruba.

"I like to know what is happening on Aruba, and how the people are doing." [R18Mar10]

Also in relatively geographically close relationships people communicate about mutual known environments. Participants report that one person informs about others within the group as well. Participant 15_D, for instance, writes about an email he received from his father:

"I'm a little bit more up-to-date about the state of affairs at home." [DS15fat30-1;9:50]

Show things

The ability to show things extends social awareness. To keep the other informed of events or day to day happenings in a person's life or home environments, these events and happenings are usually described. These descriptions are not always satisfactory, though.

"...there are not enough guides for me to see what is going on outside, because if you go about letters, they describe what has happened and with life communication I don't, I can't see what exactly is going on and why." [R19 remark]

A number of times foreign participants reported the sending and receiving of digital pictures. Participant 9_F, for example, wanted to share the feeling of finding an old photo with his family [DS9fam18-1;13:00]. And participant 1_F received an email with a description and pictures of mutual friends wedding from a close friend. It made him feel

"...like I was there in spirit." [DS1Sun7-1;15:00]

Receiving pictures is valued strongly and evokes strong connectedness feelings. Participants 2_F and 9_F illustrate this. Participant 2_F emphasizes on the opportunity to see how the other looks like. He received a photograph of a close friend, he had not seen for two years. He explains why receiving this photograph made him feel connected:

"I could again put a face to her voice or messages on chat/SMS. It brought into focus her image in my head. I feel very close to her ... It contributes very strongly to furthering our relationship as it brings us closer (or makes us feel closer) even across a great distance, and offers some sort of substitute to physical presence and the ability to see the other." [DS2Par10-1;18:15]

And participant 9_F focuses on the reviewable nature of pictures. He received some digital pictures of his girlfriend. He

"...adored [the] pictures." and *"...will watch at the pictures again & again."* [DS9par21-1;23:00]

Summarizing, social communication is mostly about maintaining relationships by staying informed about each other's lives. In geographically close relationships social contacts are embedded in daily routine and information about the each other's lives is easily received and given. Within remote relationships it is not that easy to feel part of each other's lives. Especially when the contact frequency decreases people feel they lose insight in each other's daily lives. In addition, at a distance people have to rely mostly on written descriptions of events, instead of taking part in the events themselves. Pictures or moving images could be an enrichment that increases connectedness feelings.

5.2.2 Emotional communication

Where light-hearted social communication maintains relationships, the intimacy of emotional communication enhances them. The sharing of deep thoughts, feelings and problems confirms the tie between two persons.

"Sharing of personal worries strengthens your tie." [DS15mot31-1;18:00]

Especially when the sharing of thoughts, feelings and problems evokes feelings of understanding. This communication gives rise to increased connectedness feelings.

"... understanding makes you feel in touch." [DS4Bea15-1;23:40]

Participants reported emotional contacts with use of various media – even with short asynchronous messages during an SMS-chat. Nevertheless, participants indicate they, overall, prefer more rich media to convey their thoughts and feelings and read the thoughts and feelings of the other. They want to employ non-verbal communication methods.

"For personal issues I always prefer talking things out face to face. One can gauge situations and possibilities better and can tell a lot more by physical contact, e.g. a touch or a hug. I needed more contact than this medium [IM] can provide." [DS2Par9-1;9:42]

Especially when social support is needed richer media are desired. The diaries show a particular need for physicality. A hug or an arm around a shoulder can provide more comfort than words are capable of. Within remote relationships the inability of giving a hug in times of need evokes mixed feelings. Participants appreciate that others confides in them, this increases the connectedness feelings. Simultaneously, the inability to give a comforting hug makes them feel helpless. The next example will illustrate this.

During the 10-day period participant 2_F kept the diary, the father of a close friend of him died. He learns about this during a phone conversation, the conversation leaves him with mixed feelings.

"I really wanted to reach out and hold her and hug her and let her lean on me through this difficult time for her. I really desired to be physically present with her rather than just offer [the] same words over such a distance...It leaves me feeling helpless."

But at the same time:

"I feel a lot in touch because she could confide a lot of her feelings to me and me calling her did help to some extent." [DS2Par11-1;17:45]

Nevertheless, this participant was capable of providing some social support, by paying attention to his friend, and by letting her know he is thinking of her and cares for her. During the days after her father's death he has daily contact with her through SMS or phone.

"The idea of this contact moment is to let her know she is being thought of and worried about and that provides more support, which builds intimacy" [DS2Par;12-01;11:00]

"It lets her know I am there for her and that I'd do whatever I can to help her at anytime. In her heart she knows she can count on my support always. And that makes us both feel a little less insecure and alone." [DS2Par11-1;17:45]

To recapitulate, emotional communication strengthens ties between two persons. Media that facilitate this kind of communication should be capable of conveying deep thoughts and feelings. It should allow for non-verbal communication methods. Especially for social support physicality is desired. In addition to physicality attentive communication can also provide comfort. This communication type will be discussed next.

5.2.3 Attentive communication

Not only attention directed at another person in times of troubles or need intensifies connectedness feelings between two persons, but also attention given in other times. Knowing someone is, for instance, doing effort for you can make you feel special.

"She replied to me personally after I had sent an email to a group we both belong to. That she took the trouble to do so makes me feel like she's there close and in touch. ... The effort put in by her and the interest shown by her in personal affairs helps me know that she cares and makes me feel close to her." [DS2Apa10-1;15:15]

Attention can be directed at the other person in a number of ways, even at a distance, as the next few examples will show.

Participant 1_F sends his mother in India a gift on a festival day. When the gift has arrived they have a phone conversation, after this conversation he writes:

"Felt relaxing, confident, felt happy as she liked my gift." [DS1mot12-2;19:00]

Participant 17_D helped his girlfriend correct homework, although the work is not very satisfactory to him, he feels connected:

"By doing it together there is more connectedness." [DS17par9-2;12:00]

Also taking the time to communicate in a busy period is valued and evokes connectedness feelings, as participant 2_F illustrates:

"It's great to know he took the time out off a very busy schedule to send me an email, with details in it. ... That he sent in details and not just a basic email response increases the amount of feeling in touch." [DS2Roh14-1;12:15]

And participant 15_D considers the need of his girlfriend to talk on the phone, although he is not really a phone person, because she

"always has the need to call for a while when I'm not around, so she's happy & thus I am too" [DS15par31-1;22:30]

These examples indicate, that in order to evoke increased connectedness feelings, the receiver should be aware of the circumstances in which the contact moment is initiated. In other words, to feel special a person needs to know that someone is doing effort for him/her.

Geographical distance gives additional opportunities for attentive communication. As already is mentioned in section 5.2.1, at a distance people worry more about each other. Reassuring the other by just having contact or transmitting well-being information can evoke connectedness feelings.

"...but without the email there would be worries." [DS9par17-1;20:00]

So, merely having contact can be reassuring. Just having contact can also make people feel part of another's life by communicating that someone is thinking of another.

Participant 10_F, for instance, received a voicemail message of his girlfriend wishing him goodnight. This message made him feel very connected, because

"knowing that she's thinking about me makes me feel close to her. I felt close to her after receiving the message." [DS10par19-1;12:45]

Also on special occasions – like birthdays, weddings or Christmas – it is *"...nice to know that people are thinking of you."* [DS16Naj10-2;19:00], as participant 16_D writes about receiving a birthday card. It not only is important to remember special occasions in another person's life, it also is important to be present during these occasions. The next quote will illustrate this.

"I miss not being there. I feel removed from them. For example my friend won a game show, a race around the world, and I wasn't there with him." [GI10 (11)]

The dark side of attentive communication is, that it can become an obligation as the other starts to expect attention. For instance Participant 6_p expects her mother to call on her birthday.

"Nice to talk to mom. I expected her to call for my birthday." [DS16mot12-2;18:00]

And participant 7_f sends an email to her parents to say that she will not be available tomorrow. About this email she writes:

"Family does not worry about my silence and is not offended." [DS7fam16-1;19:30]

In sum, attentive communication is characterized by an attention flow from one person to another. Examples of attentive communication are taking effort for another person, considering the other's needs, or paying special attention to another. This kind of communication makes the other feel special or important, which increases connectedness feelings. Even the mere act of sending a message can be enough to evoke these feelings, because this communicates that the sender is thinking of the receiver. A side effect of attentive communication is that it can become an obligation.

