Mobile multimedia and users: On the domestication of mobile multimedia

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With camera phones rapidly becoming commonplace, mobile multimedia is spreading fast in the market. This paper focuses on how people use their mobile multimedia devices. Based on a series of studies conducted in Helsinki, this paper reviews existing arguments about mobile multimedia, and then explains why the Helsinki studies have been informed by an interaction-oriented argument based on ethnomethodology. Data and methods for the paper come from two major studies called *Mobile Image* and *Radiolinja*. The main body of the paper provides three illustrations of the framework. First, it studies how people build their mobile multimedia messages. Secondly, it shows what kinds of methods of response recipients use. Third, it looks at how people learn new methods of action from each other in the course of exchanging messages. Discussion compares the Helsinki studies to other research perspectives.

Introduction

Mobile multimedia is a new, but quickly expanding addition to mobile telephony. Phones with multimedia capabilities allow users to compile and send messages including text, still images, sound, and, increasingly, video clips. Message 1 provides an example of a typical multimedia message. A vacationing friend sent it to the first author in Helsinki from Greece. It consists of a snapshot photograph and a written greeting. Although users have been slow to adopt multimedia technology, it is spreading fast in handsets. This paper asks what this technology adds to mobile telephony. More specifically, it looks for ways in which people adopt multimedia. What drives its "domestication"? The focus of the paper is primarily on MMS, but messages from older applications are commented on as well.

The metaphor of "domestication" has its origins in British media studies of the 1980s and 1990s. Domestication denotes the phases of a product life cycle which are not controlled by industry and (here) mobile carriers. In the most significant articles in this area, Roger Silverstone and his colleagues [1, 2] argue that this process is directed not just by economic, but also by moral, affective and aesthetic considerations. As a result of these considerations, technologies find their place in people's spatial environments, practices and communication modes. This paper explores how mobile multimedia is domesticated in mobile telephony by reporting the perspective and key observations of design research conducted in Helsinki between 1999 and 2003. The reason for focusing on human action instead of technology is the conviction that although technology changes rapidly, user needs and practices do not.

What drives domestication?

In addition to several descriptive accounts [3], four theoretical perspectives have been proposed to explain drivers for the use of mobile multimedia. The first and simplest argument relates mobile multimedia to user motivations. In brief, what people see as worth capturing and sharing is explained by functional needs and affective reactions – ranging from aesthetic experience to missing loved ones. The best example of this line of argumentation is in Kindberg et al. [4], who classified multimedia messages sent by the British and Americans into individual, social, affective, and functional categories. Out of the 349 messages they analyzed, 82 % were affective. 58 % of the affective messages were social in nature – targeted towards enriching shared experience, or communicating with absent friends – and 42 % individual, intended for personal reflection. Out of 63 functional messages, 53 % were for social purposes; they were sent to help other people do some task, 47 % supported tasks not involving sharing – that is, they helped the senders of messages in their own tasks.

From a more sociological perspective, Scifo [5] has studied the domestication of camera phones in Milan. Unlike mobile phones, mobile multimedia roots experience back in users' physical and social surroundings. Multimedia messaging is almost exclusively linked to one's network of strong relationships, where it primarily nourishes sentimental bonds. With

Message 1. Postcard from Greece 02-09-2004 11:47:46

Greetings from Greece. Imagine ... An old man lives at the top of a windmill. Downstairs he has a beach café and sells small snacks. It's really relaxing to be out here. Remember to work hard while I'm vacationing ... Best wishes, Junior, Mari and kids

MMS, people give others access to places, individual and social situations, and emotions. People share images of familiar objects and people, private life (like objects, relatives), and social networks. Mobile multimedia also provides an extension of one's experience and memory – with it, one's affective world is reportable in a visual and shareable form.

While Scifo focuses on the meanings of pictures and, by extension, camera phones, Ling and Julsrud [6] focus on the "genres" of multimedia messaging. The argument is that existing media – and other – genres provide people formats for compiling multimedia messages. For example, Ling and Julsrud studied mobile salespersons of a soft drink company, real estate agents and carpenters for six months in Norway, finding that the main genres were

- documentation of work related objects
- visualization of details and project status
- snapshots (developing camaraderie)
- postcards and greetings
- chain messages (standardized messages, usually downloaded from Web sites).

