

# Everyday Practices with Mobile Video Telephony

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## ABSTRACT

The mobile phone allowed people to communicate when and where they wanted, dramatically changing how audio telephony was integrated into daily life. With video telephony services now available on everyday mobile phones, comparable arguments are being made that this will change how people relate to and use video telephony. The mobile and personal natures of mobile phones remove factors that previously hindered use of video telephony. Mobility also brings new challenges and concerns that may hinder use of video telephony in particular contexts. With this in mind, the paper revisits the notion of video telephony but within the context of mobile phones. A study is presented of people's everyday use of mobile video telephony using diary techniques and ethnographic interviews. The study uses real episodes to highlight key motivations and circumstances under which mobile video telephony was and wasn't used. Implications for adoption of design of mobile video phones are discussed.

## Author Keywords

Mobile phone, video telephony, diary study, interviews, mobility, privacy, video mediated communication.

## ACM Classification Keywords

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

## INTRODUCTION

With the growth of 3G services, mobile video telephony is now available to everyday consumers. Communications industry commentators are divided on the potential impact of mobile video telephony. For each pundit expecting significant commercial success of mobile video telephony, another remains sceptical and predicts commercial failure.

To understand this debate it is important to consider the broader historical context of video telephony and mobile telecommunications. When video telephony was introduced in the 1960s, there were confident predictions that it would eventually replace voice-only telephony. The assumption underlying these predictions was that video telephony would provide a more natural form of communication,

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closer to a face-to-face experience, than would be possible with audio alone, and that people would prefer this 'almost real' communication. This assumption, though, was not borne out and there were several market failures over the years, in particular within the domestic environment [19]. While video telephony has had some success in work contexts and most large organisations have video-conferencing facilities, even there, many of these facilities remain underused. Certainly they are not part of everyday working life [e.g. [11].

Research has sought to understand reasons for video telephony's relative lack of success [e.g. 3, 5, 7, 10, 26, 27, 29, 32]. This shows that far from being a close approximation to face-to-face talk, video mediated talk is typically more formal, stilted and unnatural than audio only [26]. There is no evidence that people perform more effectively with video compared to audio alone [e.g. 12].

There are both social and practical barriers to use of video telephony. Social barriers relate to people's concerns about privacy and a reduced ability to control presentation of the self with video (though long term experiments with media suggest some of these concerns may disappear as video mediated relationships develop with time and in appropriate cultural contexts, [e.g. 3]). Practical barriers to use in organisational contexts include the need to plan calls too far in advance, technical difficulties of setup and the need to use special equipment in dedicated rooms [11].

However, there are some modest indications that video enhances social and emotional aspects of communication, creating stronger feelings of connectedness between participants [28]. There is also demonstrable value of video to visually share objects in support of conversation between remote participants, rather than simply to share 'talking heads' [e.g. 12, 32]. However, people only consider the video option if it does not also incur the previously mentioned effort costs, such as booking to use and setting up special equipment in dedicated rooms. If the required effort is too high, people resort to the simpler and more widely available audio telephony [e.g. 16, 29].

The extent and robustness of these findings provides a somewhat discouraging context to revisit the 'video v. audio' telephony debate. However, we were concerned with the potential impact of the mobile form factor and personal nature of the mobile phone on shaping attitudes to and behaviours with video telephony. The research to date had been focussed on fixed installation video telephony and

while undoubtedly there are intrinsic factors associated with video mediated communication, whether fixed or mobile, mobile video telephony had the potential to overcome some of the previous barriers to use, as well as introducing new issues and potentially, new barriers. A growing body of research into mobile phone use and the way it differs from fixed line telephony [e.g. 1, 2, 6, 9, 14, 13, 18, 21, 23, 25] provides a precedent for considering the impact of a mobile form factor on attitudes and behaviours surrounding a particular communication medium. The mobile phone brings telephony into new social situations and contexts, with both positive and negative social consequences. It gives people more spontaneity in when and where they use their phone, allowing them to fill what might otherwise be “dead time”; it can provide reassurance (and also create anxiety) allowing people to track the whereabouts and activities of their circle of contacts; by making people almost always available to others it has potential both to intrude on privacy and to create privacy as people hold private conversations in public spaces.

The point here is that just as mobility has created shifts in behaviours and attitudes in audio telephony, it could also create shifts in attitude and behaviour in video telephony. For example, mobility potentially overcomes some of the barriers of spontaneity and setup which have hindered traditional video telephony. Being able to move the device round also has potential to facilitate showing objects and context to remote participants that would be difficult with fixed video telephony devices. It is therefore worthwhile revisiting video telephony services in the new context created by access through mobile phones. With this in mind, the current paper presents a study of everyday use of mobile video telephony. The aim here is to identify new behaviours, attitudes and concerns around mobile video telephony compared with mobile audio telephony and fixed video telephony.

