Sharing Conversation and Sharing Life: Video Conferencing in the Home

Tejinder K. Judge
Virginia Tech
2202 Kraft Drive
Blacksburg, VA, USA
tkjudge@vt.edu

Carman Neustaedter
Kodak Research Labs
1999 Lake Avenue
Rochester, NY, USA
carman.neustaedter@kodak.com

ABSTRACT

Video conferencing is a technology that families and friends use to connect with each other over distance. However, even with such technology readily available, we still do not have a good understanding of how video conferencing systems are used by people as a part of their domestic communication practices. For this reason, we have conducted interviews with 21 adults in the United States to understand video conferencing routines in the home and to inform the design of future domestic communication technologies. Our findings illustrate the importance of discerning availability and willingness to video conference prior to calling, the need to share everyday life activities in addition to conversation, and a need for new privacy protecting strategies that focus on autonomy and solitude as opposed to confidentiality.

Author Keywords

Video conferencing, domestic, families, media spaces

ACM Classification Keywords

H5.3. Information interfaces and presentation: Group and Organization Interfaces – *Computer-supported cooperative work*

General Terms: Design, Human Factors

INTRODUCTION

Most family members and close friends have a need and desire to stay connected, especially when they become separated by distance [9,11,13]. Our informal observations and self-usage suggest that video conferencing has increasingly begun to fulfill this need with the availability of inexpensive webcams and free video conferencing software such as Google Talk, Windows Messenger, and Skype. However, despite the availability and use of such systems, we know of no recent studies that investigate the use of video conferencing in the home. Noll [8] reflects on the failure of the picturephone of the 1970s but this predates the proliferation of present-day video conferencing systems. Video communication was investigated extensively as part of media space research, yet again this did not typically

look at the domestic use of video systems [3]. An exception is our study of domestic media spaces, performed in parallel to this work [6]. Most studies specifically aimed at current video conferencing systems focus on assessing and improving network performance (of which there is a large number of papers, e.g., [2]). O'Hara [10] studied video conferencing on mobile phones, but this differs from our focus on computer-based video conferencing.

For this reason, we have conducted a study aimed at specifically uncovering the ways in which readily available video conferencing systems are used within the context of the home. Our findings suggest new design avenues for video conferencing systems as well as domestic technologies in general.

RELATED WORK

Research has shown that people have a strong need and desire to stay connected with remote family and friends [9,11,13]. This involves the need to gather an awareness of remote families' or close friends' activities, locations, and status (e.g., health) [4,9]. Such knowledge can help people coordinate shared activities or simply feel closer to others [4,9,13]. Studies of families have also shown that people prefer in-the-moment sharing of information where sharing is directed at specific people [11]. In contrast, they dislike feeling obligated to send information to others [4,11]. People's preferred mode of interaction is face-to-face conversation [4]; thus, if they have the opportunity and it is convenient, people much prefer to talk to someone in person where they can both see and hear each other.

Research has also investigated the use of technology to support awareness and communication between friends and family. Unsurprisingly, people use a combination of technologies including telephones, email, instant messenger (IM), and video conferencing [9,13]. When given a choice, people almost always choose the technology that is both easy for them to use and likely to reach their social contacts [9]. For example, telephones and mobile phones are convenient for reaching people at work or while mobile [9,13]. Email and IM are favored for situations that require asynchronous communication [9,13].

Most similar to our study is O'Hara et al.'s [10] which explores video conferencing on mobile phones. This shows that although most people carry their mobile phones all the

time, mobile video telephony is typically not used opportunistically as it can easily become intrusive. For example, the use of a speakerphone and the awkward positioning of the camera to capture oneself cause privacy challenges. The mobile design, however, does render itself important for easily capturing a variety of activities as well as groups of people. This renders mobility important, yet a challenging design factor. Our work builds on this study to specifically explore video conferencing from within the home on desktop computers and laptops.

CONTEXTUAL INTERVIEW METHOD

We recruited 21 individuals (10 female, 11 male) from 15 different households in the United States using a snowball sampling technique. Participants ranged from 22 to 62 years old and fell into four groups: single with no children (3), couples with no children (2), couples with children (10), and grandparents (6). Children ranged in age from infants to 19 years old. All participants currently used video conferencing to communicate with distant family and/or friends. Households received a gift card for participating. Participant names are anonymized to protect their identity.