Soft drink sales persons used MMS most, followed by carpenters. These groups used it for all the purposes mentioned above. Real estate sales persons used the technology only for postcards, greetings, and snapshots. Carpenters also used MMS for "clarification": taking and sending pictures of problems at work to get advice from colleagues.

The fourth perspective builds on the idea that people interact with each other through mobile multimedia. To this end, they use "age-old practices" familiar to anyone from other realms of life: greetings, postcards, questions, riddles, family portraits, and so forth. Building on the initial idea of Licoppe and Heurtin [7], Taylor, Harper and Berg have generalized this argument first to SMS and then to MMS [8]. Their example of an age-old practice is gift-giving. People share things to delight recipients, who are obliged to return the gift and show gratitude, or face sanctions if they do not reciprocate.

These perspectives explain the use of mobile multimedia on a variety of levels, ranging from affective and cognitive processes through small group dynamics to macro-level cultural processes. However, each perspective has shortcomings. For example, the attempt to classify motivations does not account for messages which serve a number of purposes at once; as people routinely do several things in any individual message, classifying messages using categories created by researchers is risky. The cultural argument works somewhat better in this respect. For example,

the genres approach situates the locus of action in those cultural structures that people use to construe lines of action. It is not necessary to classify messages into "affective" and "functional" motives. Still, neither the genres framework, nor the gift-giving analogy are sufficient to account for several types of interactional patterns in messages.

Domestication and ethnomethodology

The argument of this paper is based on the notion that mobile multimedia is essentially a technology for communication and, accordingly, interaction. The argument builds on classical ethnomethodology [9], a perspective followed in the series of studies in Helsinki [10, 11, 12, 13, 14, 15, 16]. According to this perspective, communication is situated action [17]. Any message is interpreted by a recipient, who may follow the literal meaning of the message, but need not do so. The recipient's interpretation becomes evident in his response, which can be a word, turn in talk, a piece of text, or a message that contains a digital image. This, in turn, prompts a new response. Thus, each action is shaped by the context in which the previous action is typically the most prominent element. At the same time, any action renews the context, and prepares it for the subsequent action [18]. Because of this situated quality of interaction, we do not normally know what is going to happen after a few turns. Instead, we have to act here and now.

When composing multimedia messages, people often utilize commonsense cultural resources, including those used in conversation, in professional practice, and in media. Thus, despite the fact that the medium is new, messaging as such is largely based on familiar methods. There are good reasons for such conservatism. When incorporated into the new medium, these methods provide intelligibility, coherence, and predictability for communication. The main difference between multimedia messaging and traditional postcards is transmission speed: the mobile card in Message 1 came from Greece to Helsinki in minutes, not in days as a traditional postcard.

However, mobile multimedia is more than just a process of using "age-old practices" in a new technological domain. From an ethnomethodological perspective, domestication is also a collective process of discovering new methods for capturing and sharing. In this process, conventions in media presentation are not followed blindly. Pre-existing media formats or types of content are not just replicated, but reconstituted to be more useful for the participants, who are thus able to display themselves as knowledgeable,
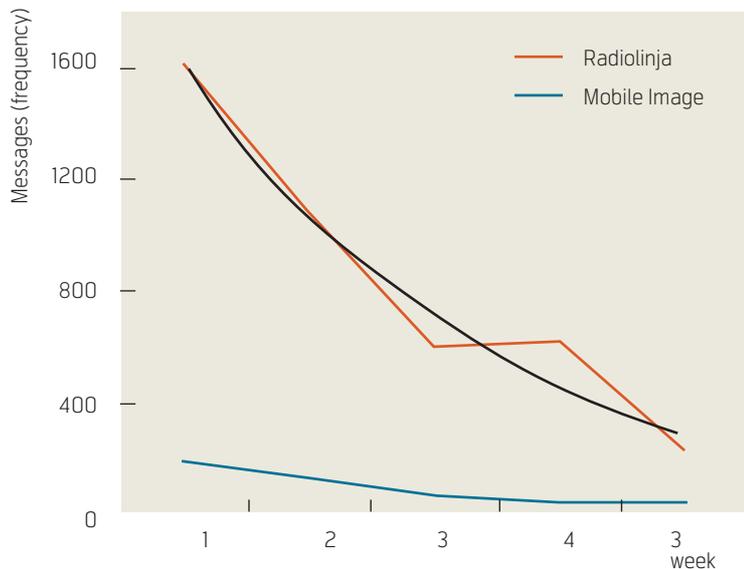
Figure 1 The Trajectory of Use in Mobile Image and Radiolinja (first 5 weeks)[1]

