Like a window in your living room:

Video-mediated communication for extended families separated by space

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ABSTRACT

Physical distances between close relations are increasing, since people tend to move and travel more and further than before. The distances might be difficult to overcome and this thesis is investigating the possibilities of video-mediated communication when it comes to intergenerational group communication in a domestic setting. The research question is "*What communication patterns emerge around TA2 Lite as it is used between extended families separated by space?*"

The thesis is done in cooperation with the TA2 project, and covers evaluations of a prototype called TA2 Lite, which allows video-mediated communication through the family TV. The TA2 Lite system was tested, for a longer period of time, by four groups of extended families separated by space. Apart from being a high quality video communication system, TA2 Lite also contains applications for mutual activities.

Methods used for collecting results are semi-structured interviews, diaries and observations. Different theoretical concepts are used for analysis, especially interaction rituals and social presence.

It was found that communication patterns often were adopted from typical face-to-face behavior but that there were some restrictions, generally in the area of nonverbal communication. The fact that the family TV was used impacted behavior around seating arrangements, interpersonal distances and turn-taking. Social presence theories might also explain some of the communication patterns – we don't have access to as many cues in video-mediated communication as in face-to-face communication.

The participants did however enjoy communicating through the system and experienced it as like they were in the same room. The fact that entire groups could interact, at a distance, was especially seen as adding a dimension to their current communication possibilities. There was especially more contact between certain members of the extended families, generally grandparents and grandchildren and the activities contributed to creating a mutual focus of attention for them. Conclusively, video-mediated communication seems to be a good way for extended families separated by space to keep in touch.

Keywords: extended family, group communication technology, interaction rituals, social presence, video-mediated communication

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LIST OF ABBREVIATIONS:

CMC   Computer-Mediated Communication

FtF   Face-to-Face (communication)

NVC   Nonverbal Communication

TA2   Together Anytime, Together Anywhere

VMC   Video-Mediated Communication

1. INTRODUCTION

In our globalized world, people are constantly moving – as refugees, tourists or just doing business (Eriksen 2007: 91-107). In the words of Wellman and Haythornewaite (2002: 33): *"Most friends and relatives with whom we maintain socially close ties are not physically close. These ties are spread throughout the metropolitan area, and often on the other side of countries or seas."* Whilst distances between people keep increasing, they struggle to keep in touch and with longer distance, contact is less frequent (Mok & Wellman 2007).

At the same time the population is ageing, and people are likely to have more generations in their extended family, though family and kinship is not as important as it used to be, due to individualization (Hjälm 2011b). These are but a few changes in the world we are living in today.

We do however have access to new communication technology, e.g. e-mails and video conversations and thus there are possibilities to keep in touch over long distances. The existing communication technology is however mostly designed for individuals though humans often meet in groups and find identity in groups, such as family (Wellman & Hogan 2006: 164-65). This is the reason behind the term *"networked individualism"*; as Wellman et al (2003) puts it: *"It is I-alone that is reachable wherever I am: at home, hotel, office, highway, or shopping center. The person has become the portal."* Most communication technology is also developed to support task oriented rather than relational communication (Frey 2005: xiii-xiv). This is where the TA2 project enters the picture.

1.1. THE TA2 PROJECT

TA2 is the abbreviation of *"Together Anywhere, Together Anytime"* and is *"an Integrating Project within the Seventh Framework Programme for Research and Technological Development (FP7) and receives funding from the European Commission."* (TA2 2011)[1]. The vision of the project is: *"Making communications and engagement easier among groups of people separated in space and time."* (TA2 2011). There is thus a focus on relational communication in groups as opposing the mainstream communication technology that supports task oriented communication for individuals. TA2 explores new media techniques in order to reach their vision. The focus is on high quality video communication for groups, connecting several locations at the same time, with orchestration. *"Orchestration refers to automatic capture and editing of the audio-visual content that mediates the communication."* (TA2 2011). The project researches both synchronous and asynchronous communication: an example of the latter is MyVideos – *"a set of tools and a secure infrastructure that people can use to combine different people's video clips and edit their own video compilation."* (Kort 2010a). This thesis will however only concern synchronous communication.

There is also a belief in TA2 that activities can be important in communication and the project is also looking into enabling applications such as story reading and playing board games at a distance (TA2 2011). The activity might be an excuse for the interaction to take place and if you don't live close anymore, activities might be harder or impossible to perform, which in

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[1] http://www.ta2-project.eu/

turn might affect the possibilities to keep the relationship going. The idea behind this is not to replace actual meetings, but to serve as an aid to keep groups together in between.

Starting in the summer of 2011 a prototype called "TA2 Lite" was evaluated in domestic settings in Sweden by the TA2 partner of the Interactive Institute[2]. These evaluations are the focal point of this thesis. TA2 Lite is a high quality video communication system, making use of a regular family TV. As a prototype it is not a finished product but a more simple system used in order to test different concepts. It also lacks several functions compared to the full TA2 system, most importantly orchestration and the possibility to connect more than two places to each other at the same time. TA2 Lite does however still provide higher quality than what is generally available for families (e.g. compared to Skype). It is also able to pick up both sound and video from a large part of the room, allowing groups to participate and provides people with the possibility to perform shared activities on an iPad. With TA2 Lite the application of *Storytelling* was tested. *Storytelling* enables book reading, with the same book being displayed on the iPad in both locations and if you flip the page on one iPad, the page also changes on the other.

The purpose of testing TA2 Lite was *"to evaluate the viability of TA2 concepts through the chaotic lens of real life and the multifaceted media ecology that is already present in the daily lives of many individuals"* (Kort 2010b: 33). The project needed to know if people actually enjoyed having group video communication with shared activities, if people kept using it after the initial novelty effect and how it was integrated into a domestic environment. The full system could not be tested outside of research facilities and therefore TA2 Lite was developed.

Different parts of the project also focused on different types of relationships and TA2 Lite and the associated activity of *Storytelling* focused on intergenerational relations and the evaluations were thus conducted in extended families.

1.2.   PURPOSE AND RESEARCH QUESTION

The purpose of this thesis is to investigate the possibilities of video-mediated communication when it comes to intergenerational group communication in a domestic setting. It's to examine what communication patterns emerge around the new communication technology. The research question to guide the research is:

What communication patterns emerge around TA2 Lite as it is used between extended families separated by space?

Since the term "extended family" is used in the question it is also implicitly understood that this is dealing with groups and group communication, since "extended family" is a type of group. Extended families are to some extent also seen as a limitation of the study, since the evaluations were only conducted in this type of relations.

Communication patterns will be used to refer to aspects such as small patterns in the communication, e.g. how people divide the turn to speak, as well as larger patterns that are

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[2] *"The Interactive Institute is a Swedish experimental IT & design research institute…"* Institute, Interactive. 2011. http://www.tii.se/.

surrounding the communication such as how the communication is initiated or who is participating in the communication. Since TA2 focuses on activities there will also be some discussion around the activities in relation to the communication.

The study is limited to video-mediated communication using TA2 Lite between extended families that are separated by space, which is also part of the research question. All participants were Swedish and it is expected that Swedish culture will affect the study and different results could be retrieved elsewhere.

2. THEORETICAL BACKGROUND & RELATED STUDIES

This chapter focuses on relevant research. The first section (2.1) deals with communication in groups, interaction rituals and ritualistic aspects of communication. Then there will be a special focus on the extended family in a Swedish context (2.2), which is followed by a section on computer-mediated communication and especially the concept of social presence (2.3). A final section contains some general comments concerning related studies (2.4).

2.1. GROUP COMMUNICATION, IDENTITY AND RITUALS

Communication often takes place in groups and this section will first discuss what communication is and then focus on group identity and rituals in relation to communication. This is followed by a section on ritualistic aspects of communication.

2.1.1. THE CONCEPT OF COMMUNICATION

Communication is a difficult term to define, since it has a great number of definitions by researchers from very different backgrounds, such as sociology, communication, linguistics or computer studies. The origin of the term is the Latin "communico" that means: *"communicate; impart; share with; receive a share of"* (Morwood 2001a: 28). The vast number of definitions can be divided into different views and for a long time the *transmission or transportation view* has dominated the field; Carey (2008: 12) explains it:

> *It is formed from a metaphor of geography or transportation. In the nineteenth century but to a lesser extent today, the movement of goods or people and the movement of information were seen as essentially identical processes and both were described by the common noun "communication".*

In this view effectiveness of communication is in focus; how well information is transported across space (Rothenbuhler 1998: 123). The Shannon and Weaver model is central in this view (Shannon & Weaver 1949). In that model a message is sent by someone to someone, using some kind of transmission and receiving equipment. There can be noise in the transmission and the message might alter or disappear. The focus is just on transportation of information and the model is often criticized for being too simple, for example since it doesn't take into account that both parties might be active in the conversation (Ong 2002: 172).

The transportation view is not enough for this thesis and another view of communication will also be used – that of *communication-as-ritual*. The goal of communication is not necessarily just to share information. Carey (2008: 15) explains: *"In a ritual definition communication is linked to terms such as 'sharing,' 'participation,' 'association,' 'fellowship,' and 'the possession of a common faith.'."* The ritual view is about maintenance of society and

relationships, whilst the transportation view is all about change (Rothenbuhler 1998: 123-25). Performing the same ritual, like in a greeting, might be important in reassuring the existing relationship, though no information as such is actually being exchanged.

In this thesis both views of communication will be of importance. The views are not mutually exclusive, but can be combined. Transmission will be of importance, since this thesis does investigate mediated communication and that "information", in the form of cues, might not reach the receiver. The ritual view will also be important since the aim is to support maintenance of relationships.

We also don't just receive a message but interpret it according to the context and our knowledge of the sender (Huang 2007: 13-14). The context is affected by the communication medium, which is the reason behind the concept of *common ground* – what we in common use and jointly construct as a ground for our conversation (Clark & Brennan, 1991). Before a conversation the participants have a common ground consisting of assumptions of what both parties already know and through the conversation this is updated. Often it takes more than one turn to reach mutual understanding and we often check our own understanding and that messages we send really have been understood as intended. The communication medium, e.g. email, phone etc., puts constraints on the common ground. Clark & Brennan (1991, p. 146) explains: *"People manage to communicate effectively by all the media we have mentioned, but that does not mean that they do so in the same way in each medium"*. Constraints of communication media is a focal point of this thesis.

2.1.2. GROUP IDENTITY AND RITUALS

As mentioned communication often takes place in groups and a typical feature of group interaction is that the group divides into subgroups, having their own conversations and by Goffman's (1990: 109) words these groups *"constantly shift in size and membership"*. At one party one might be a part of a wide diversity of groups. A group can be defined as *"two or more people who, for longer than few moments, interact with and influence one another and perceive one another as 'us'."* (Myers 2002: 282).

More stable groups might share an identity. Identity can be defined as *"a complex personal and social construct, consisting in part of who we think ourselves to be, how we wish others to perceive us, and how they actually perceive us."* (Wood & Smith 2001: 47). One type of identity is group identity, defined as: *"...the product of collective internal definition."* (Jenkins 2004: 82). Family identity is an example of group identity. The physical location of the home is important for the family, which generally identifies strongly with the home in itself and its objects (Morley 2000: 24-25). We bring the objects with us when we move, and they help us create a feeling of home in new places.

The group is bound together by cohesiveness (Hogg & Vaughan 2005: 291). Identity and cohesiveness could be seen as aspects of togetherness, which is central for TA2. Based on the interaction ritual scholars, treated below, TA2 assumes that the cohesiveness between the group members increases at times of interaction rituals and decreases in between (Kort 2010a: 13-14). Interaction ritual is a type of activity, vital for group identity.

Interaction rituals started with *Durkheim* (1912/1915), who basically wrote about religious, grand rituals and was the one who identified how rituals lead to group cohesion. *Goffman* (1967/1982) changed the scope of rituals to include small everyday matters like greetings or compliments and was the first to use the whole term "interaction ritual". In a later work by the same author the ritualistic aspect was found in *"The pre-established pattern of action which is unfolded during a performance and which may be presented or played through on other occasions ..."* (Goffman 1990: 27).

Collins (2005) based his work on both of the others and included both scopes in his idea of the interaction ritual concept. He claimed that an interaction ritual contains four ingredients: *"group assembly (bodily co-presence)", "barrier to outsiders", "mutual focus of attention"* and *"shared mood"* (Collins 2005: 48). An interaction ritual happens when the ingredients are fulfilled and it is important to understand that the ingredients usually don't coincide with the goal of the activity in itself. The results of rituals are for example "*group solidarity*" and "*emotional energy*"*.* According to Collins (2005: 50-53) a failing ritual can however be energy draining.