5.2.4 Practical communication – meeting plans

A large number of the diary log entries – mostly Dutch – concerned practical communication. During these practical moments in general information is passed on or plans are made. Overall, practical communication does not result in increased connectedness feelings, usually participants reported neutral feelings. These feelings are explained by comments like : *"Just a businesslike conversation"* [DS12mot24-1;9:30] or *"not that intimate topic"* [DS11sis16-1;21:15]. However, participants feel connected when they know they are going to meet each other in the near future.

"Because we are going to meet again, I feel more connected." [DS15Ger03-2;13:05]

About an earlier meeting this participant wrote:

"In itself our relationship was flagging, because we don't see each other that often any more..." [DS15Ger1-2;2:00]

5.2.5 Contact moment

The above discussion of activities that support the different communication types already showed some indications towards media characteristics that can support connectedness evoking communication. Through, for instance, social presence technologies people can experience a sense of being together; through, awareness technologies people can be informed about the major and small things happening in another person's life; awareness technologies also let people look into each other's lives, just like the ability to show things. Below, some other characteristics of contact moments are discussed that can increase or decrease connectedness feelings.

Visibility, audibility & physicality

Especially during emotional communication participants desire a more intimate medium that involves more senses. Also during other communication moments more modalities are valued. Over a distance most contacts take place on the Internet – i.e. through email or instant messaging. Communication through these media is very descriptive, because of fewer opportunities to employ non-verbal communication techniques. A number of participants remark about communicating through these descriptive media, that they miss seeing facial expressions or hearing the other's voice. Visibility and audibility make it easier to communicate, as the next example will show.

Every day participant 3_f talks with her boyfriend through instant messaging. She prefers voice to typed communication. For her the typing disrupts the conversation, because it takes longer to say something.

"...but everything gets abbreviated when you have to type everything out. Would be a bit better if we used voice communication." [DS3par10-1;0:45]

"It would go much easier with voice - more communication in a shorter time - however transmitting image helps." [DS3par16-1;22:00]

Next to structuring communication better, visibility and audibility also provided well-being information. As we have already seen, seeing or hearing the other can be reassuring. And especially physicality is desired in emotional contact moments.

Within remote relationships seeing, hearing or touching each other can be a rare event. When participants do have the opportunity to see, hear or touch the other, this is valued more, and will increase connectedness feelings.

Participant 10_f writes about the phone calls with his girlfriend.

"I don't really realize that I miss talking on the phone until I do hear her voice..." [RI10par13]

"Every time we talk on the phone is special, because it's expensive and difficult to negotiate because of 8 hour time difference - so it really means a lot." [DS10par17-1;23:45]

But

"...the more often we talk - the less special the phone becomes." [DS10par19-1;15:20]

Communicate emotions

For emotional communication it is necessary to convey feelings. But also during social contacts the communication of emotional reactions and mood of the other is important. The next few quotes will illustrate this.

Participant 17_D showed a video recording of an event he participated in to his girlfriend.

"Because of her enthusiastic reaction I felt connected" [DS17par11-2;21:30]

After their daily instant messaging conversation participant 3_f explains her connectedness feelings.

"Sometimes just seeing him smiling is good enough." [DS3par15-1;8:00]

And participant 6_f uses smiles to his send feelings trough SMS or email, he is

"...afraid that feelings are not conveyed (smiles :-)" [DS6Tad11-1;10:30]

Recognition

Participants indicate that, in order to evoke connectedness feelings, it is important to recognize the other in the communication. In communication people can recognize another person in a number of ways, depending on the used media. In video communication the image of the other should be recognizable. With audio the recognition of the other's voice, language and dialect can evoke increased connectedness feelings. About an instant messaging conversation with an old pal participant 1_f writes:

"I miss his dialect in real speech, his sense of humor." [DS15scr10-2;0:00]

But also the recognition of someone's writing style or sense of humor can make people feel close to the other.

"I know her sense of humor. The mail and chat session reflected it very much. Felt I was with her." [DS1Sun7-1;15:00]

Feedback

Besides recognition of the other and sensing the emotional responses participants point out that feedback is of importance to the concept of connectedness. Especially when asynchronous media are used participants need the certainty there messages arrive and are interpreted in the way they

intended. They indicate they will feel connected when their message is acknowledged. The next quotes will illustrate this.

Participant 10_f is worried that his friends will not read his mail carefully:

"I can't be 100 % sure that they all read every line – that bothers me." [DS10wol17-1;18:15]

After receiving a reply in which is referred to his email he writes:

"It was nice to hear from them and know that they read my email ..." [DS10wol21-1;13:00]

Participant 2_f also needs a reply to feel connected.

"I feel in touch when she will reply or acknowledge my message. At the moment it's just a one-way communication." [DS2Par7-1;16:21]

In addition he likes to receive some feedback about his friends reaction to his SMS, and likes to be aware of her context she receives the message in.

"I have no idea in what place my message will reach her, and I don't know always if my message is conveyed in the right tone as I have limited words to send it." [DS2Par13-1;9:40]

Interruption

When a contact moment interrupts other activities and participants have to divide their attention, they report that the particular moment evokes less connectedness feelings. The same applies to mood, when the receiver is not in the mood, they rate lower connectedness feelings. Participant 18_d, for example, reports low connectedness feelings after a phone conversation with a friend, that interrupted his sleep. During this conversation they just chatted a little, afterwards he went back to sleep.

"I had a hangover and did not really feel the need to talk on the phone." [DS18Rob28-2;10:15]

Participant 4_f kept a phone call of a close friend short, because the house line was busy and calling with a mobile phone is too expensive. Afterwards he did not really feel connected, because

"it felt a little like I didn't want to talk with him." [DS4Nac15-1;23:20]

To the interrupting party it can be annoying too. They don't receive complete attention, which does not increase connectedness feelings either. The log entry about an instant messaging conversation between participant 4_f and his brother illustrates this.

"It was not a very personal talk, and I didn't have his complete attention as he was possibly busy with something else or chatting with others too." [DS2bro7-1;19:00]

Media switch

Usually participants respond to a message using the same medium as the medium through which they received the message. However, a number of diaries show that participants easily switch between different media, or that they use multiple media next to each other. Participants switch to richer medium in order to respond to a message or follow up on things communicated through less rich media. Diaries also show a media switch in the opposite direction, from an intimate to a less intimate medium. The next few quotes provide examples of this.

Participant 6_f and his brother use email next to a phone conversation, to transmit some practical information.

"It was easier for him to call and talk but he used email to send me his new address & telephone number. ... [I] prefer written form for data like address and numbers (phone) and telephone to have closer contact." [DS6bro14-1;15:32]

A number of participants talk through a more intimate medium – like the phone – about things already communicated through a more descriptive medium.

"I could follow up on some issues that come up in our Internet chats, and in my own way, reinforce to him that I am there in case he needs anything." [DS2bro11-1;17:30]

The dairies not only show a switch to more intimate media, the log entries of one participant also show a switch in the opposite direction. Participant 2_F, continues an intimate phone conversation with a SMS chat.

"It provided a filling in after the phone conversation and let us know how we were dealing with stuff said during the recently concluded phone conversation." [DS2Par11-1;18:30]

5.2.6 Relationship diagrams

During the relationship interview, participants were asked to draw a relationship diagram of their relationship with the friends and family they described. These diagrams reflected the course of the contact frequency as well as the course of the overall connectedness feelings during the relationship. Most of these connectedness graphs show steady lines, or follow the contact frequency pattern. This indicates that over the course of a relationship connectedness feelings do not change extremely, only when the contact frequency changes drastically. However, the diagrams drawn by foreign participants show that distance has a major influence on connectedness feelings. Many diagrams of remote relationships show a strong increase when two persons move apart, followed by a slow decrease as they get used to being apart.

"Nothing changed about the feeling towards my mother, but the feeling of my desire to contact her is much deeper/ higher. When you are not living with the person you are close to, you're desire to contact her is much higher than before. It's a little bit about peoples nature: We always want what we can't have." [RI6mot7]

Some diagrams of remote relationships show another pattern. These diagrams peak when two persons visit each other and spend time together.

