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### Korjaus:

Osatutkimuksessa on virhe joko kuvassa 2 (Fig 2) sivulla 8 tai kappaleessa 3.1 sivulla 4: Yhden osallistujaryhmän tyttö on joko 9 vuotias tai teini. Samaan tyttöön viitataan epähuomiossa eri ikäisenä. Tämä ei kuitenkaan vaikuta tutkimustulokseen, koska ikä ei tässä ole oleellinen, vaan oleellista on sukulaissuhde.

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# Mobile Phone Video Camera in Social Context

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**Abstract.** Video recording is becoming available in various everyday situations, thanks to the quickly spreading video capabilities of modern mobile phones. Recording decision is now often made spontaneous, as the recording devices are constantly available without explicit planning. We discuss the effect of this change in the social environment on the basis of a study where four groups of people used digital video cameras in their everyday life. While this new way of communicating enables new social patterns, it also raises new concerns for privacy and trust. We discuss the relation of context and video recording through a model of primary and secondary contexts. We also analyze acceptability and transparency of video recording as functions of time.

**Keywords:** Mobile phones, cameras, video, context, privacy

## 1 Introduction

Stand-alone video cameras are usually not carried all the time, and their use requires some planning. In contrast, people usually keep their mobile phones on and with them most of the time. As a result, devices with video capabilities are now more frequently available in everyday situations, where video recording has not been explicitly planned. Large numbers of people are participating in the video recording situations in the roles we defined as cameramen (who records), targets (who are recorded) or passers-by (who are unintentionally in the situation). Spontaneous recording of video is enhancing our memories and enriching communication, but also raising new concerns of privacy. People perceive video recording differently from imaging; they approach recording situations even with familiar people differently depending on the intended use of the material; and the attitude of people towards video recording tends to relax over time. This is evident, for instance, in the popular “Big Brother” TV show, where the observed participants gradually become more and more accustomed to the omnipresent cameras and start acting more naturally.

In this paper we discuss the effect of mobile phone video camera in social context with regard to a user study that was carried out among people using video recording as part of their everyday lives. In the remainder of this paper, we first highlight some related research, then propose a way to model recording situations in terms of primary and secondary context, and discuss the issues of awareness and privacy. We then describe the user study and analyze its results. Finally, we summarize the main results.

## 2 Related Research

HCI research on digital imaging has largely looked at the perspective of the person doing the recording, focusing on what is recorded and how the sharing of images is done. In this paper, we view the imaging devices and people as part of a communication system.

A user evaluation by Sarvas et al. presents as a result that 89% of taken digital photos are shared at least once and most of the sharing is done within 3 days after taking [12]. While some other studies may offer lower figures for sharing, it is still evident that digital photography has lowered the barrier for sharing.

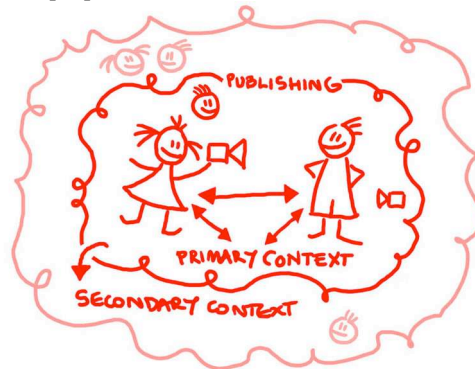
Kindberg et al. [7] have presented a division of images into affective versus functional and social versus individual categories. They discuss photographing situations and what is considered worth publishing and to whom. Their results suggest that people mostly take affective images. Those images are used for both social and individual needs. Frohlich [4] introduces digital photography, where still images are enhanced by audio. He argues that audiophotos can be better than videos. However, he states that the advantage is dependent on the content being captured: for some situations video may still be the preferred choice. The empirical studies showed that annotations of still images with audio could be used for stories and narrations. Difference between still and video recording is not self-evident anymore. A Sony DSC-M1 camera has a hybrid mode for capturing combined still and video, video being recorded all the time and part of it saved before and after still image capture.

In media science, there is research on how information and communication technologies are used to preserve our cultural knowledge for the future. For example, a French philosopher Jean Baudrillard discusses on notions of time [3]. He observes two indications of human willingness to get rid of the limitations of linear time: Firstly, we want to capture everything and share it almost before it happened to have a feeling of living the situation; secondly, we want to record everything to be archived as a record of our culture. There is relatively little research about how people react to being targets for mobile phone video recording. Huhtamo [6] states as a media-archaeological notion that already in 19th century there were frequent complaints about amateur photographers transgressing existing social rules related to privacy and decency. The threat of anyone being a target of a snapshot was noticed already then and a camera used to have a de-humanizing effect on the person carrying it. Huhtamo compares the situation to the discussions now taking place with the mobile phones and specifically to the emerging use of camera phones.