## **THE STUDY**

### **Participants**

21 participants were recruited from a population of people using 3G phones and services. Of these, 13 were male and 8 female, all aged in their 20s or 30s. All were paid £80.00 for their participation. A screener questionnaire was used to categorise candidates into a standard set of eight market segments according to lifestyle characteristics and patterns of mobile phone use (e.g. using phone predominantly for business, using phone predominantly for social reasons etc). The participants were distributed across the full range of these market segments. The aim here was not to create the basis for statistical comparisons across different segments (which would not be appropriate with such a sample size). Rather, the goal was to ensure issues particular to different types of user would be covered the study. The participants were recruited as subgroups of existing family and social networks. So each participant knew at least one and in some cases two or three other people also participating in the trial. This was to compensate for the relatively low

penetration of mobile video phones in the UK population at the time of the study, ensuring each participant could call someone they knew using video telephony.

### **Method**

Participants were asked to keep a diary of all the video calls they made and received over the course of 5 weeks. We used an answerphone diary, a method that has proved successful in other comparable studies of mobile phone use [e.g. 22]. To make a diary entry, participants phoned a dedicated phone number and then left a voice message containing key pieces of information requested in the answerphone prompt. This information included, whether they had made or received the video call; to whom, when, and why they made call; what had been discussed; and specific reasons for using video rather than audio.

Interviews were carried out with participants both before and after the 5 week period. The interviews prior to the trial period were used to introduce the participants to the study and establish background context about their work and family life, and their attitudes and typical behaviours associated with telecommunications technologies. A longer interview was conducted at the end of the trial and was based around the diary episodes of mobile video phone use. Participants were asked to provide more detailed descriptions of the calling episodes and the context surrounding the episodes. Within these descriptions, it was possible to identify the factors which were shaped the course of each particular video telephony interaction.

### **FINDINGS**

Over the 5 week period, the logs showed 58 successful video calls were made by participants and 32 video calls received. On average, then, people were only successfully making one video call approximately every 2 weeks and receiving one approximately every 3 weeks. There were other attempts to make video calls but these were not completed due to various factors affecting reception at these times. If we look at where video calls were made, the largest proportion was in the home (30%), and secondly in workplace (19%). Over half the calls, though, were made outside these environments: 20% of calls were made while “out and about”; 14 % while in a shop; 8% from a car; 6% from public transport; and 4% from a bar. These figures suggest that mobility enabled video calling in circumstances where fixed video telephony systems would not be found.

The number of video calls is obviously low considering the same people were making and receiving audio calls from their mobile phones on a daily basis. In part this was caused by the novelty of 3G services in the UK. This meant that participants were occasionally unable to make video calls either because they could not connect to the network or because the person they wished to call did not have a handset that supported video telephony. For some participants, there were “too few people to call”. These factors, though, only partially account for the low frequency and location of use. To further understand these issues, we

unpack the key motivations for using mobile video telephony and key social and contextual barriers to its use.

### Reasons for video calling

From the call logs and interviews, there were 3 primary reasons for making a video call. These were:

- Keeping in touch with “small talk” (50%)
- Showing things to talk about (28%)
- Functional talk to achieve a particular goal (22%)

We discuss each of these motivations in turn.

#### *“Small Talk”: Social and Emotional calls*

Much of mobile phone use has been shown to focus on the maintenance of personal relationships between friends and family [6, 31]. This kind of talk has come to be known as “Small Talk”. Such talk is not about the functional exchange of information in support of a particular task, but rather is simply about “keeping in touch” – sharing what is going on in each other’s lives, and through this, expressing care and affection [cf. 4]. The mobility of phones has allowed people to weave this “small talk” opportunistically into the other threads of their everyday lives.

It is perhaps unsurprising then, that video calls where such social and emotional motivations were primary account for the largest proportion (50%) of video calls in the current study. What is of note though is that video calls of this type were not made on a daily basis in the same way as audio calls of the same category. This is because video calling was not perceived by participants as appropriate for everyday communication in the same way as audio calling. Video calls were perceived to take more effort both in making and participating in a video call. This meant participants thought of them as more appropriate for special circumstances and special relationships. Indeed, when a video call was made, the extra effort involved helped denote the importance of the call and relationship.

*“The video thing becomes a bit more of a special occasion thing because it sort of takes a bit more to achieve it... It’s not an everyday use of the phone.” SF*

If video is not for everyday telephony, an important consideration is for which relationships and circumstances does the visual element add something extra. Couples were one notable example; in particular, those who are away from each other for an extended period such as travelling for work. The video element of the call was seen as adding emotional depth to certain communications between geographically-separated partners. For example, one couple used the mobile video phone for their “good night” call when one of them was away

*“I like the idea of being able to see my husband when he’s away before I go to sleep.” HM*

In another episode, we also see how the visual aspect of the video call facilitated the expression of moral support when the one partner was lonely or down. The participant in question had been working away from home and was

waiting on the platform at Rugby station at night to get a train home. She was upset at the announcement of all trains being cancelled.

