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IN SITU INFORMANTS EXPLORING AN EMOTIONAL MOBILE MESSAGING SYSTEM IN THEIR EVERYDAY PRACTICE

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Abstract

We have designed and built a mobile emotional messaging system named eMoto. With it, users can compose messages through using emotion-related gestures as input, rendering a message background of colours, shapes and animations expressing the emotional content. The design intent behind eMoto was that it should be engaging physically, intellectually and socially, and allow users to express themselves emotionally in all those dimensions, involving them in an *affective loop* experience. In here, we describe the user-centred design process that lead to the eMoto system, but focus mainly on the final study where we let five friends use eMoto for two weeks. The study method, which we name *in situ informants*, helped us enter and explore the subjective and distributed experiences of use, as well as how emotional communication unfolds in everyday practice when channelled through a system like eMoto. The in situ informants are on the one hand users of eMoto, but also *spectators*, that is close friends who observe and document user behaviour. Design conclusions include the need to support the sometimes fragile communication rhythm that friendships require – expressing memories of the past, sharing the present and planning for the future. We saw that emotions are not singular state that exist within one person alone, but permeates the total situation, changing and drifting as a process between the two friends communicating. We also gained insights into the under-estimated but still important physical, sensual aspects of emotional communication. Experiences of the in situ informants method include the need to involve participants in the interpretation of the data obtained, as well as establishing a closer connection with the spectators.

1 INTRODUCTION

Researchers in human-computer interaction have been discussing how to move from a more restricted focus on users' cognitive understanding of interaction and instead begin to design for an integrated physical, intellectual and social experience (e.g. Boehner et al., 2005a; Dourish, 2001; Fagerberg et al., 2003; Moen, 2006). It has been argued that we need to shift from the old dualistic view on mind and body as separate entities, as well as from a dualistic perspective on cognition as separate from the surrounding social and physical environment. Instead, the aim should be to design for *embodied interaction*, that is interaction that harmonises with our everyday practices and everyday bodily experiences (Dourish, 2001).

The integration of bodily, cognitive and social/cultural interactions into a design is key when dealing with design for emotional interaction. Emotions are not only cognitive phenomena, but are also experienced as physical, bodily processes, and are in turn influenced by our bodily experiences (Davidsson et al., 2003, Damasio, 1994). They way we experience emotions is shaped by the culture we live in and the specific social setting they occur in (Katz, 1999). Emotional processes are crucial in our interactions with others and we all spend extensive amounts of time figuring out our own

emotional reactions as well as interpreting those of others (sometimes highly individual reactions and expressions). The subtle nuances of our experiences that we want to express in interaction require interpretation and meaning-making, rather than crude simplifications. Designing for emotional communication that addresses bodily, cognitive and social aspects is therefore a true challenge. In here we describe how we have designed and subsequently deployed a mobile service, *eMoto*.

Communication of emotions is not simply an information transfer problem; it is about physically and intellectually experiencing the whole range of emotions that make up a conversation. We name them *affective loop experiences*, experiences where it is not possible to separate the intellectual from sensual experiences, nor to single out what is my individual experience from the overall experience arising in a dialogue with a friend, from previous friendship, and deep physical and emotional communication with one-another.

Once eMoto had been designed and implemented, we could not test the system in a laboratory setting where the user is separated from her friends, distanced from her everyday practices and everyday environment, and where the system is not integrated with all the other tools, artefacts, practices, routines and daily activities that we all engage in – the continuous improvisation that life is made up of (Suchman, 1987). We therefore turned to and combined three methods that all focus on entering people's lives as they occur *in situ*: first, *Cultural probes* (Gaver et al., 1999) a method where people are given materials that encourage them to report on personal and subjective experiences themselves; second, *Experience clips* (Isomursu et al., 2004), which is a method that relies on a friend, a *spectator*; to help obtain data on how some recently designed artefact is used; thirdly, the *Technology probe* method (Hutchinson et al. 2003). In a technology probe situation, a system is regarded as a partly unfinished, provocative artefact where parts of the design are intentionally left open-ended and ambiguous for the users to fill with their interpretation and meaning through their use over time. This in turn provides the designer with feedback on how to continue and arrive at a working design.

We present two sets of results:

1. First, specific results from the final user study of eMoto and the insights we gained on the (a) requirements on a mobile emotional messaging system, and in particular, on our (b) affective loop design idea.

2. Second, results on the *in situ informants* method as a means to provide designers with feedback on how their artefact works in use.

Let us provide a short summary of some of the attempts to build technology that allows users to express emotions, before we provide a description of the affective loop, the eMoto design, and finally the user study of eMoto.

2 COMMUNICATING EMOTIONS

People need to communicate their emotions to each other – sometimes through technology. This has led to a whole array of attempts to build technology and services for expressing emotions through

interactive media. Besides smilies and variants of smilies, such as emoticons, we can distinguish between three classes of solutions: communicating through specifically designed artefacts, communicating through composing multimedia messages (MMS, Instant messaging with photos and emoticons, etc), and communication of affect through adding sub-symbolic expressions, such as colours or animations, to textual media of different kinds.

Examples of designed artefacts for emotion communication are *Feather, Scent and Shaker* by Strong and Gaver (1996). In Feather a couple has one device each; the person who is away from home has an interactive picture frame and the person at home a cone containing a feather. When one user is handling the picture frame, a fan starts blowing the feather at home, illustrating affection in as a poetic experience of connection. Scent is similar to Feather, but a bowl is heated, vaporising essential oil. With Shaker, when the sender device is shaken by one user, the movement is mirrored in the receiver device by it being shaken proportionally. After Strong and Gaver's paper, a whole range of devices were built along the same lines as theirs but using other modalities. Examples include, the *Bed* (Dodge, 1997) uses tactile feedback in users' bed, *Kiss Communicator* (Buchenau and Fulton-Suri, 2000), is an object to be squeezed gently rendering an animated light in another object, in the *White Stone*, (Tollmar et al., 2000) one stone is heated in response to another stone being held, and in *Gustbowl* (van der Hoog et al., 2004), a bowl placed by the door that reacts to items being dropped into it by wobbling and making a camera take a picture of the contents and things above it transmitted to a corresponding bowl held by someone else.

In mobile settings, emotions are often communicated through various multimedia possibilities, such as MMS or specially designed smilies in SMS-systems. But there are also attempts to design special systems for mobile emotional communication, such as *ExMS* (Persson, 2003) which is an animated avatar-based messaging system used on mobile phones. The user expresses her emotions by combining short, ready-made, pieces of animations where a character expresses different emotions. The user can also add text to each animation that the character 'speak' in speech bubbles above its head. The resulting 'movie' is sent to the other user.