considerate, entertaining, witty, and so forth. For example, the members of one research group realized that they could also use images on their computer to produce trick effects [10]. This invention took place first without conscious reflection, but gradually led to a joking culture in which members of the group constantly tried to outdo each other. Still, its origins were modest. One member experimented with an automatic signature, but instead of writing his name, address and phone number, he downloaded a picture of the actor Liam Neeson from the Internet and used it as a visual signature. Once the idea of image manipulation was invented, messaging got increasingly more inventive; it became the group's second nature in a few weeks. For this group, there was no going back to the original meaning of the images they had used.

Data and methods

Data for this paper comes from a series of design studies conducted in Helsinki between 1999 and 2003. In particular, we focus on two studies, *Mobile Image* (1999-2001) and *Radiolinja* (2002). These two studies involved over 5000 multimedia messages. By now, about 20 scientific papers have been written from these data; this paper reports some of the main findings from this body of research.

In *Mobile Image*, we gave a Nokia 9110 Communicator and a Casio digital camera, connected with an infrared link, to four groups of five people (the pilot,

male, female, and control groups, the pilot and the control being mixed-gender) for 2–3 months each. Groups were selected so that their technical expertise, access to technology, and gender varied. Photographing became more mundane and ad hoc than in ordinary home mode of photography [cf. 19]. People took images of their meals, dirty plates in the sink, their street, and so forth. Messages were collected as e-mail attachments. For ethical reasons, we did not automatize this procedure, but asked participants to send or forward all their messages to Esko Kurvinen, who was responsible for the project. The Helsinki-based mobile carrier Radiolinja provided free phone service and data connection based on GSM technology.

In *Radiolinja*, we selected three groups from a larger technology and service pilot. The pilot took place in summer 2002, and lasted about five weeks. Each user was given an MMS phone (either Nokia 7650 with an integrated camera or SonyEricsson T68i with a plugin camera). Mixed-gender groups with seven, eleven, and seven members were studied. Out of the pilot, we selected groups to take into account gender difference, terminal types, and the city-countryside axis. Exact numbers are confidential, but we can report that users sent over 4000 messages during the pilot. Over 2000 were unique (the rest being duplicates in group messages, or recycled messages). These data were produced through the Radiolinja system automatically. As in *Mobile Image*, the service was free of charge.

Figure 1 reports weekly messaging frequencies for *Mobile Image* and *Radiolinja* for a period of five weeks (data is comparable for that period). It shows that in both data sets, use follows a downward logarithmic pattern. In *Radiolinja*, routine use settled to 2–3 messages/day/phone for each participant after five weeks. The difference between these two data sets probably relates to the ease of use. While taking a picture and sending it took thirty steps and easily two minutes with the equipment used in *Mobile Image*, the process quickened to less than 30 seconds in *Radiolinja*. Participants knew that they were studied, and were informed about the ethical procedures we used. In particular, we told them how our data was produced, promised not to publish pictures without their consent, and promised to change details of images so that it would not be possible to identify them from our publications. In addition, we have followed standard academic and legal practice and have changed all names and details that could identify people.