*“Dave and I are a couple. So I go away on business and he is stuck at home or he goes away on business and I am stuck at home. It’s actually really nice to be able to see your partner. It’s nice to see the object of your affections on the other end of the phone...It gets to be stupid things - here I am on Rugby Station. I’m just about to go and find a taxi to Coventry because they have cancelled all the trains...If you are particularly miserable a little bit of support would be nice and yeah I can ring him on the audio and he will say things to me but if I’m particularly miserable its quite nice to sort of say here I am Look I’m really miserable do something – he just says ‘Hello Bunny it’s alright, I Love you [laughs].’” SF*

Another type of relationship for which the video element of telephony was important was between family members and children: sons, daughters, nieces and nephews.

*“I made a call home the other night to see the children when I was away from home it was just good to see their faces.” SB*

These parent child relationships have a special quality that lends itself to video telephony. For other types of family relationships and friendships, people suggested that familiarity made it easy to visualise the people they were talking to. In these cases the video element added little to everyday audio calls. With children, however, there was a sense of a continuous process of getting to know them. Because they undergo rapid change when they are young, the visual element becomes more important.

*“With Raj I will happily just call him on audio call but if I think the kids might be home I would prefer to video call. I reckon because there is that whole familiarity – you want to get to know your nephews and kids etc...I don’t want to waste money on calling someone I am familiar with... If my brother [Raj] was living in this town I wouldn’t phone him up on video call just for the sake of seeing him. I’d just audio call him because he is close to me. Once you have that familiarity with someone you don’t need that unless you want to show them something.” SM*

The visual element of the call was particularly rewarding with children because they did things which were visibly cute or visibly funny and which are missed in audio calls.

*“One of the nephews had spaghetti dangling from his mouth which was a funny thing to see.” SM.*

Indeed the visual was one of the primary ways in which children were able to communicate so:

*“They’re not really for communicating. It doesn’t matter with the kids because all they want to do is jump around in front of the screen. That really ought to be the selling point.” HM*

For one participant, the mobile videophone allowed him to experience important routines in the children’s lives, (e.g. bath time) which he often missed because of work commitments. A video call during bath time became something of a ritual. Importantly, the phone’s mobility made this ritual possible: it allowed the receiver’s video phone to be taken to the bathroom, as well as allowing the

caller to have access to the service at the right time wherever he may have been.

A further pull for using video telephony with children was that the children themselves got excited about video calls. In one example, participant SM, the uncle of the children concerned, phoned up the family at home during meal time. Once again the video phone's mobility was essential. The father, who received the call, passed it around the children as they sat at the table eating and they "*got very excited by the video phone and Uncle Sanj phoning up*". Passing the phone round like this meant the configuration of the family round the table was not disrupted as it would have been if gathering in front of a fixed video phone. This limited disruption of routine family life enabled by the mobility was important in allowing the call to be taken.

For other relationships between family and friends, video telephony for social and emotional purposes was limited to times when there was an opportunity to use the video for something playful. An example of this was a brief video call after watching a rugby match on television where a group jumped up and down and cheered in front of the camera before hanging up very abruptly. On another occasion, a pair of friends put their video phones on the dashboard of their cars and video called each other as they drove around London. Such uses though, were novelty and relatively infrequent. For most social and emotional calls between friends, audio alone was sufficient.

#### *Show and talk*

The second key motivator for making a video call was to show something to the recipient or to get the recipient to show the caller something. 28% of all calls made were with the primary motivation of showing something to talk about. This is consistent with the benefits of video calling illustrated in earlier research on fixed video telephony [e.g. 32]. A good illustration of this behaviour is seen in the significant percentage of video calls made from shops. Their purpose was to show people potential purchases and share opinions before committing to buying.

*"I tended to use it when opportunities presented themselves. Usually if there was a visual thing that needed to be seen...Last week I was getting a dress on my own for a wedding and I thought I'll use the video... I could put a dress on and call Amie and show her it to get her opinion. It was nice doing this because I like to have a second opinion and it was like she was there."* FB

Three key features of this example illustrate the central role mobility plays in this kind of video call both at macro and micro levels of mobility [15] - that is, being able to take the phone with you from place to place ('macromobility') as well as being able to make small adjustments to the position and orientation of the phone ('micromobility'). First, the mobility of the phone had allowed the participant to make the video call in a shop and more specifically in the changing room with a full length mirror. The second feature concerns the opportunistic nature of this scenario. It is only because the phone is carried around all the time that

such opportunistic use of video telephony was possible. The third feature concerns the "framing" of the object to show. Achieving the correct framing is dependent on the 'micromobility' of the mobile video phone to get it into the correct position and orientation, something that is more difficult to with fixed videotelephony counterparts. In this instance, successful framing was dependent also on having full length mirror in the changing room allowing the user to position the phone far enough away from her reflection to show enough of the dress (this would have been difficult to do simply by holding the camera away from her own body, suggesting the need either for a wider angle lens or mechanism for supporting the video phone on a surface).