Problematically, Collins (2005: 48), as mentioned, assumes that interaction rituals require the participants to be in the same place (*bodily co-presence*):

> *When human bodies are together in the same place, there is physical attunement: currents of feeling, a sense of wariness or interest, a palpable change in the atmosphere. The bodies are paying attention to each other, whether at first there is any great conscious awareness or not. (Collins 2005: 34)*

Ling (2008) on the other hand argues for the possibility of performing interaction rituals through media – in his case mobile phones, and it is also assumed by TA2 that this is possible (Kort 2010a). Interaction rituals have also been considered an explanation of "togetherness" and by providing possibilities for activities the project is aiming at providing a possible *mutual focus of attention* that could be an aid in creating an interaction ritual.

Collins (2005: 48-50) does not really seem to imply that any *pre-established pattern of action* is needed, which was central for Goffman (1990). Collins (2005) did however put *"common action or event (including stereotyped formalities)"* as a possible input into the ingredients of interaction rituals, but he does not consider it a core ingredient in itself. The different scholars focus on different aspects of interaction rituals. Durkheim (1912/1915) and to some extent Goffman (1967/1982) focus more on how human beings constantly perform different types of patterned interactions and how this often leads to group cohesion; for them an (interaction) ritual is found in the patterns. Collins (2005), however, seems to start in the other end and try to understand why it is that certain activities have group cohesion as an outcome; for him his ingredients and outcomes are crucial and patterns might not be necessary.

The rituals in focus of Goffman (1967/1982) and Collins (2005) are often very small, such as how humans divide the turn how to speak. To clarify the confusingly wide scope of interaction rituals that extends from small scale patterns of interaction to grand religious rites Rothenbuhler's (1998: 4-5) distinction between ritual as a noun or as an adjective might be useful:

On the one hand are rituals, rites and ceremonies as distinct events, types of activities, or social objects. On the other hand are the ritual or ceremonial aspects of otherwise ordinary and ongoing activities, processes and events. In referring to the first case, we use ritual as a noun; in reference to the second, ritual becomes an adjective. (Rothenbuhler 1998: 4)

Ritual-as-noun could be celebrating a birthday or eating dinner, whilst ritual-as-adjective would be the communication rules or small patterns in the interaction. It is worth mentioning that this author also finds the rituals in the patterns and not primarily in group cohesion. Adjective rituals will be considered communication patterns in this thesis, whilst noun rituals are not communication patterns in themselves but are rather associated with certain communication patterns, such as who is involved in the ritual.

In fact there might be even more layers than nouns and adjectives in one ritual. For example the ritual of Christmas might be an event that covers several days. Then there is a special meeting on Christmas Eve (when Swedish people generally celebrate Christmas), which is a ritual in itself and on a lower level this ritual contains several smaller rituals such as having Christmas dinner together, watching the traditional Disney show on TV, Santa Claus coming to hand out the gifts etc. Then on the lowest level the people involved follow rituals-as-adjectives such as how to greet each other and how close you stand to other people when you speak with them. These adjective rituals might also be affected by the noun ritual – for example you greet people by saying "God Jul" (Merry Christmas) at Christmas or a birthday child might be allowed to get more attention than normally.

Wolin and Bennett (1984: 2-4) wrote about different types of family rituals, i.e. noun rituals in families and they also find the ritual in the patterns. They divided family rituals into three categories. The three are different in focus, size and purpose. "*Family celebrations*" are often cultural (religious) events and rites of passage, such as Christmas and baptisms. The "*family traditions*" are more typical for the specific family, e.g. what the family does for holidays and birthdays. Finally, "*patterned family interactions*" are what the TA2 project is mostly dealing with – frequent events that do not involve much conscious planning, such as having dinner together, storytelling, or playing a game. Wolin and Bennett (1984: 8-10) also conclude that it is important for families to use rituals and to adapt rituals as the family ages, or these will fail. Sometimes physical presence in the home might be especially important when it comes to the rituals and family identity (Morley 2000: 19). Certain rituals, like Christmas, require presence in the home.

Conclusively, rituals are often found in the fact that certain patterns are followed and by performing rituals a group can gain group cohesion and in extension group identity and this could be seen as feeling some sense of togetherness. Rituals come in many sizes and whilst a noun ritual is an event in itself, adjective rituals are the small scale communication patterns that are followed in different interactions.

2.1.3. RITUALISTIC ASPECTS OF COMMUNICATION

As mentioned rituals-as-adjectives are the small ritualistic patterns in communication. Communication is in fact full of rules, norms or patterns that we follow:

...in order for communication to exist, or continue, two or more interacting individuals must share rules for using symbols. Not only must they have rules for individual symbols, but they must also agree on such matters as how to take turns at speaking, how to be polite or how to insult, to greet and so forth. (Shimanoff 1980: 31-32)

These rules or patterns are generally unspoken but rather elaborate and they are often followed without awareness (Weimann & Knapp 1975). We also often judge people based on how they follow these rules; e.g. someone is rude if they interrupt.

These ritualistic aspects of communication come in many forms and variations. Grice (1975: 45) discussed grand and general rules (maxims) under the cooperative principle: *"Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged."* Other rules are smaller and more particular like the distance you are supposed to keep between yourself and the person you talk to or the forms of address that should be used.

Feedback and turn-taking are examples of patterned phenomena in speech. *Feedback* is the audible and visible signals a listener is sending to convey that the message is being received (Einarsson 2004: 242-43). *Turn-taking* is how the turn to talk is divided between communicators. A turn is the time a speaker has the right or duty to speak (Einarsson 2004: 242). When speaking; the end of a turn is marked by less gesturing, sinking tone and increased looking at the listener(s). The listener can also show that he/she wants to take the turn by leaning forward, breathing in or possibly interrupting by starting to speak. The pauses between turns (unless there is an interruption) are tiny, but still measurable in micro-seconds (Wardhaugh 2010: 317-18).

Many rituals-as-adjectives fall under the concept of nonverbal communication (NVC). This concept contains a vast amount of phenomena which also makes it difficult to define, in fact the word "nonverbal" tells us what it is not rather than what it actually is (Ketrow 2005: 252-53). NVC works together with the verbal communication; complementing, enhancing and sometimes substituting. Parts of it might also be more or less redundant since we often send the same message through many channels. The nonverbal rituals will be important for this thesis since it is dealing with video-mediated communication and hence cues that are audible or visible can be transmitted, though maybe not perfectly; the verbal communication is however generally transmitted rather well.

There are lots of different types of cues that together make up NVC: facial gestures, eye gaze and mutual gaze, pupil size, lip movements, movements of arms and hands, movements of legs and feet, posture, distance, spatial orientation, clothes and adornments, touch, smell, taste and nonlinguistic sounds (Allwood 2002: 6-8). The functions of NVC are many and there is no simple relation between function and cue. It can for example be used for own communication management or to express emotions and attitudes or identity.

NVC is not as controllable as verbal communication, in the words of IJsselsteijn et al (2003) *"...the nonverbal channels seem to be less controllable than the verbal channels, i.e. they are more likely to 'leak' information about feelings."* For this reason we tend to trust NVC more

than verbal communication, when these are in conflict; we believe the less controllable to be more authentic and real (Allwood 2002: 3). The sender is normally less aware than the receiver of the cues the former is sending, but the receiver is also affected by some cues like pupil dilation and gaze shifts, without awareness (Argyle 1988: 5).

An important nonverbal area in the case of video-mediated communication (VMC) is *kinesics*, which includes gestures, posture, facial expressions and eye behavior (Ketrow 2005: 255-65). It's important since these cues are visible. *Gaze* can indicate if we are available for communication and help in handing over the turn (Knapp & Hall 2006: 352, 241). Mutual gaze or eye contact makes us feel connected to each other.

Spatial behavior concerns how we behave around space. *Proxemics* is the term for how we want to have people at a certain distance from us, depending on our level of acquaintance (Argyle 1988: 169-70). If someone gets to close you feel uncomfortable and move backwards; if someone is too far away more gaze can be used to decrease the feeling of distance (Knapp & Hall 2006: 352, 241). *Orientation*, is how we place ourselves in relation to others (Argyle 1988: 173-76). Sitting next to each other is connected to co-operation and informality, whilst sitting opposite each other is interpreted as more formal and competition, though there seem to be some exceptions like eating, when we normally choose to sit opposite each other. Proxemics and orientation are connected and also to intimacy, which means that if one is affected we might try to change the other; if we for example face each other we might make sure the distance between us is larger (Argyle 1988: 171). Another area that falls under spatial behaviour is *territorial behavior* i.e. how we consider places our own; individuals might for example, have their own room or their special seat at the dinner table (Argyle 1988: 180-83).

Touch or *haptics* is an important part of nonverbal communication and has an ability to evoke very strong emotions (Knapp & Hall 2006: 264-65). It is however versatile:

> *Touching may be the most ambiguous of the nonverbal codes because it's meaning depends so much on the nature of the relationship, the age and sex of the other, and the situation, as well as where we are touched, how much pressure was applied, whether we think the touch was intentional or accidental, and how long the touch lasted. (Trenholm & Jensen 2000: 70).*

These ritualistic aspects of communication will be further discussed in relation to video-mediated communication in section 2.3.2.

2.2. THE EXTENDED FAMILY AS A GROUP

TA2 wants to support relationships that could be defined as *strong ties* – family and close friends (Kort 2010a). Strong ties is a concept adopted from (Granovetter 1973). The evaluations were performed in extended families.

2.2.1. THE CONCEPT OF FAMILY

Family comes from the Latin word "familia", which can be defined in various ways, for example: *"household"*, *"all persons under the control of one man"* or *"servants or slaves belonging to one master"* (Morwood 2001b: 54). The concept has change since and especially during the last century. Today family is more of a choice than it has been; we are freer to

enter and quit relationships depending on affection (Askham et al. 2007: 187-89). The related concept of marriage has also changed lately in many countries, with divorces increasing and acceptance of children being born out of wedlock. Another recent change is that homosexual couples are allowed to get married in some countries, including Sweden.

Different foci of research give three main areas of family definitions; form, function and interaction:

The *form or structural definitions* focus on who is in the family and how these people are connected, generally biologically, to one another (Segrin & Flora 2005: 5-7). These definitions are often relatively simple and commonly used in legislation.

Function or task-oriented/psychosocial definitions instead focuses on tasks commonly taking place in a family such as "socialization, nurturance, development, and financial and emotional support" (Segrin & Flora 2005: 7).

The final area of *interaction or transactional definitions* defines family as: *"A group of intimates who generates a sense of home and group identity, complete with strong ties of loyalty and emotion, and an experience of a history and a future."* (Fitzpatrick & Caughlin 2002: 728). These definitions concentrates on how the communication works and flows, on group feeling, family rituals and stories (Segrin & Flora 2005: 9-11).

We probably all know of families that might not be defined as such according to one or more of the approaches above. Linguistic research has found that we use prototypes in categorization (Ungerer & Schmid 2006: 14-23). Something is more or less typical within a category; it is more or less close to the prototype. Most people pick out the same bird (a robin, for the English) as being typical for the category "bird" or a certain shade of blue as being typical for the category "blue". Boundaries however are difficult to define, for example - how many trees make a forest?

Maybe it is the same with family. It is easier to see the typical, than defining the boundaries. A combination of the definition types above is likely the prototype of family, which makes the prototypical (Swedish) family consist of a father and a mother, who take care of, raise, discipline, nurture, etc. their biological child/children living in the same house and they share group identity, family rituals etc. By this approach some families are less typical, but could still be considered to be somewhere on the family scale. At the same time the third approach of interaction definitions might be of special importance to this thesis due to the focus on rituals and group identity.

2.2.2. EXTENDED FAMILY RELATIONS

The term *extended family* is often used to include grandparents and other close kinship relations in a unit. Grandparents might be of great importance in a child's life for example in identity construction, both when it comes to family, cultural and religious identity (Soliz 2007: 180). The society is, however, increasingly individualized and family and kinship is not considered as important today as it used to be (Hjälm 2011b: 3). On the other hand, it is much more common to have grandparents today since life expectancy has increased over the last centuries and keeps increasing (Segrin & Flora 2005: 195-96).

The quality of the relationship between grandparent and grandchild is affected by for example the physical distance between them and the ages of both grandparent and grandchild (Segrin & Flora 2005: 200). Extended families live further away from each other today, and Sweden has larger physical distances between generations than most other European countries (Hjälm 2011b: 5). This is typical for countries with a strong welfare state, as is the case with Sweden (Petterson & Malmberg 2009: 343). With large distances come that isolation is more likely and it is one of the largest problems for the elderly (Blythe et al. 2005: 683-84). People also generally have more phone contact with people living closer (Mok & Wellman 2007).