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[1] *For Mobile Image $y = -98{,}434Ln(x) + 179{,}45$, $R^2 = 0{,}9405$; for Radiolinja: $y = -835{,}32Ln(x) + 1624{,}4$, $R^2 = 0{,}9655$*

Multimedia elements in messages

The first question we have focused on is the way in which mobile multimedia messages are constructed. Multimedia messages contain three types of media: images, audio, and text. By far, the most prevalent media type is text (94 % of messages in Radiolinja had text), followed by photographs (87 %) and sound (10 %). People appeared in 56 % of photographs, followed by animals (11 %), scenes (11 %), various types of things (10 %), and food (8 %). This list of topics resembles that calculated by Kinberg et al., although in their study "specific things" were more prevalent [4]. As such, this list resembles ordinary snapshot photography [19]: people capture and share a selected sample of things with their "hiptop" devices.

However, for several reasons, multimedia messaging takes messaging beyond what one finds in photo albums. First, as Ling and Julsrud [6] have noted, people routinely borrow media formats from their environment to construct messages. These include postcards, movie-like stories [10: 55-61], travelogues, posters, TV and newspapers, including tabloid ads. Second, messages are always compiled for particular viewers, which is perhaps best evident in ubiquitous hellos, goodbyes, and signatures in the beginnings and closings of messages. Thus in Message 1, there was not only a greeting in the beginning of the message, but also a "best wishes" element and a signature-like list of names that made the message more personal to the first author. Third, people routinely explain why they send messages in the first place. For example, in a message that has a picture of a neighborhood pond, Laura accounts for sending the message (Message 2), explaining that even though she knows that for some, nature photographs are boring, the scene was so enthralling that she decided to send it anyway. Finally, as we noted above, people routinely do several things in any one message. Thus, while in Message 2 Laura gives this explanation, she also instructs the viewer (Markku) that she is specifically sharing her aesthetic experience with him. At the end of the message, she finally asks his advice on how to create animations (Markku responds to her a few minutes after). The message is "complex" – just like many SMS messages [20: 158-160].

Message 2. Korso 07-15-2002 16:08 Laura to Markku

Oh what a wonderful and lovable scene. I know that many people think that nature photos are boring, but I can't but rejoice when beautiful things can be found even in Korso. Another thing: can you make animations with this phone, and if you can, how?

For these reasons, we believe that to properly describe what takes place in multimedia messages, we need to analyze how they are constructed in detail, and understand them in terms of multimedia elements and their specific constellations in that form in which the recipients find them. Consequently, we have analyzed mobile multimedia as communication rather than, say, in terms of motives [4], genres [6], or even gift-giving [8]. For the same reason, our analysis has focused on methods of action rather than being built on analogies like the notion of "gift." An ethnomethdological perspective provides accuracy, but also detail that opens up new insights for designing services. Avoiding glosses like "humor" typical to content analysis makes analysis more difficult, but also makes it possible to spot message structures that can be used as templates in product development. These structures have the virtue of being grounded in existing, age-old practices.

Responding: Mobile multimedia as interaction

Perhaps the most important observation for our studies is that multimedia messages are something people use to interact with each other. This notion is based on ethnomethodological sociology and conversation analysis [10: 32-35, 11, 16, 21]. The point is not new; it has been made by Taylor and Harper [22] in their study of text messaging and by Berg et al. [8] in a design study on MMS. However, unlike Berg, Taylor and Harper, the Helsinki studies have specifically focused on actual responses to messages, not to mutual obligations on theoretical grounds. As this line of research is not construed from interviews, but from *actual chains of messages*, we have been able to study in detail forms of interaction mediated by mobile multimedia.

The argument has a solid footing in data. For example, we randomly selected 100 messages for closer analysis from the massive *Radiolinja* data. From these messages, we found 43 messages containing a textual formulation that seemed to link them to some previous or subsequent message. Of these 43 messages, we were able to find the other pair for 32 messages. For example, if our sample contained a question, we were most often able to find the reply from the following messages. For the remaining eleven messages, although it first appeared that there was for example a question in the message, it was not treated as such by the recipients – or the answer was delivered by other means. Thus, there is strong evidence that roughly every third message was part of a longer sequence. In addition, messages can link to each other implicitly, by e.g. addressing the same theme as the previous one(s). For example, photos of boy-

friends were sometimes replied to with similar photos, without saying in the text that the message should be seen as a reply to the previous one.