The act of showing things is also a dynamic process that involves continuous repositioning of the camera during a call. In the following example, participant MW was on the train making a video call to one of his friends at work:

*"My boss was next to me on the train and he asked who was in the office - he had me [ask Dave to] sweep around the room to show him everyone was in."* MW

The recipient's video phone was used to pan round the office so the boss could see who was in. Again, mobility was significant in determining the opportunity for this video call in terms of being available on the train as well as supporting the sweeping motion around the room at the other end. Note though, that video performance would often suffer under movement, becoming broken and pixelated under image processing algorithms optimised for relatively constant scene components. Mobility, then, both created opportunities as well as sometimes detracting from the experience.

It is important to examine this 'showing' behaviour within the broader context of the conversation. Talk was used to introduce and narrate over images being shown, requiring a delicately timed choreography between face-to-face and object views displayed on the phone screen. Most of the phones used in the trial had two cameras or moveable cameras to support both face-to-face and object views and the movement between them. Sometimes, the cameras would be switched over by a button press, or by rotating the camera manually. These mechanisms, while seemingly simple were not always easy enough for people to use while maintaining the delicate choreography between audio and video. Knowing and finding the right button to press in time was not always successful for people. As such, people would often exploit the 'micromobility' of the phone and simply turn the whole thing round to face the object or scene in question. This movement of the whole phone often seemed simpler for people to manage while maintaining the conversation flow, perhaps due to its more tangible nature. However, it may have yielded poorer quality images as the lens was designed and positioned for face to face conversation rather than showing things. Also the microphone would be pointed away from the speaker.

The importance of the broader conversational context

surrounding opportunities for showing items was also key to understanding why some opportunities for video telephony were missed. These opportunities would arise during standard audio phone calls. However, there was no easy way for participants to move from audio only calls to a video call. Shutting down an audio call to then make a new video call was not an option because of the effort, social disruption and the uncertainty of whether they would be able to connect by video. This behaviour pattern suggests that an easy mechanism for transferring between audio and video during a call (e.g. “push-to-video”) would help realise otherwise lost opportunities for show and talk.

#### *Functional Talk*

Just under a quarter (22%) of the mobile video calls were used for the functional purpose of achieving specific goals (e.g. making arrangements for work, organising night out or simply to discuss when and where to meet up for lunch). When participants were asked the reasons for using video on these occasions, their reply was invariably ‘just because they could’ rather than due to something useful about the video channel. Such occasions tended to be when they needed to speak with someone who happened to have a video phone; they were just opportunities to use the technology with little to suggest this kind of talk would be a long term feature of video call use. As PW says, “*you don’t use it if you really have something important to talk about*”, a sentiment shared by the majority of participants who suggested it was not suitable for the purpose.

Many thought video calling detracted from the ability to exchange functional information effectively. This perception was partly due to unreliability of 3G connectivity with the potential for calls to be dropped or degraded. The conversational repair work necessary was much less tolerable for these kinds of calls compared to the other types of calls. Additional factors were inherent to the demanding, distracting and stilted nature of the video channel. Consequently, people chose audio calls if they had anything important to discuss, e.g., SM discusses a video call to his brother at home with the children:

*“So just before the end of the [video] call I asked Raj when would be a good time for an audio call so that we could talk business. With audio only it is much less distracting and chaotic...Because you are concentrating so much on the video call you sometimes don’t think about what you are saying too much and you sometimes lose the point you have actually phoned up for and you end up sort of staring and going “well, I’ll call you some other time – I’ll see you later”.” SM*

These explicit choice points of using audio calling versus video calling were of particular importance to us as they made salient significant characteristics of the different call modalities shaping people’s behaviour and attitudes towards them. Even when there were opportunities and desire for “small talk” or “show and talk” type video calls, there were still many circumstances under which participants actively chose to make audio rather than video calls from their mobile. The explanations for these choices are not simply

attributable to things such as higher cost of video calls or well established factors inherent to all video mediated communication (e.g. call lag and stilted nature of conversation). Rather, the factors inhibiting frequent use of mobile video telephony were found in social and practical characteristics of the locations and use contexts enabled by the very mobility of the phone. We first consider the social factors inhibiting use and then discuss the practical factors.

