I Saw This and Thought of You:
Some Social Uses of Camera Phones

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ABSTRACT

This paper presents aspects of a study into how and why people use camera phones. The study examined people's intentions at the time of image capture and subsequent patterns of use. Motivated by current interest in "picture messaging", we focus on images taken to communicate with absent people and look at how they were actually used. We consider the timeliness of communication and the role of common ground to derive implications for design.

Author Keywords

Camera phones, multimedia messaging, mobile phones.

ACM Classification Keywords

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

INTRODUCTION

The worldwide boom in mobile telephony and the success of text messaging has raised expectations around the next wave of services centered on "picture messaging" using camera phones (via "MMS" or Multimedia Messaging Services). While current camera phone sales exceed 50% of the mobile phone market, early MMS revenues for many mobile operators have been disappointing causing them to downgrade their original forecasts [1]. This raises questions as to why people buy these devices, how they actually use them and what they value.

Unfortunately, when it comes to understanding what users actually do with their camera phones, the field is still in its infancy. Beginning with the "Maypole" project [2] prior to the release of commercial camera phones, and later in work sponsored by the Finnish telecommunications company Radiolinja [3], research has tended to focus on the sending and receiving of images by small socially connected groups of people. More recently, the research has broadened examining a wider range of activities carried out via picture messaging using ethnographic techniques [4,5,6]. However, while this work sheds light on emerging social practices, it is not focused on design implications for new technologies.

Of relevance is also the literature on use of still photographic images as well as other forms of mobile communication such as text messaging. Such areas of research are themselves relatively new although some seminal work has been done [7,8]. What is clear so far is that each of these different technological contexts has its own affordances for interaction. The extent of their relevance to camera phone use has yet to be established.

This paper is concerned specifically with how camera phones are used to communicate with people who are not co-present to share an experience when a picture is taken. This is an interesting subset of use for which picture messaging would seem, a priori, to be an obvious way of communicating. Indeed, we shall show that it is a compelling mechanism in these cases, although users find barriers to using it; for that and other reasons, they more frequently wait until they can show the images, face to face, on the phone's display.

The paper draws from a more general study which we carried out to understand why people capture images on camera phones, and the range of ways in which such images are used [9]. Unlike previous studies involving groups of individuals known to one another, we examined a wider cross-section of individuals, most of whom were experienced camera phone users.

METHOD

We recruited 34 participants in the US and UK, ranging in ages from 15 to over 50. They had a variety of types of camera phones and service providers. Most of the phones had VGA resolution cameras (640 x 480 pixels), without a zoom or flash. Except for a few subjects, all had access to MMS sending facilities and the GPRS service enabling email access. Some additionally had infrared or Bluetooth for transmitting images directly to other phones. All of the subjects had access to a PC at work, school or home.

We used discussions around a random sample of images to examine people's intentions at the time of capture, subsequent patterns of use, and desires for future technology (see [9] for details). From two sets of interviews with 2-5 weeks in between, we collected complete data on 320 images (photos and short video clips). The analysis involved coding the data collected for each image – for

	Social				**Individual**	
Affective	**Mutual Experience.** Images intended to enrich a shared, co-present experience (either in the moment or later as a memento).	103 (35%)	***Absent Friends or Family.** Images intended for communication with absent friends or family (either in the moment or later).	63 (21%)	**Personal Reflection.** Images intended for personal reflection or reminiscing.	120 (41%)
Functional	**Mutual Task.** Images intended to share with people co-present in support of a task (either in the moment or after the event).	11 (4%)	***Remote Task.** Images intended to support a task by sharing with remote family, friends or colleagues (either in the moment or later).	23 (8%)	**Personal Task.** Images intended to support some future task not involving sharing.	29 (10%)

Table 1. A taxonomy of image capture, with numbers and proportions by category. *Discussed in this paper.

example, the intentions behind images. The authors independently produced and then reached iterative agreement on what constituted sensible coding categories. The coding was done to build a framework for understanding the data, not to prove any hypotheses.

RESULTS

For each of the 295 captured images (the remaining 25 were received), we recorded up to two reasons why the subject said they captured it. There were broadly two different dimensions along which subjects' intentions at capture varied (Table 1). The first dimension was whether an image was taken for an "affective" reason (e.g. emotional) or a functional reason (i.e. to support the accomplishment of a particular task). The second dimension was that of "social" (i.e. intended for sharing with others) versus "individual", where no sharing was intended. Further, when we look more closely at social uses, these can be broadly broken down into sharing with people who were co-present at the time of image capture versus sharing with people who were not physically co-present.