"Since we haven't lived in the same place for years, it becomes important to capitalize on the time we do spend together." [RI 3 (Geo10)]

5.3 CONCLUSION

The previous discussion of the results of the diary study shows a deviation in types of contacts – social, emotional, attentive and practical contacts. Practical communication has no direct impact on connectedness feelings, therefore this communication type will not be discussed any further. Social communication maintains relationships. It evokes general connectedness feelings – like the feeling of being included in each other's lives – but does not give rise to intense feelings. The main social communication activities are sharing experiences, and sharing information about both major and little things in life. Within geographically close, social relationships these social contacts are naturally embedded. Within remote, social relationships, it is more difficult to feel part of another's life, though. At a distance it is harder to share experiences, and more effort has to be taken to keep informed about each other's lives. Especially when contact frequency drops and people lose insight in each other's daily life.

Where social communication maintains relationships emotional and attentive contacts enhance them. Emotional communication strengthens the tie between to persons, and attentive communication makes a person feel special. During emotional contacts deep thoughts, feelings and problems are shared and social support is given. These contacts ask for richer media that are capable of conveying thoughts and emotions. Moreover these media should involve more senses in the communication. Especially, physicality is important in providing comfort.

Attentive communication can be described as an attention flow from one person to another. Basically, attention can be given in two ways. First, by taking some kind of effort for the other. In this case the other needs to be aware of the effort the attentive communication costs. Second, by paying special attention to the other. For this type of attentive communication merely having contact can be enough, regardless of the content. Having contact can tell a person, that for instance someone is thinking of him/her.

A contact moment can incorporated multiple contact types. Especially during emotional communication, the contact moment will also have attentive and social characteristics.

Table 5.2 summarizes the various communication activities that emerged from the diary study as relevant to the concept of connectedness. This table also lists the range of feelings that participants used to describe their connectedness feelings with, and shows which activities evoke these specific feelings.

Besides a description of relevant communication activities and connectedness feelings, the diary study also resulted in some additional characteristics of contact moments which can be of importance to the concept of connectedness.

Richer media that involve more modalities evoke stronger connectedness feelings. Richer media allow for the employment of nonverbal communication techniques, which structure communication better. They also are more capable of conveying emotional reactions or moods, which influence connectedness feelings. In addition, visibility and audibility provide well-being information, and physicality can be comforting.

Moreover, recognition of the other is in the communication – by for instance a recognizable writing style, or tone of voice – also gives rise to additional connectedness feelings. Beside this, communication applications should be able to deal with interruption, and provide feedback about the receipt of and the reaction to the message.

5.4 METHODOLOGICAL DISCUSSION

After discussing the results of the diary study we will now discuss the used methods and followed procedure during the study and analysis of the data in order to assess the reliability of the conclusions.

Unlike the Dutch participants, the foreigners who responded to the call for participants responded because of their affinity with the subject, this might cause a distorted image. On the other hand, they are more conscious of their communication, which perhaps makes it is easier for them to convey their feelings regarding the subject.

Both foreign and Dutch participant groups showed that some participants were more capable in putting their thoughts and feelings into verbal or written words than others. While some illustrate their statements with anecdotes on their own, others have to be stimulated more to elaborate on their answers. In interviewing the less expressive participants the interviewing skills of the interviewer are of importance. Through the inexperience of the interviewer these participants probably were not stimulated in the most effective manner.

Looking at the relationship diagram assignment, participants proved to be capable of drawing these kind of diagrams. A number of diagrams of a parent-child relationships showed the recognizable pattern of a high connectedness during childhood, with a drop during puberty, followed by a steady increase – often starting when the parental home is left. For the purpose of this study the relationship diagrams were less useful since they reflected the overall connectedness feeling over the course of an relationship, and did not lift out many events that influence the momentary connectedness feelings. It would have been better if the diagrams covered a shorter period, of for instance the last few months. The diagrams did reveal a difference between the way foreign and Dutch participants interpret connectedness. Although the relationship diagrams provided little useful information for the purpose of this study, exercises like this one can provide an useful starting point for an interview. In drawing the relationship diagrams participants were triggered to overview the history of relationship they were discussing.

Surprisingly, little comments were made by the participants about the used methods. Some participants indicated they would have liked the diary to be digital. They spend most of their day behind their computer, and the majority of their communication activities happens on the Internet, or nearby their computer. For them a digital diary would have been more convenient.

In addition, the dairies proved to be too structured. This left little room for the participants to tell their own story. Some participants found their way around the questions, and were able to tell their stories. But especially for participant who seemed to have trouble with describing the contact moment and their feelings the structured approach gave them a way out.

Using scale for capturing the intensity and value of the feelings the communication moment evoked was a good idea. It provided information about the direction of the change in feelings during or after the contact moment. However, this data is only valuable when participants illustrated it with a description of their feelings and give an indication of their origin. A number of log entries do not show this description in the participants' own words. Especially near the end of the 10-day period some participants only rated their feelings but forgot to describe them.

Content analysis of descriptive data is sensitive to the interpretation and preconceptions of the analyzer. Usually, to overcome this problem, the data is analyzed by at least two persons multiple times, and an inter-analyzer reliability and stability can be calculated to indicate the reliability of the analysis. In this study only one person analyzed the data, and this person did not have any experience with content analysis beforehand. This inexperience can be an advantage as well as an disadvantage. Because of this inexperience the content analysis was a search for the appropriate method to use, therefore the data was looked at in different manners. So the analysis was not guided by a presupposed analysis plan. However, because of the inexperience, the analysis could have been susceptible to interpretation and preconceptions biases.

6 CONCEPTUALIZATION, DESIGN AND EVALUATION

After discussing the results of the empirical data collection concerning the concept of connectedness, this chapter focuses on part III of this research project: the translation of the results into a conceptualization of the concept of connectedness and into requirements for design and evaluation of connectedness supporting technologies.

6.1 CONCEPTUALIZATION

In the theoretical framework (chapter 1) we linked the concept of connectedness to the human need to belong and to the emotional tie between two persons. We assumed that during contact moments the sense of connectedness is influenced by intimacy and immediacy behavior, whether emotions are communicated, and by the emotion-evoking meta content of the communication. The empirical data support this assumption and show other activities of influence to the concept of connectedness in addition to the feelings that describe the concept.

The results of the diary study show, that contact moments can be categorized into practical, social, emotional and attentive contacts. To the concept of connectedness the latter three contact types are of importance. Social contacts maintain relationships, and emotional and attentive contacts enhance them by increasing the sense of connectedness. Looking at the email questionnaire, the connectedness-related communication activities resulting from this study can be classified in these three contact types as well.

Social contacts are often characterized by talking, whether face-to-face or mediated by synchronous media. Spending time together, sharing experiences and having fun together are also valued in the context of connectedness. Social contacts not only consist of synchronous communication, asynchronous contacts can also be typed as social. The main goals of social contacts are merely maintaining contact and keeping each other informed of things happening in life. Where social contacts are usually light-hearted, emotional contacts are more intimate. During these contacts people discuss deep thoughts and feelings, share personal problems and provide social support. Attentive contacts are characterized by an attention flow from one person to another person. Basically, attentive contacts can have two forms – doing effort for another, and just having contact regardless of the content. This second form of attentive contacts communicates that one person is thinking of another person.

A contact moment can include several communication types. Especially, emotional communication will have social and attentive aspects as well. During emotional contacts social and attentive communication both can be experienced as supportive.

The results of the email questionnaire and the diary study show that basically there are three types of connectedness feelings – feelings of being part of each other's lives, psychological closeness feelings, and feelings of being important to another person. Social contacts usually evoke feelings of being part of each other's lives; psychological closeness feelings often result from emotional contacts; and attentive contacts make people feel important. However, this distinction is not as clear as it seems. Especially where contact moments encompass several communication types, and contact activities are performed to support different communication types, all three communication types can result in all three types of connectedness feelings. Table 6.1 summarizes the main communication activities resulting the two studies and shows which connectedness feelings these activities evoke.

