

Home Video Communication: Mediating ‘Closeness’

David Kirk¹, Abigail Sellen², Xiang Cao²

¹Mixed Reality Lab
University of Nottingham,
UK, NG8 1BB
dsk@cs.nott.ac.uk

²Microsoft Research Cambridge
Cambridge, UK,
CB3 0FB
{asellen, xiangc}@microsoft.com

ABSTRACT

Video-mediated communication (VMC) technologies are becoming rapidly adopted by home users. Little research has previously been conducted into why home users would choose to use VMC or their practices surrounding its use. We present the results of an interview and diary-based study of 17 people about their uses of, and attitudes towards, VMC. We highlight the artful ways in which users appropriate VMC to reconcile a desire for closeness with those with whom they communicate, and we explore the rich ways in which VMC supports different expressions of this desire. We conclude with discussions of how next-generation VMC technologies might be designed to take advantage of this understanding of human values in communicative practice.

Author Keywords

VMC, Video-Mediated Communication, Home users.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design, Human Factors

INTRODUCTION

Most future visions of human society are replete with imagery of video-mediated communication (VMC). It has almost become expected that in the near-future, VMC systems and devices will become ubiquitous. Rather than using the telephone, future visions see us opening video windows or peering into mobile devices whether this is to conduct business meetings, or simply to chat with friends and family at home.

Historically, much of the development of VMC technology has been at the behest of business and organisations, with interest in how such technologies might support a distributed workforce [10]. Video has long been vaunted as

the panacea to our remote communication difficulties in this respect. But video technologies in support of work practices have often failed to take hold. One set of reasons put forth for this has to do with how the nature of mediated communication is different from sharing a physical space and how this undermines the capacity to effectively convey information [25]. Studies have looked at, for example, how non-verbal gestures such as head-turning and gaze direction are distorted over video links [7, 9, 21]. However, others have argued that a preoccupation with increasingly modelling bodily forms of interaction, or attempting to simulate the properties of a shared space, have come at the expense of developing more nuanced ways of understanding communication [8]. The argument here is that communication is often as much about such things as the expression of identity and conveying affection as it is about the exchange of information.

These more diverse aspects of communication, however, have begun to be discussed in the HCI literature, particularly with regard to supporting intimacy at a distance [2, 24]. A variety of (often) bespoke ubiquitous devices have been developed which offer both tangible and digital means of conveying intimate gestures remotely [6, 12, 18]. Importantly, such ‘phatic’ technologies [24] are designed to foster social bonds rather than to communicate information. As Vetere et al claim, these technologies satisfy “an important social and personal need to feel connected.” ([ibid] p.471).

Whilst many of these devices are somewhat exotic and explicitly designed to support particularly close relationships, it seems evident that an awareness of the phatic aspects of technology use lends itself well to the study of domestic communicative practices. This sensitising lens allows one to focus not just on the pragmatics of communication but on the intentions and desires behind it, and uses these as a vehicle for design.

We find ourselves then at a curious point in history. Suddenly, despite previous failed attempts in the business world, video communication has arrived and is being adopted *en masse* by the everyday user [22]. In the sphere of domestic computing, in many parts of the world, video chatting and webcam use has become widespread and almost mundane. Yet, surprisingly, the ways in which these practices of video communication are made manifest in the home and, perhaps more importantly, the intent revealed

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee.

CSCW 2010, February 6–10, 2010, Savannah, Georgia, USA.
Copyright 2010 ACM 978-1-60558-795-0/10/02...\$10.00.

through them has remained largely unreported in the HCI literature.

Consequently, where others have sought to study how intimacy is mediated through bespoke technologies [24] there is opportunity here to explore how existing VMC technologies are already used. For the study of VMC, this offers the possibility of extending our more bodily understanding of use, generated from workplace studies, with an understanding more attuned to the domestic, more closely reflecting the ‘moral order’ of the home [20].

In this paper, therefore, we present research into the adoption and use of VMC by domestic users. We not only explore practices surrounding their uses of video technologies, but through their accounts, we investigate the *motivations* behind their uses of VMC. Commonly, home users of VMC claim that it makes them feel closer to those with whom they are communicating [19]. We wish however, to delve deeper to explore what it might *mean* for one to ‘feel closer’ to somebody via video, through what *practices* this is achieved and what *forms* this closeness takes. We wish to understand aspects of ‘closeness’ in video communication such that we might, derive ways of refining and improving upon the current VMC experience, but also potentially, to open up avenues of exploration for new forms of communications technology.

In the rest of this paper we present a brief overview of related literature, summarising key reasons why VMC at work has had little purchase and highlighting the small amount of current literature on domestic VMC technologies. We then present our study and findings from interviewing home users of VMC technology, concluding with discussion of the implications of such practices for the next-generation of domestic VMC devices.

RELATED WORK

VMC in the Workplace

Since the 1970s, designers of VMC systems have aspired to replicate face-to-face meetings. This has been predicated on much prior research which outlined the importance of visual cues such as eye gaze, facial expression and gesture to conversational situations. As a result, many VMC systems have attempted to mimic the properties of face-to-face conversation, conveying not just talk but non-verbal behaviour as well [7]. Consequently, this led to a preponderance of systems which focussed on conveying images of the head and shoulders of participants, including attempts to align eye gaze, support head turning and so on.