The age of grandparents is connected to health. Not all old people have health issues but the probability increases with age in areas like illnesses of eyes, ears and movement (SCB 2006: 277), which could have impact on communication. Issues like dementia also have an effect on relationships and decrease the possibility of using new communication technology drastically. When you get older doing things with your body also takes up more mental capacity than it used to (Krampe & McInnes 2007: 267). It gets more difficult to learn new things. Unhealthiness might also make a grandparent feel embarrassed to be seen by grandchildren or the grandparent might lack the energy a meeting requires.

Another issue in relationships might be the stereotypes around elderly people. In Western culture youth is admired whilst ageing is something we try to escape (Bond & Rodriguez Cabrero 2007: 117). Connected to this is how well the persons involved accommodate their speech (Hogg & Vaughan 2005: 588-89). Younger people often accommodate in a way that reflects their stereotypes of elderly people as being frail and incompetent and talk "*baby talk*". At the same time young people often feel that elderly fail to accommodate their speech.

Hjälm (2011a: 9-16) also found that elderly in Sweden were afraid of intruding on their children's families and hence restricted their contacts with their children. This might also be the reason behind the same researcher finding that it was common with pre-arranged meetings even though they lived very close. The elderly parents also expressed the importance of being independent and having their own lives and interests.

When meeting, grandparents and grandchildren typically talk about family, education, leisure activities and friendship but avoid talking about health and age of the grandparents (Segrin & Flora 2005: 201). Grandparents are also especially touched if the grandchildren initiate the contact (Segrin & Flora 2005: 201). Generally they also have different perceptions of how much they communicate; typically the grandparent thinks they don't communicate often, whilst the grandchild believes they do.

2.2.3. COMMUNICATION TECHNOLOGY IN THE EXTENDED FAMILY

Younger people often use communication technology that the elderly generation does not know of, which could be a difficulty in intergenerational contacts (Bryant & Bryant 2006: 300). Usage of Internet varies a lot among elderly people. In the age group of 65-74 in Sweden, 47% of the men and 34% of the women use the Internet at a daily basis, whilst 28% of the men and 39% of the women have never used the Internet at all (SCB 2011: 36). There are also different types of communication technology and "richer" communication technologies, like video conversations, have fewer users. In the same age group only 11 % of

the men and 6 % of the women have used Internet based phone or video conversations (SCB 2011: 36).

For younger children some communication technology might also be challenging. Telephone calls are not very suitable for children since it is audio-only (Yarosh & Abowd 2011: 1186-90). Younger children also often need the aid of an adult when using communication technology. Just talking is also not a natural activity with children: *"When adults interact with young children, they do not converse – they play"* (Raffle et al. 2011: 1196). Book reading with grandchildren has also proven to lengthen the time of video interaction (Raffle et al. 2011). This type of interaction lasted about five times longer than normal video conversations. As mentioned book reading is an activity also researched by TA2.

2.3. COMMUNICATION TECHNOLOGY

Communication technology has been around for a long time; people have been using smoke signals, drums, pencils etc. (Scott 2005: 438). Humans tend to be skeptical, however, to new communication technology, for example believing that it will weaken relationships between people (Bargh & McKenna 2004: 575).

2.3.1. CONCEPTS OF TECHNOLOGY

Technology simply means *"the making and using of artifacts"* (Mitcham 1994: 1). *Communication Technology* stands for *"Any apparatus (device, tool, or machine) or technique (process) used to help accomplish exchange of messages (e.g., pencil or the Internet)."* (Scott 2005: 437).

Computer-mediated communication (CMC) stands for communication that is mediated in some way by a computer. This term will be used collectively for all types of communication mediated by computers including e-mails and social platforms whilst the term *video-mediated communication (VMC)* will be used for the restricted area of communication that is performed by using video. As the opposite of CMC, *face-to-face (FtF)* is used for communication when the participants are physically present in the same location and the definition excludes VMC though it could be seen as face-to-face.

2.3.2. RESEARCH ON DIFFERENCES BETWEEN FTF AND VMC

There are aspects of FtF that cannot (currently) be transmitted through communication technology and VMC and FtF are thus different in some aspects, especially concerning NVC.

One example is that in VMC the camera usually is fixed, and this has impacts on visual cues. Movement is restricted, but on the other hand communicators have more control over what is displayed (Parkinson & Lea 2011: 103-05). VMC often only displays the face, whilst the entire body is used for communication. Eye contact is, for similar reasons, often difficult or impossible to manage (Grayson & Monk, 2003). Gestures might also seem strange, for example if you point at something, and the self-view option adds the unnatural feature of seeing yourself, though it might help in managing visibility.

Fixed cameras also impact spatial behavior (Parkinson & Lea 2011: 103-04). The other person might seem too close or too far away and it might not be possible to adjust the distance by moving as in FtF. It is common to adapt the communication to be as private as the distance

or to use more formal language to create a larger distance. Orientation is often fixed due to the cameras and the communicators are generally facing each other.

Turn-taking is also normally more difficult in VMC (Bitti & Garotti 2011: 92-93) (Parkinson & Lea 2011: 106-07). If the quality of the transmission is not perfect a little delay might disturb turn-taking and it is common that audio is transmitted faster than video. In research by van der Kleij et al. (2009) turns in VMC were found to be fewer and longer, but no additional time was needed to complete the same task as in FtF. There were fewer interruptions in VMC, less simultaneous talk, though the length of pauses was the same in both conditions. This was interpreted as listeners being more polite and that the conversation was more formal. These effects increased when there was a lag between audio and video

Concerning feedback, Doherty-Sneddon et al (1997) found that participants checked their own understanding a lot more in VMC than in FtF communication. This might be since the common ground is restricted and that people also reacts to things outside of the frame and that you cannot be sure what is actually transmitted to the other location.

Sensory information is also not available or altered (Parkinson & Lea 2011: 104-05). Sound normally tells us where things are in relation to each other and though this can be done to some extent through microphones and speakers, it is not exactly the same. So far VMC is normally in 2D and hence quite different to normal vision. Smell is naturally not possible in VMC and its importance is debated. Real touching is also not possible, but the possibilities of technological touch is being researched (Haans & IJsselsteijn 2006) Technological touch consist of vibrations, electrical impulses or sometimes temperature change and there is no proof that mediated touch has the same effect on human beings that has social touch. There are also indications that VMC might omit or alter more nonverbal cues than we might be aware of (van der Kleij et al. 2009: 372) (Doherty-Sneddon et al. 1997: 120).

Parkinson and Lea (2011: 109) considers *"Perhaps the most obvious difference between FTF and VMC interactions is that people are physically co-present in the former but not in the latter."*. Travelling is constantly increasing, since being physically co-present is still of special value (Urry 2002: 262). In relation to family rituals there are moments when you want to be physically present, especially family celebrations and traditions, whilst patterned interactions might be suffering.

Another important difference between FtF and VMC is that people in FtF communication claim to be more satisfied with the communication (van der Kleij et al. 2009: 370). Conclusively, the restrictions in VMC hinder the communicators to follow common communication norms and rules that would be applied in FtF. TA2 has tried to improve some of the aspects above, especially when it comes to audio and video quality, but this also demands high bandwidth.

2.3.3. SOCIAL PRESENCE THEORIES

Social presence can be defined as the *"the degree to which a communication medium is perceived to be socio-emotionally similar to a face-to-face conversation"* (Rogers 1986: 52). Commonly NVC is seen as providing more presence, and FtF is seen as superior to CMC.

Social presence theories started with the classical work by Short et al. (1976: 65-66) where they state that social presence is *"a quality of the communication medium."* Communication through media was seen as lacking cues and thus functions, since a one-to-one relationship between cue and function was assumed (Walther & Parks 2002: 532).

Whilst "techies" studied social presence, studies in interpersonal communication dealt with *channel reliance* (Burgoon et al. 2002: 657-59). Similarly, sociologists studied the *compulsion of proximity* (Boden & Molotch 1994). They worked separately and didn't use each other's findings, but all concluded that FtF communication was superior to other forms.

As a development of social presence the concept of *media richness* was introduced in the 1980:s by Daft and Lengel (1986: 560). Richness is based on *"the medium's capacity for immediate feedback, the number of cues and channels utilized, personalization and language variety"* (Daft & Lengel 1986: 560). There was also an assumption that there is *"an optimal match between the equivocality of the communication tasks and the communication media among which one may choose"* (Walther & Parks 2002: 535). Kock (2005) didn't approve of the term richness and developed the similar *media naturalness theory*, with the approach that evolution has assured that FtF communication is more natural than CMC.

Culnan and Markus (1987: 423) criticized the social presence theories for considering FtF as superior in all circumstances and wanted focus on the new capabilities found in CMC, for example the possibility of more controlled communication. Walther (1992) believes that when the communication is restricted communicators substitute nonverbal cues with other types of cues or increase the importance of the ones that are available.

There is also some research pointing in other directions than FtF always being superior. Baym et al (2004: 316) found in their research that telephone calls were as valued as FtF conversations since people in a FtF situation often were doing many things at the same time. This indicates that we might care more about getting someone's full attention than having access to all possible sets of cues. There might also be times when the more controlled or anonymous communication without NVC is preferred.

Social presence in the sense of feeling that you are somehow together is another concept that has been used in TA2 for explaining togetherness.

2.4. COMMENTS ON RELATED STUDIES

As shown through the theory chapter, there has been plenty of research in areas that touch upon the subject of this thesis, namely video-mediated group communication for extended families separated by space.

In the area of group communication technology most research and development is executed in relation to organizations and business and focuses on making communication effective (Scott 2005: 432-33). One example of this type of study is *"Media Space: 20+ Years of Mediated Life"* which is dealing with VMC in an organizational setting (Harrison 2009). Many studies focus on different types of tools for cooperation, often asynchronous communication. There are also lots of media that enable us to create and maintain social and professional networks and this is also studied, i.e. weak ties, as opposite to the strong ties that are of interest for TA2.

CMC research often deals with asynchronous communication, such as e-mails or social platforms. Synchronous communication research often focuses on phone or mobile phone conversations, for example Ling (2008). Some studies also deal with virtual worlds. Many of these studies relates to social presence or, as critique, focuses on how for example display changes can create awareness and feelings of connectedness, e.g. Dey and de Guzman (2006).

When communication across media is studied, it is often done at research facilities, and often focuses on communicative aspects like turn-taking and how the communication is affected by delays, for example van der Kleij et al. (2009). There is also a new editorial work by Kappas and Krämer (2011), which contains several studies in this category.

Another used source in the theory chapter is Hjälm (2011b) – a dissertation on intergenerational distances in Sweden, though it had very few comments on communication technology. It has however, been useful in providing an understanding of intergenerational relationships in Sweden in relation to physical distances and the Swedish culture.

There is also an interesting and similar study on video communication and book reading, finding that book reading could increase the time of video conversations with children (Raffle et al. 2011). This study contained a large number of families and often intergenerational relationships, but compared to TA2 only used a computer screen instead of a large TV and the same screen was used for both book and video. The focus was also only on book reading.

3. METHOD

This chapter discusses methods used and describes the specific setting and the sampling. The system was used in extended families for a longer period of time and a number of methods were used for collecting data; interviews, observations and diaries.

3.1. SETTING FOR THE STUDY

TA2 Lite was tested between homes, which consisted of extended families. Four different groups of families participated in the study and each group will from now on be called "*a set*". The families are coded and the first number stands for the set whilst the second number is used for the individual family within the set. The families will be further introduced in the part on "Sampling".

The idea was to let people test TA2 Lite for about 4-6 weeks, but due to technical issues, participants traveling, Christmas etc. some trials went on for a lot longer, in fact the longest for about six months and they are still using the system. Unfortunately, the final study could not be started in time, due to issues around getting broadband and these participants hence did not get four weeks of using the system within the scope of the project, though they are also still using it.

TA2 Lite is a high quality video-communication system and consists of a computer, microphone/s and video camera, speakers, a large TV (generally the families' own) and an iPad. The iPad is used as a remote control but also provides possibilities for synchronized activities in the form of applications. Video cameras were positioned on top of the TV, leaning downwards towards the seating area normally used for watching TV, whilst the microphones were placed underneath the TV screen and the speakers on each side of it. There

were also a keyboard and a mouse and it was beforehand believed that the participants should never have to use them; they were only for technical support. However, sometimes the remote control application on the iPad did not work and several families learnt how to start the system using keyboard and mouse and in some cases also to restart the system in the same way. In order to get high quality video there was also a need for a reasonably good Internet connection and all families but one had to get upgraded Internet connections, and some families only got good enough quality but not the highest.

In the beginning of the testing, *Storytelling* (book reading) was the only available application. Later on a Memory game, an interactive whiteboard and an application, which enabled people to play their own games with a deck of cards, were developed and introduced. There was also an extra camera added. The aim was that it should be easy to switch to this camera and move it around the room. Some families got a prototype of this, but it was not fully developed and difficult to use, since you had to press "c" on the keyboard in order to switch to this camera.