Geographical distance shifts the importance of the various communication activities and connectedness feelings. Within geographically close, primary social relationships social contacts are often taken for granted, because these contacts are embedded in normal day to day life. At a distance it is harder to establish these kinds of contacts. Therefore it is particularly important to maintain a feeling of being part of each other's lives. One way of accomplishing this is keeping each other informed about the things happening in life – especially the little things. Also the sharing of experiences seems to be important as well as looking into each other's worlds. Within remote social relationships emotional contacts often result in mixed feelings. Emotional contacts ask for physical proximity, so non-verbal comforting methods can be employed. Today's commercially available telecommunication applications are not capable of supporting this, resulting in feelings of helplessness by the user. Nevertheless, emotional contacts are valued in remote social relationships, and increase the sense of connectedness. Within the context of geographical distance attentive contacts are especially helpful is reassuring that a person is still important to the other and part of this person's life.

6.2 DESIGN AND EVALUATION IMPLICATIONS

Below, the design and evaluation implications resulting the conceptualization and the empirical data will be discussed. This discussion will follow the categorization of contact types, and indicates for every contact type which activities are of particular interest for designing in the context of remote, primary social relationships. With regard to these activities some guidelines for design will be given, next to examples of already developed applications and prototypes. Together with the discussion of the design implications, the evaluation implications will be discussed. Design and evaluation criteria resulting communication activities are summarized in Table 6.2. In addition design and evaluation guidelines will be derived from reported connectedness feelings and remarks about contact moments – these guidelines are summarized in Table 6.4 and 6.3.

6.2.1 Social contacts

Overall, technologies supporting social contacts can be evaluated by asking, if communication through these technologies makes users feel included in each other's lives. However, this evaluation should be an evaluation of an isolated contact moment, it should be embedded in a communication pattern within the context of a primary social relationship. In supporting social contacts within remote social relationships, three main design aims can be identified which give rise to additional evaluation criteria - the design of applications that support spending time together; applications that support the sharing of experiences; and applications that support the exchange of information about persons and their environments.

When people spend time together they are not necessary consciously engaged with each other. They are just doing their own things in the presence of the other person; they are aware of the other's presence and activities; and once in a while they will pay conscious attention to each other by starting a conversation. So, in order for two persons to spend time together a technology is required that facilitates a continuous connection, and evokes awareness of the other's presence and activities. This technology should provide the possibility of initiating interacting communication. Although developed to connect remote work environments, media space technology (Bly et al., 1993) supports spending time together, just like TeleWindows (Heeter et al., 2001) – a continuous audio and video connection developed to connect a homebound elderly with his/her Senior Center. Other applications that support spending time together are applications like the FamilyPlanter (Kuwabara et al., 2003), which convey presence information of people at remote locations, and provide interaction by, for instance converting a touch at one location into an audio response at the other location.

For evaluating applications that support spending time together, social presence measures aimed at level 1 social presence (Biocca & Harms, 2003) can be used – i.e. questions that address the sense both persons have of being in the same room together. Next to social presence, questions

should address the awareness both persons have of each other's activities during the contact moment, and the sense they have that they spent time together.

Next to spending time together people want to share experiences. Two persons can share experiences in three different ways. First, it can mean that one person participated in an event and wants to communicate this experience to another person, who did not partake in this event. This type of experience sharing is accomplished by the exchange of information about persons and their environments, which will be discussed below. During the second type two persons are engaged in the same event, they are aware of each other's reactions to this event, and are also influencing each other's reactions. For instance, they are watching a broadcast football match, or are enjoying a concert together. Applications that support this should evoke level 1, 2, and for a partly level 3 social presence. They should be capable of conveying each other's behavioral and emotional reactions to the event. Huijnen, IJsselsteijn, Markopoulos, and de Ruyter (2003), for example, performed an empirical assessment of this kind of experience sharing within a remote group of friends. They compared the influence of three representations of presence information on the *in-group identification during a shared experience*. The third type of experience sharing implies that two persons are engaged in an interactive activity together, e.g. playing games or go sporting together. This type of experience sharing gives rise to an additional design criterion: The application should support interactive activities, like Exertion Interfaces do (Mueller, Agamanolis, & Picard, 2003).

For evaluating applications that support experience sharing level 1,2 and 3 social presence measures (Biocca et al., 2003) can be used. Social presence questions should address the sense both persons have that they are together, they have access to each other's emotional and behavioral reactions, and the degree that these reactions are interdependent. Besides social presence, users should be questioned about their sense that they were engaged in the same event or activity, that they were engaged in this event or activity together, and their enjoyment of this engagement.

Finally, social contacts involve the exchange of information. This can be information about things happening in a person's life – information about events as well as little things, information about a person's well-being or information about a person's environment. This information can be descriptive in nature and can be supported by pictures, video and audio fragments. So, applications that support this, should be able to capture and transmit information about major and small things happening in a persons life as well as information about a persons physical and social environment. Applications like the pin board (Markopoulos et al., 2003) facilitate the capturing and transmitting of this kind of information. And also the ASTRA project envisions the pictorial capturing of day-to-day events as a way to keep people involved in each other's lives. Visualizations of a person's day to day activities can provide well-being information as well, this is what the digital family portrait is based on (Mynatt, Rowan, Craighill, & Jacobs, 2001). And applications like the Hole-in-Space (Galloway & Rabinowitz, 1980 in Bly et al., 1993) and TeleWindows (Heeter et al., 2001) let a person at one location look into another location. During the evaluation of this type of applications users should be asked if they feel they are well informed about events and little things in another person's life, about the well being of another person, or about things happening at a remote location.

6.2.2 Emotional contacts

Emotional contacts enhance social relationships. Therefore, technologies facilitating these contacts can be evaluated overall by asking if users felt (psychologically) close to each other, or connected to each other during the evaluated contact moment.

In emotional communication deep thoughts and emotions are shared and social support is given. Physical presence is desired during these moments in order to employ non-verbal communication – especially a touch or a hug seem to be comforting. Applications for emotional communication should convey deep thoughts and emotions. In addition, they should facilitate nonverbal communication and physicality.

This seems an obvious solution for supporting emotional communication. Participants report they do use asynchronous and text-based media – like Instant Messaging, email and SMS – for emotional communication. They, however, evaluate these media as to cold and artificial for this type of communication, which leaves them with mixed feelings after the contact moment. Nevertheless, these media seem to be capable of conveying deep thoughts and emotions. Participants report they often follow up on text-based emotional communication through a richer medium. This implies that a communication through an asynchronous text-based medium can be used as an introduction to emotional communication through a rich, synchronous medium. In evaluating media for emotional communication, level II social presence measures (Biocca et al., 2003) are appropriate, posing questions addressing the sense of awareness and understanding of each other's feelings and thoughts. Moreover, items that address the extent to which users felt comforted or able to provide support can be used.

6.2.3 Attentive contacts

Attentive communication is associated with feelings of being important to another person. Therefore technologies that support these contacts can be evaluated by asking if the receiving user feels he/she is important to the other person, and if the sending user thinks he was capable of evoking these feelings in the receiving user.

Attentive communication gives rise to the design of two types of applications – the design of applications that communicate effort, and applications that support low-effort communication that one person is thinking of another person. For effort applications it is important that the receiving person is aware of the context of the communication, so he/she knows the other is taking effort for him/her. The handwritten letter forms a nice example of this, especially with the computer available, because it takes more time to write and send it than with email.

In order to communicate that you are thinking of another person merely having contact, regardless of the content, is enough. Lately, a number of applications have been developed that are based on this idea. A nice example is the White Stone (Tollmar et al., 2000). This is a stone-like object that sends a signal to a linked object that is possessed by another person, whenever it is touched. This concept is especially nice because objects can remind a person of someone else, and merely thinking of another persons evokes a sense of connectedness. Also pictures remind people of the ones in the picture, applications like LumiTouch (Chang et al., 2003) make use of this. See for a discussion of other emotion-evoking applications (Gaver, 2002).

Attentive contacts can be evaluated by asking the receiver if he/she is aware of the fact the other person did effort for him/her, or thinks the other was thinking of him/her. The sender should be asked if he/she thinks the other person is aware of the effort he/she did, or feels he/she is thinking of this person.

6.2.4 Additional features

The email questionnaire and diary study pointed out some additional criteria for supporting contact moments. These criteria are discussed below, as well as the evaluation criteria they imply.