#### **Social Barriers to video calling**

The mobility of the phone has taken personal telecommunications into all sorts of public spaces, giving people the ability to contact others and be contacted. As with other kinds of networked technologies, the use of personal communication in public spaces in this way brings its own unique challenges to the ways we manage our public-private boundaries and what we choose to reveal about ourselves in these contexts [20]. In this section we discuss the impact of video phones on people’s ability to manage the public-private boundaries:

- Between self and co-present others
- Between caller and recipient
- Of co-present others

#### *Managing boundaries between self and co-present others*

With mobile audio calls, people use a range of strategies for dealing with privacy in public spaces, such as: talking quietly; crafting verbal responses which are only meaningful within the context of the other half of the conversation that remains “hidden” from co-present others; physically withdrawing to a less public place [e.g. 6, 8, 30] or simply not taking a call when others are around.

#### *Audio is more public with video calls*

Unsurprisingly, with mobile video telephony there were similar needs to manage the privacy of communication in public places where one might make or receive a call. What emerged from the fieldwork, though, was how privacy management was made difficult for people when using mobile video telephony compared to audio calls. Some of the strategies normally available for mobile audio calls did not work for video. So while, in theory, the mobility of the device gave participants the capability to video call in public spaces, difficulties with the management of the public-private boundary in these spaces created social barriers to its use. The problems here stemmed from a need to hold a mobile video phone at arms length or positioned on a surface at a distance from the face. This necessitated use of the phone loudspeaker making the normally “hidden” side of the call audible for those within earshot. This is illustrated by participant FB:

*“Yes it does constrain you to some extent as it always tends to be a little loud and everyone can hear what your conversation is about so if the conversation is a little banal everyone can hear both sides of the conversation...you can keep it more discreet with a voice call.” FB*

Not only was the “normally hidden” side of a call broadcast

on loudspeaker, participants also noted how they talked louder on a video call than they would with an audio call. Again this restricted the normal strategies of talking quietly to manage public-private boundaries during mobile calls in public settings. As MW commented:

*"When I'm at work or he is at work you don't [make video calls] because it's more obvious that you are making a personal call. Its very obvious because you are stood there like this [holds out arm simulating video call pose] and you tend to talk a bit louder because the mic is over here [reaches out in front of him where the mic would be]...you don't want to be seen to make too many personal calls at work" MW*

If we consider what is being said in the last two quotes, the issues here are not that people have lots of secrets to keep from others around them. Rather their concerns are about what the conversation said about them and their activities and how they were being perceived by those around them. They became self conscious because the salience of the conversation made them socially accountable to those co-presenters [cf.18]. This accountability further related to whether the talk was appropriate within the tacit social rules of their particular context [cf.21]. For participant FB, her embarrassment was about the "banality" of the conversation in front of strangers. For MW, the concern was how he was being perceived at work and that he was seen to work rather than make personal calls. Personal audio calls at work are easier for him to disguise and so more readily made and received during a normal work day.

Some of these difficulties could be overcome using the earpieces that came with the mobile video phones. While participants considered the concept good for maintaining privacy, the reality was that they were never used.

*"You just can't carry them about, you lose them. It's as simple as that" PW*

They were therefore never readily available in the situations where calls were being made and received.

#### Visibility of display to co-present others

As well as the audio being public with mobile video phones, the video channel too made any communication a public feature. The typical position of the phone during a video call made the display available for others around to see. For SF, this created a source of embarrassment:

*"It was quite embarrassing. He called me when I was on the train and I was like err I'm talking to my phone – it's embarrassing. "HELLO, I'M ON THE TRAIN" pales into insignificance compared to this - Some poor soul sat next to you. And of course the person next to you becomes quite fascinated and they start staring into the phone. And you are like "do you mind I'm trying to have a conversation here" – it's very public." SF*

Of course there are occasions when this ability to share the display with co present others is a valuable feature, allowing a more collaborative phone experience for small groups of friends. But the key issue here is that under normal everyday conversational circumstances, the ability to maintain boundaries around the call is made more

difficult by the shared visibility of the screen. The difficulty with these boundaries was exacerbated by people near to the video phone diving in and waving or pulling funny faces. These people would not be complete strangers but rather would be known to the person with the video phone. The result of these intrusions was a somewhat chaotic and unfocussed call as is well highlighted by SM:

*"The phone call has a chaotic feel to it that is not so much the case with audio calls – everyone is trying to take part and get in the picture – it is less focussed. The chaos is enjoyable but it makes other things difficult to achieve in the conversation" SM*

The consequences of these various difficulties are numerous. Mobile video calls in public situations became an awkward experience and in some cases end abruptly:

*"Also there's a slight embarrassment factor as well, when you're out making a call... Shaun called me once from Victoria Station and he said he had to stop the call because he was being stared at..." FB*

People became reluctant to make video calls in certain places, as participant DW suggests:

*"I haven't been using much because she is at work and a video call – she has only just got her own office and it wasn't very private to have a video chat because the offices were open before." DW*

#### Lack of control over recipient context

Receiving video calls in public situations was particularly problematic for participants because of the unanticipated nature of the call and the recipient's lack of control over where the video call was made and who was around. As participant LC described it, "receiving them is inconvenient." Under such "inconvenient" circumstances, participants either: didn't answer the call at all; answered it only to defer the call until a later time; or ended the video call and made an audio call instead. When asked about his reactions to receiving a video call, participant MW commented:

*"It obviously depends on where I am. If it's at work I might say "I'll call you back". I would answer it. There is no point in ignoring it... I might call them back on an audio call or wait until lunchtime." MW*

What can be seen, then, is that the difficulties managing the public-private boundaries between self and co present others results in missed or deferred opportunities for mobile video calls to take place.