Expressing affect through various modalities, such as colour, shape, animation, characteristics in body posture, sound and haptics has been used in several systems. *Miro* (Boehner et al., 2005b) visualises the emotional climate in an office space. The system consisted of a set of emotional input stations and output is displayed on a big screen portraying movements and colours of objects using a Mirò-style design. In *Affector* (Sengers et al., 2005b) is a video window placed in the offices of two friends. The emotions are picked up by sensors, but where the interpretation of those sensor data is made by a set of rules developed by the two friends using the system. The emotion states are translated and rendered as a distortion of a video taken of the users sitting in their office. In *AffectiveColor* (Liu et al., 2003) the affective structure of a text document is visualised in a colour bar above the text. The *Influencing Machine,* (Sengers et al., 2002) uses colour, shape, animation inspired by children's drawings and music to portray emotions. Users insert postcards with art on them, representing different emotional

input, into a slot, much like a post box, and the Influencing Machine answers with the child-like drawings. *KinEdit*, (Forlizzi et al., 2003), makes use of kinetic typography, which is often used in film titles and television advertising. Animation, colour and shape of the written text are used to create an emotional content to the words written. *VIO* (Kaye et al. 2005) is supposed to be used by couples separated by distance. It appears as a circle in the Windows taskbar and when it is clicked the other person's VIO turns red, fading over time finally reaching a blue shade of colour.

There are also a range of other modalities that have been used in communication systems to convey emotions, such as music or haptics (Rovers and van Essen, 2004).

3 AFFECTIVE LOOP

Dourish (2001) sees embodied interaction as not only focusing on *what* is being done but also on *how* something is being done. The concept of embodiment allows Dourish to combine two trends from the human-computer interaction area: *tangible interaction* where interaction is distributed over the abstract digital world and objects in the physical world (Ishii and Ullmer, 1997), and *social computing* where social practice and the construction of meaning through social interaction is core in design. What we aim to achieve is design for emotional communication that has these qualities of embodiment – both with the physical side of emotions but also with its social/contextual nature. In particular, we are interested in designing for what we name *affective loop* experiences (Fagerberg et al., 2003, Sundström, 2005).

The way we see an affective loop is as an interaction where the user first expresses her emotions through some physical, bodily means, for example, through gestures or manipulations of an artefact – a tangible interaction. The system (or another user through the system) then responds through generating an affective expression, for example, colours, animations, haptics, or some other sensual feedback. This in turn affects the user (both intellectually and physically) making the user respond and step-by-step feel more and more involved with the system and their own experiences.

An affective loop is in our view an empowering process where the user decides what they want to express – not a system where their emotions are interpreted by a system picking up on, for example, their bio-signals. It is an involvement that users decide to enter and where they decide how immersed or distanced they want to be to the experience. It also needs to be based on our both our physical/bodily familiarity with emotion processes in dialogue with others as well as our familiarity with our social contexts and dialogues with others as they take place in our daily lives.

An affective loop design should also preferably be open-ended enough to allow it to be used in and changed by its social and contextual setting. The application's contents, functionality or possibilities for communication between users should be able to "drift" over time – allowing users to be co-constructors of the system, and most importantly, the co-constructors of the *meaning* of emotional expressions as they are used over time (Höök, 2006).

With the eMoto design, we also wanted users to reflect more on what emotional communication actually involves, in terms of both physical and intellectual experiences. Sengers and colleagues (2005a) see reflection as a possibility to bring unconscious aspects of experience to conscious awareness. Sengers and colleagues argue that reflection does not have to be put in opposition to usability but can be part of a holistic experience. In traditional usability, the tool is supposed to fade into the background, allowing users to focus on the task at hand – not on the tool itself. While we do not think users want to be reflective in every single situation and we do not either wish to require such activity, reflection can arise as a consequence of use over time. A method they use and also a method that Hutchinson and colleagues (2003) have been using to explore users' reflection is to give users technology probes to encourage them to see things in their lives that are there but perhaps aspects they do not normally think of nor discuss much. After using these probes for some time, users start, step by step, to reflect. In the study discussed in this paper, we hoped to see a similar, slowly arising reflective process, where users would become increasingly aware of their inner, physical experiences of emotions as well as their social role in their communication with their friends.

4 DESIGNING EMOTO

When we meet face to face, we show our emotional reactions in many ways – through facial expression, body posture, gestures, tone of voice, eye gaze, etc. We notice the reactions of others and become influenced by their physical behaviours. Some of what we show we can control, some is transmitted beyond our conscious control. To be socially adept means that we need to hide certain reactions and consciously put on other reactions. As pointed out by Aoki and Woodruff, (2005), technology needs to balance "the utility of ambiguity against the utility of usability and communicative clarity", that is, sometimes allow users to hide behind the technology in order to save face rather than to make it totally transparent by communicating all our reactions. This is why some affective computing systems that attempt to measure users' emotional reactions through, for example, measuring our physical, bodily reactions might be revealing too much. To empower our users we therefore decided to design for gestures that the user consciously expresses, rather than to pick up on signs and signals that we cannot control. But to adhere with the affective loop aim, these gestures should be such that they reinforce our experience of the emotions we try to express and be rooted in physical movements that resemble and trigger bodily, physical emotional experiences from our everyday life.

Our approach has therefore been a user-centred, iterative design process where we have involved users throughout the design process. Following on Dourish' ideas of designing from familiarity we first of all conducted an analysis of emotional body language (Fagerberg et al., 2003). This was followed by iterative user encounters in the laboratory to verify that each part of eMoto worked as intended before eMoto could be tested in situ. This followed Höök's *two-tiered evaluation method* (2004), which

emphasises the need to first make sure that any emotional input or output to a system is indeed interpreted correctly by end-users before evaluating the overall aims with the system.

To complete the affective loop, the system needs to provide feedback that reinforces users' experience, expressing and mirroring their gestures. This could be done in many different modalities, such as sounds, haptics, symbols, or, as we choose in the end, colours, shapes and animations. The reason we went for an abstract, even somewhat ambiguous colourful representation was to provide a rich palette that (in combination with the textual part of the mobile message) could express many subtle nuances. The animations should also mirror the sensation of the gestures. To make sure that the gestures and the shapes and animations harmonized, both were designed from the same analysis of emotional body language, which we turn to now, before describing the eMoto system.

4.1 An Analysis of Emotional Body Language

To capture the familiarity of emotional body language and the underlying experience dimensions of movement, we used *Laban Movement Analysis* (LMA) to extract the *shape* and *effort* in movements (Davies, 2001; Laban and Lawrence, 1974). The Laban notation is presented in more detail in an earlier paper (Fagerberg et al., 2003), but, in short, *shape* describes the changing forms that the body makes in space, while *effort* involves the dynamic qualities of the movement and the inner attitude towards use of energy.

The analysis was performed on nine different emotions (*excitement, anger, surprise-afraid, sulkiness, surprise-interested, pride, satisfaction, sadness* and *being in love)* as expressed by an actor. Even though the actor was asked to perform nine distinct emotions, his way of acting out those emotions was more like a process where he worked on the concept of each given emotion, going from initiating the expression to experiencing it more and more, thereby expressing it stronger, and then varying it using various alternative interpretations of it. The LMA was performed on the whole sequence of expressions for each given emotion, although summarized into one effort graph and one description of shape for every emotional process.