Reasons like the fact that the system kept changing and that the families used their own TV means that the study is not comparable, which was also never intended. The research provided indications from different types of families. Implementation and testing of new ideas, originating from the families and observations, also provided some valuable feedback. There were also severe technical issues through the testing period that might have impacted the results; issues such as that the system would not start at all, that the sound did not work properly, that the camera shut down in the middle of a session etc. Generally these issues were sorted throughout the trials, but between an issue arising and the elimination of it, time passed. It often took a week or two before a problem was sorted.

A first interview was performed, with each family, in order to map current communication patterns, relationships and expectations. Then there was one interview in the middle and one in the end of the testing period. The interviews were performed as depicted in the figure below. The shaded squares indicate that the writer of this thesis was involved in performing the interview.

Figure 1 - The interviews

Family	1st interview	2nd interview	3rd interview
1:1	2 interviewers, Entire household present, FtF	1 interviewer, Entire household present, FtF	2 interviewers, Entire household present, FtF
1:2	1 interviewer, Only father present, FtF	1 interviewer, Father, mother + 2 children present, FtF	2 interviewers, Father + one child present, FtF
1:3	2 interviewers, Entire household present, FtF	1 interviewer, Entire household present, FtF	2 interviewers, Entire household present, FtF
2:1	2 interviewers, Entire household present (1 woman), FtF	1 interviewer at family 2:1's location, Both households at the same time, using TA2 Lite,	2 interviewers, Entire household present (1 woman), FtF

2:2	2 interviewers, Woman, father, sister present, FtF	woman of family 2:1 and her son (father) family 2:2 present, FtF & through TA2 Lite	2 interviews, 1 interviewer, woman FtF, father through Skype
3:1	2 interviewers, Entire household present, FtF	2 interviewers, Father present (mother + 1 child in background), FtF	2 interviewers, Parents present (children in background), FtF
3:2	2 interviewers, Entire household present, FtF	2 interviewers, Entire household but one after the other, Telephone	2 interviewers, Man present, FtF
4:1	1 interviewer, Entire household present, FtF	2 interviewers, Woman (and a few comments from man in background) Telephone	
4:2	2 interviewers, Parents present, FtF	2 interviewers, Woman (and comment from daughter in background) Telephone	
4:3	1 interviewer, Parents present, FtF		

As depicted the interviews were performed in groups, generally with one or two adults at a time, whilst children were just included for some time of the interview, when it was possible. In several cases only one adult represented the entire family, which was due to the fact that it was difficult for busy families to find a suitable time. In most cases the interviews were performed FtF, but some interviews took place over the phone or in one case Skype, due to some logistic issues. In the case of the final set there were only two interviews dealing with actual results, due to lack of time since they got started too late.

The aim was that the interviews should take about an hour, but in reality the time was different in the different interviews, and especially with the different families; some people had plenty of time and enjoyed talking. The interviews that took place over the phone were also generally shorter.

All interviews were audio recorded and all transcription and translation from Swedish to English has been made by the author of this thesis. All participants did sign informed consents for participating in the study and these also allowed the researchers to do both audio and video recordings.

Times for observations and filming were always chosen for convenience reasons, i.e. when the researchers happened to be present (for setting up the system, performing interviews or technical support) and felt it was appropriate to film. Sometimes there was just a very short

film of something that interested the researchers as it happened, other times the camera was placed somewhere and recorded an entire session using the system. Sometimes the researchers helped the family to get the system started and filmed for a little while whilst making sure everything was working and then left so that the family could use the system in peace.

There were also very different amounts of video materials from different families. The most material comes from the first set, since they got the system first and there were many technical issues that needed to be sorted. The second set never managed to use the system when the researchers were not around and though there is not much material on this family, it is in fact almost everything that happened. The third set lived far away from the researchers and the father of family 3:2 was very skilled when it comes to technology and hence technical support was most often performed at a distance, which did not result in observable material.

There is however a couple of films that were recorded at the times for interviews. As mentioned the final set didn't get started until the very end of the project and though there is some video material from these families, it is not very much. This material is hence not representative, but still provided some valuable insights.

People were also provided with a diary, with a form to fill in for each day of the trial, consisting of different tables with the labels: "time", "who participated?", "activity" and "comments". Each day consisted of one A4-page and "*Figure 2*" provides an example of a diary sheet.

Parts from both observations and interviews were selected if they seemed to be related to the research question and this material was then divided into categories. It was then analyzed and interpreted in relation to theories. All through it was attempted to look through the material unconditionally and not to find examples that supported anticipated results.

Figure 2 - Diary

Torsdag – 3 november			
Tid	Vilka deltog?	Aktivitet	Kommentarer

3.2.   SAMPLING

The first and second sets of families were found through a meeting place for the elderly, which had been used previously for workshops whilst developing the technology. The third set was found through contacts of the researchers involved and the fourth set was a contact of the first set. In all sets but the third, the set got involved through the elderly generation.

This way of founding participants makes it a convenience sample (Trost 2009: 120). The reason behind this was that there were somewhat tricky requirements the testers had to fulfill e.g. several generations, certain distance between the families, preferably children in certain

ages (since there was an aim to evaluate *Storytelling*), possible Internet connections etc. They also had to accept to spend plenty of time in interviews and diary writing, as well as testing the system. This means that the testers were positive towards TA2, whilst the ones who did not believe this was a good idea never took part in the evaluations. There was hence a bias, which probably had some impact on the results.

Below is a description of the families involved in the study and the information is mainly retrieved through the first interviews:

3.2.1. 1ST SET OF FAMILIES

The first set of families consisted of an elderly woman and man, who were connected to their respective sons' families. The couple lives in a bigger city and was just temporarily living together, since she needed help when healing from an injury. The elderly couple also both had daughters living elsewhere; the woman's daughter living abroad. The elderly man has a visual impairment and very little knowledge of computers and was provided with and Internet connection by TA2. The woman however uses the Internet for paying bills and sending e-mails etc. They both have mobile phones, though the woman uses more of its functions. The elderly couple will be coded as family 1:1.

The woman's son and his wife are in their 40s, both working at universities. They live in a town with their three children; a son 11, a daughter 9 and a son 7. They have good knowledge of computers and different types of communication technology. They will be coded as family 1:2. The distance to the other household is about 30 kilometers and phone calls were typically used to stay in touch, but some e-mails were sent between the adults.

The elderly man's son and wife are around 50 years old. Both have very limited computer skills, which they relate to them both being on extended sick leave. It's about 20 kilometers between the households and in order to stay in touch phone calls were used. They meet about every second month, normally drinking coffee together. They will be coded as family 1:3.

3.2.2. 2ND SET OF FAMILIES

The second set of families consisted of a 78 year old woman and her granddaughter's home. The elderly woman has three children and her daughter and grandson live in the same city as she does. She is living alone in a bigger city and she often has company by a man. She has problems with vision and movement and is not able to visit the other location anymore. She was provided with a new TV and Internet connection by TA2. She does have a mobile phone that she only uses for phone calls. She will be coded as family 2:1.

As mentioned the other system was placed at the home of the woman's granddaughter – a single mother, 32 years old with a daughter of six and a son of eleven. The woman is mainly studying to become a nurse but also works part-time. Her father and siblings live in the same town and this place was expected to serve as a place for them all to meet and connect to the grandmother. They are all used to technology and the family will be coded as 2:2.

The distance between the two places is about 400 kilometers and the contact between the locations is mostly sustained by phone, sometimes letters. The son and his mother talk about every ten days on the phone and he visits some times every year. Contact between the grandmother and grandchildren is scarce, a few phone calls a year and one meeting FtF.

3.2.3. 3ʀᴅ SET OF FAMILIES

The third set of families consists of an elderly couple and their son's family. The elderly persons are about 70 years old and live in a small town, where their other son also lives with his family, with whom they have close contact. They sometimes use the Internet and mobile phones to make phone calls. The man has a hearing impairment and they will be coded as 3:1.

The younger family consists of parents in their 40:s and two sons aged four and six. They live in a big city and the father works with research and the mother as a consultant. The family uses the Internet, smartphones etc. a lot and the sons play a great deal of computer and TV games.

The distance between the households is about 150 kilometers and they meet FtF about eight times a year, half of the times in each location. Otherwise they have weekly phone contact.

3.2.4. 4ᴛʜ SET OF FAMILIES

The fourth set of families consisted of an elderly couple and their two daughters families. The elderly people are about 70 years old and live in a small town. They have some knowledge of computers and use the Internet for some tasks and their mobile phones. They were provided with upgraded Internet and a TV for the purpose of the study. They put the system in their TV room and used it next to their regular TV. The man has a visual impairment and they will be coded as family 4:1.

Their eldest daughter lives in a bigger city with her husband and two daughters. The parents are both 42, and the daughters 10 respective 8. The woman is a graduate economist and the man is an engineer and works as a regional manager for his company. The family is relatively used to different types of communication technology and used the system in the living room. The youngest daughter has a hearing impairment and the family will be coded as 4:2.

The younger daughter of the elderly couple lives very close to her sister, with her husband, daughter and son. The parents are about 40 years old and the daughter is 8 and the son 6. The woman is a project manager and the man an administrative manager. The family is used to communication technology and had a separate TV room where the system was used.

The distance between the elderly couple and the daughters is about 40 kilometers and they have close contact, both FtF and phone. All three families were connected to each other, though the sisters would not have been connected, if it wasn't for the connection with the parents since they lived so close to each other.

3.2.5. COMMENTS ON SAMPLING

All participants were Swedish and though there was a certain concentration of people living around Gothenburg were the researchers involved were working, three families were found more than 400 kilometers away and several participants originated from other parts of the country. The age distribution of the participants was as depicted in the chart below:

Figure 3 - Age distribution of participants

Figure 3 - Age distribution of participants
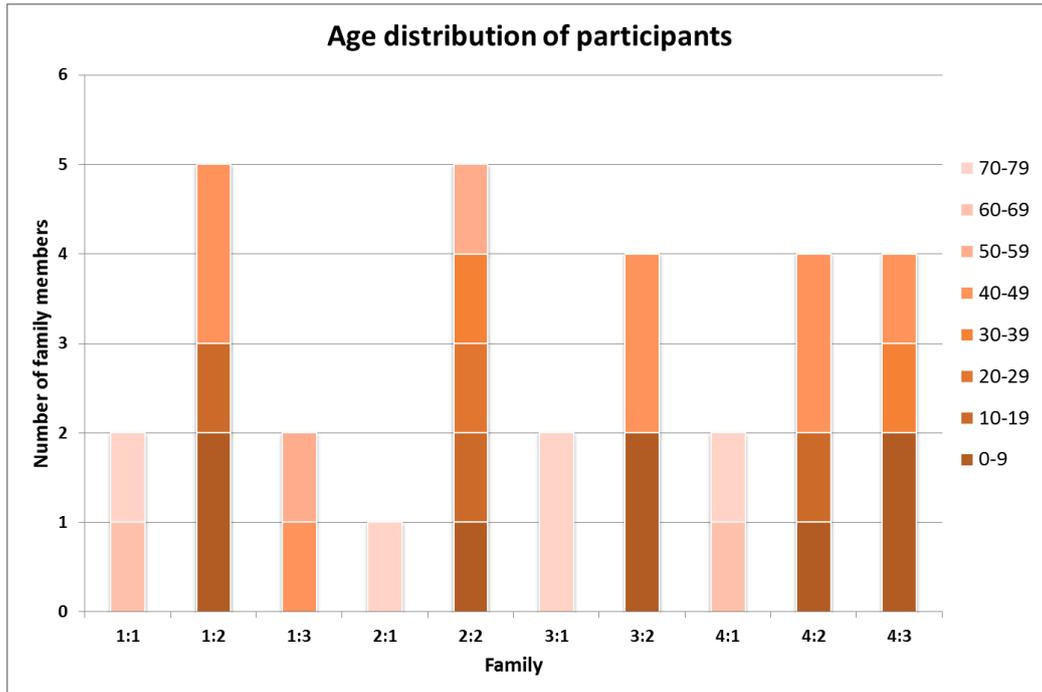
Some age groups have a stronger representation which is due to the fact that there was an aim to find testers with younger children so that *Storytelling* could be evaluated. With this comes that their parents were generally around 40 years old and the grandparents around 70.