### 2.1 Context Approach to Video Recording

We model the situations where mobile video is recorded and consumed in primary and secondary contexts (see Fig. 1) [10 and 11]. We present an overview of the model of primary and secondary contexts and discuss how the mobile phone video camera affects the social context as well as how the situation changes during time. We analyze the conditions that context must fulfill to make video recording getting started and, conversely, what is the effect of the video recording to the context.

Primary context means the immediate physical surroundings where the people can experience each other and the event without technological devices. The physical location and common time are identifiers of the primary context. The situation turns to feel more risky when the camera is present since there are more privacy concerns arisen due to the possibility for capturing and sharing the material. A user study by Koskinen et al. [8] reports that photos taken of strangers were shared to friends. This makes primary context with a camera risky to the persons who are in the photos by accident and/or who are not friends of the shooter. There are attempts to protect privacy and prevent unnoticeable photographing; in Japan and Korea it is mandatory by law to have shutter voice in digital cameras. In the context of this paper, we understand privacy as follows: “Privacy is the claim of individuals to determine for themselves when, how and to what extend information about themselves is communicated to others” [13].



**Fig.1.** Primary and Secondary Contexts

The secondary context surfaces when material which was recorded in primary context is published and also sensed by someone. A video camera enabled mobile phone is an example of a device which makes secondary context possible but also less sophisticated devices such as analog cameras and tape recorders make appearing of secondary context possible but slower. People within the primary context may be aware or unaware of the existence of the secondary context. Secondary context has no boundaries; it may occur in any time and any place where it is possible to consume captured material.

Thanks to the camera phones, the possible secondary contexts can now have a greater effect for primary contexts. This can change the way people behave in such situations. The effect is bi-directional. If the existence of the secondary context is seen inevitable and the nature of it is known, the affect to primary context is specified, but even possibility for secondary context affects the primary one. An early example of the real-time sharing was “Hole in Space” media art experiment by Kit and Sherrie [5]. This bi-directional video call between Los Angeles and New York was used for real-time video and audio communication with people in secondary context. In the mobile domain, covering the whole end-to-end chain from creating the content to consuming it is already possible. There is equipment available for each part of the chain (capturing, editing, sharing, and consumption) even within one device such as a

mobile phone; and the recorded material is always available. When compared to earlier capturing and publishing possibilities, the video call enabled mobile phone makes the secondary context more probable. This makes rich communication easier than before between two or masses of people who are not in the same primary context. In addition to services like YouTube [14], emerging technologies, such as DVB-H and RSS, make self-made mobile television broadcasts more practical, secondary context may spread to larger audiences.

### **3 Study**

We conducted a user study with 22 participants in Italy, 2003-2004 aiming to examine how people are using video recording as part of their everyday lives. Recording situations and subjects, as well as sharing and preserving were in the scope of interest. A qualitative research method was selected to get rich data on usage behavior related to a phenomenon that was not widely investigated before. It also allowed interpretation of the meanings that the participants attributed to video recording with a mobile phone.

#### **3.1 Participants, Methods and Data**

Participants consisted of four groups: two families (Fa1 and Fa2) and two groups of friends (Fr1 and Fr2). The groups were connected; one family member was also a member of another group. Choosing groups with an existing social network was crucial in order to gain realistic understanding of how people use video cameras and share the resulting content in their daily lives. None of the participants had used mobile phone with video recording and sharing capabilities before and they neither studied nor worked in the related field.

Fa1 was a typical Italian family with six members and three generations; grandparents, middle-aged mother and 15, 16 and 18 years old children. The father of the family did not participate in the study. The oldest child belonged also to another friends group. Fa2 consisted of five members and three generations; grand parents, middle-aged father, son and his girlfriend, who were in their twenties. All members of these two families were familiar with information and communication technologies and they had used e.g. e-mail. Fr1 consisted of five members between 15 to 17 and one 24 years old. Fr2 was a coherent group of six socially active young adults who were studying either at a university or a college. They used to spend a lot of time together. Both genders were represented in both friend groups.