In this paper we discuss images that belong to the two social categories of "Absent Friends or Family" and "Remote Task". Those categories, one affective and the other functional, are distinguished by the fact that the intention was to share or communicate with people who were absent at the time of capture.

The subjects used face-to-face sharing for the majority of these images, and a remote sending mechanism for little more than a third of them (largely MMS). In choosing the sharing mechanism, one factor may have been one of the general barriers to sending found in our study, including the lack of a "critical mass" of people to exchange images with, expense, complexity and poor image quality. However, there were other factors at play, namely, (1) timeliness, or how soon the communication needed to occur after the point of capture, and (2) how the communication relates to the common ground between the photographer and the absent person – that is, what each knows, and knows that the other knows [10].
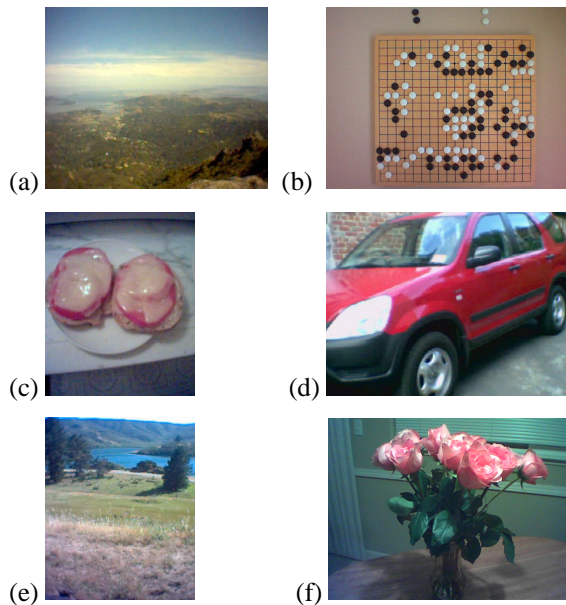
Absent Friends or Family

For images captured to be shared with the absent friends or family (Figure 1), this could happen very much "in the moment", or it could happen after the fact. In all, 27% of the images in this category were shared in the moment. Figure 1(a) shows an example of extending an experience to absent friends: the subject had just reached the top of a mountain and sent an image of the view to friends, riddling them about his location. Drawing someone into an experience happening at the same time despite being separated by distance represented a compelling way to stay close. The riddle added to this act of bringing his friends in, since it invited a real-time response: "Where am I?".

The next two examples are further compelling cases of spontaneous connections that are possible only with a camera phone. This time the photographer connected a specific thing with the thought of a particular friend, prompting the capture and transmission of the image. Figure 1(b) shows a game of "go" and the text accompanying it was "Your turn!". The photographer was reminding his friend about the game they had been playing, and that it had been a while since they communicated. Figure 1(c) shows food that the photographer had just made, and which he and his girlfriend used to eat in college. "Look what I made" was the text accompanying it.

Both those examples also illustrate how images can embody personal common ground. The images required few words. Not only did they demonstrate shared history between friends or family, but they were also sometimes more tightly woven into an ongoing conversational context as a way of adding to common ground. For example, one subject took a picture of his new car in immediate response to receiving a friend's picture of his new motorcycle (Figure 1(d)). A joke was followed by a joke: ""My Honda's bigger than yr Kawasaki" – each relying on the image for its effect. The pair then had a discussion by phone. There were also several cases of users sending picture messages while communicating via a PC.

In addition to sharing in the moment, many images in this category were shared after the fact either on the phone itself

Figure 1. Images shared with absent friends & family.

Figure 2. Images used to complete a task with someone who was absent at the time of capture.

or sent later. Sometimes this was because sharing was less urgent than in the examples above – the photographer knew they would see the intended recipient in good time; and sometimes sending in the moment was impossible because the other person had no way to receive the image.

For example, Figure 1(e) was captured on a cycling trip in order to show the subject's husband the scenic view with animals. At the time of the interview, she had not in fact shown it to her husband, raising the question of how many of these more casual impulses might ultimately be lost if not acted upon at the time.

When it did occur, *post hoc* sharing typically involved story-telling with people who had been absent. But there were examples of communication after the fact when the intended recipient was still absent. Figure 1(f) depicts a gift sent to the subject. She waited until the flowers bloomed and then thanked the giver by capturing and printing an image of them, and sent the print in a letter with a written "thank you" note.