As we did not want to resort to some simplistic one-emotion-one-gesture solution that would reduce emotions to separate entities mapped to symbolic gestures, we looked for an emotional model that also could hold the subjective and personal characteristics of emotions. *Dimensional models* of emotions focus on the experience of emotion processes, both on a low level (as in the limbic parts of the brain and in the body), but also on a higher, cognitive, level (Scherer, 2002). In psychologist Russell's dimensional model, named the *circumplex model of affect,* (1980) emotions are seen as combinations of *arousal* and *valence* (Figure 1). Since a high degree of effort brings a high degree of arousal and vice versa Russell's analysis of emotions concurs nicely with Laban's theories of effort.
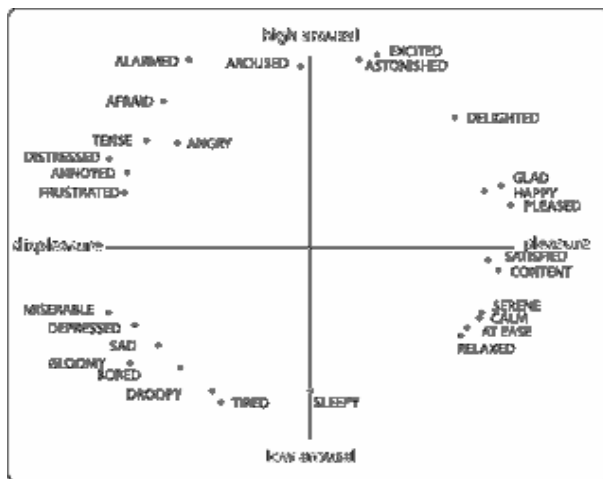
Figure 1: Russell's dimensional model, named the circumplex model of affect (Russell, 1980).

4.2 eMoto: design and implementation

We took the results from the LMA and Russell's model of affect and decided to extend on the stylus that comes with Sony Ericsson's P800 and P900 mobile phone series[1] so that it could pick up on users' gestures. We added an accerolometer, a pressure sensor, Bluetooth communication and a battery to the stylus, ending up with the fairly large extended stylus that can be seen in Figure 2. The design of this stylus is such that users are in complete control of their gestures – gestures are not picked up by movements they happen to do anyway while writing. They have to decide to start doing a movement by putting some pressure and start moving the stylus before anything happens. The LMA showed that more tensed, inwards movements were used to express negative emotions, while upwards, open, less tensed gestures were used to express the positive movements[2]. The negative end of the valence-scale in Russell's model therefore became associated with more pressure on this extended stylus. The positive end could be reached by less pressure. From the LMA we saw that emotions with a lot of energy, like being very angry or very happy, involved short busts of lots of movement, while depressed or relaxed emotions involved slow, prolonged gestures. The high arousal end of Russell's model is therefore reached by shaking the stylus more and more, while the low arousal end of the scale is reached by less movement of the stylus. By combining pressure and movement the user can move around all over Russell's circumplex model of affect.

A consequence of this simple design is that the stylus is not limited to recognising a set of specific gestural shapes but instead users can make the gesture with different shapes depending on their willingness to exhibit big, visible gestures or just small, less visible ones. In both cases, the same inner

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[1] eMoto is built in Personal Java and runs on Sony Ericsson's P800 and P900 mobile phone series.

[2] This was repeatedly tested in all our subsequent user studies with early prototypes of the eMoto styles and the results were always consistent with this pattern. Thus, the design is not only based on the first early experiment with the actor.

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experience of the gesture in terms of effort and shape is possible. The combination of simple pressure and more or less movement achieves this. Both can be done either visibly, violently, or through smaller movements (Figure 3).

We would like to point out that gesturing with the stylus is something that users do by choice, consciously and that the gestures have to be learnt. In that sense, they are different from, for example, a system that reads users' facial expressions. The control of what should be expressed remains with the user.
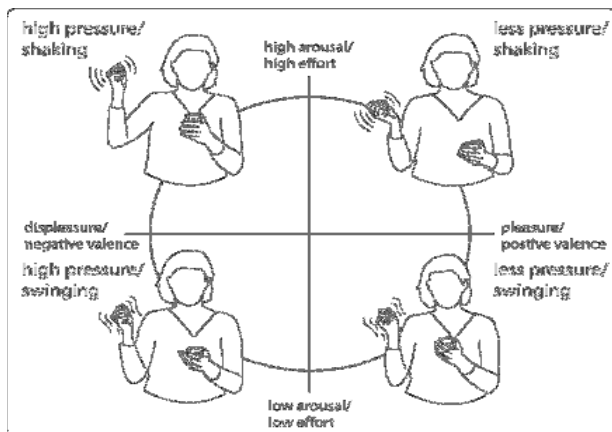

Figure 2: eMoto

Figure 3: The eMoto gestures.

The feedback from the system needed to fulfil two criteria: on the one hand, create for an affective loop experiences where the gesture is mirrored in some kind of response from the system, and on the other hand, this response also needed to be able to carry the emotional message that the user wants to convey to a friend. In order to provide for an affective loop, the system needs to respond, preferably in some sensual modality that reflects and reinforces users' experience of what they are trying to express. While the full design process and the choices made are described in (Ståhl, 2006, Ståhl et al., 2005), in short summary we decided to create combinations of colours, shapes and animations that are added to the background of users' text messages. The colourful, animated background was designed with a basis in the same LMA and Russell's dimensional model as the gestures – aiming to mirror one

modality in the other. Colours were used to express arousal, where red represents emotions with high arousal and blue is calm and peaceful (Ryberg, 1991). The shapes of the animated objects in the areas representing high arousal are small and can therefore render animations and patterns that are energetic, quick and spreading imitating what was found in the LMA. Moving around the circle towards less energy and calmer expression, the shapes get bigger and more connected, rendering slower and more billowing animations. Shapes placed on the positive side of the circle are softer and more round, while shapes placed on the negative side are more angular and sharp (Goethe, 1976, Itten, 1971). The emotional expressions are stronger along the outer border of the circle while weaker towards the middle, which is represented through less depth in colours and fewer animated elements (Figure 4).

Figure 4: The graphical expressions in eMoto (the animations in the expressions can be seen on emoto.sics.se/animations/).

Neither the gestures nor the graphical expressions should be mapped to any specific emotion in a one-to-one mapping. The graphical expressions and the range of possible gestures blend into one another and are designed in an open-ended way to allow for many different interpretations.