Data from both email questionnaire as the diary study show it is important that media reveal the users to each other, and that users recognize each other. Therefore media should transmit sensorial information as realistic as possible and facilitate a recognizable personalization of the communication. The participants indicated it, for instance, is important to recognize the other's expression style or sense of humor in the communication. One participant [R11] mentioned he personalized hand-written letters with little drawings. The criterion of recognizability undermines research efforts regarding calm technologies, which search for an abstract representation of awareness information. Recognizability can be evaluated by asking users if they recognize the other in the communication and feel the other is able to recognize them.

The empirical findings also point out that users like to receive feedback. They like to be aware of the user's reaction to their messages, in order to infer how the messages are interpreted. Markopoulos et al. (2003) considered this in designing the Pinboard. Upon opening a message the facial expression of the receiver is captured and sent to the sender of the message. In

addition, especially with asynchronous communication, users want to know if their message has arrived and is read. In evaluating the feedback, that users receive during a contact moment, users can be asked if they feel they know how the other person responded to their message. Other remarks of respondents of the email questionnaire and participants of the diary study indicated the importance of emotions during contact moments. Not only during emotional communication it is important to convey emotions, but also during other moments, as awareness of the other's momentary mood and feelings can increase the sense of connectedness. Moreover it communicates well-being information. Especially facial expressions, body language and tone of voice convey emotional information. Finally, the email questionnaire shows that in order to increase a sense of connectedness a contact moment should be evaluated as relaxed and complete.

As already is mentioned, a contact moment can incorporate several communication types and communication activities. During face-to-face contact moments people switch easily back and forth between the different communication types. This implies that a communication medium should support the multiple communication types. The telephone is a good example of a communication medium that can be used for different types of communication. However, when different tasks have to be performed with one application this application will not be able to support the various tasks in the best possible manner (e.g. Norman, 1998; Weiser, 1991). Norman (1998) and Weiser (1991) argue that technologies should disappear in the background, people should simply use them unconsciously to accomplish daily tasks. This asks for a range of communication applications, where every application supports different communication activities. In this context Buxton (1997) talks about Ubiquitous Media. The data from the diary study show that participants already switch between different media or use them next to each other, easily, during a contact moment.

The data collected in this research project mostly refers to information participants would like to receive from others, it hardly shows references to the information they like to send about themselves. Usually the information people want to receive from others does not correspond to the information they want to exchange about themselves. People have the need for privacy and want to control who has access to which information and for what purpose. But at the same time, they want others to share private information with them, as a token of psychological closeness (Markopoulos et al., 2003).

Most design and evaluation implications discussed in this chapter are formulated from a receiver point of view. Therefore, no attention is paid to privacy and control criteria. These criteria, however, are important and should be applied in the design and evaluation of communication technologies – applications that do not meet privacy and control needs run the risk of being rejected by the consumer.

Table 6-2: Design and evaluation criteria resulting comments regarding communication activities

Activity	Design implication	Example applications	Evaluation implication
spend time together	<ul style="list-style-type: none"> ▪ continuous connection ▪ peripheral awareness of other's presence (social presence level I) ▪ peripheral awareness of other's activities ▪ support interaction 	<ul style="list-style-type: none"> ▪ 6th sense (Tollmar et al., 2000) ▪ FamilyPlanter (Kuwabara et al., 2003) ▪ media space (Bly et al., 1993) ▪ RoomLink (Hindus et al., 2001) ▪ soft air communication (Tollmar et al., 2000) ▪ TeleWindows (Heeter et al., 2001) ▪ ▪ 	<ul style="list-style-type: none"> ▪ social presence (level I) measure (Biocca et al., 2003) – user's sense of other's presence ▪ user's sense of awareness of other's activities ▪ user's sense (s)he is spending time with someone
share experiences/ do things together	<ul style="list-style-type: none"> ▪ awareness of other's presence (social presence level I) ▪ convey (nonverbal) reactions (social presence level II) ▪ support interacting activities ▪ show things → 	<ul style="list-style-type: none"> ▪ RoomLink (Hindus et al., 2001) ▪ TeleWindows (Heeter et al., 2001) ▪ watching a game together (Huijnen et al., 2003) ▪ exertion interfaces (Mueller et al., 2003) ▪ Instant Messaging multiplayer games 	<ul style="list-style-type: none"> ▪ social presence (level I, II & III) measure <ul style="list-style-type: none"> ▪ user's sense of other's presence ▪ user's sense of the others responses ▪ users' sense they influence each other's responses ▪ user's sense of peripheral awareness of the other ▪ users' sense they are engaged in the same event ▪ user's sense they are engaged together ▪ users' sense they are engaged in a mutual interacting activity ▪ user's motivation for the activity ▪ user's enjoyment of the engagement
keep informed daily things events world/people well being	<ul style="list-style-type: none"> ▪ convey description of events ▪ capture and transmit images of events ▪ capture and transmit audio images of events ▪ communicate feelings/moods/ emotions ▪ visibility (facial expressions, body language) ▪ audibility (tone of voice) 	<ul style="list-style-type: none"> ▪ ASTRA (Baren et al., 2003) ▪ digital family portrait (Mynatt et al., 2001) ▪ pin board (Markopoulos et al., 2003) ▪ scan board (Hindus et al., 2001) 	<ul style="list-style-type: none"> ▪ user's sense of awareness of the events/day-to-day things in another person's life ▪ user's sense of another person's awareness of events/day-to-day things in his/her life ▪ user's sense of awareness of the other's well-being ▪ user's sense of the other's awareness of his/her well-being
Look into each other's world	<ul style="list-style-type: none"> ▪ presence technologies ▪ convey descriptions of environments/people/events ▪ transmit images of environments/people/events → 	<ul style="list-style-type: none"> ▪ Hole-in-Space (Galloway & Rabinowitz, 1980 in Bly et al., 1993) ▪ media space (Bly et al., 1993) ▪ Telewindows (Heeter et al., 2001) 	<ul style="list-style-type: none"> ▪ presence measure <ul style="list-style-type: none"> ▪ user's sense of being present at the remote location ▪ user's sense of awareness of things happening at the remote location ▪ user's sense (s)he could look into the remote location
→ show things	transmit images reviewability	<ul style="list-style-type: none"> ▪ scan board (Hindus et al., 2001) ▪ pin board (Markopoulos et al., 2003) ▪ photo share concept (Greef et al., 2001) ▪ email attachments ▪ Instant Messaging attachments 	<ul style="list-style-type: none"> ▪ user's sense of the presence of the object

Table 6-2: Design and evaluation criteria resulting comments regarding communication activities (continuation)