#### Managing the boundaries between caller and recipient

The way that caller and recipient could present themselves and their circumstances to each other also determined people's acceptance of mobile video telephony.

#### Video reveals too much information

It is well established that video telephony can reveal too much visual information, making people self conscious about how they come across to the other person. This was also the case with mobile video calls made by participants. Indeed this self-consciousness appeared more exaggerated

with mobile video telephony. In part this was due to the ergonomics of positioning the video talk and view which creates an odd “camera angle [that] looks straight up your nose and [makes] you look awful” (PW). The main cause though was the mobility of the phone which afforded spontaneous use at unpredictable times, places and behavioural contexts outside the recipient’s control. In some of these contexts video calling was regarded as “invasive” because it revealed too much information which participants wanted to control, e.g. their appearance, as PW describes:

*“I used it in conversation with this French girl. When she used it for the first time, she’d just got out of bed, she was in her pyjamas, her hair was a mess and she’s never used it since....it’s too invasive. If I got a video call, half the time I wouldn’t use it. It’s like having someone walking in your house and saying ‘what are you doing?’ I don’t want that.” PW*

At other times, there were aspects of the place and behavioural context that would have been too much to reveal. In one such episode, SM had an opportunity to make a video call to his parents but explicitly chose to make an audio call instead since he was at his flat in bed with his girlfriend, both of them only half dressed. He knew his parents tacitly disapproved of him “living in sin”. “It’s not that they don’t know that it is going on but if it is not mentioned, things are fine and there is no conflict.” (SM) So in this situation he chose not to make a video call because it would reveal too much about his current context and make explicit the issue of his living arrangements. This would have led to conflict with his parents which he was able to avoid through the use of audio alone.

#### Visual channel makes it difficult to lie

Video did not just reveal too much information but also made it difficult to “distort the truth” due to the fact that you were looking someone “in the eye”.

*“You can’t really lie can you? You don’t want to lie do you but you know...You can’t call someone and say look I’m in so and so can you? Say if I call Shaun and say “I’m at so and so and I’ll be there in 10 minutes” and really you’re somewhere else and you’re going to be 20 minutes. You can’t do that with a video call.” FB*

The management of social relationships through “white lies” in this way is complex and subtle. People use ambiguity in how they project their identity and circumstances for all sorts of social reasons, both good and bad. While mobile audio calls are well documented to support these interactions [25], mobile video telephony, in contrast, tended to compromise them. Again, the outcome of this was that people made explicit decisions not to use mobile video telephony in specific social circumstances. The social constraints here conspired against the technical opportunities for video calling, compromising the very flexibility that has made the mobile audio phone a significant technology in people’s lives. Interestingly, in response to the prevalent use of white lies on mobile phones, one participant, who was late for a meeting used a video call to explicitly show she was approaching the

entrance to the office building, demonstrating the veracity of her circumstances.

#### Managing the boundaries of co-present others

The boundaries being managed during mobile video calls in public places were not just those of the callers themselves. Video calls also had an impact on those in the vicinity. The annoyance caused to people in the vicinity by mobile audio calls in public places has been documented [25].

#### Aural intrusiveness

Study participants felt that mobile video call in public places would be even more disruptive due to the increased volume of talk with mobile video calls and the other conversation half on loudspeaker. Those who considered the needs of others around them were conscious of social pressure to avoid using video telephony in these places. In one episode with PW in a ski cabin on holiday with friends, the complaints from his friends in the vicinity resulted in a lost opportunity for a “show and talk” video call:

*“I used the phone in the ski tele-cabin and the other guys complained” PW*

#### Intrusiveness of camera

The prime concern in relation to managing others’ public-private boundaries, though, came not from aural intrusiveness, but from the intrusiveness of introducing a camera into other people’s space.

*“I have one friend, basically just didn’t want to be seen on the call. When I used it on the train my friend just disliked the idea of being involved in my phone call” PW*

What is significant here is how the video call compromised the ability of the co-present other to choose whether or not they got involved in a call. As participant MD said:

*“Someone else has the choice of joining in a voice call but on video they are forced to join the call because [of the camera].” MD*

With standard audio calls co-present others can choose not to get involved in a call simply by not speaking. With video calls, co-present people are passively involved which removes their control. This introduces the same issues of managing the presentation of identity and behavioural context discussed in the previous section but this time for the co-present others. In this context though, the co-present other created an additional social pressure against the video call being taken in that place. In the following example, we see this cause recipient of the video call to leave the room.