Participants were supplied with video camera phones, equipped with video editing software and 128Mb memory cards for the time of usage period. They were able to cut segments of video clips, combine them, and change audio tracks. The participants had software for editing the still images and they were also given a possibility to transfer the multimedia material created on the phone to the computer with a memory card readers. Furthermore, each group was given a video camera for shooting DVD or TV quality video. The video camera was small enough to carry on a constant basis

and therefore used to simulate the capabilities of a mobile phone with a good quality video camera. Mobile phone subscriptions were provided for the participants.

The study consisted of an introduction meeting, usage period, final interviews, and data analysis. In the introduction meeting the study and users' tasks as well as the technologies were described to the participants. The participants were asked to use the mobile devices and the additional software as naturally as possible. Further, they were asked to send the material created to those with whom they would communicate in their typical everyday life setting. All the configurations and other settings were made so that starting to use the devices was easy. The participants used the devices and the pre-installed additional software for one month. They also had a possibility to contact a service desk maintained by the subcontractor in case of a problem or a need for technical advice. After the usage period all 22 participants were interviewed either in one-to-one or pair interview. The interviews that took from one and a half to two hours were simultaneously interpreted to the project team, which was observing the interviews in an observation room.

The study produced two kinds of data that was used to construct the understanding on user behavior concerning video recording with a mobile phone. First, the interviews, which were recorded and transcribed, provided qualitative data. Second, all the multimedia material, including videos, still images and messages that the participants produced was another set of qualitative and quantitative data. The participants had a possibility to delete the most private material, if they wished, before they returned the devices. However, they were encouraged to return their devices including as much material as possible.

## 4 Results

We found out that motivations of video camera usage can be divided into four areas. The first one concerns creating and using multimedia for preserving it for one's own use. We call this behavior (1) *for archiving one's life*. The other areas of recording behavior are related to communicative usage and self-expression; two of them being connected to publishing for others via a communication device (2) *for sharing one's life* and (3) *to enhance social presence* and the fourth meaning to affect the immediate social surroundings (4) *as a facilitator in group dynamics*.

The factors which define the attitude towards filming situation are: (A) *target's relation to the cameraman*, (B) *target's impression of cameraman's intentions* and (C) *the filming context*. We found that acceptability of video recording changes in a process of time. Sharing possibility raised some privacy concerns.

The participants were active in using their camera phones and video cameras during the trial. They took from 50 to over 600 pictures in a month. Videos were shot less with the phone, from 0 to 40 clips in a month, due to bad quality and the 9-second length limitation. Specific video cameras were used more actively. The study brought out that the motivation to use a video camera is highly dependent on personal preferences: some liked photographing more, while others were more interested in filming. Those who found filming awkward said that it requires much more concentration than photographing. Another criticism towards shooting video was that

it excludes the cameraman from the social situation longer than photographing. According to this study, male participants were more into filming than female participants. The participants highly appreciated the immediate nature of photographing with a mobile phone. They were able to capture images and videos anytime and anywhere and share them with their friends. Photographing with a mobile phone was much more spontaneous than photographing with other camera devices since it was carried around all the time. However, users complained that the camera phone did not support immediateness well enough. The camera application in that particular model could be opened only by using soft keys and took far too much time. In some contexts a phone was more acceptable than a specific camera device. For instance, photographing during a dinner with colleagues with a traditional camera would have been odd, but taking a couple of pictures and filming a few seconds of video with a phone was acceptable.

#### 4.1 Usage Motivations and Behaviors

**Archiving one's life.** Participants wanted to save all the pictures and videos created during the test period even if they were bad in quality. One of them put it as follows: *"I want to save every moment of my life and make a media-album of important things of my life."* Especially females thought that image material construct a pictorial diary. The diary was seen as a very personal place for personal pictures and videos, and many participants mentioned a need for a protected and secured folder for their personal material. Another interesting finding was that some people collected things by taking a picture of an item and saving it. For instance, one participant took a large amount of pictures of logos from advertisements, labels on clothes, etc. Another one photographed graffiti made by a famous graffiti painter. Also CD-covers, art, cars, and paintings were photographed in order to collect these items.

**Sharing one's life.** Several participants expressed wishes to share their lives by the means of photographs and videos. They sent photographs via MMS and e-mail and also showed them in face-to-face occasions on their phone display. They also tried to send videos but due to the quality weakening remarkably in the transfer process, interest towards sending videos via MMS decreased. The shared material presented places, people, or activity that shaped the persons' lives. Sometimes a photograph or a video clarified the message which the sender wanted to convey. Some of the participants said that they did not need to explain so much when the receiver could see what they meant. In addition, pictures in a message strengthened expression of moods. Participants also wanted to share the results of their creative activity. For instance, a middle-aged housewife, who took about 40 video clips during the usage period, stated that *"I found my creativity when filming and editing the films"*. She was amazed how dramatically the atmosphere and mood of the film can be edited by only changing the audio clip. Image-editing software was used for making simple modifications, such as frames, text boxes, or blurring to photographs and also to add a personal touch to the pictures in order to make them more fun or more valuable.