Activity	Design implication	Example applications	Evaluation implication
share thoughts	<ul style="list-style-type: none"> ▪ convey thoughts ▪ user should be able to express himself 	<ul style="list-style-type: none"> ▪ telephone ▪ email ▪ letters 	<ul style="list-style-type: none"> ▪ user's sense of awareness of the other's thoughts ▪ user's sense of the other's awareness of his/her thoughts ▪ user's sense (s)he was able to express his/her thoughts
share feelings	<ul style="list-style-type: none"> ▪ convey emotions ▪ user should be able to express himself ▪ visibility (facial expression, body language) ▪ audibility (tone of voice) 	<ul style="list-style-type: none"> ▪ telephone ▪ email ▪ letters ▪ emoticons 	<ul style="list-style-type: none"> ▪ user's sense of awareness of the other's feelings ▪ user's sense of the other's awareness of his/her feelings ▪ user's sense (s)he was able to express his/her feelings
provide support	<ul style="list-style-type: none"> ▪ social presence (level I & II) ▪ support nonverbal communication ▪ physicality ▪ have contact → 		<ul style="list-style-type: none"> ▪ social presence (level I, II) measure ▪ user's sense (s)he was able to provide support ▪ user's sense of the other's support
listening	<ul style="list-style-type: none"> ▪ transmit nonverbal cues 		<ul style="list-style-type: none"> ▪ user's sense (s)he was able to listen
give advise	<ul style="list-style-type: none"> ▪ describe advise 		<ul style="list-style-type: none"> ▪ user's sense the other was listening ▪ user's sense (s)he is understood
touch, hug	<ul style="list-style-type: none"> ▪ physicality 	<ul style="list-style-type: none"> ▪ White Stone (Tollmar et al., 2000) ▪ inTouch (Brave et al., 1998) 	<ul style="list-style-type: none"> ▪ user's sense of being touched ▪ user's sense the feels touched
do effort	<ul style="list-style-type: none"> ▪ communicate effort ▪ provide information about effort context ▪ have contact 	<ul style="list-style-type: none"> ▪ handwritten letter/ post card 	<ul style="list-style-type: none"> ▪ user's sense the other took effort ▪ user's sense of the other's awareness of the effort
pay special attention let other know you are: thinking of him caring for him worrying about him	<ul style="list-style-type: none"> ▪ communicate thinking of ▪ communicate caring for ▪ communicate worrying about 	<ul style="list-style-type: none"> ▪ SMS ▪ White Stone (Tollmar et al., 2000) ▪ LumiTouch (Chang et al., 2003) ▪ In Touch (Hindus et al., 2001) ▪ Feather, Scent, Shaker (Strong & Gaver, 1996 in Gaver, 2002) 	<ul style="list-style-type: none"> ▪ user's sense the other was paying special attention to/ thinking of/ caring for/ worrying about him/her ▪ user's sense of the other's awareness of the fact that (s)he was paying special attention to/ thinking of/ caring for/ worrying about the other
be interested/show interest	<ul style="list-style-type: none"> ▪ communicate interest 		<ul style="list-style-type: none"> ▪ user's sense they other shows/is interested ▪ user's sense the other feels the user shows/is interested
remember special occasions (SO)	<ul style="list-style-type: none"> ▪ communicate thinking of the other 	<ul style="list-style-type: none"> ▪ post card/ e-card 	<ul style="list-style-type: none"> ▪ user's sense the other remembered the SO ▪ user's sense the other feels his SO is remembered
reassure well-being part of e/o lives	<ul style="list-style-type: none"> ▪ communicate well-being info ▪ visibility (facial expression, body language) ▪ audibility (tone of voice) ▪ have contact → 	<ul style="list-style-type: none"> ▪ ASTRA (Baren et al., 2003) ▪ digital family portrait (Mynatt et al., 2001) 	<ul style="list-style-type: none"> ▪ user's sense of awareness of the other's well-being ▪ user's sense of the other's awareness of the user's well-being ▪ user's sense (s)he is included in the other's life ▪ user's sense the other feel included in other's life
→ have contact		<ul style="list-style-type: none"> ▪ the white stone (Tollmar et al., 2000) ▪ Feather, Scent, Shaker (Strong & Gaver, 1996 in Gaver, 2002) ▪ SMS 	<ul style="list-style-type: none"> ▪ user's sense (s)he had/was in contact

Table 6-3: Design and evaluation criteria extracted from comments regarding the contact moment

Contact features	Design criteria	Example application	Evaluation criteria
recognition/ show/be yourself	<ul style="list-style-type: none"> ▪ personalize message ▪ presence traces ▪ visibility ▪ audibility 		<ul style="list-style-type: none"> ▪ user's sense of recognition of the other ▪ user's sense of being recognized ▪ user's sense of being able to show him/herself through the medium
feedback	<ul style="list-style-type: none"> ▪ let know when message arrives/ when message is 'read' ▪ capture & transmit the other's reaction ▪ capture & transmit facial expression ▪ capture & transmit body language 	<ul style="list-style-type: none"> ▪ pin board (Markopoulos et al., 2003) 	<ul style="list-style-type: none"> ▪ user's sense of awareness of the other's reaction to the communication ▪ user's sense of the other's awareness of the user's reaction
communicate emotions	<ul style="list-style-type: none"> ▪ capture & transmit emotion/moods/ feelings 		<ul style="list-style-type: none"> ▪ user's sense (s)he was aware of the other's emotions/feelings/mood (social presence level II) ▪ user's sense of the other's awareness of the his/her emotions/feelings/mood
evoke emotions		<ul style="list-style-type: none"> ▪ Feather, Scent, Shaker (Strong & Gaver, 1996 in Gaver, 2002) ▪ Kiss Communicator (Barley, 1999 in Gaver, 2002) 	<ul style="list-style-type: none"> ▪ user's evokes emotions during/after contact moment
interruption	<ul style="list-style-type: none"> ▪ asynchronous communication ▪ calm technology 	<ul style="list-style-type: none"> ▪ email ▪ calm technology (Weiser et al., 1995) 	<ul style="list-style-type: none"> ▪ user's sense the communication was interruptive ▪ user's sense the communication was interruptive to the other ▪ user's sense the other was sharing attention
obligation completeness relaxation media switch	<ul style="list-style-type: none"> ▪ cope with obligation 		<ul style="list-style-type: none"> ▪ user's sense the contact was complete
	<ul style="list-style-type: none"> ▪ various cooperative media for different purposes 	ubiquitous media (Buxton, 1997; Weiser et al., 1995)	<ul style="list-style-type: none"> ▪ user's relaxation during and after the contact moment

Table 6-4: Design and evaluation criteria extracted from comments regarding connectedness feelings

Connectedness feelings	Design criteria	Example application	Evaluation criteria
feel connected feel part of each others' lives			<ul style="list-style-type: none"> ▪ users' mutual sense of connectedness ▪ users' mutual sense of being included into each other's lives
psychological closeness feel important			<ul style="list-style-type: none"> ▪ users' mutual sense of closeness ▪ users' sense of being important to the other ▪ user's sense the other feels important

7 DISCUSSION

This research project explored the concept of connectedness in the context of geographical distance, and resulted in some guidelines for the design and evaluation of connectedness supporting technologies. Literature showed design efforts were already aiming at the development of connectedness supporting applications – e.g. awareness technologies like the digital family portrait (Mynatt et al., 2001) or the pin board (Markopoulos et al., 2003), and applications that facilitate attentive communication, like the White Stone (Tollmar, et al., 2000) or the Feather, Scent and Shaker (Strong & Gaver, 1996 in Gaver, 2002). This project provides some empirical evidence for the value of these kinds of applications. It also points out some other interesting focus points for the research and development of telecommunication technologies within the non-work related context. For example, the present commercially available telecommunication applications do not support emotional communication, the sharing of experiences, or the communication of effort very satisfactory.

The objective of this research project was to explore the concept of connectedness, in order to contribute to development of a theory of the concept of connectedness. For this exploration of the concept of connectedness we perceived it necessary to gain insight in peoples' thoughts and feelings regarding the communication activities within their social relationships. Since these thoughts and feelings cannot be easily quantified we used qualitative methods to reveal these thoughts and feelings.

To limit the scope of this project we chose to look at the concept of connectedness in the context of geographical distance. Therefore we compared data about remote, social relationships with data about geographically close, social relationships. For this comparison the qualitative data could have been quantified by frequency counts, revealing the differences between both groups participants. One assumption underlying this approach is, that the most frequent appearing issues reflect the greatest concern. However, frequencies do not necessarily reflect the nature of the data, especially with the low amount of participants used in this project. If, for instance an issue is mentioned twice as often by one group compared with the other this does not mean that the issue is more important to the first group as to the second group. Moreover, even the most important issues might be mentioned infrequently or not at all.

Another approach towards qualitative data that should be used with caution is the interpretative reading of the data. Qualitative research should result in awareness of the point of view of the participants, and not attribute the researchers view or misinterpretations. Therefore we tried to keep ourselves from misinterpreting the data by only describing the manifest content, but we had to limit the analysis to a selection of the content, that was of interest to the present project.

The quality of empirical research is assessed by looking at the reliability and validity of the collected data and the induced conclusions. To safeguard qualitative data-analysis multiple analysers should analyse the data more than once. Only one person analysed the data collected in this project. In search for the best way to analyse the content of the data she looked at the data in several ways on various detail levels, but she did not repeat a complete analysis cycle. Therefore, reliability of the empirical data and the induced conclusions cannot be assessed. However, the data gathered in this project show many similarities and no remarkable contradictions with the data collected in the ASTRA requirement study (Baren et al., 2003). This study explored people's attitudes towards communication with their family members. Although ASTRA took a different approach, a reasonable reliability of our data and conclusions can be assumed.