MMS is not just a technology for interaction; interaction is an essential phenomenon to be studied if we want to understand mobile multimedia.

Some interaction formats in *Radiolinja* are familiar to anyone from ordinary life. For example, people routinely reply to greetings and hellos, answer questions, and either accept or turn down invitations [10]. Not responding would be considered rude. However, in some cases, the response is optional. For example, a typical postcard contains meaningless, unnecessary details. It is up to the recipient to pick these up and continue messaging, but he may as well choose not to do so.

Sometimes these beginnings lead to longer sequences of interaction. For example, teases have minimally a three-part structure: an opening message which is somehow laughable, a tease which formulates the message as laughable, and a response from the teased person to the teaser [23]. The following example has been analyzed by Kurvinen [13]. Message 3 is from Thomas, who informs six friends that he got engaged to his girlfriend by showing two hands with rings, reporting in the text that it had taken 15 years to get to this point. As Kurvinen notes, announcements of important family events, especially milestones such as marriages, babies born, graduations and funerals effectively call for replies. Not just any kind of reply will do: appropriate replies must be in line with the announcement; joyful events call for congratulations and tragic events invite empathy. The first messages of these pairs set a preference against which subsequent messages can orient to. The reply from Jarkko, one day after the announcement, draws from the visual material of the original to make a teasing comment on rings and engagements (Message 4).

Messages 3–4. Engagement News

Thomas to 6 people /
07-16 2002 16:42

It took 15 years! But good things come to those who wait.

Jarkko to Thomas /
07-16-2002 21:27

Congratulations! Jarkko, Leo and Topi

Messages 5–6. Engagement News Turns into a Teasing Series

Jani to Thomas
07-17-2002 17:12

Screw your ring. Nobody snatches me, except Miss Universe.

Thomas to Jani
07-17-2002 19:25

Well screw you! Just think that I've had more mornings with my woman than you with both of your hands! Hah hah heh hee

In Message 5, Jani teases Thomas by suggesting that he has lost his freedom. To strengthen his point, Jani takes a picture of his hand, which does not have a ring. However, Thomas does not accept this tease as such, but turns it into counter-tease by hinting about the solitary nature of Jani's sex life (Message 6). By closing his reply with a series of textual laughter tokens "Hah hah heh hee", he shows that his message is a tease – and a gleeful one.

The importance of interaction for understanding mobile multimedia is that it explains a good deal of variation in the frequency of messaging [21]. Some messages prompt several responses that are seen in statistics as peaks of activity. For instance, Thomas sent the news of his engagement to "all", that is, to the six people in the group. In response, he first got a series of congratulations from other members. However, as we have seen, Jani's response was untypical, as was Thomas' reply. Jani did not respond to Thomas anymore, but the important thing to pay attention to is that in all, this exchange consisted of 13 messages within two days. This episode explains 14 % of the group's messaging activity in those two days when it took place (N = 91 messages). Thomas' announcement was not a self-standing message, but situated in social action; messaging does not result solely from independent acts of expression, but from sequences in which preceding and subsequent actions relate meaningfully to each other.

Discovering methods of action from others

The final observation to be reported here is that as people use their multimedia devices, their messaging develops with experience. Experience is essentially a social process: different "trajectories" develop depending on what kinds of messages people are exposed to. Precedents are to be found in studies of how SMS use has evolved into innovative user cul-

Messages 7–8. The Giant Green Sociologist

Subject: On the Esplanade / 08-13-1999 15:35

"I'm on the Esplanade! Cool!"

Subject: The Giant Green Sociologist / 08-13-1999 16:36

"STOMP!"

"What was that?"

"STOMP!"

"Run for your lives ... it's ... it's ... the Giant Green Sociologist!"

"STOMP!"

tures [24, 25]. In the course of messaging, people learn new ways to construct messages, i.e. they learn new ethnomethods. Initially, they have a limited stock of methods at their disposal; at a later stage, this stock of methods is larger.