3.3. COMMENTS ON METHODS USED

Since this thesis is done in cooperation with TA2, method choice has also been done in cooperation and the results were used both for this thesis and other parts of the project. To have three semi-structured interviews and diaries was more or less decided before I got involved in the project. The method of observations was however a method that I wanted to use as a complement to the other methods and a method I attempted to use as much as possible, since I was aware of the fact that when it comes to communication we are not aware of everything that we do. This is especially the case when it comes to smaller scale communication patterns or rituals-as-adjectives, such as spatial orientation or turn-taking. Since we already asked a lot of our participants, it was however difficult to also ask them to let us be present in their home even more to do observations, and observations thus took part when it was suitable. It was also important to leave the participants to use the system in any way the wanted and this might not have been the case if we had scheduled observation sessions.

Interviews were however also a suitable method for studying the communication since it was a good way to get an understanding of what happened when the researchers were not around, and this was also the case with the diaries. The interviews also provided some insights into the experience of people when they were using the system, which could not have been seen in observations. Interviews, and to some extent diaries, provided more insight into the larger scale communication patterns. Together the different methods of semi-structured interviews, observations and diaries provided an understanding of the communication patterns surrounding the usage of TA2 Lite. Qualitative methods were used since a deeper

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understanding of experiencing the system was desired (Trost 2009: 14). Quantitative methods were used in other parts of TA2.

The interviews were semi-structured and covered different topics of interest (Treadwell 2011: 165). Interviews were also generally conducted in focus groups (Treadwell 2011: 167). A positive aspect of interviewing in groups is that people can get ideas from each other and develop each other's contributions (Treadwell 2011: 165). The presence of others might, however, hinder people from saying everything that they actually think. This was however not considered a substantial issue, since it was assumed that the interviews would not cover very sensitive topics; communication patterns were not considered that sensitive to discuss in front of and with your family.

The second method used was participatory observations (Halvorsen 1992: 83-85). In relation to observations, there were also video recordings, which were observed later on. The observations were overt, which might be problematic since the presence of researcher and/or being filmed might change the behavior of people. This was however not the primary method for collecting data, but it was considered that this could provide extra insights that would not have been understood otherwise. The material was also only seen as indications.

The third method used for collecting data was diaries; used in order to get an understanding of how the usage was spread out across time and especially to make participants write down comments and ideas so that these were not forgotten before the interviews would take place.

Analysis and interpretation, of the collected material, has been conducted following guidelines from Trost (2009). The approach used was to print out the transcribed material and then go through it marking text and making notes in the margins, as well as dividing material into categories (Trost 2009: 125, 32-33). Then the material was interpreted in relation to different theories.

4. RESULTS

This chapter accounts for the different results from the observations, interviews and diaries.

4.1. THE DIFFERENT CONSTELLATIONS

First of all quite different patterns emerged in the different constellations. These results are a short summary of the results from all the different methods in relation to the different sets.

4.1.1. 1ST SET OF FAMILIES

Between families 1:1 and 1:2 there was a connection roughly once a week. The participants started the trial with only the Storytelling application. They were however very inventive, playing instruments and games and making up all sorts of activities of their own. The children also enjoyed showing things to their grandmother. They initiated sessions by making a phone call to see if the other side was available and this mostly happened in the evenings.

Between families 1:1 and 1:3 they struggled a lot with the technology, but when it worked they enjoyed being together all four of them. They used phone calls to require if the other side was available and when using the system they spent the time just talking, with the exception of sometimes showing things to each other.

4.1.2. 2ᴺᴰ SET OF FAMILIES

In this set there was not much contact at all due to several reasons; different ideas of how the system should be used, technology failures, a visual impairment and an elderly user not understanding the technology. They struggled to find time and always scheduled meetings in advance. If the meeting couldn't happen due to illness or other issues, they rescheduled for the next week. In the town where the younger generations lived the place, where they had chosen to put the system, was in advance believed to be a suitable gathering point but it was difficult for the son of the elderly woman to get there in order to speak with his mother. The woman of the house chose not to be very involved, because she believed her grandmother was scared of the technology and was also pretty busy. This will be further discussed in section 5.4.

4.1.3. 3ᴿᴰ SET OF FAMILIES

In this set, house purchases and sickness posed some issues on interacting as often as they wanted to. Both homes believed they took the initiative more often, which was done by making phone calls. The older generation explained that they tried not to call too often, since they felt the other side was so busy. Sessions still took place a couple of times a week and they generally used the system in the evening. The adults spent time talking together and enjoyed being able to do so in group. The applications were widely used with the children, who especially liked the Memory game.

4.1.4. 4ᵀᴴ SET OF FAMILIES

The fourth set was the one which did not get started in time, and it is hence impossible to say anything about communication patterns in this family. They did however enjoy using it for the time they could, and wanted to keep it after the project ended. The system was also used between the two closely located households, between the young cousins, who tried different activities such as Hangman, using the interactive whiteboard application. When the grandparents finally got the Internet connection needed, the grandmother, who used to work as a teacher, helped her grandchildren with their homework.

4.2. OBSERVATIONS

This section will focus on the results from the observations, both participatory and recorded. The few quotes in this part come from the observations.

4.2.1. RITUALISTIC ASPECTS OF COMMUNICATION

In the beginning of the sessions and in the end, the gesture of waving was used for greetings in most of the observations. Together with the gesture were verbal greetings, typically "hej" (hi) or "hallå" (hello).

Participants sometimes tried to point at things. Sometimes this did not really work, another time one participant seemed a bit surprised at the accuracy:

- *"When you pointed at her, you actually pointed at her." – Man 52 (2:2)*

It seemed like horizontal directions worked relatively well, whilst vertical was difficult for the participants to manage. The quote above is in relation to horizontal directions.

There were also some quotes from when the participants were using the system, around managing eye contact:

- *"Then I should try to look there, but I want to look at you."* - Woman 68 (1:1)

- *"Can you look straight into the camera, so that I can see?"* – Man 56 (2:2)

As the quotes demonstrate, people tried to get an illusion of eye contact. From the observations it is clear that in order to do so one participant had to look straight into the camera and as far as the observations go they did not manage mutual gaze. There was also a comment around how the lack of eye contact affected the feeling of the interaction:

- *"Eye contact affects the sense of presence – they feel very far away."* - Woman 41 (1:2)

There are many examples of interactions across the system with other conversations taking place in the background. One example is a conversation between the families in set 2, a son and his mother had a conversation across the system, at the same time as his daughters were talking with the researchers in the background. The man was sitting very close to the TV and the microphones. In the recordings from the mother's location you can clearly hear him, and they managed to keep a conversation going despite of the noise in the background.

Other examples show that when everybody is engaged in the conversation the person closer to the microphones has an advantage in turn-taking. In a conversation between families 1:1 and 1:3 the women were sitting in the background and the men close to the TV and microphones. Especially the woman in 1:1 tried to take the turn several times without succeeding. The image below depicts how they were sitting:
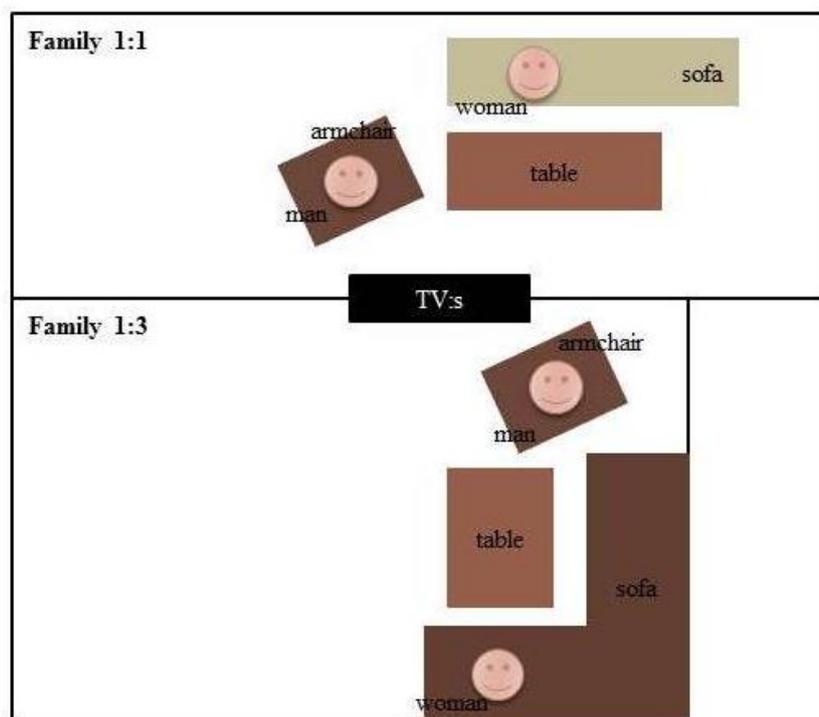

Figure 4 - Seeting arrangements

The variation in distance to microphones in these families depended on the seating arrangements. In all families the normal TV watching location was used and the original seating arrangements were thus made for the activity of TV watching and this seemed to affect the behavior whilst using this system as well, in all families. When they used the system, people moved around to be able to see the TV, especially the people with visual impairments who put a chair very close to the TV. When they had chosen a seat, they normally stayed in their chosen seat all through the session. This also meant that they did not seem to adjust interpersonal distances. Children moved around more than adults.

In the turn-taking case above between family 1:1 and 1:3, the men were both looking mostly at the screen and the women were behind them. The women were thus not just further away from the microphones; they were most of the time not visible to the man in the same location. The women thus had disadvantages in turn-taking both when it comes to audible and visible signals; audible signals were not transmitted with the same strength to the other location, and visible signals were not seen by the person in the same location. This is just one example but similar patterns were also found in other families.

Some participants cared a lot about self-view, which could be started from the iPad and was visible on the TV screen. Other participants did not seem to bother with this at all.

What happened in the room entered the conversations; pets moving through the room, dressed up children ringing the doorbell at Halloween, phones ringing etc. There was some concern around privacy in the preparations of trials with the different participants, but after using the system this was not a concern anymore.

Younger children were at times physically controlled by their parent, when they were interacting through the system. They were told to calm down or to be quiet and it involved physical touching. Naturally, the physical part could not have been done from the other location.

4.2.2. WATCHING THE TV

People stared at the TV screen most of the time; they often didn't look at the person talking in their location but at the screen and hence at whomever the message was intended for. They also sometimes kept looking at the screen when their utterance was directed to a person in the same room. The behavior decreased a bit when they got more used to the system.

The utterances were also mostly directed towards the people in the other location, which added to the effect. People in the same location also helped each other with forming utterances and providing lacking information. They also sometimes encouraged someone in their location to tell something that was already known to them, for example a father said to his son: *"Did you tell grandma about…?"*

It seemed like younger children behaved less like this, in fact they often did look neither at the screen nor at the people in the same room.

4.2.3. THE ENTRANCE OF NEW MEDIA

There were many discussions on how to arrange meetings through the system. In some cases there were also rather formal conversations at the first occasion(s), but this changed with time.

Formality was seen in how at the first observations the participants did not interrupt each other, used rather formal vocabulary and sat up straight. In later observations they interrupted each other more and were seen lying down in sofas etc.

In most families only one person learnt how to use the system and the others were dependent on this person to start a session. One example is when family 1:3 wanted to connect and made a phone call to the other location to ask if they could do so. The father (1:1) did however reply that he was alone and did not know how to start the system. He did have time and wanted to connect, but they all had to wait until the person with the skills came home.

4.2.4. GROUP COMMUNICATION

People in one location often started their own conversations in the background, but there were no occasions with two separate units talking across the system that actually worked. There was at least one attempt to do so, but there could only be one utterance at a time, which meant that they had to wait for their turn.

Conversation did also take place in different constellations or different subgroups; all people in a household were not present at the same time. In family 1:2 it was rare that the entire family was present, often it was just between one and three persons out of the five. In family 2:2 there was one occasion when the woman of the house was not present, only her father and son. In families with just two people both would generally be involved in the interaction at some point, but one person would often leave to answer the phone, go out and smoke etc.

4.2.5. ACTIVITIES

Families have been trying to do all sorts of things using TA2 Lite. The following activities were observed:

- conversations
- playing many different types of games
- playing musical instruments
- solving crossword puzzles
- showing things
- using the provided applications

Mostly, the families tried their own activities, especially different types of games and all through the observations activities were mainly used for communication with children.

One time family 1:1 and 1:2 were playing a Swedish game, called "Bulleribock" that normally is all about touch. You are supposed to guess the number of fingers someone puts into your back. In order to play at a distance the participants added a new dimension. After the person had guessed; the number of fingers were hold up behind his/her back and a person in the other location would then try to see how many fingers there were. In a game that normally focuses on touch, they added vision.