We conducted semi-structured contextual interviews with all participants about their existing usage of video conferencing systems. Interviews occurred in the context of their home and typically the location from which they video conferenced. This helped put participants in the mindset of their existing routine. Interviews were audio-recorded and handwritten notes were taken to aid analysis. We used the open coding method to analyze the interview data and draw out key themes. It would have been better to observe families *while* video conferencing, yet this was impractical due to the timing and sometimes opportunistic nature of the activity. Alternatively, asking participants to video conference while we were present would arguably be too contrived to gather real usage data.

RESULTS

All participants had a preferred video conferencing system that they used for their video calls. Thirteen people used Skype, 5 used Apple iChat, and 3 used MSN/Windows Messenger. Participants varied in terms of who they video called. For sixteen people, they only called family members, including parents, grandparents, and siblings. For 2 people, they called just friends who lived abroad. The remaining 3 people called both family and friends who lived abroad. Video calls ranged in frequency from weekly pre-set times between grandparents and their children/grandchildren to impromptu calls between friends that occurred every few weeks to months. The location of remote family/friends that people connected to ranged from being in the same city to being separated by up to 12 hours' difference in time zones. We did not however find a difference in usage pattern between domestic and international video calls.

Initiating and Planning Communications

All of the video conferencing systems that our participants used showed their contacts in a "buddy" list along with

availability information such as online, busy, away, etc. (based on activity at the computer or set by the user). From this list, they could place a call to someone and then turn on a video link. However, surprisingly, for nearly all participants (18 of 21), the video conferencing systems did not act as the first point of contact between people when initiating a video conference. So-called "impromptu" video calls were not truly impromptu. These participants first communicated with remote users via phone, email, or text message *prior* to video conferencing. This was done to inform the other person that they were available and wanted to video conference and to find out the remote person's availability and willingness to do so. This even occurred when both parties had a good understanding of each other's schedule and availability or when they had preset times for calling (e.g., calling every Sunday afternoon).

"Even if my mother sees that I am logged onto MSN she calls me first to ask if she can talk to me. She always assumes that I am busy doing something on my computer and does not want to disturb me" – Larry, Single, Age 22

"My 4 year old granddaughter calls me whenever she wants to talk and says 'Grammy, do you want to talk?' I am usually preparing dinner or doing something around the house when she calls but I stop everything and go upstairs, turn on the computer and talk to her" – Michelle, Married, Age 58

"I have my phone with me all the time and when my son is ready or has time to Skype he sends me a text with one word 'Skype?' I can get these texts at any time of the day, even at 6am since he knows I wake up early... We use text because I am not always around my computer even though it is turned on all the time" – Leanne, Married, Age 62

Participants told us that the reasoning for not immediately video calling someone was because video conferencing was perceived as being more intrusive than the other communication technologies they used. Moreover, the status indicators provided by the video conferencing software did not represent true availability, and did not show one's willingness to video conference. Furthermore, nearly all participants (19 of 21) did not stay logged on to their video conferencing software, and some only turned on their computer for short spans of time.

We did have 3 participants who would directly video call remote family. In these situations, both parties knew the time frame in which they could talk and made themselves available during that time.

Sharing Conversation vs. Sharing Life

We found two distinct patterns of video conferencing usage that largely stemmed from the demographic grouping of the participants. First, adults without children primarily used video conferencing for *conversation*. Here the webcam was used solely to watch the other person, their gestures, and body language. This augmented the voice/audio component of the conversation and was the primary reason that these participants used video conferencing as opposed to just the phone. Sometimes additional things pertinent to the conversation were shown such as a new poster, shirt, or furniture in the house. For example, Mark, a college student, periodically video calls his friend in Croatia because he likes seeing him when they talk. When he

moved into a new house, he moved his webcam around to show the new place to his friend. Other adults without children described similar routines when augmenting their conversations with video links.

Second, for families with children, video conferencing was used primarily to share *activities*. During this type of video call, conversation between adults was a secondary activity and happened during lulls in children's activities, in the background, or sometimes not at all. Grandparents commented that it was especially important to watch their grandchildren grow up, to stay connected and to make sure their grandchildren knew them. Sharing activities and interacting through video conferencing helped them do this. In some cases, they would leave the video call going for a couple of hours, and in the extreme case (for one participant) this may be for an entire day. These participants did not mind being watched by their distant family and enjoyed the feeling of connectedness and awareness that sharing larger portions of their life provided.