Such “talking heads” approaches to video systems have been heavily critiqued however. For example, studies have shown that, even if the system design preserves head-turning and eye gaze, mediated conversations are still more formal, stilted, and less interactive than face-to-face conversations [21].

At the same time a “richer is better” hypothesis has permeated much of the work in this space. This can be seen

made manifest in recent high production, high resolution systems such as Cisco’s TelePresence and HP’s Halo systems. These strive for increasingly life-like, high fidelity video interactions. But despite these advances there is little support in the research literature for the advantages of higher bandwidth, video connections. For example, much of the literature has failed to show that people using video plus audio systems perform any better on objective measures (such as time to complete a shared task) than people using only an audio connection (e.g., [4], and for a summary, see [25]). The structure of their speech is similar, the speed and accuracy with which they do tasks is no better, and some research has even found the addition of video can make the experience worse [17].

So why have work-related systems not lived up to our expectations and aspirations for them? Instead of issues of fidelity or the richness of the channel, behavioural studies instead suggest that videoconferencing systems fail to support an adequate sharing of the physical frames of reference that make mutual action and interaction intelligible. One of the aspects concerns the nature of work-related conversations often being object-focused (objects such as documents) suggesting video-as-data is more important than talking-heads [1, 5, 25]. A second issue concerns the framing of people *in relation to* the objects they are interacting with [5]. Most video systems fail to adequately support awareness of people’s relative views of objects and other collaborators requiring the participants to reconcile images and perspectives of others to understand relative orientations. A final issue concerns establishing shared perspectives more generally. For example, Heath and Luff [9] have shown the difficulties video systems create in establishing reciprocity of awareness amongst collaborators. Being mutually aware of perspectives and orientations is fundamental to a *shared physical* space but is difficult to recreate in a *shared video* space.

In summary, the work-related literature has focussed on the way in which *interactional* limitations and fundamental differences in VMC compared to face-to-face interaction undermine the value of VMC technologies, with the implication that these issues may have hampered their wider scale adoption. This research must be interpreted alongside a host of other more practical reasons that have been suggested for why people in workplaces often avoid the use of VMC systems, such as issues to do with the high overhead of setting up, learning to use, and troubleshooting these systems [11]. Such perceived obstacles are weighed against the possible benefits of using video systems, and here, other tools, such as audio conferencing, are often seen to be “good enough”.

Domestic Video Technologies

Turning to domestic video technologies, we can see that, like work-related VMC, attempts to develop domestic ‘videophones’ have often, in the past, suffered from poor uptake [15, 16]. Now, however, the picture is quite different. Webcams have been used for a number of years

in domestic settings, and their use is becoming quite prolific (with billions of unique video sessions every year) [22]. Other trends may also explain why video technologies are suddenly so pervasive in domestic use. Over the last 20 years there has been a transformation in our communications landscape, altering how we communicate. Of these changes we see four principal trends underpinning the adoption of VMC:

- *Communication Styles*. Increasingly there has been a convergence of devices which means people now routinely see their PC as a means for communication and use it as such.
- *Communication Infrastructures*. Massive investment in telecoms infrastructures from various sources has made broadband internet access achievable for huge sections of the population (in first world countries).
- *Communication Possibilities*. Increasingly, the means for video communication (i.e. video cameras and microphones) are being integrated into PCs as standard. People now have the technology for video calls without making a separate purchase.
- *Communication Cost Models*. New cost models to suite the new telecoms infrastructures and to entice home users have removed the cost barriers to necessary data exchange for video calls.

We would not argue, however, that these factors have caused the upsurge in video communication, but merely that in the aggregate, they have sown the seeds of possibility for domestic use. This use only becomes reality if such systems are delivering real value for users. The question then is what is this value, and what is its importance in the home?

We have very little in the way of research to look to for answers, within the CHI or CSCW literature. Of course there is a growing body of work on domestic photography [14], and even domestic video recording practices [13]. But whilst this may have interesting links to video communication practices (in terms of the use of such visual media for asynchronous communication), the use of still and moving images in this way is clearly different from the technologies we are concerned with here. A notable exception to this dearth however is the work of O'Hara et al [19], which studied uses of mobile phone-based video telephony. That work however, made no distinction between uses of video calling for work or domestic purposes. Further, this research was specific to the use of mobile technologies in a variety of contexts. We might therefore expect that the practices and motivations for the home use of VMC technology such as webcams are quite different. It is therefore these issues to which we now turn.

FIELD STUDY

Methodology

To explore the current state of home video communication we recruited a sample of home users of VMC technology (paid £40 per home for participation). Our research

participants took part in two, hour long interviews in their own homes, each interview separated by a three week period during which they kept a log of video calls made (all interviews were audio recorded and transcribed). This allowed us to solicit participants' accounts of their regular VMC practices which were then validated with the records kept during the logging period.

The first interview was semi-structured and participants were questioned about their video call making practices, their intentions behind these practices and their relationships with the people with whom they communicated. The second (depth) interview was used as an opportunity to clarify any contentious points raised in the first interview with individual respondents and was an opportunity to discuss broader themes (such as being part of the family whilst being far from home, experiencing involvement in remote activities and giving reassurance remotely) which were emerging from the first stage of interviews and were tailored to individual respondents. Specific probing was conducted during the interviews to interpret the ways in which making a video call differed from regular practices of telephony. Interview accounts were combined with observations in the home of participants' VMC technology arrangements (their typical (and atypical) arrangements for making video calls).