A common activity was to show things to each other. Already at the installation of the system a grandson, age 11, talked about how the first thing he wanted to do was to show a new possession to his grandmother. Another example comes from the first connection in set 2, when the son holds up a dog to the camera in order to show it to his mother and she says:

-   *"Oh, that is the dog; I haven't seen it [before]." – Woman 78 (2.1)*

Another discussion, from an observation, provides an example of how there was a desire to see something that had been discussed before on the phone:

-   *"By the way, do you have one of those plates to show?" - Woman 68 (1:1)*

-   *"You mean that we talked about yesterday?" -Woman 47 (1:3)*

Showing was not always successful. The man in family 1:3 tried to show his father one of his teeth that had been fixed, as well as a photo on his digital camera on what it looked like before. The man struggled to know were to be in relation to the camera and his father said that he couldn't see, which could also be due to the fact that he has a visual impairment.

When using the Memory application the 7-year old boy in family 1:2 looked almost exclusively at the iPad, whilst the grandmother (1:1) kept looking up at the TV and down at the iPad and struggled to know whose turn it was in the game. Similarly, when set 3 was playing Memory, most focus was on the iPad. Other activities provided more focus on the people in the other location and more communication between them, such as when family 1:1 were playing a question game.

The Memory application was used with younger children (age 3-7). The Storytelling application was mostly used with a 7 year old. The interactive whiteboard was used with children in many ages, but it was used in different ways; whilst younger children used it just to draw for fun, it was used as a medium for teaching with older children.

4.3. INTERVIEWS

This section will focus on the results from the interviews.

4.3.1. COMMUNICATION NORMS

There were several comments around seeing body language and facial expressions:

There is a greater closeness [...] You see the facial expressions; I can see my son when he is joking a bit. He moves his mouth… - Woman 68 (1:1)

… it has an enormous importance the body language; that I have discovered as the years have passed, how much it really means [when you are] with people. [...]... and now you can get this, when you sit in the sofa and speak and gesticulate [...] It was very good image, you saw exactly everything – facial expressions and all. – woman 78 (2:1)

Another important observation relating to gestures came from one participant, who was dealing with reduced quality due to poor Internet connection:

When you know the persons, then you know kind of how they work too, so you might fill in [the blanks] yourself there. Had it been some completely different persons, then maybe it is more important that you see everything, all the time. – Man 42 (2:2)

One man also mentioned that due to his father's illness of the eyes, they normally did not have eye contact even in a FtF situation.

When asked about if they would have liked a different seating arrangement, some people did (but never did change anything):

You would have been somewhat closer to the camera then [if you would have a different arrangement], I mean you feel a bit far away from them. On the other hand they sit rather close, [...] it doesn't feel like they have as far between their screen and the sofa where they sit, but they sit closer to the camera then, but we are a little bit far away from the camera here. - Man 41 (1:2)

I wouldn't mind if he could get a bit closer... but then they would have to refurnish. - Woman 68 (1:1)

Some participants also explained that they had their designated seats in front of the TV and the same seats were used when using the system:

That my husband mostly sits there, that is because it is his armchair, because he has bad vision [...]. ...this is kind of my place and that is his armchair. But we fight about it sometimes. – Woman 47 (1:3)

When asked if they looked at each other or mostly on the TV, one woman explained:

...Most of the time you talk to the ones on the other side, so to speak. [...] It could happen if it is something my husband says: "What day was that?" and then he looks at me: [and I say] "Well, yes that was last Wednesday". [and then he says] "Yes, that was last Wednesday, dad" If it was something that we had done or so. - Woman 47 (1:3)

There were also comments around the difficulty of controlling children across the system:

You need some kind of control, if you want that type of, if you want it like usual. Indeed, you can flip the pages even if the child is in the lap and tries to read – they can flip the pages, but it feels like it was easier that they accidently flip the pages, because there is no physical control in that way. - Man 41

For the girl with a hearing impairment the extra cues, compared to phone calls, were appreciated:

And [my granddaughter] has some problems with her hearing so it's important to be very clear with her and that I think, that is good like this she can see the mouth also when you talk with her. She stood close and watched me when I said the sentences to her, so it was a big favor that she could see the mouth. – Woman 70 (4.1)

4.3.2. BEING IN THE SAME ROOM

People compared the new system to other types of communication, both with and without being particularly asked to do so. It was mostly compared to meeting FtF or talking on the phone, which were the major types of communication previously used by the participants. In these comparisons there were two prepositions that were commonly used in union with the two types of communication. The preposition "like" was commonly used around utterances that compared the system to FtF:

... it is like you're sitting in the same living room. Maybe not straight in the beginning, but then after a while you fall in to it, somehow, and it is exactly like you sit and talk in the same room.- woman 47(1:3)

...it is just like a room, as I say, that it continues a room here. – Man 52 (1:3)

This is just like if you had them in the room. – woman 78 (2:1)

It is a greater closeness; it is like you get into their living room. You get in, and sit in the sofa, so to speak. – woman 68 (1:1)

[It is] kind of like spending time together in a way, like a window in your living room kind of. - Man 56 (2:2)

The other preposition (or conjunction) was "than" and this was commonly used around utterances that compared the system with the telephone.

You get another contact than on the phone. - Woman 78(2:1)

It provided another presence in that instruction than what you get on the phone. – Man 41(1:2)

It is more fun than the phone. - Woman 78(2:1)

It is another thing than that someone calls and just check what is going on. -Man 41(3:2)

Well, you speak a lot longer like this than what you do on the phone.- Woman 47(1:3)

Different expressions of "being in the same room" was also the most commonly used metaphor for describing the sensation. Other expressions such as "meeting for real", "being together" or "actually meeting" were less common.

There were also several comments around the fact that you could see parts of the room in itself and how that impacted the communication:

I don't think it is the same thing, I mean that in a computer you often just see the face of the person you are talking with, but here you see, kind of, well, not the entire room, but you see a large part of the room anyway, you see several people. - Women 47 (1:3)

But here, I think that you get such a good image here. You, kind of, you see the entire room and you, I believe that you come, get another contact, I think. That you get. It is like being at each other's home. -Woman 78 (2:1)

... because here things happen in this room or with the camera they see even here behind [the sofa] and the children are active and friends come and someone comes home from work and you cook food in the kitchen, well things happen here... - Man 41(1:2)

But it is a lot funnier when it is in the living room. Otherwise it is in some dull office room far away and you have to get there, hassle [...] It would be fun to find

a similar solution, where you could have it in the living room like this. - Man 41(3:2)

...but it is also exciting to see straight into someone else's living room. That is also a fun ingredient. Similarly, to send your own room to someone else, with everything that happens in it. Children that come and go and so on... – Man 41 (1:2)

...then you start to talk about all sorts of things, "oh, here comes the cat and there..." because then they see things around you too. – Woman 47 (1:3)

Another intriguing comment shows one participant considered it natural to connect the same type of room in the two locations:

If I would have chosen. Yes, maybe, that was interesting, because maybe if I would have had a TV in the kitchen and grandma would have had a TV in the kitchen, then maybe... - woman 32 (2:2)

4.3.3. THE ENTRANCE OF NEW MEDIA

The forms were not set for how to initiate sessions with TA2 Lite or when it should be used and how often, but some patterns emerged during the trial, which could also be seen in section 4.1. In set 1 and 3 they used the phone to reach each other and see if the other location was available for interaction, sometimes unsuccessfully.

... Sometimes they have called and asked if we could connect, but often it has been too late, well what should I say? Between seven and eight, and after eight for that matter, and that is the time when it is time to finish the homework and put the children to bed and things like that, so it has not been that suitable. – Man 41 (1:2)

We usually call in the evening, when it feels like it could be suitable. But, it has been a lot that we have to take the initiative otherwise... so sometimes you've kept from [calling], because it shouldn't become nagging. – Man 70 (3:1)

The last quote is from the 3rd set, and the participants did actually not agree upon who was taking the initiative more often; both locations believed they did.

The fact that younger generations did not have time to use the system was a consistent complaint of the elderly generation in all sets, maybe with the exception of the 4th set:

And then it has been very much with the children, so that one should go to a party there and someone should be there and someone..., and then the parents should go and work out and then it is this with the food... - Woman 68 (1:1)

I know that she [granddaughter with the system] is extremely stressed and that it's the same with my daughter and her boy over there. I mean they are so stressed. They cannot, they cannot even speak on the phone. They don't have time with that. Unfortunately, it is like that in life and I think that is very sad that it is like that. – Woman 78 (2:1)

There were also some comments around the fact that only one person in the household knew how to start the system:

> *… if there is one how knows it, then there is no reason for the other [person] to learn… - Woman 47 (1:3)*

Some participants also observed that the conversations were a bit formal when they first started to use the system:

> *They can be a little tense to start with, but that presumably cease with time, I would imagine. Not as much with children I think. I don't think they are as tense, as much, at least not small children. – Woman 78 (2:1)*

> *It never got to the point where it becomes a thing, so it was that stiff, almost like if you're in a meeting or so. – Woman 32 (2:2)*

Sometimes the idea of how communication across the system should be handled was quite varied in the different locations:

> *It is a little bit stupid to think, but what does grandma do? She is in her apartment. It could be so that it was a part of the TV, that we only have to be visible in the TV. And then we could live our life here, that you could just talk. […] That you would more have an open link to each other. That's what I thought. – Woman 32 (2:2)*

It was never like that and all sessions were planned in advance. Grandmother and granddaughter had somewhat different ideas of why:

> *…we have to decide [time] you know, because they have so many different times and… Well, I can, almost anytime. So for me it is not that tricky. But it is very… [difficult?]. People work and go to school and it is, you know. You have to be a bit prescient. – Woman 78 (2:1)*

> *…the aim was that I should call grandma when my children and I would talk to grandma. […] But grandma wanted to decide a time and a day, when she could sit down more. A little [like] booking time. – Woman 32 (2:2)*

The granddaughter also kept from contacting her grandmother for other reasons:

> *But I think that, because I thought I heard an undertone of fear of the technique on the other side. Och maybe not admitted, but I still thought that I heard that or could guess myself to that. […] It becomes too many new steps and then you are scared or at least I am that anyway. – Woman 32 (2:2)*

It was difficult for elderly people to learn how to use the system, and in combination with visual impairments it got more or less impossible:

> *…I believe there were many different parameters there, but mum's bad technical knowledge […] and habits then that is number one, as I see it and in combination with bad vision. – Man 56 (2:2).*

This is another reason behind why set 2 really struggled to use the system.

4.3.4. SPENDING TIME TOGETHER

The fact that the system was designed for groups and enabled group communication amongst the participants was considered a positive difference:

> *There has been a communication [between grandmother and grandchildren] that would not have been there otherwise, that has felt meaningful and positive. - Man 41(1:2)*

> *... that [you can communicate as a group] is really good. It is a clear advantage over the phone. Absolutely and that we should say that that we have also been, since the children come when we speak with [my son] and then comes one and then another and maybe one runs away, it depends. [...] But it is clearly a positive effect. [...] That [spoken more with certain people] I have done, because everybody comes into the same context, when it was that Halloween then they came in, dressed up and each and every one told about what they had done. - Woman 68 (1:1)*

> *...and if [name of father's partner] also sits along, if he sits there and she sits there then, and my wife here and I there, then it becomes kind of a four part conversation automatically then. Even if you don't say anything, then you are kind of... You take part in the conversation. – Man 52 (1:3)*

> *[The difference compared to phone calls] is that you see all of them her, that you can talk to several [people] at the same time. On the phone it's mostly just my son or his wife. – Woman 71 (3:1)*

That conversations also took place in different constellations or different subgroups was mentioned by some participants:

> *Then we leave and come back, kind of like that when we are connected, which is also something you cannot do in a phone conversation, that you come and leave as you want to. – Man 41 (1:2)*

In an interview with the daughter and father of the family, from the quote above, they kept returning to the last trial where the daughter had been involved for just about a minute. When the same trial was talked about with the grandmother in family 1:1, the fact that the girl had just entered the conversation to show her Halloween costume was also mentioned. She made a short appearance, but it still seemed very important for all the people involved.

A TA2 Lite session was also generally considered a good way to spend time together:

> *...but I think this is a good way to stay in touch without having to [travel], because it is always more work for everyone, I was about to say, that you should manage to get everyone gathered. So in one way you can see that this is an easier way to spend time together. – Woman 68 (1:1)*

> *There is a great value in this, that you can see each other and spend time together like this. You know when it comes to my son and his wife, I'm not there often but now I can be there anytime if I want to. – Man 75 (1:1)*

There were also examples of children asking their parents to use the system:

The girls have asked: "Oh, could we not connect?" and that [their cousin] has done also, so they have really wanted to connect. – Woman 42 (4:2)

Conversations between the households were found to be longer, easier and including more topics than usual conversations across the phone:

All of a sudden it is like you talk to each other, like you are sitting in the same sofa. It kind of becomes like that. You talk to each other about all sorts of things all of a sudden. In the phone you just take the most necessary. […]We talk a lot more with this, than what we normally have done on the phone. – Woman 47 (1:3)

It is another thing when someone calls to just check what is happening. Then [using the system] you sit down more in peace and quiet and maybe talk for a quarter [of an hour] all of you. Telephone is so focused. I [!] talk to someone over there, for a certain period. If you sit and take a cup of coffee then it can be the two of us, or us and the children, but when they are joining, they are also joining somehow. It is still kind of coffee, but also spending time with them somehow. – Man 41 (3:2)

That the interaction lasted longer than phone calls was mentioned in many interviews. Some people also believed that it was longer than if they met in person, in this case people who were able to visit the other location over the day.