This is exemplified by Paul and Megan who video call Paul's parents in the UK every Saturday morning. Their routine involved setting a laptop with webcam on the kitchen counter so it could capture their morning activities. Paul's parents loved watching Paul and Megan cook and eat breakfast with their 2-year-old and 3-month-old baby. In these situations, conversation occurred intermittently. Although they shared nothing more than their regular Saturday morning routine, it was important for both families to be able to see each other and share parts of their everyday routine. It made them feel more connected. When Megan gave birth to their daughter, Paul took their laptop to the hospital so that his parents "could visit too". The following quotes illustrate similar situations:

"I leave MSN on during the weekend while I am cooking or doing things around the house. I can watch my mother in China and she can watch me doing my work. I also leave MSN on while watching a movie on my laptop so my parents can continue looking at me." – Chong, Married, Age 26

"I once babysat my granddaughter on iChat while my daughter was busy in another part of the room. She was in her high chair and I read to her and kept her entertained" – Michelle, Married, Age 58

"Skype is all about grandma and [her grandson]. We focus the camera on him and that is all she wants to see for hours. She loves watching him and he loves showing her things." – Kyle, Married, Age 38

In all of these situations, children/grandchildren were the sharers of information and parents/grandparents were the receivers. For example, one grandparent in our study, said she liked being "a fly on the wall in her daughter's home" and watching her grandchild's bedtime routine.

For parents with adult children far away, it was important for them to see their children to know how they were faring. These "children" might email or phone and say that they were well, but it was important for parents to be able to see their children to know for sure. Children might also share aspects of their life through photos/video recordings, but parents said this was not the same as seeing them. Seeing people live brought an additional sense of believing.

"As a parent, I have a heightened sense of anxiety when my female child is away in another country…When my daughter is away, it is important for my wife and I to see her. Only when we see her we know if she is getting enough sleep or being worried about something. She emails us regularly but it is not the same as seeing her" –Thomas, Married, Age 62

The sharing of activities was strongly supported by the mobility associated with peoples' video conferencing setups. Families with laptops would move them to locations of interest. For example, one parent set his laptop on a foot stool in their living room so it could show his daughter playing to her grandmother. He would then rotate the laptop as his daughter moved around. On the other hand, families that used a desktop PC often felt confined to a location. External webcams with long cords helped position or change the camera angle but participants were still confined to a single room. For example, a grandmother, Michelle, used a desktop PC in an upstairs room and when she was baking or cooking while video conferencing, she would have to keep running downstairs to check on the food.

Privacy Concerns

Prior work has defined privacy in terms of three control modalities: solitude, confidentiality, and autonomy [1]. *Solitude* can be violated if someone interrupts another at an inappropriate time, *confidentiality* is violated if someone sees things that are not intended to be revealed, and. *autonomy* violations occur when someone is unable to choose when and how she participates in an activity [1].

None of our participants said they had concerns over what remote people could see as the result of using video. Thus, they were not concerned about confidentiality. This was largely because they were connecting with someone who they knew well. Also since video calls were initiated using other technologies first (as described), participants could ensure they were not doing anything that they would not want the remote person to see. Given the high mobility of most webcams or the ability to easily change the camera angle, participants could control what remote people saw. For single adults, mobility let them set up their laptop and/or webcam to show as little background as possible. This was mainly so they did not have to clean up before talking to someone. Interestingly, they were unconcerned about their own physical appearance.

Privacy was instead more strongly related to solitude and autonomy where participants chose who could video call them and when they were accessible for video calling. This was most commonly done by logging into their video conferencing system at times when they were expecting a video call or wanting to place a video call. They also only included certain people in their contact list. By restricting this access, others could not violate their solitude by video calling at an inappropriate time, and only certain individuals could video call, thereby regulating autonomy. This is exemplified by a situation involving Anita, a married female participant who never logged into Skype unless someone had scheduled a conversation with her. She did this because she valued her solitude and autonomy and did not want to be disturbed by just anyone who might be

logged on. When her husband traveled overseas, she used a Skype account that only her husband knew about and remained logged on to it so he could contact her whenever his schedule permitted. These types of routines certainly work, yet this behavior causes people to be uncertain of one's availability and willingness to video conference. People have to then rely on other technologies to discern this information before video calling.

DISCUSSION AND CONCLUSIONS

Our results point to several important considerations for designing video conferencing systems as well as domestic communication technologies in general. First, there is a clear need for mechanisms that allow people to easily deduce other's availability and willingness to video conference. This need is echoed by O'Hara et al. [10] and similar to Nardi et al.'s [7] finding about the initiation of phone conversations in the workplace. Such mechanisms will reduce people's needs to rely on several pieces of technology prior to communicating via video. It will also help prevent video conferencing from being deemed overly intrusive. One possible solution might be to design a more ubiquitous technology that families do not mind leaving on all the time to provide awareness information.