Through thematic analysis of transcribed data (interviews and field notes) concepts of "closeness" emerged as a central theme. An iterative and grounded analysis focussed on the ways in which closeness was experienced by the participants. This built on top of the rich description of user practices derived from the interviews. In this study our major concern was not for observing the minutiae of the call making practices as might be engendered by a more ethnomethodological account of practice (and which has previously been replete in the more bodily workplace communication studies [9]) but was more focused on understanding how users made sense of and accounted for their practices and motivations. This analytic concern was best served through using an interview technique.

Participants

We interviewed 17 participants spread across 12 homes. Participants were recruited by email advertisement within one of our own research institutions, via online advertisement on local message boards and word-of-mouth. Participants were screened prior to inclusion in the study and had to meet the requirement of regularly using VMC for non-work purposes (regularity being defined as at least 3 video calls per month).

All participants were currently living in the East and South-Eastern areas of England but were of a variety of nationalities, ages and socio-economic statuses. Of the 17 participants, we interviewed 9 females and 8 males ranging in age from 15 to 55. In 5 homes we spoke to both members of a male/female couple, but in all others only one member of the household was interviewed. Amongst our

participants, 7 had children (ranging in age from 2 years to adult). Because we suspected their practices might be quite different, and as a point of contrast, we interviewed 2 participants (in separate homes) who were teenagers (aged 15 and 16 – both female).

FINDINGS

The interviews with participants and observations/logs of their calls revealed some prevailing patterns of VMC use and a variety of dispositions to interacting via VMC. In the following sections we detail how our study participants were making video calls and the motivations behind this, as well as their opinions on interacting in this way.

Which Technologies Get Used?

Our participants used a variety of largely homogenous VMC technologies. Twelve of our participants used laptops (8 with integrated webcams, 4 with externals). The remaining 5 interviewees used desktop machines (1 with an integrated webcam, and the remaining 4 with externals). The software being used to facilitate the video communication was mostly Skype (14/17 participants) but we also spoke to 2 users of Windows Live Messenger (MSN) and 1 respondent who used a variety of IRC (Internet Relay Chat) clients with video capability.

Practices in Video Calling

The average call length for video conversations amongst our participants was 35.5mins (15.03 SD). Conversations occurred on average 2.2 (1.26 SD) times per week.

Open connections vs. call focused

Video calls reported fell into two broad categories. Firstly, the ‘focused conversation’ was the predominant form of connection and was referred to by all participants. In this type of call, the video connection would remain open for a limited amount of time but for the whole of the conversation. For 2 participants however, video use was far more likely to be on an *ad hoc* basis during chat via other means where there was a sudden desire to show something.

Secondly, respondents spoke to us about ‘open connections’. In this form of call, participants established a video link and left it open for extended periods (often 2 to 3 hours). In these kinds of interactions there was no particular pressure to a) talk or b) remain in view on camera. This was only reported by 4 of our participants. One, a teenage girl, used this kind of link to communicate with her best friend whilst they were doing school work. Given that the work required her to be at the computer, she opened the connection so that occasionally she could check in with her friend to see how she was progressing and to stop to chat. For one male participant (late 20’s) the video connection was to his girlfriend. They would leave the connection on between their respective living rooms, but, perhaps importantly, with the sound turned off, thus spending the evening together but without the pressure to chat.

“Sometimes we leave it open actually, sometimes at the end of a call. Given that we’re living apart, it’s a nice way of somewhat appearing in the same room when, you know, when I go and watch

TV. [...] Often I’ll turn off the audio [...] You know, because she’s working on her computer and studying.” – Male, Household 3

Finally, the 2 other participants who opened these kinds of connections did this when trying to include their parents (the grandparents) somewhat passively in their child’s birthday celebrations.

“So we had him on the webcam for his first birthday, not for long, it was probably about a couple of hours [...] he was just rolling around and having a play, you know, we just left it on so they could watch.” – Father, Household 2

Opening calls

Our participants described common practices for arranging such calls. Most participants had an established pattern of calling those they knew well. As such, they were aware of the common rhythms of availability of the people they were calling. Often a rough period of time, such as ‘Sunday afternoon’ would be dedicated as a regular slot during which a call was likely to occur. Mostly, fine-grained coordination was achieved by logging on to the communication service, e.g. Skype or MSN supporting the video call. This would often be done whilst the user was engaged in some other behaviour, surfing the web or similar. Online visibility was then enough to prompt a call being made. In this way the simple alerting mechanisms of the online presence indicator along with awareness of broad routines was used to negotiate availability for calling.

For one couple however, given that their desktop PC was in an office near the living room, where they spent most of their time, they would often log into Skype and then simply turn the volume up on the PC, thus treating the Skype service like a regular telephone making it audible throughout the house. The daughter of the family (the one making the call) was aware of the arrangement at home and would know that an online presence in Skype did not necessarily mean that her parents were available to talk.

Our participants also detailed for us how they managed non-routine video calls. This was reportedly normally achieved by first logging onto the online service and checking for the intended target’s presence online. If the target wasn’t online then another communication medium would be used such as sending a text message or making a quick mobile or fixed line phone call to tell the other person to go online. All participants confirmed that this was their common practice for making *ad hoc* calls.