Interaction with eMoto proceeds as follows: first users write the text of their message, similar to a SMS. The system shows the middle of the circle. The user then perform gestures with the stylus, pressing and shaking it, while simultaneously watching the screen to see how the colours, shapes and animations change – slowly moving out from the middle of the circle towards others parts of it depending on the gestures. The gestures are picked up by the sensors in the extended styles and are transmitted wirelessly, using Bluetooth, to the mobile phone. Once users reach a part of the circle that they find suitable to their message, they stop performing the gestures, and they can then click on the send button and the message is sent. There is no other way to change the colourful background of a message than to perform the pressure and movement gestures with the stylus. The receiver of an emoto will see both the text but also the graphical background if they have eMoto installed on their phone. If not, they can look it up by a web-address.

4.3 Iterative User Encounters

Through the whole design process we used a Persona to focus both the design process but also to help us choose the informants to our studies (Cooper, 1999). Cooper sees the Persona method as the

opposite of designing for *the elastic user*, that is any user, which tends to make the user adapt to the system rather than the other way around. In the Persona method the design team makes use of a very specific individual, a persona, who is given a name, a picture and a precise description of her goals and needs. This helps the team to resolve design issues when they arise during the design process. The Persona set up for eMoto is named *Sandra* (Figure 5).

In short Sandra is a confident 29 year old woman who likes to spend time with her friends and family. Sandra does not care much of how things work technically, but she likes new cool "techy" features and she is very happy with her new mobile phone that has camera and MMS functionality. Sandra's main aim with her mobile phone is to keep in touch with family and friends.

Figure 5: Sandra, the persona for the eMoto project.

Besides bringing in a few potential users here and there during our design process, we also needed to perform a couple of more organised studies where we "staged lived experiences" (Iaccuci and Kuutti, 2002). We needed to check whether the gestures and the graphical expressions were understandable and usable in the way we intended to them to be (see reference to Höök's *two-tiered evaluation method* (2004) above). Thus, before we conducted the real life evaluation presented here, we performed two separate user studies of the two parts of the eMoto system: the graphical expressions and the gestures. While these studies were done in a lab environment, we tried to stage the setting through using scenarios that we hoped the users could relate to.

The first validation focused on the graphical expressions and was conducted in a lab environment (Ståhl et al., 2005). In short summary, we found that the users described properties of the graphical expressions that could be mapped to what we had found in the LMA. Users were able to recognise the intended emotional content of the expressions and could relate to them, while they were still ambiguous and open-ended enough to let the users choose different expressions depending on the context of use and users' individual preferences and personality. When asked to point out where in the circle which emotion was most prevalent, users for the most part choose places in approximately the same area. But some parts of the graphical expressions had to be redesigned, which we did before the second user study.

In this second user study, users got to try the redesigned graphical expressions together with the gestures (Sundström et al., 2005). Most users got involved in the interaction and the extended stylus was able to carry movements that resembled and reminded our users of their sensual experiences of emotions. Users performed, for the most part, the same kind of gestures (despite not being told which gestures to use) and they picked background expressions in approximately the same areas to express

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similar emotions related to the scenario we placed them in. We learnt one important lesson about the duration of gestures that required some redesign of the stylus interaction. Gestures for low arousal and negative valence need to be sustained for a longer time in order for users to experience them as negative, while expressions for high arousal and positive valence need to be quick and performed in intervals. If the latter is pro-longed for too long, users feel disembodied and loose their sense of being inside the physical experience. This design problem was solved through letting the timing between gestures and graphical response become different for different parts of the eMoto-circle.

Following these two studies, the system was fully implemented, and five extended styluses were built.

5 IN SITU EXPLORATION

Given that we had tested the usability aspects of eMoto in the lab, we could now move on and give the eMoto-probe to a small group of friends to be used as part of their everyday practice and everyday experiences. By giving it to a group of friends who already had strong relationships to one-another we hoped to see how eMoto would be picked up and integrated with their communication needs and how well it would allow them to express their feelings in personal yet interpretable ways. Through this *in situ exploration*, we hoped to move beyond the simplistic scenarios we had imagined for its usage. We would like to emphasise that this is an explorative study that will lead to design insights – not a scientific validation of some hypothesis.

Isomursu and colleagues have proposed a method they name *Experience clips* (Isomursu et al., 2004), to be used when evaluating mobile services. The mobile service is given to a user and a friend of the user, the *spectator*, who is provided with a camera and other documentation facilities and asked to send back feedback on how the user is experiencing the system. In Isomursu and colleagues' study users took turns in being the user and the spectator. Users got to use mobile phone applications and they were asked to focus on feelings, emotions and subjective experiences, aspects that are very hard to capture with traditional methods. A great advantage is that a close friend will be able to interpret and communicate more of what the user is experiencing than other observers. As we were hoping to get insights on how friends engage emotionally with one-another and in a sense with themselves through the engagement with the eMoto-gestures, the spectator should be someone who knows the user well. Emotional body language can be highly individual and hard to interpret unless you know someone well.

In addition to the Experience Clip method, we added the *Cultural Probe* and *Technology Probe* methods. In a *Cultural probe*, participants are typically given a range of materials, such as a diary, a disposable camera and postcards, together with a set of provocative tasks and questions making participants reflect over some aspect of their life (Gaver et al., 1999). The obtained data from such a study are used exclusively as design inspiration and should therefore not be seen as a method for gathering data in a scientific sense. Variants of the method have made use of digital equipment, using for example mobile phones and text messages to prompt participants with questions (Hulkko et al.,

2004). *Technology Probes* were proposed by Hutchinson and colleagues (2003). Their idea was to place partly unfinished technology in people's homes and then study how participants made sense of it.

5.2 Procedure

The two weeks of usage by the five users took place in September 2005. The five users were each given probe material consisted of a notebook, postcards, a disposable camera and eMoto. That is, we let them borrow a Sony Ericsson P910 mobile phone and the extended eMoto-stylus we had built. The five users were asked to recruit five spectators who knew them well and who would be nearby the user during the two weeks. The five users' spectators each got another set of probes material: a notebook, some postcards and a small video camera, see Figure 6. The probes also contained letters indicating what kinds of issues we were interested in, e.g. signs of physical engagement and emotional expressions, and suggestions for some tasks they could perform in order to document their initial and later experiences of the eMoto-usage. For example, they were given the task "send a happy emoto to someone today". They were asked to use the mobile phone and the stylus in their daily communication.

Figure 6: Probes given to user, left, and probes given to spectators, right.

After the two weeks we quickly went through the material from both users and spectators grouping it with our log data and from that created a first, draft analysis of each user's experiences. This served as a basis for individual interviews with the five users.

The interview was structured in four parts. First, we asked general questions about their experiences, how they felt about using eMoto, describing occasions when it had felt fun/hard to use the system. Second, they were asked to go through all emotos they had sent and received and divide them into two groups; *authentic emotos* sent to communicate 'for real' and *tests* that were sent either to explore the service or simply because they felt obliged to since they were participants in a study. In the third part, they were asked to show how they would gesture to arrive at some of the emotos they had sent. Finally, they were asked to sort the emotos they had received, again into two piles.

We paid for their mobile phone usage during the two weeks and we also gave them two movie tickets.