*“The call came through while I was sat on the sofa with my girlfriend. So I got up from the sofa and went to the bedroom to take the call. She was on the sofa in her pyjamas so that is why I went to the bedroom but also with the video calls you are on speaker phone so it picks up a lot of ambient noise more – the TV was on and this gets picked up – it would have been really difficult for the person at the other end.” MW*

In this instance, the participant exploited the mobility of the video phone to remove himself from the situation where he was compromising his partner’s privacy.

### Practical Barriers to video calling

The literature on mobile phone usage reveals that a key value of mobile phone technology is the ability to make use of “dead time” – time spent in places where activities are restricted and which would otherwise be wasted, e.g. while travelling [24]. The phone’s mobility means it can be carried at all times, providing access to telephony when and where people choose. As such, it is always available to exploit “dead time” when it arises. The same argument should of course apply to mobile video telephony and indeed provide some of the spontaneity missing from traditional fixed video telephony. However, some important practical factors prevented frequent, spontaneous video calling in dead time in particular spaces. These included:

- High ambient noise
- Poor lighting
- Problems dual tasking while video calling.

#### Ambient noise

As we discussed earlier, the mobile phone during a video call was either be held at arms length or positioned on a surface at arms length in order to get a full face view in the camera frame. A consequence of this was that the microphone was left open to surrounding ambient noise which proved to be distracting to the person at the other end of the video call. The position of the phone also necessitated listening to the conversation on loudspeaker and again this had to compete with the ambient noise in public spaces making it difficult to hear. So, for example, several participants experienced difficulties trying to have a video call in a bar. Likewise traffic noise on the street made it difficult to conduct video calls in urban spaces.

*“I was in the street and that was a little difficult to hear because of the traffic.” IP*

In the following quote we see how this had an impact on a participant’s ability to use the phone in “dead time” in the pub while waiting for someone else to arrive – a typical and important behaviour with a standard mobile phone.

*“After the trial ends I don’t think I’d use it...There are just too many problems making the call... if you use it in the street you can’t hear it. We often make calls in the pub and you can’t hear it... but it is there that you want to do things with your phone while you are waiting for someone.” PW*

Again, some participants, when possible, worked around these constraints by exploiting the very mobility of the phone from which the original difficulties stemmed; withdrawing to quieter places that met the audio requirements of making a video call. As MW commented:

*“If I’m in the pub I’ll do like with a normal audio call – I’ll go to the loos or find a nice quiet spot or out in the corridor. It’s primarily for the audio – you need to be heard.” MW*

Movement away from places with ambient noise was not always possible causing missed video calling opportunities.

#### Lighting

Noise, though, was not the only environmental constraint. Low light levels also hindered people’s ability to use mobile video telephony effectively. Several participants had tried video calling while walking on the street at night. Participant KB for example, wanted to video call her partner on the way home from work (again it is typical mobile phone behaviour to get in touch with a partner at the end of a work day). However, being dark outside she was unable to. SM reported similar frustrations:

*“You can’t use it at night either because you just see a little coloured blob on the screen so you think why am I using a video call” SM*

Lighting difficulties were not restricted to outside at night. People also experienced difficulties in some indoor environments with artificial light. In part this was due to the dimness of the lighting conditions but also because of the position of the overhead lighting with respect to the video phone. Again the positioning of the device during a video call compounds the problems here. The natural position of the phone so that the display could be seen was lower than the head. This meant the camera pointed upwards towards the head and also the light sources in the ceiling resulting in a silhouetting of the person making it impossible to see them. As participant AB noted:

*“You do have to get the position right because of the light and also if you put the camera in the wrong place they can see literally up your nose... there’s a certain amount of angling.” AB*

It is not the case that such environmental constraints could not be overcome with careful positioning or by waiting for more suitable lighting. Rather, these factors added effort to the process of making a call and eroded much of the flexibility a mobile device is meant to create. This reduction of flexibility made it difficult for mobile video telephony to enter all aspects of people’s lives in the same way that mobile audio calling has done.

#### Problems of dual tasking

A particular concern for people was the ability to use time efficiently by dual tasking. Making and receiving telephone calls was often something people would do while simultaneously carrying out other tasks, such as reading email, doing household chores, driving or even just walking. Unlike audio calls, video calls interfered with the ability to do other tasks. For example:

*“When I call on a hands-free [audio] phone I can put the phone down during a call and get on with other things. With a video call you can’t do that. It would be a bit rude or there would just be no point in using the video at all.” MD*

These extracts indicate a concern both to *see* and *be seen* by the person at the other end during a video call. While theoretically possible for these participants to revert to hands-free loudspeaker, they were reluctant to do so. The issue here was not just physical but rather social: it was considered rude to create an asymmetry in the video channel where only one participant was in view.