Locations for calling (fixed vs. mobile)

When making these calls participants using desktop PCs were obviously constrained by where they could call from. External webcams for 4 of them however gave greater flexibility over camera view and angle. Despite the greater potential for mobility amongst the laptop users, most were consistent in call location. For 9 of the laptop users, this was the family living room. This was largely due to this being their regular location for laptop use and other family evening activities. Video calling could therefore be coordinated with this general activity.

“I’ve started sitting with the laptop on my lap and turning it so that they can watch ‘K’ play but I can still talk – because my mum quite enjoys watching him play.” – Mother, Household 2

In addition, participants with laptops all reported taking their laptops on “tours” around the home to show people around during video calls, but this kind of mobility whilst calling was only an occasional use.

I gave him a little tour [...] that was quite good actually. The webcam’s on swivel, so I just, kind of, turned it round so it became, kind of, like a little video camera, so I just walked round. I could see the screen, so I could see what he was seeing. – Father, Household 2

Talking heads vs. video-as-data

Video calling mainly supported chat so the predominant view relied upon was a head and shoulders view. However, flexibility to adjust this view was appreciated. The kinds of objects being shown (beyond the virtual tour described above) most often included items recently purchased as this was often a specific topic for a conversation greatly enhanced by the ability to look at things together.

The framing of shots

How a camera might be used to construct a shot was often of concern. For our younger adult participants who were regularly chatting with parents, there was a strong sense of wanting to control what was in the image that was being sent. As such they would often frame a limited view of their homes and possibly even bodies, so that parents could only see what was intentionally shown. A tension is raised here though in that for those parents that we spoke to who regularly communicated with adult children, there was a desire to be able to see not just the person but their crucially informative surroundings.

“I want to see where ‘A’ is. How his bedroom is looking, if he’s picked up his laundry.” – Mother, Household 1

Dropping video

Despite the preference for video, and the reported preference for seeing faces, our respondents did report that good quality audio was a priority. Several participants reported how, if video transmission was becoming very poor (too much lag or distortion), or crucially if they felt it was having an adverse effect on the audio transmission, then they would drop the video signal in favour of a more coherent (perhaps less distracted) audio-only conversation.

Complementing or replacing?

It was evident then that video calling was being done by our participants as a direct replacement for telephone calling. All participants agreed that if video was not available they would still make the regular calls that they were already making using audio only means. Video was seen by our participants as a bonus rather than a requisite, if they spoke via video to their child, parents or partner, they would then have met their intent and would not then need to have any other additional communication. Video was not therefore outside of normal communicative practice.

Family connections

There was a clear sense however from our participants about the types of people that they thought it suitable to have this special video connection with. In most cases, conversations via video were almost exclusively with either family or partners. Where friends were spoken to via video this only appeared to occur with our two male interviewees who were both under 30 and currently living alone. It was evident from our participants’ practices that video was deemed a relatively intimate act and one that would not necessarily be extended to a wide set of friends.

The prevalence of multiparty interactions

Perhaps because of this familial connection, for 9 of our participants it was a common experience to have multiple parties at either end. In most cases the conversation would be instigated by two people one at each end but often they would be joined by others. Participants reported difficulties with conversing with more than one person at each end and especially more than two at each end given the capture angle of webcams. It was seen as particularly annoying if people couldn’t be adequately seen on the camera and this was felt by both the person being viewed and the viewer.

“What I find annoying is when ‘S’ is on talking to someone, I’m not in the picture, I can be sitting right next to her but they can’t see me. [...] I feel like I’m not involved.” – Male, Household 8

Despite these difficulties, multi-party interactions were by far the norm. The couples we spoke to reported that they both regularly talked via video during the same call. For example our two middle-aged married couples regularly chatted to their children who had left home and both wanted to be in shot at the same time. Equally for two other pairs of participants (both young couples) both parents would be in view during the weekly video calls home. Small children were reportedly also regular participants in video calls for some of our participants, but rarely alone. They often made serial incursions during a call whilst adults were chatting.

Closing calls

The closing of calls was something that was seen as necessarily awkward but which was not regarded with much importance. Participants commented that at times they would encounter slightly embarrassing situations where they would have turned off their webcam giving the impression to users with limited understanding that a call had ended, but which would leave an open connection coming from the other end. Under which circumstances they occasionally heard elements of conversations which perhaps they shouldn’t have.

(Male) “I sometimes find it funny when they are trying to shut it off and they are not aware of the fact that you are still there.”

(Female) “You just hear them talking ‘I have got to get it off, which button was it?’”

(Male) “But sometimes about stuff we have said.” – Couple, Household 4

There were norms developing however for closing behaviours such as the use of almost iconic gestures such as

over-exaggerated waving. It was clearly felt that the visible connection required some kind of comparatively visible ending to the conversation similar to the kinds of closings used by phone callers.