5.3 The Five Users

Table 1: Description of the five users

	Users
Agnes	A 25 years old behavioural scientist living in Uppsala (a city, 70 km outside Stockholm), but at the time of the exploration she still took a few courses and worked extra in the support office at one of Sweden's larger phone companies. She had her boyfriend as spectator and she was the only one who knew all the other women in the group.
Isabella	A 26 years old Consultant in the energy sector living in Stockholm. Isabella lived a busy working life in Stockholm and since she did not live with anyone she had two spectators, her cousin and one of her friends. Isabella is an old friend of Agnes and she did not know any of the others in the user group from before.
Louise	A 25 year old student, writing her master thesis in Technical Biology at the Royal Institute of Technology (KTH) in Stockholm. Louise lived alone and therefore she asked one of the other participant's (Susie's) spectator to be her as well. Louise knew and still only knows only Agnes and Susie.
Susie	24 years old, wrote her master thesis in Technical Biology, in Uppsala where she lived. Her roommate worked as her spectator and they meet up with Louise a couple of times during the weekends. Before the exploration Susie knew primarily Louise but also Agnes. During the two weeks she not only spent more time than she had done before with Agnes she also became good friends with Mona.
Mona	A 25 years old School of Economics graduate from Uppsala, as Agnes, she still took a few courses and worked extra in the support office at one of Sweden's larger phone companies. Living together with a few of her friends, she had her roommate as spectator.

We found the five users through contacting one of the participants, Agnes[3], from one of the previous studies of eMoto (Sundström et al., 2005). She fitted well with the persona *Sandra* (see above) and she had indicated that she really liked eMoto. As we wanted eMoto to be used by a group of friends, Agnes in turn asked four of her friends to participate. The five women who took part in this user study were *Agnes, Isabella, Louise, Susie* and *Mona* (see Table 1). The reason we choose participants to be all female, of a certain age category and with a certain educational level and technological experience was that they fitted with our Sandra persona. Our intention is not that eMoto should be seen as a system for anyone – it is not intended for kids, people who infrequently use their mobile phones, etc. It is intended for this particular user group and should therefore be tested with users who resemble Sandra.

6 RESULTS

As outlined in the introduction, we divide the results into three different areas. First specific results from the final user study of eMoto and the insights we gained on the (a) requirements on a mobile emotional messaging system (section 6.1 below), and in particular, on our (b) affective loop design idea (section 6.2 below). Second, results on the *in situ informants* method as a means to provide designers with feedback on how their artefact works in use (section 6.3 below).

Let us first provide a brief summary of the data we obtained; in total 96 emotos were sent with the eMoto service during the two weeks; 53 of those were sent as *authentic emotos*, messages the users said they sent in order to express an emotional value while 43 emotos were sent in order to test and

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[3] All users' names are fictional.

explore the functionality of the service. Table 2 shows how much of the probes that we returned from the in situ informants.

Table 2: Log data and returned probes from the in situ informants.

	Log data and returned probes
Agnes	33 sent emotos and 28 received, 38 SMS left in memory, 5 postcards, ~8 minutes of experience clips, her and her spectator's notebooks
Isabella	16 sent emotos and 10 received, 0 SMS (she unfortunately had to carry her regular phone), 2 postcards, ~7 minutes of experience clips, her and her spectator's notebooks
Louise	11 sent emotos and 10 received, 2 SMS left in memory, no postcards, no experience clips and no notebooks
Susie	13 sent emotos and 13 received, 13 SMS left in memory, 2 postcards, ~10 minutes of experience clips, her notebook but not her spectator's
Mona	23 sent emotos and 17 received, 11 SMS left in memory, 3 postcards, ~11 minutes of experience clips, her notebook but not her spectator's

6.1 Emotional Communication through eMoto

eMoto entered into an already existing web of friendships where some were stronger and others weaker, some were unbalanced where one party needed the relationship more than the other, or where one party was more expressive and responsive than the other. The way eMoto was picked up reveals some of what is communicated in a circle of friends. Several of these message would probably have been sent anyway using only text, but as we will see in the examples below, the eMoto-colours contributes to changing the meaning of the message, adding more expressivity, moving some of the message from text to background colours, and in some cases, eMoto makes our five friends reflect more on their friendships. For the participants, the introduction of eMoto also put the spotlight on some aspects of their friendships and caused different kinds of reflections, not only of eMoto, but also of the participants' personalities and how their friendship was functioning, their personal way of expressing themselves, what they wanted to reveal and what not.

6.1.1 Reinforcing friendships: past, present, and future

In the use of eMoto, we found that there was a special "rhythm of friendship" that needs to be maintained in order to keep it alive. It involved talking about past events, planning for future events, repeating special, meaningless jokes known only by the two friends, or in general just showing some presence – I am here, I still remember you, we are friends (or when communicating with a boyfriend outside the eMoto-study: expressing love). In Figure 7 we see five examples of such messages.
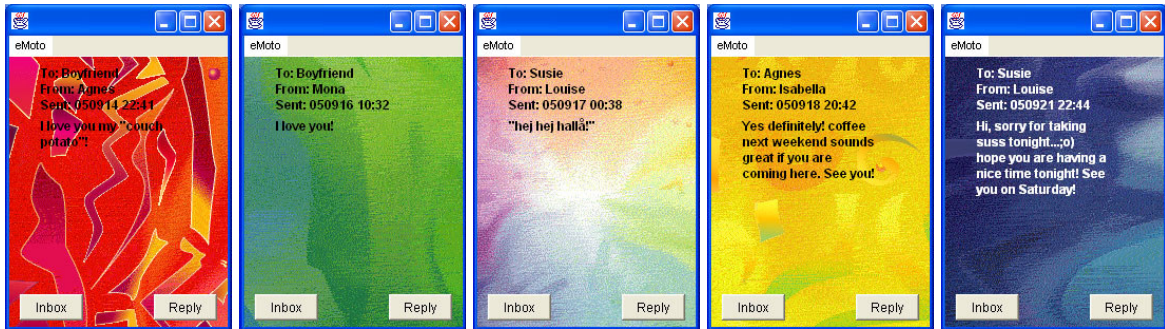
Figure 7: Five example emotos of reinforcing friendships.

In the first message, Agnes expresses her love for her boyfriend. This is probably not news to her boyfriend – no new information is conveyed – she just feels the urge to express it. The background she has picked for her message comes from a part of the circle that we had intended to be somewhere in between angry and happy, but Agnes interprets it in her own way:

"This looks almost angry, but it is not, really. It is like, but oh… […] It looks somewhat edgy but at the same time the way it is feels like it could be some kind of warm streams with like love like this. But it is somewhat too edgy for me to interpret it as love. I would have had somewhat more round, soft, maybe somewhat pulsating or something […] It was this one that I felt fitted best to it."