Remote Task

Turning to more practical uses, the images captured to complete a task with people absent at the time of capture represented a rich source of interesting tasks. Again, timeliness and common ground were important aspects.

The importance of timely delivery is reflected in the fact that about half of these images were sent at the time of capture. Figure 2(a) shows a choice of sandals which a woman found for her husband while shopping. She sent the image to his phone and immediately called him to discuss the selection. This mode of communication saved an extra shopping trip. Moreover, by sending the image, the woman dynamically added to the common ground she shared with her husband and thus simplified the conversation.

Figure 2(b) is an example of an image that relies upon common ground rather than adds to it. One subject sent the image to his wife, without a phone call or an annotation. The image conveyed that the new road sign, for which they had campaigned, had finally been installed. The reliance on common ground makes such communication wordless and so efficient -- the image had unambiguous meaning in their context. In addition, the communication's timeliness was significant. By sending the image soon after he saw the sign, the man added affect to what would otherwise have been merely the closure of a task: he reached into his wife's working day with something of mutual importance.

As well as the ability to convey news, images enabled subjects to provide evidence needed to meet a commitment with an absent person. Figure 2(c) shows a plane with people disembarking, which a son used to assure his mother he had landed safely. Again, the significance of this image was tied to the understanding of the two people involved and the timeliness of delivery. If he had had a digital camera, he could have waited until he found a PC to send the image; but the delay would have undermined his intent.

By contrast, Figure 2(d), is an example of how the phone's sending facility can prove inadequate. A pen had disappeared from an office-worker's desk. Partly in jest, he decided to broadcast a message to get it back. The "always to hand" characteristic of the camera phone meant that he could capture an image of a similar pen. However, since phones are used as person-to-person devices, he had no group "address" for his colleagues – many of whom would not possess a phone capable of receiving the image, anyway. Emailing it via a PC, by contrast, fitted his needs.

The final two images in Figure 2 show that asynchronous communication is sometimes more appropriate for remote

tasks. Figure 2(e) depicts an object that a subject found in a scrapyard, which he later combined with other images to explain to friends how it fitted into the sculpture they were discussing. Figure 2(f) was captured as a sample of a haircut that another subject took with her to the hairdresser. The first of these images awaited further activity until it could be used; the second image only made sense in the context of later face-to-face discussion.

DISCUSSION

The above examples show the richness of communication within the two categories we have discussed. In particular, they show a major choice between sending an image at the time of capture or soon thereafter, or sharing it later, typically by showing it face-to-face.

Sending "in the moment" occurred for over a third of these images. The combination of camera with direct sending capabilities brought remote people into an experience or helped accomplish tasks. Despite barriers, such activities were a compelling new form of imaging interaction.

The choice of whether to send now or share later is affected by the timeliness requirements of the individual communication act. We have provided examples such as the sandals and the top of a mountain where there was some functional or emotional urgency behind the communication. On the other hand, images such as the haircut were intended to be shown later face-to-face.

Personal common ground – or the lack of it – is another factor behind the choice to send now or share later. Images that rely on common ground, such as the road sign, can be sent efficiently with few or no words, and affirm a relationship between the photographer and the absent recipient. In addition, an image sent on the fly such as the sandals can enhance common ground more than any text or voice could easily achieve. But if the image or its meaning is insufficiently clear, then showing and interpreting it in person may be the only option – and is sometimes a desirable form of social interaction in itself.

Implications for image sharing

One implication of the study is the need for more convenient interweaving of image sending within other conversational contexts such as voice and text – so that images can be more easily used to enhance and repair common ground within those larger conversations. As things stand, our subjects had to use multiple devices or serialise image sending with phone conversations. Another aspect that should not be overlooked is the timeliness of message delivery: if it takes too long to transmit images, then they cannot communicate what is happening "now" and so be interwoven.

Second, the findings have implications for web-based forms of sharing such as "moblogs", at least for certain images. The study has shown that many images are taken of spontaneously chosen subjects, and that communication via

such images often either relies upon personal common ground, or it involves an in-person interpretation. While the web may be suitable for archiving or for presenting straightforward images of common interest (e.g. restaurant food) to a broad audience, its sharing mechanisms would require considerable re-thinking for such direct personal use. That is the subject of ongoing research [11].

CONCLUSIONS

This study has shown a variety of ways in which camera phones are used to make a bridge between what the photographer encounters and an absent person. Carried everywhere, these devices allow the photographer to make spontaneous connections with other people through unconventional subjects. These are new types of imaging interactions, and the study has highlighted some of the developments that will be needed to fully exploit them.

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