Teenagers (A Cautionary Note)

Although we only have a very small sub-sample of two teenagers, making it extremely difficult to draw conclusions, we did get a strong sense that teenage practices of video use differed from their parents and our adult participants. The use of VMC itself constituted only a small subset of their regular and extensive use of other forms of communication. Both teenagers commented that as they regularly had to do homework on a computer, they would often spend a couple of hours every evening (somewhat legitimately) using a computer. During this time they would engage in extensive IRC client use, messaging and chatting with friends from school. One parent commented that it was common for her teenaged daughter to have between 5 and 10 separate chat windows open at any given time, each hosting a separate conversation. During these episodes there would be the possibility of video communication with one other person. The notion of having multi-party video conferencing was well received:

“Typing is just a lot of work. If I wanted to have a massive conversation with all my friends then I’d wanna do that [have a multi-party video call].” – Teenager, Household 11

But neither teenager knew how to do this or felt that it was particularly possible given either the limited number of their friends who they thought might have the necessary hardware (webcams etc) or access to relevant software (access to different IRC clients often determining teens interaction possibilities). Similar to much of their communication practice, video was tied far more to friendship groups than families, and their differing approach to intimacy with friends (different to adult relationships) would suggest that more work needs to be done to understand their specific attitudes towards VMC.

Why Use Video?

When asked why they would rather use video than the telephone to communicate, our participants repeatedly claimed that it made them feel closer to the person at the other end (similar observations were made in [23]). We were curious as to what that really meant for people. In other words, what work was the term ‘close’ doing in people’s accounts of practice? In these interviews, it became apparent that ‘closeness’ and the way it was expressed or managed through video communication could mean quite distinct things for an interaction. In the following sections we explicate some of the various ways in which the concept of closeness was expressed through users’ accounts of VMC.

To recognise and be recognised

For some of our participants, there was talk of wanting to use the video connection such that their own children would be close to *their* parents (i.e. the children’s grandparents).

Fostering links between grandchildren and grandparents, often when they were separated by great distance, and the prospect of physically meeting was significantly diminished, seemed like a natural motivation for establishing video links. Here, then, closeness was being expressed through a desire to ensure that children would know what their grandparents actually looked like. There was also a sense that this was a response to an unspoken fear of grandparents that they themselves would not recognize their own progeny. This was done so as to avoid the awkwardness that might be encountered on both sides when an actual face-to-face meeting occurred, to inculcate a level of intimacy before such a meeting. Closeness here referred to the ability to recognize and be recognized by significant others.

“With the grandparents being so far away there’s always the feeling that he’s not getting enough time with them or they’re not getting enough time with him. But I think the video does make it a little bit easier.[...] His grandmother came over from South Africa for Christmas and she commented that yes he’d grown but she’d been able to see it happen.” – Father, Household 2

To be involved

For one of our participants, her sense of closeness was derived through video in the way in which she became involved in the ongoing lives of people back home. An immigrant to the UK, she had struggled at first living in a new country, with a foreign language to learn, and consequently had found her everyday life somewhat isolating. She used the video connection to talk with her large family back home in Poland. She described how she would talk to many members of her family in turn, with each coming to talk to her over the computer. She told us of how she would often see people walk by the screen and would be aware of visitors to the family. Consequently she was updated on a regular basis about not just what her immediate family would be doing but also her aunts, uncles, cousins and extended family. Often they would have told each other what they had talked about with her and so she told us having the video link made it feel like she was still involved in their lives.

“Now I know they are alive, almost, second by second, everyday my mum tells me, so now I know what is happening in all my family. It’s like I’m there, I feel sometimes.” – Female, Household 8

To know that somebody is there

With one of our participants, already mentioned above, we found the curious behaviour of establishing open pervasive video links with his girlfriend, where peculiarly they often muted the sound. This was explained to us as a way of just knowing that somebody is there, which gives a sense of closeness but which doesn’t have that same compulsion that one should be making conversation – the lack of sound removes this requirement.

“I mean, it’s more really just, like, a sense of feeling that there’s some, kind of, open connection there, so that if we do want to, like,

give someone a wave or something like that, then we can do.” – Male, Household 3.

Equally, this behaviour was paralleled by the teenager who would use a pervasive connection with her friend when she was doing coursework at school together. Because of their prevailing communication habits and its staccato rhythms (in the way they would pick up and drop IR chat threads), having a video connection over which one only occasionally spoke but which was always available seemed perfectly natural. It was described to us as reassuring that she knew her friend was going through the same experience of having to endure homework whilst she worked.

To partake of routine

In one household we visited, the mother told us about how, when she was apart from her husband (travelling for work), she would still want to partake of the kinds of routine at key parts of the day that they normally undertook. Consequently, bed time, being a somewhat ritualized activity in most homes, would be a time at which she shared in regular routines with her husband.

“As we’ve been living together for such a long time, for us there are certain important routines you know, you lie around, you talk a little bit, you say certain things.” – Mother, Household 1.

Here then video went some way to making it possible to continue these routines (providing of course that she or her husband had not travelled wildly outside of their home time zone). Here, as important as the types of activities or the things that might be said are the underlying prosody of action, and the rhythm of routine. The video link helped establish closeness by enabling such shared awareness.

To allow yourself to be seen

Another way in which some of our participants felt that video was facilitating closeness was through allowing others to see them. This was particularly evident amongst our younger adults who were living far from home. We interviewed a young Canadian couple and a young Israeli researcher all of whom were living at a distance from their close families. In both cases, our participants seemed at pains to not appear vain in their statements but they clearly articulated that for them it was perhaps less important for them to literally see their parents than it was for their parents to see them. They commented on how, at times, they would not want to be literally seen, maybe because of their state of dress or the state of their house. This sometimes lead to their pretending that their webcam was broken or somehow otherwise unavailable. For them the act of showing themselves to somebody else via the webcam was an explicit act to satisfy the people they were talking to, i.e. their parents. In this act they were offering an intimacy to somebody else, and this was a way in which they expressed their closeness with them.