Of course the mobility of the video phone allowed more flexibility than a traditional fixed video phone. There were some examples when people would move around the house during a video call, but this was more to *get to* another room rather than for ongoing movement while doing other tasks. As participant MW commented, video calls are “*difficult to do while walking*” not only because of the demands of maintaining visual contact but also because holding the phone in front of you is uncomfortable for all but short time periods and ties up your hands. Unlike mobile audio phones, cradling the phone on your shoulder while video calling was not a practical option.

Participants’ frustrations about the constraints on dual tasking imposed by video telephony were not simply about time efficiency and convenience but also about safety. Trying to have a video call while walking in the street created concern by not wanting to “*be a prat and walk to a lamp post*” (MW). Similarly, with driving: the demands on visual attention that video calling makes were simply too dangerous for people to make or receive calls while driving. Yet for many people, the car, to and from work, was a key place for communicating with people during otherwise dead time. The inappropriateness of mobile video telephony for the car context created a barrier to it being used as an everyday tool. So while the mobility of the device enabled ubiquitous access to video telephony, the video element essentially hindered the ability to exploit this ubiquity.

## DISCUSSION

The study has shown some of the ways that mobile video telephony comes to be used in people’s everyday lives. These uses demonstrate how mobile video calling is not perceived simply as a straightforward replacement for audio only calls. Rather, video calls exist within a complimentary suite of mobile communication possibilities (text messages, multi media messages, and audio calls). Each of these possibilities has their own unique characteristics which people exploit to suit particular circumstances. For mobile video telephony, a primary driver for use was found in “special occasion”, high value emotional calls between absent spouses and to households of family members with young children. Key here was how mobility provided the flexibility for these calls to be interleaved with the ongoing activities of everyday life in terms of when and where they could be made and received. This applied to large scale mobility where people were “out and about”, as well as to smaller scale mobility (e.g. in the home) where they could move the video telephony capabilities from room to room as activities demanded. A second key driver was the need to show things to talk about. Mobility was again crucial here, creating opportunistic possibilities for showing things by virtue of being in the right place. Of equal significance for “show and talk” was the ‘micromobility’ of the phone in supporting dynamic framing of objects/scenes during talk.

These uses of video calls were niche relative to the other mobile communication possibilities (e.g. mobile audio calls and text messages). While the study suggests this niche use

will remain to an extent, there was evidence that usage could be increased by overcoming barriers to video call opportunities. Such barriers went beyond concerns of call costs often assumed to be the reason for low usage. Rather, as the study demonstrated, there were crucial social and practical barriers to use, including concerns about privacy management in public spaces and problems with ambient noise and lighting in particular locations.

Careful design can help users manage the social and practical barriers to create more opportunities for use. A key design implication here concerns supporting a more fluid switching between audio and video modalities. The current model of separate audio calls and video calls makes it impractical to move between the two channels. As such, it is difficult to fluidly exploit the properties of each modality according to particular practical and social circumstances. An interesting solution to consider here would be a “push-to-video” model in which the video channel can be introduced to the conversation from a standard audio call simply by pressing a button. This model would allow callers to default to audio calls (for easier management of privacy and ambient noise in public places). Then, through negotiation over the audio, callers can agree to introduce video if circumstances are appropriate. This “push-to-video” model also helps capture lost opportunities for show and talk by allowing users to respond more opportunistically to the evolving content of a conversation. If an opportunity to show something arises during an audio call, users can push the button to start the video channel.

Further ways for managing when and where video calls are received would be simply to have an option in the phone’s settings profiles to divert video calls to voice calls. So for example, in the phone’s “car” profile or “meetings” profile, the user might select the option to divert video calls to voice calls; in the “home” profile, they may allow video calls through. Interesting extensions to this would be to make the receiver’s contextual information available to the potential video callers to support their judgments about whether to make a video call or not [cf. 17, 23]. Such contextual information made available to potential callers might simply include the selected “profile” on the receiver’s phone. This level of contextual information is sufficiently ambiguous not to threaten privacy and maintains an ability to control what is presented to potential callers. More sophisticated sensing technology might allow richer contextual information to be presented to callers (e.g. location and activity) but would also introduce new difficulties in terms of privacy management.

Other issues highlighted in the study remain an inherent part of mobile video telephony that will continue to shape everyday practices, e.g. difficulties dual tasking. Such issues are not necessarily raised to be designed around directly. Rather, they help make judgments about wider behavioural practices and adoption patterns for mobile video telephony and how it sits within the broader ecology of mobile communications technologies in coming years.

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