**Enhance social presence.** Pictures and videos in messages are extremely strong in enhancing feeling of presence and togetherness when communicating with a person or

persons not present. This kind of activity took place mostly between couples and close friends. In many occasions these messages were responded to and sometimes they started a dialog. Video captures the surroundings, including audio, and thus conveys social presence. Due to the fact that MMS supported video transmission poorly, the participants who were familiar with PC usage sent videos via email. In their opinion, mobile phones should better support sending email instead of having an MMS format of its own.

**Facilitator in group dynamics.** Video camera also had a big role in group dynamics both in primary and via the secondary contexts. Sometimes when participants recorded some social situation they discussed and made jokes with people in nearby surroundings. We found out the bi-directional correlation between the camera and the context. The presence of the camera in the social event shaped the way people behaved; the cameramen often interacted with others in order to make them talk to the camera and make the end result more collective while targets behaved the way they thought was wished. On the reverse side, the context and situation formulated the camera use. The study also showed examples of loosely planned, spontaneous short sketches that were made just for fun. Flirting is one example where the role of the video camera facilitates group dynamics. This kind of behavior was common especially in the school environments. Some of the videos shot during the trial show how one cameraman flirted with the targets by making jokes, flattering, and teasing them. In some cases the recording made the target to flirt with the cameraman. Because people are interested in how the others see them, they take photos or videos about themselves by using the camera as a mirror to see how they look like.

A multimedia phone was frequently used as a tool for joking. As an example, a common activity for students was to take a picture of a friend at school, modify the face with image editing tool and send it via Bluetooth to friends in the class. This kind of activity made immediate feedback possible, but in some cases even required an immediate response. Generally, the younger participants appreciated the possibility to share pictures for free via Bluetooth, but they complained about the slow process of searching for available Bluetooth devices. Bluetooth messaging was also used for flirting. One of the participants shared pictures in a bar with unknown recipients. She recognized those who received Bluetooth message by observing how people used and handled their mobile phones. In the interview, she said that Bluetooth messaging made it easier to start a conversation with those who received her picture.

## 4.2 Acceptance of the Video Recording

Perception of privacy depends on the situation, the emotional closeness between the present people, and the familiarity of the context. The trust between familiar people in primary context makes recording situation more acceptable.

**Target's relation to the cameraman.** The presence of camera affects the social dynamics between the subjects. Further, the relation to the cameraman affects the target's response to the recording. If the target doesn't feel comfortable with the cameraman, may use of the camera be experienced hostile. When being exited by the presence of a video camera, users tend to perform TV or movie like role plays. Sometimes the camera strengthens the cameraman and puts the target into an

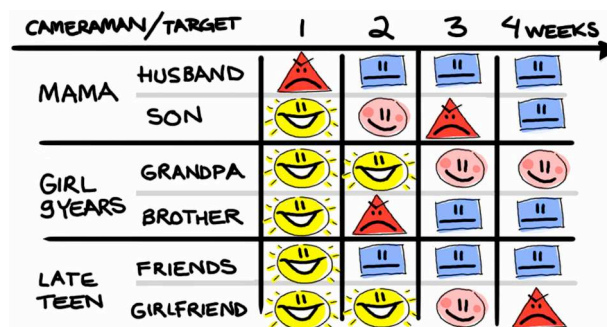


interrogation. Emotions are caricaturized and acted out in movie style when a camera is present. With constant exposure to the video camera presence this phase usually fades rapidly.

**Target’s impression of cameraman’s intentions.** The target has an assumption about the cameraman’s intentions when recording starts. This assumption characterizes the attitude towards the cameraman. As an example of the primary context intentions was the late teenager male participant filming his girlfriend with flirty and cuddly style, and getting the flirty and cuddly response. In another case, when the cameraman was acting as a reporter, the target immediately took the role of an interviewee. When cameraman’s intentions are miss-assumed, the response can be unwanted. Possible sharing to secondary context makes the intentions even more interesting for the target.

**The filming context.** The more familiar the filming context, the more open and natural is the response towards the cameraman; anger, frustration and affection have been noticed. In the public context, the target’s response is more acted and joyful.