Thus, she puts her own interpretation of what the love between her and her boyfriend looks like into this picture. When Mona communicated her love to her boyfriend (message two in Figure 7), she instead used her favourite colour, green, to express love to her boyfriend:

"Green is my favourite colour and my boyfriend knows that, so this is why it is green because he knows that I think that green is a lovely colour, just as lovely as he is."

Both these messages are examples of the need to express those intimate "I am still here for you"-messages in styles that makes sense to the sender and receiver. There is a potential here for developing an intimate "gesture" that can be used and re-used by the couple (or two friends) to repeatedly communicate their closeness for no other purpose than maintaining the relationship when apart. As shown in a study by Vetere and colleagues (2005), in intimate relationships people use small signs of affection, like a special gentle stroke or keeping gifts from your partner that can then be used as proxies, in order to maintain their mutual contact.

The third emoto presented in Figure 7 is an example that does not make sense to anyone else but the two friends. This message was written by Louise and sent to Susie. In the interview after the study, Louise explained how she and Susie both liked a Swedish song by a musical artist named Timbuktu where one of the lines in the lyrics is "hej hej hallå!". This was a standing joke between them, expressing irony in a way that we still think only Louise and Susie understands. The background of this message is the centre of the eMoto-circle. Often this part of the graphical expressions was chosen

because it had bits and pieces of all emotions and still none in particular. Here it is probably used to emphasise the ironic use of this joke between the two friends.

The fourth message in Figure 7 is an example of the second most common tempus used between friends which was expressing hopes about future experiences. Here the friendship is re-instated by talking about future events when they will connect again and do things together. They often used emotos to explain how they were looking forward to something or preparing for a mutual future. Planning for and showing that you remember the plans you make with your friend is an important part of the rhythm that keeps the friendship alive.

The last emoto in Figure 7 shows how the users often express several moments in time in the same message – relating to events of the present, the past as well as the future. This specific message was sent by Louise to Susie and expressed how Louise was sorry for "stealing" Susie's roommate Suss. Suss is Susie's roommate in Uppsala but when visiting Stockholm she stayed overnight at Louise's place. During Louise's and Susie's interviews we got to know that this message, between the lines, also dealt with an issue that had become a problem to Louise. Louise had a hard time finding a spectator to the eMoto-study. Our interpretation is that she is a somewhat shy and reserved person and therefore avoided the task of finding someone who would be willing to document her interactions with the eMoto system. Susie had chosen Suss as her spectator and Louise now took the chance and asked Suss to act as her spectactor as well (something which in the end did not really happen). In her message she is apologizing for "stealing" Susie's spectator for a while. Apart from this, the message also re-instates the relationship to Susie through the question about whether she was having fun. Finally, Louise talks about her expectations for their upcoming party the following Saturday. Regarding the choice of the background expression for this rather complex message, Louise said the following:

"Like this kind of 'sorry that I nicked her' and then we were probably about to go to bed right just about then as well, so to have like that somewhat half good night."

Our interpretation is that she both wanted to express gratefulness for borrowing Suss and the choice to make it perhaps darker than we would expect came from wanting to express something that resembled the darkness of the night. This, in itself is an interesting way that the eMoto-expressions may be used. The graphical expression is used to resemble the surroundings, the night, and not only the inner experience of emotions. Below we will continue to show how eMoto in many ways manage to embody much more of a communicational setting, such as the environmental and social setting, and not simply be a channel for transfer of information of emotional states.

6.1.2 Balancing friendships – being responsive

Friendships are not necessarily easily maintained. Sometimes they are unbalanced in the sense that one friend is putting more effort into the relationship than the other, or needs the other more. The

communication patterns between friends have to be handled delicately in order to not overstep the invisible border lines to where you feel intruded or neglected by the other. eMoto sometimes put a spotlight on those processes, perhaps making those imbalances more visible than otherwise. While this might be seen as a worrying aspect of the eMoto-design, this is an unavoidable part of friendships and one that people worry about, discuss and brood over a lot in their lives. If eMoto cannot be used to make such processes accessible, we argue that the design would be a failure. Any new tool introduced in the way eMoto was, would probably put similar demands on responsiveness on its users.
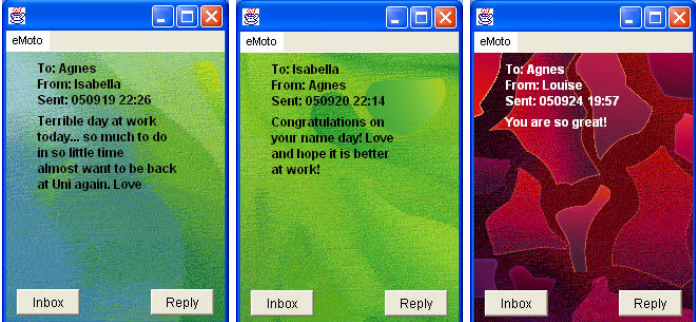

Figure 8: Three example emotos of imbalances in friendships.

In the first message in Figure 8 Isabella is sending a message to Agnes that Agnes feels compelled to reply to. It was sent at a time when Isabella was stressed and tired due to her situation at work, which Agnes knew about and understood. But Agnes was also disturbed by this message. She explained afterwards during the interview that she felt unpleasantly pushed by this message. She did not like to have messages that demanded her reply and in some ways she did not feel so close to Isabella. Agnes herself avoided sending any negative messages requiring an encouraging reply. This rule of behaviour she took for granted as a norm. Looking at the distribution of each user's authentic emotos (Figure 9) it became apparent that Agnes did not use the negative side of the graphical expressions. She simply avoided sending messages that would require consolation or empathy return messages. As can be seen in Figure 9, the rest of the friends' emotos were distributed over the whole circle.

Figure 9: Distribution of the authentic emotos that were sent, presented separately for each user from left to right: Agnes', Isabella's, Louise's, Mona's and Susie's.

Also Agnes' spectator commented on Agnes' more cheerful nature:

"Most emotos that she sent seemed happy, only on a few occasions did she do restrained movements with the pen. This is probably because Agnes seldom sends depressed SMSs anyway".

Agnes feels that Isabella is overstepping a line here in their friendship, at least a line that needs to be drawn in this particular communication media. The second emoto in Figure 8 shows Agnes' reply to Isabella, where she obviously, in spite of what she said above, has been affected by Isabella's emotional state. If we carefully study Figure 9 we can see that this is the only time Agnes went outside the first, positive, quadrant of the eMoto-circle. What Agnes does in her reply is that she tries to cheer Isabella up by both showing empathy with Isabella's working situation but also by congratulating her on her name day. Agnes explained how she this time simply wanted her emoto to look beautiful, and she was not so concerned of what emotions the expressions she had chosen actually communicated:

"I was trying to kind of put together something nicely looking as well sometimes [...] I knew what kind of background as I wanted in order for it to become a good-looking emoto and it kind of communicated that which I wanted it to communicate, then that there might not be any emotion behind it but instead it is… yes, it is simply a congratulation".