Using the system did also provide some extra contact between some households:

We haven't been to visit each other, anything. It has been good with this. It is good with this system that you can see each other. […] Now I met her [my mother], during the trial, but we haven't met all family so to speak. And then it was still possible for mum and [her partner] to see us here and the grandchildren. That is fun. – Man 41 (1:2)

But now you have gotten more contact, thanks to having this. – Woman 47 (1:3)

It hasn't replaced the phone really. We call each other about once a week kind of. So this has more become an addition, […] So this more becomes two things, two extra conversations a week. – Man 41 (2:2)

People mentioned all sorts of occasions when the system could be used. Christmas was one:

If he [the father] and [name of father's partner] would have been home at the evening of Christmas Eve then, then we would of course have connected for a while and maybe played a game. […] And it is the same with my sister, if she would've had a system like this […], then I would have connected for a while, because then you wouldn't have felt that you have to go down there and show yourself... Man 51 (1:3)

When asked when the system would not be suitable to use the answer was funerals and:

...more serious stuff so to speak. If something has happened to someone. If mum, I wouldn't want mum to connect here saying that my dad has had a heart attack. – Woman 47 (1:3)

When people were asked about whom they wanted to be to able use the system with, they mentioned lots of people, consisting of other extended family members, relatives and friends.

It would be fun, of course, to have one of these permanently at home, to have that possibility. It would be fun. Since it brings something new, something you don't have. – Man 41 (1:2)

The distance to the people they desired to talk to varied a lot. Many of the desired people to be in contact with were people further away, that you couldn't meet that often, including people in other countries. Family 1:1 did however also mention people living in the same city.

4.3.5. DOING THINGS TOGETHER

Through the interviews it was clear that the participants had attempted all sorts of activities through the system, both with and without the iPad applications. The following activities were mentioned in interviews (that were not mentioned as observed in section 4.2.5):

- showing what is going on in the home
- making decisions together
- helping each other by demonstrating
- eating dinner and drinking coffee together
- helping children with homework
- practicing skills with children i.e. reading, spelling, writing, English and mathematics
- using other iPad applications, i.e. Wordfeud

What the participants were doing was generally not planned in advance:

And then we had a time of music, and I think that was very positive- It was fun. It was my grandson who asked himself if he could play some on the drums. – Woman 68 (1:1)

It was fun too that it wasn't directed that they should play drums, it was my son who wanted to do it and it is fun that you could just start up and what happens happens. They enter our everyday life, as it is. – Man 41 (1:2)

[What we do] is also quite spontaneous. It is not that we plan to run anything specific… Man 41 (3:2)

Family 1:1 and 1:2 were into music, the man in family 1:1 had in fact worked as a musician earlier in life, and they enjoyed a music time together as mentioned in the quotes above. They also talked about possibilities to play music together with other people or to sing, using the system. In set 4, a granddaughter was also playing guitar for her grandparents, which was also something that could happen when they meet FtF:

And the children want to perform as [my husband says] they think that this is fun. […] When my granddaughter got to play the guitar there and showed us. […] and just this to show. I think that is very good and that is one of those, just practice these things and have someone who listens. That I believe very much in. – Woman 70 (4:1)

When asked what family 2:2 usually do when they meet their grandmother, the answer was eating and that when they talk they also often talk about food. The granddaughter commented:

> *That's why I have moved my kitchen table out here, so that we will eat with grandma. – Woman 32 (2:2)*

Some adults also had coffee together, which is also something they do if they meet in person:

> *We have done sometimes that they drink coffee and we drink coffee here then, kind of. Now, they cannot offer cookies through the TV, but anyway. [...] You sit down and have a coffee and talk a little. Pretty nice actually. – Man 41 (2:2)*

It was clear from some comments that the activities were especially enjoyed by children:

> *[The grandchildren] are with [us] and say hi and talk a little bit [...], if you get Memory started, then they sit. Then you can go on for a long time. Then they also win all the time. – Man 70. (2:1)*

> *...since Memory started to work and [my sons] got quite caught by that, so it has been pretty... [we] talk for a while first, maybe equivalent to what you usually call in the weekend and something, and just talk, "hi", something like this, for ten minutes – a quarter. Wave a bit at each other and then there is a Memory session of about 40 minutes maybe [...] It might be I that take the initiative and start it but then when we are all in place there, then they want to play Memory of course. That's the funniest. - Man 41(2:2)*

When asked, the children expressed that they enjoyed the fact that it was not just talking. One girl tried to explain why it was better:

> *Well, it is more fun, kind of. Well, then... No, I don't know. It's just kind of more fun. – Girl 9 (1:2).*

The combination of activity and communication was also appreciated by some:

> *Well, I also think that both [my son] and mum want to have, I mean that they want to play simultaneously as they see each other. So then they have one each, one hand computer each and the connection too and play, because both presumably want direct feedback - "now I have put, what do you put?" kind of. ...they presumably want to play more in real time, so to speak. [...] Because then it becomes an activity in life, that you play, you perform that activity then. Whilst I can feel, for my part that I don't have time to play, but I take it at some point when I have time, when I'm going to sleep or when I sit on the train, then I can do some Wordfued. I mean, it becomes an "activity to fill up time", whilst for them it is presumably more a – "now we shall have fun and do this activity together". - Man 41 (1:2)*

There was also an example of an activity that covered several sessions. A grandmother was crocheting and showed the progress to her grandchildren and let them make design decisions:

Since they have a caravan, I have crocheted the car there to it, and then they get to be apart – "what color do you want? I have these yarns and so on." So a car is finished, the caravan will come and that monster, [my grandson] has ordered so that is also finished. [....] And then I have an order for a crocodile [...] – with sharp teeth. [...] And [my grandson] himself got to decide where the dots should be, and colors and other [things on the monster]. [...] [We did this via the system] but I have also crocheted in between there. "But now I am working on this then, and what should I continue with that or what do you want?" [...] So it often comes ideas when you sit and talk. - Woman 68 (1:1)

There were also comments around the activity of showing things:

My grandson keeps running up to his room to get things to show. It is very fun, or he experiences that very much, I don't know how many times he runs up to his room. It was his birthday and he showed his birthday presents and how they worked ... - Woman 68 (1:1)

And then it is this that you can show things to each other all of a sudden, you cannot do that on the phone. "Now, I'll show you that nice thing I bought" or "now I have bought a present" – "What did you get?" and then you have to explain what it was. Since we girls, we want to do this... If you've been out shopping, you really want to show it to your friend... – Woman 47 (1.3)

The extra camera that was added through the trials was, for example, used to show what was happening around the home:

Some time I have used it in order to show that there are some [people] up on the bridge [visible part of their second floor] watching grandma and [her man] or so, "here is the oldest son and his friend" or something like that then. – Man 41 (1:2)

The possibility to show was also used to help each other by demonstrating:

I also have some specific memory of that I have, well, that there is something that is qualitatively different, that we don't have in the other communication, which this enables. There is another level of support, if you say so. It happens sometimes that mum calls and have questions connected to the mobile phone or the computer and it is not always that easy to instruct or help with this over the phone. There are so many different steps; you kind of need to point at different places. [...] So it provided another presence in, in that instruction, in that meeting than what you get on the phone. - Man 41(1:2)

This possibility was also used for helping the grandchildren with their homework:

And we started with the iPod, or Ipad it is called and then I gave her some assignments that she should do on it and it was in English: "Draw a green frog" for example "draw a grand bear"... [...]Then [my other granddaughter] came and then it was homework in English for her too and there were plenty of sentences that we should do and that we discussed around then. [...] She did have some days for this but now she took the opportunity to do most of it then, since she

could get help and we discussed the whole, why it was like this or that. – Woman 70 (4:1)

4.4. DIARIES

Diaries were more or less only retrieved from set 3. What was written in these diaries mostly only confirmed what was also mentioned in the interviews with the same families. One interesting observation from the diaries, however, is that they used the system one week on Friday and Sunday whilst they met FtF on the Saturday. It was also clear from the diaries that there were technical issues most through the trial and that this affected usage, i.e. the participants were often not able to use the system when they wanted to.

5. DISCUSSION & CONCLUSIONS

In this chapter the results from the last chapter will be analyzed and discussed and with this, there are also some suggestions of matters to take into account when developing this type of technology. This is followed by conclusions, critical reflections and a session on further research.

5.1. THE DIFFERENT CONSTELLATIONS

Section 4.1 demonstrated the patterns in the different constellations and it is interesting to see that very different patterns emerged in different sets. This indicates that this type of medium can be used to support a wide range of activities and quite different people with different preferences.

5.2. WHAT RITUALS-AS-ADJECTIVES WERE FOLLOWED?

It seemed like the rituals-as-adjectives that were followed when using TA2 Lite were mostly adopted from FtF, i.e. the same way of acting in FtF was used for TA2 Lite as far as it was possible. Visibility might be important in this, since it adds a dimension compared to the phone.

Some of the aspects from related works covered in the section on "*Research on differences between FtF and VMC*" were also found here, for example effects of a fixed camera. This is the reason why gestures like pointing did not always work. The fact that entire group should be visible at the same time might have added to the effects, since participants often were situated in different corners of the screen, rather than in the middle as if they would have been alone.

Seeing facial expressions and eye contact were mentioned as sources of closeness, though the latter did not work properly. This supports one of the common ideas of the social presence theories that access to more cues is superior and might have more impact on the relationship. The comment about the fact that people might fill in the blanks, when they communicate with people they know well is worth some consideration. Maybe they did not see as much as they believed they did, since their common ground already included an idea of how these people usually behave.

That people use the gesture of waving to greet each other and to say goodbye is interesting. This is a clear sign of the fact that the communication takes place at a distance. When these people meet in person, they most likely hug each other or in some cases shake hands, which

mean touch is involved. Waving is used when you cannot get that close to each other; it's a sign of distance. People did adapt their greeting ritual to the possibilities of the medium they were using, and it is uncertain what if any impact this ritual change had.

It seems that different seating arrangements and closeness to microphones have impact on some communicative aspects, especially turn-taking. The users did not seem to realize this and did not change the seating arrangements or move the microphones. The seating arrangements were in many cases difficult to change, and directly imported from TV watching. Sitting down to see well is what you normally do in front of the TV, and the furniture is arranged for that purpose. You might even have your designated seat as was the case in some families. Ideally, people should have a separate designated area for this activity that would be furnished for its purpose, but this would of course be expensive.

Self-view however unnatural might be a help in spatial orientation. The reason for self-view to exist is so that we can be aware of what is transmitted to the other location. Self-view was also very important for some users. It might however cause self-consciousness, since you see yourself all the time. Orchestration, which is being researched by other parts of the TA2 project, might make self-view unnecessary, since automatic editing and cutting between different cameras should make sure that people are visible and zoom in on people who are further away from the camera.

In these evaluations people never seemed to experience that there were issues with privacy, but rather appreciated to share rooms. The result might have been different if it had not been strong tie relations; with people whom you know well privacy might not be an issue, at least not when you use the living room. By sharing so much of the room, the common ground was also larger and when something happened in the room, it often came into focus of the communication. It was not just about sharing a conversation, but also about sharing a part of each other's everyday life. The participants were put into a natural context, which could be beneficial for family identity (Morley 2000).

As is often the case with mediated communication, young children might need the help of an adult, e.g. to start the system. It's also clear that it can be difficult to control children without the possibility to touch them, which is both seen in the observations and in the interviews. In VMC, the child might leave or do something they are not allowed to, and you only have your voice to stop them. In FtF a child could be handed over completely to the care of the grandparent and the parents could do something else in another part of the house or even leave the location completely. Here, there were several occasions where children were physically controlled by their parents, and when the children performed activities with their grandparents, the parents stayed around. This is a major difference and has rather large impact on the possibilities of mediated communication.

It is also interesting that some participants mentioned that difficult matters, such as telling about a serious disease, were not suitable to discuss through the system. Touch might be the reason. If someone is upset it is typical to hug them or hold their hand, which cannot be done in VMC. The cues that cannot be transmitted might be especially important in some rituals, like providing comfort, and therefore these rituals would be avoided through the system.