(Female) “And your mom loves it. I don’t think she’d be able to survive without it.”

(Male) “Yes, sometimes we call them and because it is five hours behind, usually it’s late at night for us and we’ll be like almost

ready for bed and not feeling that great, so we won’t want to put the video camera on, but my parents want us to and we are just like, yes..”

(Female) “Okay” – Couple, Household 7

To exercise your right to look

Of course the reverse of the comments above is the perspective of the parent. Parents considered they had a moral right to be able to look at the state of their child and the environment they were in. Whilst it was acknowledged that on the telephone one could make a reasonable assessment of how a child away from home (an adult child) might be coping with life, it was far easier to pick up on cues of distress via video.

“It’s me wanting to see that they were physically alright.”

“It was just the fact that you could see them, as parents, the fact that you can actually see them whilst you’re talking to them, you can see their facial expressions.” – Mother, Household 10.

For parents this right to look underpinned a fundamental desire to seek *reassurance* that their child was OK. This was seen as a key duty of a parent and part of their role in life. Delivering and getting reassurance through the extra information provided by a video link kept them close.

To focus and show dedication

One of the most prolific ways in which closeness was seemingly experienced (outside of experiments with open connections) was through the sense in which video required dedicated time. Our participants expressed that when talking via video it was almost impossible to be doing anything else, because it would be so visible. By contrast, talking on the phone meant that they could engage in all sorts of other activities, such as wandering around their apartment, doing cleaning, and checking email all whilst seemingly paying attention to the conversation. With video however, any distraction would be noticed and commented on. Video then offered closeness by one person granting a totally dedicated moment in time during which the user implicitly agreed to be totally focused on the conversation and the other person.

“It’s a more focussed conversation, if you can see someone face to face. Certainly, if there’s someone there looking at you, you’re much less likely to get distracted.” – Male, Household 3

To talk when there can’t be talk

One final act of closeness that we wanted to touch upon also stems from a unique feature of video communication. Put somewhat obtusely, video enables conversations between people who can’t ordinarily converse. We have in mind with this situation a very specific interaction. We return once more to interactions between grandparents and grandchildren (although it needn’t be exclusively such).

Making conversation on the telephone is a skill and a skill which must be learnt. There are courtesies and patterns of discourse which are necessary to maintain the conversation. For example, back-channelling is vitally important, making the other person aware that you are still there and paying attention. These skills take a long time for children to learn

and consequently until their later pre-teen years they are somewhat at pains to achieve a coherent telephone conversation. This is especially so in very young children who either can't yet converse, or who don't fully understand the rules of conversation.

Our respondents who were parents however, informed us of the general success of video over the telephone in being able to establish conversations (of a sort) between children and grandparents. Of course the interactions were still not like a proper conversation for the younger children but crucially they provided a level of interactivity.

(Female) "He likes to laugh when we all laugh as well, so, we're all laughing and he stands there laughing as well. I think he understands now, the conversation."

(Male) "He waves at them as well."

(Female) "He doesn't wave at the TV, but he waves at the laptop." – Couple, Household 2

These examples show that with video, even if a child was too young to exchange words (perhaps because they had none yet), they would still recognise the imagery of the person they were 'talking' to and could wave or bring things to show to the camera. In this act there could be more back and forth and interaction than could be achieved on the telephone. Here then the closeness achieved by video is by the literal interaction between a grandparent and a child, something that could not otherwise be achieved.

DISCUSSION AND IMPLICATIONS

The fieldwork above provides a deeper understanding of the ways in which people currently use VMC technology in the home. We have shown that central to this is the theme of "closeness" and the heterogeneous ways in which home users of VMC achieve a closer connection with family (and sometimes friends) through video technology. Being mutually aware of other's activities and routines, achieving familiarity through video, demonstrating dedication and affection through the intimacy of a video link, and exercising one's moral right to look and be looked at are all ways in which video supported closeness. These, in turn, may be the fundamental reasons why video technology in the home is becoming an ingrained and valued channel for communication. Further, we would argue that it is these issues, both in terms of the pragmatics of use and the value which the technology delivers within the moral order of the home, which technology designers should be sensitised to when developing VMC technologies for domestic use.

Note that such concerns are different to the kinds of bodily awareness problems which have previously occupied researchers of workplace-oriented VMC technologies. Further, one might argue that many of the systems our householders used are less technically sophisticated than those available in the workplace. Thus, we might expect that they are less effective at solving the kinds of interactional difficulties (such as eye gaze and the sharing of objects) that past research has pointed to. And yet despite this, home users of VMC clearly derive a range of important values from the technology. This either means

that previous work has been somewhat misguided in its emphasis, or that the home is a very different place indeed with different sets of concerns.

Whatever the case, let us consider what some of the implications of these findings might be to technology designers. These fall into two broad categories: the practical issues of delivering more effective technology, and ways in which the technology might augment the fundamental value of this technology for home users. These latter issues are highlighted by considering the particulars of the moral order of the home. Addressing each in turn we present some potential design ideas which resonate with these themes and which might serve as fruitful further work.