The ASTRA requirement study confirms that social, emotional and attentive communication evoke connectedness feelings and that practical communication does not. As our project does, the data gathered in the ASTRA requirement study indicates the importance of the exchange of information about the things happening in the other's lives in order to feel part of each other's lives; as well as the importance of physicality in emotional communication, and the importance of meaningful effort. But, it mentions neither spending time together nor the sharing of mutual, interactive activities and experiences, which our project identified as important needs within remote social relationships. Another difference with ASTRA is that the context of geographical distance in our project identified the need to look into each other's world. ASTRA did investigate participants' views on automatic capturing of context information, which can be used to facilitate looking into each other's environments. When confronted with the idea of automatic capturing, ASTRA's participants expressed their concern about privacy and control issues.

7.1 FURTHER RESEARCH

As this project provided a first exploration of the concept of connectedness a lot of work remains to be done. For one thing we did not follow up on the data gathered during the diary study. And we did not subject our conclusions to the views of participants. Therefore, for instance a focus group discussion about our conclusions could substantiate them.

In the theoretical framework we presented in chapter 1 we addressed the relationship between the concept of connectedness and the complementary concepts of social presence and social awareness. The data resulting from the studies conducted in this project confirm the existence of these hypothesized relationships: both social presence and social awareness of another person can increase connectedness feelings within primary social relationships. However, further investigation of the relationships and boundaries with social presence and social awareness is needed.

This project gives a first impression regarding the conceptualisation of the concept of connectedness. The empirical part of this project uncovered some variables of influence to the concept of connectedness. Future research should investigate the influence of these and other variables further and should look into the social and psychological phenomena behind the concept of connectedness.

In addition, the evaluation and design implications are open to elaboration. The evaluation implications should be transcribed into a measurement of the concept of connectedness. And the design implications can be used for development of connectedness supporting technologies. Finally, the evaluation of connectedness supporting technologies will also provide knowledge of the concept.

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STAYING IN TOUCH OVER DISTANCE
An Exploration of
the Concept of Connectedness

Appendices

APPENDIX A: EMAIL QUESTIONNAIRE

Beste mensen,

Voor mijn afstuderen ben ik bezig een onderzoek op te zetten naar "staying in touch", het contact onderhouden met vrienden, familie, de mensen die belangrijk voor je zijn.

Om wat meer grip te krijgen op het begrip "staying in touch" wil ik jullie vragen om met me mee te denken over wat "staying in touch" voor jullie betekent. Hoe jullie dit zouden omschrijven?

- Met wie? Beschrijf de relatie tussen jou en de perso(o)n(en) met wie je "in touch" bent. (de frequentie van jullie contact, de afstand, hoe lang ken je elkaar al, waar ken je elkaar van, etc...)
- Op welke manier blijf jij "in touch" met deze personen?
- Wat is er voor nodig, jou het gevoel te geven dat je "in touch" bent met iemand?
- Kun je dat gevoel beschrijven?

De mensen die op dit moment in het buitenland zijn wil ik vragen om ook na te denken over wat "staying in touch" voor jullie betekent nu jullie in het buitenland zijn.

- Hoe houden jullie contact met het thuisfront?
- Wat is hierbij belangrijk voor jullie?
- Is dit contact bevredigend? Wat wel? En wat zou je liever anders zien?

Je zou me een eind op weg helpen als je hier even over na zou willen denken

Dank je wel,
Froukje

APPENDIX B: PARTICIPANT RECRUITMENT DIARY STUDY

Dear Mr./Mrs.,

In January 2003 a study of the concept of "staying in touch" will take place. This study is part of my graduation project in the study program Human Technology Interaction of the Department of Technology and Society at the Eindhoven University of Technology.

Currently many communication activities are supported by telecommunication technology. Especially those who are separated from the people that are dear to them make use of these technologies. This way they can "stay in touch" with their friends and relatives in spite of the geographical distance. To gain deeper understanding of how people interact at distance and how telecommunication technologies support and facilitate this, I am looking for individuals who are currently living and working or studying abroad, away from their family and friends, and who are willing to participate in this study.

The study will consist of two parts. During a 10 day period in the beginning of January 2003 participants will be asked to keep a diary log of their communication activities with friends and relatives. After each communication activity participants will be asked to note some details in their logs concerning the communication partner, the relationship with the communication partner, the topic of and reason for the communication, the medium used and their satisfaction with the medium and the communication.

In February 2003 participants will be invited to further discuss these topics in a group of 3 to 5 participants.

Under the participants a gift certificate of Amazon.com will be raffled.

If you are:

- currently staying abroad, separated from your friends and relatives,
- willing to keep a diary log of your communication activities during a 10day period in January 2003,
- willing to take part in a group discussion on one morning or afternoon in the beginning of February 2003,

you can send an email to F.v.lanen@student.tue.nl. Please state in your email the reason for your stay in the Netherlands (e.g. study) and the period of your stay.

All information you provide will be used only for the purpose of this study. Your personal information will be dealt with in strictest confidence and will not be known by others but myself and my supervisors dr. P. Markopoulos and drs. W.A. IJsselsteijn.

With kind regards,

Froukje van Lanen

APPENDIX C: RELATIONSHIP INTERVIEW

INSTRUCTION

Dear participant,

First of all I'd like to thank you for your interest in this study. Let me start by explaining what this study is about and what I expect from you. It is very important to me that you complete all parts of this study. And don't drop out. If you have any objections, please say so now.

This study is part of my graduation project. My aim is to gain knowledge about the meaning of "staying in touch" with family and friends. What does it mean to people to be in touch with someone? Of what importance are communication and telecommunication media to the special connection between two people?

This study will consist of three parts. First of all I will interview you. After this interview I will ask you to keep a diary of your communication activities towards the people back home. During 10 days you have to answer a few questions after each contact moment towards or from people back home (telephone conversation, email, letter, etc.) This will be further explained after the following interview.

In February the study will be concluded with a group discussion. In groups of 3 or 4 persons the subject will be discussed further and will be elaborated on.

This study focuses on the relationships with the important people in your life at this moment, and on your perception of these relationships. I can image that this is very personal. I don't expect a complete lay out of your personal communication with these persons and your feelings regarding this communication. Nevertheless, it is very important to me that you give a broad outline of the topic of the communication and your feelings towards this communication.

All information you provide during this study will be used for the purpose of this study only. Your personal information will be dealt with in the strictest confidence and will not be known by others but myself and my supervisors at the TU/e.

Do you have any questions or doubts?

Prior experiences

10. Have you been staying abroad for a longer period before? Explain.

11. Do your prior experiences abroad influence the way you keep in touch with your relatives and friends back home? Explain.

Available media/ media use

12. Which media do you use to stay in touch with your relatives and friends back home?
(More than one answer possible)
- Face to face
 - Telephone
 - Voicemail, answering machine
 - Email
 - E-cards
 - Instant messaging (MSN, AOL, ICQ, ...)
 - Letter
 - Postcard
 - Fax
 - SMS
 - Internet conferencing (e.g. Netmeeting)
 - Internet (website)
 - Sending of digital pictures
 - Otherwise, namely _____
-

8. What kind of information do you want to share with this person? (For instance your daily activities, special events, your thoughts, problems, emotions, appearance, etc.)

9. What kind of information would you like this person to share with you? (For instance your daily activities, special events, your thoughts, problems, emotions, appearance, etc.)

10. On a scale from 1 to 7, how much do you feel in touch with this person? Why/why not?

0 0 0 0 0 0 0
 1 2 3 4 5 6 7
 Not at all Very much

11a. How do you usually (when your not abroad) stay in touch with this person?
 (Put the options in order of priority)

- | | | | |
|--------------------------|---------------------------------------|--------------------------|---|
| <input type="checkbox"/> | Face to face contact | <input type="checkbox"/> | Postcard |
| <input type="checkbox"/> | Telephone | <input type="checkbox"/> | Fax |
| <input type="checkbox"/> | Voicemail | <input type="checkbox"/> | SMS |
| <input type="checkbox"/> | Email | <input type="checkbox"/> | Internet (website) |
| <input type="checkbox"/> | E-cards | <input type="checkbox"/> | Sending of digital pictures |
| <input type="checkbox"/> | Instant messaging (ICQ, AOL, MSN,...) | <input type="checkbox"/> | Internet conferencing (e.g. Netmeeting) |
| <input type="checkbox"/> | Letter | <input type="checkbox"/> | Otherwise, namely _____ |

11b. Why this order?