The third message in Figure 8 was in fact sent by Agnes to herself but from Louise' phone. After having sent and received emotos during a few days Agnes started to reflect on what relationships she actually had with her friends, something she probably already were aware of at some level, but that the introduction of eMoto made more overtly visible. Agnes claimed that Mona 'impersonated eMoto'. By that she was attempting to express how she more and more came to enjoy Mona's expressions and ways of using eMoto. She also saw Mona as a person very similar to herself. Louise, on the other hand, was not responding to the eMoto-communication and was not sending any emotos. Agnes was getting more and more annoyed by this fact:

"Louise is kind of funny anyway. She could have the totally wrong mappings against mine kind of [...] She probably cannot express her emotions."

Having these thoughts Agnes, at a party that Louise hosted, essentially stole Louise' phone for a while and, as she said, "helped" Louise to express herself. She basically took Louise' phone and sent an emoto to herself. During the interview Agnes said:

"Since I am rather full of myself, I sent a 'you are so good' message to myself".

Every new communication medium requires time to develop its own communication patterns and norms, but these examples show how a new medium introduced into an existing practice of communication between a group of friends may well make one of those invisible boarders we draw in our relationships to others unpleasantly visible, even requiring action. Agnes has to reply to Isabella's request – otherwise she would harm their relationship – and so she does, even if reluctantly. The choice of background and the contents of the message to some degree communicate this duality. She

does not dwell on the work situation but just briefly tries to cheer up Isabella. Regarding the message sent by Agnes from Louise's phone, Agnes' explanation to this message came after we had met with Louise so unfortunately we never got Louise' perspective on how she felt about this rather 'blatant' action of Agnes. Having all the messages in front of her, Louise during her interview simply did not remember sending this message and was actually a bit confused about it. Thus, she never really got the provocation that Agnes put out there for her to react to. The lesson learnt from eMoto here, compared to many other intimate communication technologies, is that only providing for simple, positive reinforcements of intimacy will not create for a rich enough communication channel. Close friendships also entail negative, unbalanced, messy aspects that we need to communicate.

6.2 Experiences of the Sensual Aspects of eMoto

Throughout the examples above, we can see that the eMoto-circle is not used in a simplistic one-emotion-one-expression manner mapping emotions directly to what you are experiencing at the time of sending an emoto. Instead the graphical expressions are appropriated and used innovatively (together with or in contrast to the text of the messages) to convey mixed emotions, empathy, irony, expectations on future experiences, portraying the surrounding environment (the darkness of the night) and in general a mixture of their total embodied experiences of life and in particular, the five users' friendship.

But eMoto was also designed from the affective loop idea, to create physical, sensual experiences and our aim was to make that aspect well-integrated with the overall experiences. We hoped that the physical side would, after some training, become an unreflected, embodied part of the interaction, 'ready-to-hand' (Heidegger according to Dourish 2001)[4] – something that only happened to some extent. With eMoto we wanted to provoke users to reflect more on the total experience of how they communicate emotions, not to be hindered by technical limitations of the eMoto stylus. Sensual and more personal experiences are mostly thought of as secondary to the aim of getting some information across. Here we wanted to show that maybe they are primary in terms of learning about ourselves and understanding others.

Whilst being inside the interaction experience, it is hard to reflect on the physical aspects of the interaction, especially in those instances when it works well because then the interaction disappears into the activity. But as we came back to our users and interviewed them afterwards, such a reflection could take place as they could see the experience clips of themselves using eMoto and also look back at the emotos they had sent.

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[4] Heidegger makes a distinction between "ready-to-hand" (zuhanden) and "present-at-hand" (vorhanden). The first is when you act through something, and the tool fades into the background. In the second case, you become aware of the tool as such, in your hand, and it becomes the object of your attention.

These more sensual aspects of the experience clips are however hard to retell in textual form in this report, and also most experience clips were more spectators interviewing the users than users actually being filmed emotionally engaged with the system. An example though, is an experience clip of Isabella when she constructs an emoto being emotionally engaged in the gestures and the emoto she is in the process of creating, but also by the loud music she is listening to at the same time. In Figure 10 we provide a series of snap shots from this clip where one sees her body dancing to the music, singing along at the same time as she is gesturing with the eMoto-pen.

Figure 10: Snap shots from one of Isabella's experience clips

The experience clips also showed that our five users did quite different gestures with the eMoto stylus. Some did large, jerky gestures, others small, rounded gestures.

In the spectators' notebooks we found a few comments on whether and how users got emotionally engaged with eMoto:

Agnes' spectator: "When she was happy she showed that with her whole body, not just her arm was shaking but her whole body while a huge smile appeared on her lip."

Isabella's spectator: "Uses more expressions when using eMoto than when using SMS."

In the users' notebooks and afterwards during the interviews we could see that the users after a while started to reflect more on these sensual aspects of communication. First though, the users seemed to have been mostly annoyed with the gestures. They quickly became fond of the graphical expressions and liked using those to express themselves, but they did not really understand why they had to find those expressions by the use of gestures, an interaction model they initially thought simply made things more complicated. The wireless Bluetooth connection between the stylus and the mobile phone seemed to be introducing delays between gestures and feedback, a problem that we previously had seen in the laboratory study and had tried to resolve. For a while it looked as if this obstacle would stop the users from incorporating our technology probe into their everyday lives, but as it turned out, it seemed to be what really triggered them to reflect on these more sensual aspects of communication:

Mona: "I leave out things I think are implicit due to the colour… the advantage is that you don't have to write as much, it is like a body language. Like when you meet someone you don't say 'I'm sulky' or something like that, because that shows, I don't need to say that. And it's the same here, but here it's colour."

Mona: "It is nice to be able to express an emotion, and it feels good to be able to do it purely physically."

Both Agnes and Mona discussed how there might be different reasons to express emotions physically depending on whether they are negative or positive. They wanted to reinforce happy feelings and relive those again and again through physical movements. But for the negative feelings, the need is different, perhaps instead to get rid of them through physical movement:

Agnes: "Do one really wants to reinforce the expression through movements? Presumably if one is happy, but not if one is sad… or not I anyway. Anger perhaps works fine. To relieve one's anger. […] I mean, most often when one gets pissed one wants to kick and perhaps throw things."

Mona: "When one says 'now I'm f**king irritated' then one stops somewhat being so irritated, and it becomes somewhat the same thing here, if one shook it off [using the eMoto stylus] it disappeared a little bit."

As mentioned above, eMoto in a good way addresses "the rhythm of maintaining a friendship" but our users found that the gestures would have made much more sense if the receiver had experienced the physicality of what the sender had gestured. The mirroring of the gesture in the animations of the eMoto-circle (that the receiving party could see) was not enough for them to warrant the gesturing. Agnes, for example, proposed some ideas for how we could work with more physicality on the receiver end by using haptics and thereby make the gestures more important in the interaction at the sender end. She also told us of how it works when Harry Potter's mum wants to yell at him and then 'sends' him a scream. Her idea was that sound could create for a more physical experience on the receiver side.