The Pragmatics of Home VMC

The first area of interest we might term the 'pragmatics' of interaction. These issues derive largely from the ways in which people were currently using their VMC technology and the limitations or benefits that they found with it at the level of interaction. We said earlier that people derive a wide range of value despite interactional problems, but here are some ways this could be made better:

- *Mobility.* There was clear evidence that users were intrigued by the mobility of video devices within the home. It was made evident that they wanted to easily configure shots, to lock them off, and to variably frame views. It was also clear that at times people wanted to be able to move the camera to focus on specific objects and they also wanted to be able to manoeuvre the camera such that they could provide a 'tour' of the house. This suggests the development of new kinds of standalone video communication device that are easily configurable and portable.
- *Multiparty use.* The systems used in the homes we observed were often used by multiple people. At the same time, laptops are not always the most convenient devices to crowd around, presenting viewing angle problems, and a camera with a limited angle, optimised for single person use. This suggests a need to redesign webcams for more multiparty use, or perhaps, more radically, the need to develop a home appliance for multiparty viewing and use.
- *Ease-of-use.* It seemed evident that users were experimenting with VMC because they often found they had the means to do it and the configuration of devices was simple. Laptops often included integrated webcams which caused little trouble (as opposed to external webcams which required configuring). This suggests that integrated technologies which combine the hardware with the software required for managing the call will be of benefit to users.
- *Awareness alerting.* It was evident that one of the key advantages of Skype was its simple alerting of other's availability. Being able to see that others were online was a major means for the coordination of a call. If a stand-alone video device were to be developed then it might do well to take heed of the usefulness of these

availability indicators (and the implicit ease of making a call – just having to click on the address of the person highlighted as available). Whilst the connection could be used like a phone to audibly alert attention, as reported in one house, this required that a user be permanently *logged-in*. Evidently, from the lack of similar use amongst our other users, this was not preferable. So the ability for a video device to mark availability seems particularly useful – software which not only highlights current availability but scheduled availability also seems an interesting way forward.

- *Meshing with other activities*. Whilst there was evidently an argument for video being about dedication and focus (and in itself it stopped people from being distracted by other software), there were also times when it was clearly important that video could be meshed with other activities as necessary. Many of our participants discussed using video in coordination with online chat. On top of this there was some (albeit limited) discussion of using the technology to coordinate other activities around which the conversation might be focused. Integrated messaging environments, with utilities like shared web-browsers and file sharing mechanisms might then be of benefit.
- *Giving audio priority over video*. Given the importance of audio over video, automatic mechanisms for dropping the video signal when the audio is being impaired would be of benefit to users, removing the need to reconfigure links manually.
- *A feature for continuous connection*. Although most users seemed resistant to any design for a pervasive ‘porthole’ connection [3], the fact that some of our participants liked to have such a persistent background connection suggestions there is some potential here for some classes of user. For separated partners, for example, a phatic technology approach to video window design might offer benefits and suggest a role for pervasive video windows.

A Moral Order of Home VMC

Our findings also articulated to us the ways in which there were moral issues of the home driving the domestic adoption and use of VMC. It is fair to say that the issues are much more complex than simply offering up richer communication (i.e. more information) than audio alone. Rather, there were subtleties to what it meant to want to use video to foster ‘closeness’ with the people one cares about.

The natural tensions that arose between parents wanting to observe their children and feeling it their right to do so and the children feeling it appropriate to reciprocally grant access (visibly) to their parents, and perhaps very close friends, but not others, foregrounds issues of the *moral order of looking*. Who has the right to share a video connection with you? Evidently, in the domestic space this is a particularly intimate act, rather than the more public space of the workplace. We do not invite casual colleagues into our homes. We have much stricter rules about our

domestic space. Video transgresses the natural boundaries of the home [20] and as such it should be treated more sensitively when this space is being designed for. The kinds of ‘portholes’ [3] attempted in the workplace just would not work translated to the domestic space, unless under specific situations (such as the intimate partners discussed above).

It was also evident from our findings that because of the nature of video it was essentially used for *the exchange of intimacies*. It was a strong medium for this kind of communication, being highly personal and highly focussed. As such it offers a kind of communication that sets it apart from others when placed in the domestic sphere, and consequently this might shape the ways in which such technologies are either packaged or targeted for a user.

Ultimately though there are *different aspects of closeness* that video might serve. And it is to these more specific factors, such as the capacity of video to foster communication between a grand-parent and a child that can’t yet talk, or the desire to partake in routines of the home when away or the desire to actively demonstrate that you have taken the time to focus on a person, that are, perhaps most appropriately, potential sources for design inspiration. Video in the home is delivering closeness by various means, or perhaps to put it more accurately, people are trying to achieve closeness in various ways through video. One might ultimately design a variety of different phatic technologies [24] to serve the purposes of supporting such intimacy. But video and its use sensitises us to some of the ways in which people seek to make connections and feel close to one another, and it has valuable properties which support key values of human closeness. There is much that can be done to develop the design of VMC that would ultimately enrich its value to the user – without discarding the video itself but strengthening its use.

Some Possible Directions

On the basis of this understanding we raise three (of potentially many) areas in which we might wish to develop technologies which would resonate with these human values being, therefore, worthy of further research.

- *Video messaging*. On many occasions the capacity to sustain a conversation with a video link is hampered by connection quality. Or equally, travel, distance and time zones can mean that activity is difficult to coordinate. As such having the ready means for making video ‘podcasts’ could be particularly rewarding. An easy way of leaving video messages for people potentially offers an increased intimacy and allows one to remotely demonstrate a period of focussed dedication.
- *Stand-alone video devices*. People respond to the mobility of video and have increasing desire to move their video connection around. But this needs to be combined with the simple alerting and availability mechanisms currently enjoyed. As such, having networked home webcams which can be integrated with social networking sites offers much potential.