12. How do you stay in touch with this person now that you are abroad?
(Put the options in order of priority)

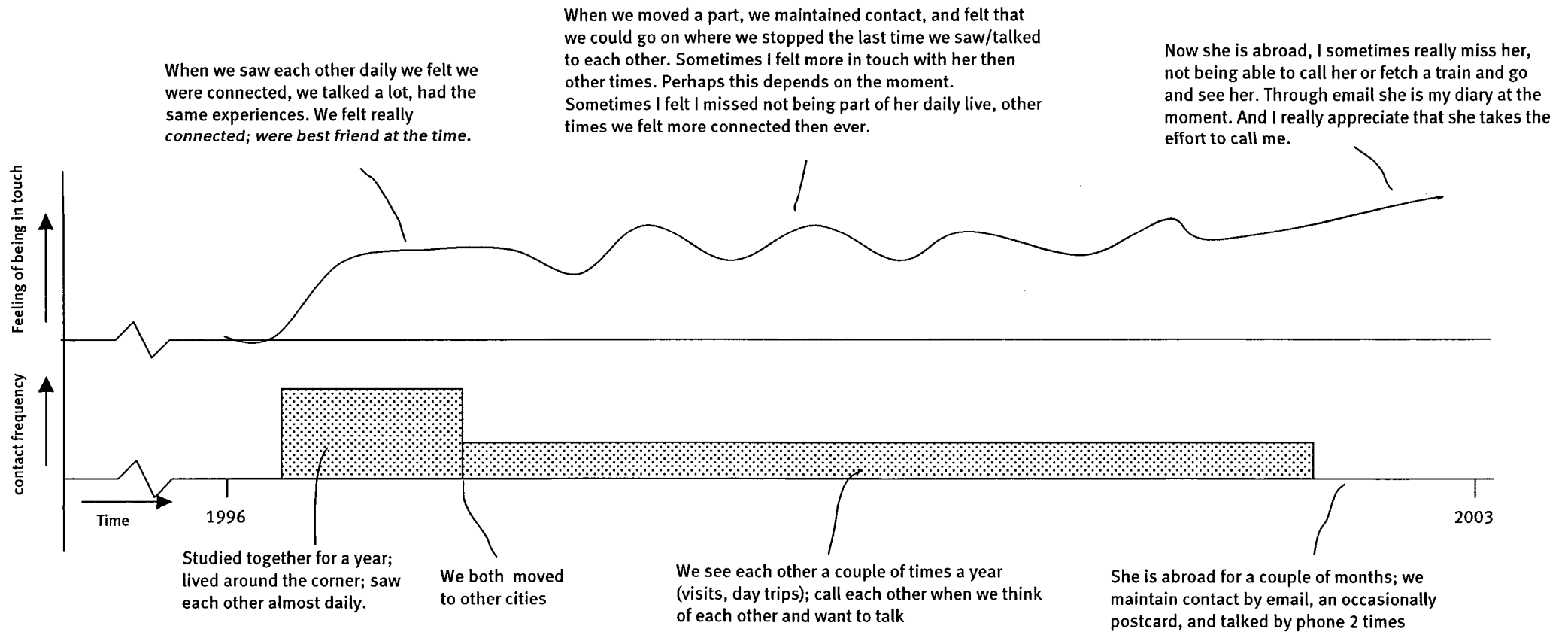
- | | | | |
|--------------------------|--|--------------------------|--|
| <input type="checkbox"/> | Face to face contact | <input type="checkbox"/> | Postcard |
| <input type="checkbox"/> | Telephone | <input type="checkbox"/> | Fax |
| <input type="checkbox"/> | Voicemail | <input type="checkbox"/> | SMS |
| <input type="checkbox"/> | Email | <input type="checkbox"/> | Internet (website) |
| <input type="checkbox"/> | E-cards | <input type="checkbox"/> | Sending of digital pictures |
| <input type="checkbox"/> | Instant messaging
(ICQ, AOL, MSN,...) | <input type="checkbox"/> | Internet conferencing (e.g.
Netmeeting) |
| <input type="checkbox"/> | Letter | <input type="checkbox"/> | Otherwise, namely _____ |

12b. Why this order?

13. On a scale from 1 to 7 how satisfactory is this contact for the both of you? Explain.

0	0	0	0	0	0	0
1	2	3	4	5	6	7
Not very satisfactory						Very satisfactory

RELATIONSHIP DIAGRAM



APPENDIX D: DIARY STUDY

Dear participant,

In front of you lies the communication activity diary. The idea is that during the next 10 days you fill in a log form after every contact moment with your friend or relatives back home. With 'contact moments' I not only refer to a telephone conversation, a conversation by email, instant messaging or internet conferencing, but I also refer to send or received e-mails, letters or postcards, left messages etc. You don't have to report every contact moment you have during the day, but only those moments with your friends and relatives back home. Work or study related communication is not of interest for this study.

It is of importance that you fill in a log form right after the contact moment, because your memories of this specific moment will be still fresh. It is no disaster if you happen to forget this once or twice. But it is important for me to get a complete picture. So each contact moment with each friend or relative back home is of importance, not only the profound communication but also the shallow.

This diary concerns your personal communication with the most important persons in your life. I can imagine that this can be a sensitive topic. So I don't expect a complete lay out of your personal communication with these persons and your feelings regarding this communication. Nevertheless, it is very important to me that you give a broad outline of the topic of the communication and your feelings towards this communication. All information you provide during this study will be used for the purpose of this study only. Your personal information will be dealt with in the strictest confidence and will not be known by others but myself and my supervisors at the TU/e.

A log form consists of 9 questions (see example). For a few questions you will be asked to indicate your answer at a scale from 1 to 7 and to illustrate this. It is very important that you do illustrate these answers with your own words. The more you write, the better! This applies to all questions.

During the next 10 days I will contact you regularly by phone or by email. If you have any questions in the mean time you can contact me by mail F.v.Lanen@student.tue.nl or by phone 9.00 and 17.00 at 040-2472922

*Good luck!
Froukje van Lanen*

APPENDIX E: LABEL EXPLANATION

The replies on the email questionnaire and the transcriptions of the tape-recorded interviews and handwritten diaries are perpetuated on a CDrom. During the discussion of the results, quotes extracted from this data will be used to illustrate the findings. These quotes will be labelled in order to be able to retrace them in the data. The labels will have the following format: [RI2Par10] quotes retrieved from an interview or questionnaire and [DS2Par6-1;18:00]. The first two letters represent method used to capture the quote:

EQ: email questionnaire

GI: general interview

RI: relationship interview

DS: diary study

These two letter are followed by the participant number and, if necessary, the first 3 letters of the name of the person the interview or diary log refers to. The label is closed by the question number in case of an interview or questionnaire, and with the date and time when the quote is extracted from a diary entry. Figure E.1 illustrates this.

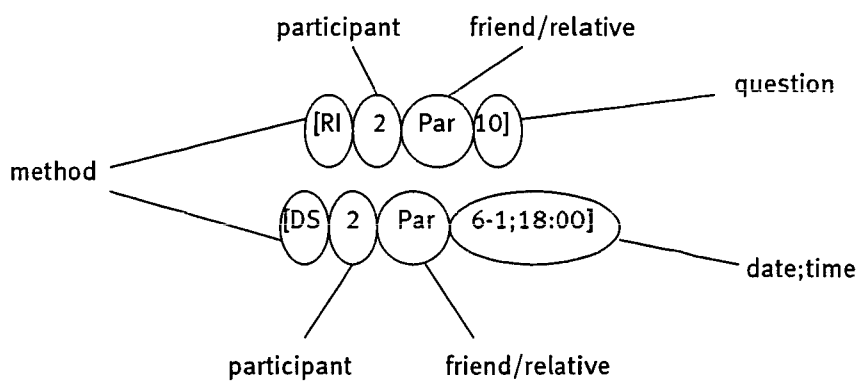


Figure E.1: Label explanation