It is also important to realize that the participants were generally not aware of differences between using the system and meeting FtF. They generally said it was different, but struggled to put the finger on what the difference actually was. This is probably due to how nonverbal cues are sent and received at a low level of awareness. If participants are not aware of these matters it is also important to not just rely on interviews, when investigating usage of mediated communication.

5.3. THE DIFFERENCE OF BEING IN THE SAME PLACE

The use of the different prepositions in the interviews was intriguing. "*Like*" expresses similarity, whilst "*than*" expresses difference. This indicates that using TA2 Lite was not only somewhere in between a FtF experience and a phone call, but was a lot closer to the former. Other quotes and the fact that "being in the same room" was the most common metaphor for the feeling, also indicate that the fact that the room was visible in itself supported the feeling of presence. The fact that one woman considered it obvious that if she would have changed room for the system, the room should be changed in the other location too is also very intriguing; for her a living room should be connected to a living room and a kitchen to a kitchen. This also indicates an importance of the room in itself.

Facial expressions, gestures and eye contact were mentioned sources for closeness or presence, the first two working and the latter not. As mentioned in section 4.2.2, it was found that people looked a lot more at the people on the screen than at the people in the same room. This could partly be because of imported seating arrangements; that people were used to watching the TV when sitting like that. Another possible explanation lies in the social presence theories. As mentioned in section 2.3.3, there might be more cues omitted when we communicate through a medium than we are aware of. We might sense cues from the person next to us that we cannot pick up from the person on the screen and therefore must rely more on visible cues from the person in the other location. This seems to be what Collins (2005) was discussing, when he believed that physical presence was necessary for interaction rituals. As mentioned Walther (1992) claims that possible cues are given more prominence when some cues are omitted, thus people rely heavily on the visual information from the people on the screen, since they don't have access to some of the cues that they do receive from the people in the same room.

It is also important to consider new possibilities of mediated communication and not just limitations (Culnan & Markus 1987). When using TA2 Lite both families are at their home and at the same time get access to the other home. This provides some unique possibilities, for example that they all have access to their possessions.

5.4. NEGOTIATION OF A NEW MEDIUM

It was obvious that a new communication possibility had entered the picture. The participants negotiated around how and when to use it and it seemed to take some time for this to settle. In one of the sets (2) it never did settle. It is difficult to conclude what the reason for the troubles in this set actually was, since the participants have very different ideas of it. It seems to be a combination of many things, partly technical failures and that it was difficult for the grandmother to use the system, both considering her lack of technical knowledge and her

visual impairment. Apart from this the grandmother believed that the granddaughter never had time, whilst the granddaughter chose not to push system use because she believed her grandmother to be scared of the new technology. It also seems that she was scared herself since she says: *"It becomes too many new steps and then you are scared or at least I am that anyway."*

It is also obvious that it is difficult to fit new media and more communication into already busy lives. If people have problems with their relationships and communication, media cannot solve it for them, and if they are used to not seeing each other that often, media will not make them interact more often automatically. There has to be motivation.

The reason behind why only one person learnt how to use the system in most locations probably depends mostly upon the technical difficulties through the trials. The participants tried a prototype and it was not simple to use. They were also aware of the fact that they only had the system for a limited period of time. Had this been more permanent, maybe more people would have learnt how to start a session. However, this might still be the case for many elderly couples that one is depending on the other when it comes to different tasks. It is therefore advisable to design this type of technology as simple as possible with elderly people in mind, if the aim is that it should be used by extended families. Possibly, the system could also allow different functions in different locations. Maybe the grandmother does not need to start the application herself; it is enough if the application is started in the other location.

There were also aspects in the communication that changed with time as the participants grew accustomed to the new medium, i.e. they were less formal. This may of course also be because they were observed and as time passed they got more comfortable about it. Either way, it indicates that the behavior changes and this means that some of the problematic communication aspects that participants could have improved by different behavior might possibly change with more time, e.g. they might eventually change their seating arrangements.

5.5.   A NEW WAY OF BEING TOGETHER

The TA2 vision: "*Making communications and engagement easier among groups of people separated in space and time*." (TA2 2011) also seems to be somewhat fulfilled. People experienced that it was almost like being in the same room; the conversations were longer and included more topics than when they spoke on the phone. The participants also desired to use the system with other people than the ones included in the study. To some extent a new type of noun ritual was created in the extended families and different patterns emerged around it.

People also commented on the fact that the entire group could participate; this was seen as adding a dimension to the current communication between the families. Many people also commented on the fact that they especially got to talk more to certain people in the other family, people they normally would not talk as much to on the phone and thus the contact increased more between certain people. There was especially more contact between grandparents and grandchildren.

People typically come and go in a TA2 Lite session, much like in a FtF situation and unlike a telephone call. This creates all sorts of subgroups in the family that can work on their

relationships and group identity. Whilst part of the typical group feature of constantly shifting subgroups, mentioned in section 2.1.2, could take part, there was also some restriction to this, i.e. the fact that only one conversation can take part across the system at a time. This could possibly be somewhat solved technically.

The fact that there was only one utterance at a time across the system and that participants helped each other to construct messages gave the impression that one group was talking to another group; they never merged into one. Adding to this effect was the fact that people were depending so much on the TV screen and that they were facing each other.

5.6. ACTIVITIES

To a large extent the activities tried through the system represented what the participants said that they usually do together when they meet in person. They also experimented with the possibilities of the activities. The new dimension in the touch game is interesting, since it clearly shows how inventive the users can be. This has to be taken advantage of. Instead of just developing polished applications; flexible or open-ended applications, like the possibility of being able to write and draw things together on the iPad, open up a vast amount of new activities. Flexible applications could also be adaptable to different constellations or contexts.

As mentioned in section 4.2.5, activities were mostly used with children, whilst adults just talked and enjoyed seeing and hearing each other, which is in my experience rather typical for adults meeting. The activities also varied with the ages of the children, e.g. the interactive whiteboard application was appreciated by many people of different ages, but they did different things with it. Activities might need to be adaptable to the ages of growing children. A twelve year old might not enjoy doing the same thing as a seven year old. As Wolin and Bennett (1984) concluded, family rituals need to be changed with time. Once again flexible applications might be useful, as they can be used for different activities and thus the activities can be changed depending on the ages of the children involved.

As already discussed people were heavily dependent on the visible cues from the TV. Meanwhile, activities sometimes required most of the participant's focus of attention, and they looked less on the TV and more on the iPad. Attention absorbing activities might not be an issue per se, but if the aim is to promote communication, some activities might be more effective than others. A Memory game can be played without talking, and talking might not add to the activity, whilst when the participants played games including questions, there was a lot more communication around the game.

Participants also spent lots of time around showing objects and introducing new possessions. This could also be seen as working on the family identity since objects are of importance for family identity as discussed in section 2.1.2. One of the best examples of this might be how a grandmother crocheted some items for her grandchildren; objects that will always remind them of her and of their relation. The items were introduced through the system and she also let them take part in design decisions.

5.7. CONCLUSIONS

The purpose of this thesis was to investigate the possibilities of video-mediated communication when it comes to intergenerational group communication in a domestic

setting and to examine what communication patterns emerge around the new communication technology. The research question was: **What communication patterns emerge around TA2 Lite as it is used between extended families separated by space?**

When it comes to small scale communication patterns or rituals-as-adjectives these were mostly adopted from typical FtF behavior, but there were also aspects that differ; some because there was a lack of possibility. Other aspects could have been solved, but the participants never seemed to think of it. The fact that the family TV was used seemed to be one reason for the effects on the communication. Another explanation can be found in the *social presence theories*. It seems like we are able to pick up substantially more (nonverbal) cues from a person in the room than a person on the screen and this also impacts the communication.

The participants do however adapt their communication patterns to the possibilities of the medium and manage to communicate well though the shortcomings, and did in fact experience it as being very similar to meeting FtF. Some of the issues in the communication might also change with more time getting used to the new medium. New ritualistic aspects of communication, different from the communication norms used in FtF, might also emerge.

There might also be aspects that could be addressed by developing the technology, and some are indeed already being addressed by other parts of the TA2 project. Orchestration might for example have the possibility of solving some issues around turn-taking and spatial behavior. By cutting between different cameras and zooming in on participants the advantage of being closer to the camera and microphones might disappear. It is, however, also important to remember the importance of seeing the room, and that participants experienced a TA2 Lite session as being very similar to meeting FtF. By adding orchestration, there is a risk that some of the positive aspects of seeing the room are lost if the image is zoomed in on certain participants. Cutting and zooming do not happen in FtF, as we are all aware of and there might also be a risk that this is experienced as more different from FtF for this reason. Orchestration might also control the communication patterns rather than aiding people in their communication.

The participants appreciated that they could communicate in group. Their overall communication patterns changed and they communicated more often, longer than on the phone, covered other topics than on the phone and said that it felt like they were actually meeting in some sense. The possibility of activities in union with the video communication was also seen as a positive addition, especially with children. To some extent a new type of noun ritual was created by and for these extended families and communication patterns emerged around it.

The fact that the users appreciated the system is more important than how well the communication functions in itself. It seems like this system, at least in some families, could lead to more contact and a possibility of a stronger family identity. Some properties of the system might be especially important in this. The fact that a large part of the other location was visible and that the quality allowed for showing things seemed to add to the sharing experience and opened up to more activities. The fact that people seemed to experience high *social presence* might also have been a reason for the effects.

These evaluations only focused on extended families and it was clear that this was suitable for this type of relations. By using the system, certain people in the different families got especially more contact, generally grandparents and grandchildren. This was mentioned as a positive effect both by grandparents and parents.

The older generation also generally complained that the younger generations were very busy and though they had more interaction through the system, this aspect was not easy to handle.

The children did never learn how to start the system, likely since it was rather difficult. If the system would be developed to be sold and thus be easier and more stable, and people would have this system permanently at home, children might learn how to start it and could use it with their grandparents before the parents come home from work. Especially, the activity of homework seemed useful. The children need help, the grandparents wanted to help and the parents struggled to find time to help.

The fact that all participants were Swedish probably had some impact on the results. As mentioned in part 2.2.2 Sweden has larger physical distances between generations than most countries in Europe and therefore a system like this might seem more useful to the participants. In Sweden it is also common to use the Internet, also among elderly (see part 2.2.3) and then starting to use a system like this might not seem to be such a big step. The issues around finding time to use the system also reflects the fact that elderly in Sweden generally are afraid of intruding on their children and children's families as mentioned in part 2.2.2.

Over all, these evaluations were more positive than we had anticipated and having access to video-mediated communication between the homes seems to be a good way for extended families separated by space to keep in touch.

5.8. CRITICAL REFLECTIONS

To use both observations, diaries and interviews contributed positively to the results. Some aspects could be strengthened by results from the different methods, whilst other aspects would not have been discovered by only using one method. This especially applies to the method of observation, since participants are not aware of many of the nonverbal patterns.

It seems like the diary was not very useful, mostly because of the fact that many participants did not write anything in it. The fact that the diary supported what was said in the related interviews is however positive since it strengthens the results and keeping the diary might also have helped the concerned participants to remember things that were brought up in the interviews. It did however require quite a lot of effort and it is doubtful whether the effort matches the results.

Doing research in the homes of people had positive impacts on the results, since some aspects would have been lost in research facilities e.g. seating arrangements, importance of the home and negotiation around when to use the new medium. On the other hand we do not really know what happened when the researchers were not around and the results from the interviews are only what the participants chose to tell.

It would have been interesting with more observations, but the major focus was on interviews in this part of the TA2 project, whilst others used other methods. Observations were, however, only conducted in research facilities by the other parts of the project, and more observations in domestic environments could result in different findings.

Another critical reflection is that the subject of this thesis turned out to be very wide. This was not that much of a problem when it came to collecting data, but it touched a vast amount of topics and it was difficult to get an understanding of all different scientific areas that treated these topics. The fact that different areas of research did not cooperate nor refer to each other's work made it more difficult to find relevant research.

5.9. FURTHER RESEARCH

Every single area of research that I touched upon in this thesis complained that there was too little research done within the field, so there seems to be much to be done.

The area of group communication technology could definitely benefit from more research in the area of relational aspects as opposed to business oriented studies. Another issue is, as mentioned, that many areas look at these topics but don't necessarily cooperate with each other. Areas that touch on these subjects are for example linguistics, sociology and psychology. There should be more cooperation between different fields!

It would also be interesting to work more with TA2 Lite; to test the system with more families, but also in different areas, for example with hospitalized children, isolated elderly or between children and parents in prison. Other functions of the full TA2 would also be interesting to test in families in this way; functions such as orchestration and multi-party connection. It would also be interesting to record people performing the same activity in FtF and VMC, and thoroughly compare the two.

I also believe that this type of research, where prototypes are tested in domestic settings for some period of time, should be used more often when it comes to technical development since it provides a deeper understanding and a possibility to develop more user-friendly technology.

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