In general, the attitude towards recording and presence of the camera changed in few weeks from excitement through annoyance to ignoring (See Fig. 2). We claim that adjusting to the camera makes targets less aware of it and thus feeling more safe. Relation between a cameraman and a target had an impact on the change on the behavior. In the study like this privacy concerns are presumably low since the recorded material is shared only within the group of pre-defined familiar people and trusted researchers.



**Fig.2.** The four week period with 3 cameramen and 6 targets visualized in the chart; the faces representing the targets. Sunny smiling face: excitement, joking, making faces, acting and imitating TV and movie stars and interest to the filmed material. Circular face: diminishing excitement and slight embarrassment. Triangle face: anger and frustration. Square face: ignoring the camera.

### 4.3 Sharing and Themes

Benefits of the possibility to share the captured multimedia content included: “real time”, “immediate”, “spontaneous”, “message is polite”, “it’s is like a gift”, “feeling of being connected and reachable”. Having the material created in a mobile phone and thus always available was also considered as a big benefit. Sharing raised

concerns such as need to control the spreading to the secondary context. Participants felt that the rich information in MMS sometimes revealed more of their situation than they desired. Editing seemed to be done to prevent that. We noticed that the material which was intended to be shared was edited more often than the private material.

The study suggests that although mobile phone video camera brings up new video recording themes, the old, familiar ones such as: people (e.g. you and me, jokes and social life), pets (e.g. cats, dogs and birds), occasions (e.g. family events, soccer game and events) and holiday (e.g. monuments and landscapes) still remain. New themes that derive from the always-with characteristics of the mobile phone video camera include: daily life (e.g. work, school, places and activities), practical (e.g. notes), object (e.g. CD covers, graffiti and works of art), celebrities (e.g. from TV screen and magazines) and surprises (something noteworthy comes across).

## **5 Discussion and Concluding Remarks**

Camera in the primary context affected the behavior of the present persons. That was recognizable e.g. by the posing acts. Subjects' behavior changed all the time during the study which we presume being an indicator of four weeks being too short time for the participants to develop their own mobile video camera usage habits as cameramen or targets. Time was long enough to get results from the acceptance of the video cameras in social context though.

This study brought up that the participants did not perceive remarkable privacy threats due to the fact that the recorded material was shared mostly with familiar and trusted people [See also 8]. Furthermore, some earlier studies [See e.g. 1, 2 and 9] have shown that people do not tend to pay much attention to possible privacy threats, unless they have personally encountered invasion of privacy with regard to the information or multimedia content they have shared. For instance, after posting some highly personal material e.g. to a personal blog or an on-line community, the material is fairly easy to publish all over the web. Today, it seems that many people do not either know or care about this. One can easily find such material from the web that seems to be recorded spontaneously in a private sphere and express something that has not been meant to be visible for the whole world. As one possible explanation for that, we suggest that the more people get used to the cameras around, the less they pay attention to them and in time become almost unaware of them. That seems to lead to less artificial behavior and lower concerns of publishing and privacy loss.

These observations bring up the two-folded nature of privacy in terms of designing and developing systems allowing capturing and sharing videos and images. On the one hand, designers should take privacy regulation features into account and try to avoid such functionalities that might be harmful for users. On the other hand, users will inevitably apply the given means to their own purposes, and especially in a case of mobile devices enabling recording and sharing videos and images, designers and developers have very limited means to regulate their usage.

The recent technological and behavioral evolution related to capturing and sharing multimedia content have resulted discussion of radical change of privacy. The private sphere has diminished whilst the public sphere has extended due to video recording

capability of mobile phones. Many are truly concerned of this development. However, one can also take an alternative viewpoint. The future where everything is recorded and viewable for everyone can be seen as a relief and give an opportunity to live un-stressful life without secrets and hiding. People's openness in publishing extremely private content in the web is one indicator witnessing this trend. In addition, monitoring authorities has become easier for citizens (a phenomenon called *sousveillance*) and this might have positive implications of rightness of society.

Since the study was made only in one country, we can't claim that the results are valid in every culture. However, the study illustrates that mobile phone video camera affects the social context in various ways such as expanding group dynamics and giving possibility for preserving material for own use or sharing it with others. In other words, the reason for recording is either in the primary or secondary context, sometimes both of them. About half of the videos are taken in some new situations where camera wasn't available before the appearing of mobile phone video cameras. Target's behavior in primary context where the camera is present changes in the course of time; in most cases it starts with joy and turn to ignoring.

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