An illustrative case of this development comes from the pilot group of *Mobile Image*, which developed a habit of image manipulation. Message 7 is a typical postcard-like city scene, but the response in Message 8 was far from typical. The response had a Godzilla-sized colleague in the horizon, and it captures the horror felt by the crowd who sees the monster approaching. Also, the picture was digitally shaken to show how pedestrians feel the giant's footsteps.

Of course, this is an extreme case; most inventions are far less conspicuous. As an example of how users discover more ordinary ethnomethods in the course of making messages, we may look at how one group developed a lively riddle culture consisting of 70 messages during the first week of the study. The interesting point is that riddles are *always* based on images; not a single riddle was done with text alone. In fact, every part of a riddle could be visual, not just the opening message of the riddle.

In the group in focus, riddles can be classified into four main groups. The simplest riddles started with a picture of an obscure or an ambiguous object, and the text asked what it was. An example was a picture of a baby's toes shot from the front so that the shape of the foot disappeared. The second typical method was to show a detail so that the whole disappears. Parts of the body, parts of animals, and objects such as carpets worked in this way. In the third method, the image was obvious, but the text made it problematic. For example, in one message, a picture of a sunbathing man was turned into a riddle by asking "Guess what Lars is doing?" This text effectively rules out the

obvious reply; what initially seemed evident in the photograph became questionable after reading the text. Finally, a fourth and less prevalent set of methods bordered on satirizing the riddle form. Several messages turned obvious objects – like pizzas and friends – into "riddles" of sorts. If one takes a picture of a glass of red wine, and asks others to guess what's in the mug, the fact that the answer is obvious shows that the riddle is to be taken as a joke.

The first riddles followed the traditional three-part format. However, in the course of *Radiolinja*, the structure of riddles became increasingly more varied. People learned to use:

• *Tips*. As already noted above, the sender may also give tips to recipients.

• *Rewards*. When starting the riddle, a bonus of some kind can be offered. For example in one message a bottle of beer was promised to whoever was able to give the right answer.

• *Side sequences*. Other things that make this structure more complex are side sequences in which the recipient may, for example, ask for a reward if the guess proved to be right. Such inquiries are typically responded to either by promising a reward, or by denying it.

• *Closing suggestions*. Recipients may show the sender that the riddle is getting boring by asking the joker to send the right answer and by making disapproving remarks or gestures about the quality of the riddle.

• *Visual responses*. Recipients' remarks may be visual and lead to visual commentary that takes place aside from the actual textual exchange.

More generally, people learn methods of action and uses of technology from other people. Consequently, their sensitivities for observation change: with new methods at their disposal, new things are considered relevant, funny, and reportable. At certain times, people use technology in certain ways. Later, they use it differently, even when the situation is more or less similar: they simply have different methods at their disposal. The history of use shapes future uses in the domestication of mobile multimedia.

Conclusions and discussion

In a series of studies conducted in the Helsinki metropolitan area, we have explored the use of multimedia technology in mobile phones from a classic ethnomethodological perspective informed by its off-

shoot, conversation analysis [9, 26]. The reason for building our analysis on this perspective rather than relying on other possible arguments available in literature on mobile phones is that ethnomethodology is capable of producing a rich description of what people do with new technology. Equipped with this description, we are able to get an idea of future uses even though the technology in use might change. As we are dealing with "age-old practices" of ordinary society [22], these practices do not develop nearly as quickly as technology. Thus, our descriptions will inform designers for years to come. Also, it is on this practical ground that larger scale social structures must be built to be successful – including technologies and services.

Most literature on mobile multimedia has tried to explain how it is used: mobile multimedia is treated as a dependent variable to be explained. Our studies in Helsinki have specifically focused on how people interact with each other through multimedia messages. Its basic premise has been that people use ordinary methods of interaction in this new domain. We share this assumption with Berg et al. [8], but have not followed their focus on gift-giving as an example of such an age-old practice. Instead, we have tried to describe methods people use to interact with each other. This analysis differs from other proposed explanations, in particular the motivation-centred argument proposed by Kindberg and his colleagues [4, 27], but less with the cultural argument proposed by Ling and Julsrud [6], which we see as a special case of the more general ethnomethodological perspective.