Another issue with the gestures was that they in this (in situ) study were exposing users' to others in public environments. Similar to the laboratory studies there were of course situations in which our users were not exposed to strangers, like when composing emotos in their home or alone walking in the woods. But bringing the technology to an everyday use context also involves more public spaces were the gestures have to be performed in front of other people, something Isabella commented upon in her diary:

"Used eMoto 'publicly' today, in the middle of the town. Noticed that I was restrictive in my movements. I was going to show a buddy how it works. But [I] shook it only discreetly, through [I] put more pressure on it. Somewhat interesting to think about that afterwards. At home I shake it violently, but out there I don't. Must use eMoto more often in public environment to see if my behaviour is changed, that is, will I feel more comfortable with it after a while?

eMoto needs to be redesigned so that it makes use of less visible movements in order to meet the needs for privacy in public spaces. On the other hand, some new mobile phones have gestural interaction (for example, the SPH-S4000 and SCH-S400 Samsung phones in Korea), and so such behaviour might become more socially accepted with time, removing the embarrassment of gesturing publicly.

In summary, the eMoto-pen on some occasions created 'disembodied' experiences, especially in public environments where our users probably reflected too much on their own gestures to really by touched by their emotional, sensual qualities. The design problem with the time delay between gesture and change of expression on the mobile phone also provided for a disembodied experience at some occasions. Despite these problems eMoto provoked the users to reflection and in the experience clips we saw evidence of several embodied, successful interactions. Much more experimentation on designs that involve users affectively is needed before we can arrive at any definite conclusions about how to design for an affective loop, but eMoto is a promising step in the right direction. In particular, we succeeded in making the design open enough for individual expressivity (small vs big gestures, jerky vs rounded shapes) that evoked emotional bodily reactions in our users.

6.3 Experience of an In Situ Exploration

The combination of experience clips and a cultural probe that we made use of in this study, proved to be very successful in documenting the effects of our technical probe. We got insights into our users' everyday life, the social roles they took on in their friendship group, and their uptake, use and interpretation of eMoto that none of our previous laboratory-based studies had been able to capture. For example, in our laboratory studies we saw that scenarios were very important in order to make the subjects involved enough to warrant a good interaction with eMoto, but writing scenarios is not an easy task (Iacucci and Kuutti, 2002). The scenarios we put into that study, in retrospect, had very little to do with our subjects real use of eMoto in their daily life. In the lab studies, we used scenarios such as "I was stopped in the door because of a racist doorman" and "I got the job I applied for out of a thousand applicants" which involved very extreme emotions experienced at the time of sending the emoto. What our circle of friends actually communicated about when using eMoto for real was more on a level of constantly establishing and re-establishing their relationships using nice small "gestures" rather than expressing strong emotional experiences as they occurred right there and then. As discussed above, the graphical expressions in eMoto were also used to convey other meanings than purely emotional ones.

Through involving users in the process of documenting and interpreting their own activities with eMoto, it was also possible to deal with and understand some of the more creative usages of eMoto. For example, stealing Louise' phone and creating a message from it, arranging an eMoto-pub-get-together in order to explore eMoto in a public space together, were activities that we could not have envisioned or created in a laboratory setting.

Since users were able to use eMoto in their daily lives for as long as two weeks we think we received data on a deeper level moving beyond comments on usability and first impressions. It was notable that problems the users found also did not stop them in their investigation. Instead they thought of ways for us to solve these problems and how and when a service such as eMoto would be useful. All, except for Louise, explicitly stated they wanted to keep eMoto after the two weeks had passed.

Making someone a spectator for two weeks was on the other hand a bit difficult. The spectator could of course not be there all the time and was perhaps not there when the most exciting experiences occurred. From the spectators point of view it became a problem that they were not users themselves. For a similar user study in the future we would have to work more on the incentives of spectators. Perhaps we should take inspiration from Isomursu and colleagues' work where the participants took turns in being user and spectator.

Not everyone will be willing to enter study like the one described here. Our experiences with Louise, who did not make use of eMoto extensively, points not only to the importance of finding the right user group for an application like eMoto, but also how important it is that subjects feel at ease with the study method itself. In that sense, this method might not be useful to reach a representative selection of the intended user group if it includes users who are more 'private'.

If we bring our technology probes out in situ they will also be exposed to greater expectations than in a user study taking place in a more staged environment, such as the laboratory. The further we take our prototypes towards being experienced as products the further we have to bring them to a level of actually being products. All informants in this in situ exploration of eMoto, for example had problems with the form factor of the extended stylus:

Mona: "The stick is too big and tall and looks like a dildo. I know I shall try to look beyond the technical, but it undeniably restrains usage."

Still, we could see that the methodology encouraged the users to find solutions to the problems they saw instead of simply complaining about them. Agnes for example suggested how we instead of the stylus could work with the new trend of having gadgets attached to the mobile phones, she suggested a ball that the users could press, move and squeeze as they wish, a ball that would be attached to the mobile phone and both play the part of a mobile phone decoration and a tangible for interaction.

Finally, we would like to issue a note of caution. This method allowed us to see some very private aspects of our users' lives and should therefore be used carefully.

7 CONCLUSIONS

First of all, the results confirm that emotional communication must support more than transferring 'information plus emotion' from one friend to another. Emotions are not detached entities that can be communicated separated from the rest of the context. Instead, any system for emotional communication must provide ways to maintain the sometimes fragile communication rhythm that friendships require. It also needs to provide users with open-ended 'surfaces' that allow for their own personal ways of expressing themselves to one-another. An important lesson was how an emotion does not belong to one individual alone, but is something that permeates the total situation, changing and drifting as a process between the two friends communicating, based on their previous encounters

and knowledge of each other, the particular social and physical setting they are in when they communicate, their intimate, well-known gestures, and their own personal needs for communication. We also gained insights into the under-estimated but still important physical, sensual aspects of emotional communication. We learnt that the physical expressions used by the sender should be experienced as physical by the receiver as well. The particular design we choose for the physical, sensual aspect of emotional communication involved gestures that are not as private as other modalities. The results show that users limit their gestural interaction in public settings. But we also noted that a greater physical expressivity in some situations was what really got them emotionally engaged – providing for an affective loop experience. Through this and the previous user studies of eMoto we think we have found ways of designing for personality in the gestures but we need to work more on how they can be adapted to different public settings.

On the methodological side the user-centred design process and final study of eMoto provides some important lessons to be learnt by the field of affective interactive design. Designing artefacts aiming to embody a richer experience of communication is not possible will not be achievable through laboratory studies alone. The combination of a technical probe and the *in situ informants* made it possible for us as outsiders to reach into the everyday, private lives of our users and better understand their communication needs. Making users part of the interpretation of the results proved to be very useful. Overall, the methods we used helped us provoke our users to reflect upon the more unconscious and subjective experiences of everyday life and their embodied experiences of emotions.

ACKNOWLEDGEMENTS

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