Second, domestic awareness and/or communication devices should enable people to easily share everyday activities as they occur. Hutchinson [5] discovered that people found value in sharing impromptu moments through photos. Our findings further illustrate that families enjoyed sharing extended moments of time (e.g., everyday activities) which are not easily captured and shared with photos. Although photos/videos can now be shared immediately after an event, this event has already past as opposed to receiving live information. Mobility plays a large role in sharing aspects of daily life; hence, people should not be tied to their devices and/or be confined to a certain location when sharing. O'Hara et al. [10] also point out the importance of mobility and the manner in which families exploit this for sharing everyday life with mobile phones.

Third, we have found that privacy, as it relates to video conferencing, is most concerned with autonomy and solitude—choosing when to connect and with whom—as opposed to confidentiality. This contrasts the use of video media spaces in the workplace where often confidentiality is the primary concern [1]. Thus, we see further need for technologies that allow people to smoothly move into properly timed video calls that take into account users' needs for solitude and autonomy in the home. This contrasts privacy protection strategies commonly found in over-the-shelf video conferencing systems that provide features to obscure or alter the background of the video or even the user (e.g., creating an avatar).

We also recognize that our study is not without its limitations. Our results describe video conferencing routines from the perspective of adults and not children or teenagers. These demographics are interesting as older children and teenagers will likely utilize their own video conferencing routine, which might be independent from their parents'. However, we leave this avenue for future work. We also recognize that video conferencing usage will likely vary across cultures and geographic regions. Again, we leave such cross-cultural comparisons to future work.

REFERENCES

1. Boyle, M., Neustaedter, C., and Greenberg, S. Privacy Factors in Video-based Media Spaces, *Media Space: 20+ Years of Mediated Life*, Springer (2009).

2. Cicco, L., Mascolo, S., and Palmisano, V. Skype Video Responsiveness to Bandwidth Variations, *Proc. NOSSDAV 2008*, ACM Press (2008).

3. Harrison, S. *Media Space: 20+ Years of Mediated Life*, Springer (2009).

4. Hindus, D., Mainwaring, S.D., Leduc, N., Hagström, A.E., and Bayley, O. Casablanca: Designing Social Communication Devices for the Home, *Proc. CHI 2001*, ACM Press (2001), 325-332.

5. Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B., Druin, A., Plaisant, C., Beaudouin-Lafon, M., Conversy, S., Evans, H., Hansen, H., Rouseel, N., Eiderback, B., Lindquist, S., and Sundblad, Y., Technology Probes: Inspiring Design for and with Families, *Proc. CHI 2003*, ACM Press (2003),17-25.

6. Judge, T.K., Neustaedter, C., and Kurtz, A. The Family Window: The Design and Evaluation of a Domestic Media Space, *Proc. CHI 2010,* ACM Press (2010).

7. Nardi, B. A., Whittaker, S., and Bradner, E. Interaction and Outeraction: Instant Messaging in Action, *Proc. CSCW 2000*, ACM Press (2000) 79-88.

8. Noll, A. Anatomy of a failure: picturephone revisited, Telecommunications Policy (1992).

9. Neustaedter, C., Elliot, K., and Greenberg, S. Interpersonal Awareness in the Domestic Realm, *Proc. OzCHI 2006*, ACM Press (2006).

10. O'Hara, K., Black, A., and Lipson, M. Media Spaces and Mobile Video Telephony, *Media Space: 20+ Years of Mediated Life*, Springer (2009), 303-323.

11. Romero, N., Markopoulos, P., van Baren, J., de Ruyter, B., Jsselsteijn, W., and Farshchian, B. Connecting the Family with Awareness Systems, *Personal and Ubiquitous Computing,* 11, Springer Verlag (2006).

12. Schiano, D., Chen, C., Ginsberg, J., Gretarsdotti, U., Huddleston, M., and Issacs, E. Teen Use of Messaging Media, *Proc. CHI 2002*, ACM Press (2002), 594-595.

13. Tee, K., Brush, A.J.B., and Inkpen, K.M. Exploring Communication and Sharing between Extended families, *International Journal of Human-Computer Studies*, 67(2), (2009), 128-138.