What if mobile multimedia is treated as an independent variable? What are its consequences? Recently, the French sociologist Carole Anne Rivière has been critical of its consequences. She sees multimedia as intimist and sensational communication that turns real things into spectacle: "Being multimedia tools, they increasingly use intimate play context, which have no rational purpose but rather aim at sensations, and in which the search for immediately shared pleasure is more and more visible" [28: 212]. Koskinen [29] uses less gloomy wording, but still characterizes multimedia as one that promotes a "banal" vision of the world. It supports mutual bonding, but turns the shared everyday into a commentary of small, trivial things rather than, say, politics or religion. If people reproduce "age-old practices" in the new domain through their actions as Berg et al. suggest [8], mobile multimedia contributes to person-to-person interactions rather than to wider institutional structures.

Our observations in this paper are perhaps less pessimistic about how multimedia technology gets domesticated in everyday life. First, people do many kinds of things with mobile multimedia, including many kinds of useful things. Second, we should not be too cynical about mutual entertainment. Is there something wrong in technology that supports fun and mutual rather than commercial entertainment, if it relieves boredom in ordinary life and maintains contacts between friends? Third, we have only begun the work of explicating mobile multimedia. As we see it, using mobile multimedia reproduces old cultural forms, but there are more innovative uses as well. In any case, our perspective shows that mobile multimedia gives people an opportunity to transfer their aesthetic, moral, and humorous experiences into a wireless domain in ways that were not possible using SMS or mobile phones. However, these aspects of life are rooted in ordinary experience rather than in the imaginary worlds of computer games or science fiction – although they may inform users of mobile multimedia.

What kinds of implications do these studies have for service providers and designers of services? The first level concerns how to "prototype" social action. We have consistently treated our studies as prototypes rather than real data. We have given people an opportunity to use (then) futuristic technology to see how they would use it, should it become common one day. We have monitored messaging using an up-to-date social science framework. Our objective has been to produce a picture of what people are going to do with mobile multimedia in the near future. From a design perspective, a picture like this is immensely valuable: building a technology and service roadmap is easier if one knows in advance how technology is going to be used. Of course, we do not know how well the picture we have given describes future uses. Hearsay evidence from other countries suggests that we have not missed the mark totally; in any case, the analysis we have proposed seems to describe the phenomenon better than, say, research that sees digital technology as a world-changing technology in mythical terms [30]. Second, at a more practical level, the utility of our analysis is more questionable. We have proposed several services to our technology partners immediately after our studies were done, and built some specific prototypes to illustrate them as well [31], but we do not know about the possible afterlife of these concepts in company memory. We believe that the approach could be most useful as part of an iterative developmental cycle, not as one-off studies as we have done so far. Unfortunately, this has not been possible, partially because recently mobile operators (at least in Finland) have focused on price-driven competition and market shares instead of e.g. on product and service development. In consequence, multimedia messaging services are still pretty much the same as they were at their launch.

Finally, we are fully aware of some limitations of our studies. Perhaps the main problem is that when we focus on interaction, we can easily lose sight of "larger" social structures. In our analysis, these are relevant only as local achievements – for example, as race, nationality, or gender labels in messages. However, in the long run, a more structural analysis is necessary for research and product development. Secondly, we have focused on a sort of visual chat among young city-dwellers. To generalize from this group is obviously risky, although we have been able to ground our research on interactional patterns that exist for people at large and also outside this domain. Third, institutional context needs to be added, perhaps along the lines proposed by Ling and Julsrud [6], who studied camera phone use at workplaces, or along the lines proposed by Katz [32], who has suggested that people use mobile phones to share religious information and also images of religious objects like the Pope. Finally, due to the experimental nature of our studies, we cannot evaluate the effects of price on multimedia use. Regardless of these limitations, we hope to have shown how design research can contribute not just to technology and service development, but also to social scientific understanding.

Acknowledgements

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