- *Interactive devices for kids*. There is a strong desire to foster inter-generational communication. As such, simple devices that might facilitate interaction between grandparents and grandchildren allowing for interactivity not requiring conversation but fostering visual engagement could be of benefit.

CONCLUSION

In this paper we have explored VMC in the home. We have foregrounded user practices and sought to explore the motivations behind the domestic use of VMC, most of which appears to be very different from what we know from workplace VMC research. We have argued that a desire for closeness motivates adoption of video and, through exploration of user accounts of practice, we have sought to explicate how closeness is articulated. From this we have derived implications for the further development of video technologies for the home, pointing to ways in which households might continue to find new ways to reconcile geographical remoteness with intimacy and closeness.

ACKNOWLEDGMENTS

We thank our participants for their time, effort and candour.

REFERENCES

1. Anderson, A.H., Smallwood, L., MacDonald, R., Mullin, J., Fleming, A. & O'Malley, C. (2000). Video data and video links in mediated communication: What do users value? *International Journal of Human-Computer Studies*, 52(1), 165-187.
2. Bell, G., Brooke, T., Churchill, E. & Paulos, E. (2003). Intimate Ubiquitous Computing. In *Proc. UbiComp Workshop*, 3—6
3. Dourish, P. & Bly, S. (1992). Portholes: supporting awareness in a distributed work group. In *Proc of CHI '92*. ACM, New York, NY, 541-547.
4. Fussell, S.R., Kraut, R.E., & Siegel, J. (2000). Coordination of communication: Effects of shared visual context on collaborative work. In *Proc. of CSCW'00*, 21-30.
5. Gaver, W., Sellen, A., Heath, C., & Luff, P. (1993). One is not enough: Multiple views in a media space. *INTERCHI'93*, 335-341.
6. Gibbs, M. R., Vetere, F., Bunyan, M., and Howard, S. 2005. SynchroMate: a phatic technology for mediating intimacy. In *Proc. of DUX '05*. AIGA: American Institute of Graphic Arts, New York, NY.
7. Grayson, D. & Monk, A. (2003). Are you looking at me? Eye contact and desktop video conferencing. *TOCHI*, Vol. 10(3).
8. Harper, R. (2009) From Telepresence to Human Absence – the pragmatic construction of the human in communications systems research. In *Proc. of HCI 2009*. BCS 73-82
9. Heath, C. & Luff, P. (1991). Disembodied conduct: Communication through video in a multi-media environment. In *Proc. of CHI*, 99-103. ACM
10. Hinds, P. J. & Kiesler, S. (2002) *Distributed Work*. MIT Press
11. Hirsh, S. Sellen, A. and Brokopp, N. (2005). Why HP People Do and Don't Use Videoconferencing Systems. *HP Technical Report, HPL-2004-140(R.1)*.
12. Kim, S., Kientz, J. A., Patel, S. N., and Abowd, G. D. (2008). Are you sleeping?: sharing portrayed sleeping status within a social network. In *Proc. of CSCW '08*. ACM, New York, NY, 619-628
13. Kirk, D., Sellen, A., Harper, R., and Wood, K. 2007. Understanding Videowork. In *Proc. of CHI '07*. ACM, New York, NY, 61-70
14. Kirk, D., Sellen, A., Rother, C., and Wood, K. 2006. Understanding Photowork. In *Proc. of CHI '06*. ACM, New York, NY, 761-770
15. Lewis, A.V. & Cosier, G. (1997) Whither video? Pictorial culture and telepresence. *BT Tech. Journ.* 15, 4.
16. Lipartito, K. (2003). Picturephone and the information age: The social meaning of failure. *Technology and Culture*.
17. Matarazzo, G. & Sellen, A.J. (2000). The role of video in work at a distance: Addition or distraction? *Behaviour and Information Technology*, Vol. 19(5), 339-348.
18. O'Brien, S. and Mueller, F. (2006) Holding hands over a distance: technology probes in an intimate, mobile context. In *Proc. of OZCHI '06*, ACM, 293-296.
19. O'Hara, K., Black, A., & Lipson, M. (2006). Everyday practices with mobile video telephony. In *Proc of CHI '06*. ACM, New York, NY, 871-880
20. Randall, D., Harper, R., & Rouncefield, M. (2007) *Fieldwork for Design: Theory and Practice*. Springer-Verlag New York, Inc.
21. Sellen, A.J. (1995). Remote conversations: The effects of mediating talk with technology. *Human-Computer Interaction*. 10, 401-444
22. Schindler, E. (2006). Lights, camera, inaction. *netWorker* 10, 1 (Mar. 2006), 11-13
23. Short, J., Williams, E. & Christie, B. (1976). *The social psychology of telecommunications*. London: Wiley.
24. Vetere, F., Gibbs, M. R., Kjeldskov, J., Howard, S., Mueller, F., Pedell, S., Mecoless, K. & Bunyan, M. (2005) Mediating Intimacy: Designing Technologies to Support Strong-Tie Relationships. In *Proc. of CHI '05*. ACM, 471-480
25. Whittaker, S. (2003). Things to talk about when talking about things. *Human-Computer Interaction*, 18, 149-17