

Intimate Objects: A site for affective evaluation

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ABSTRACT

In this paper, I present Intimate Objects -- technological devices for communicating intimacy between couples -- as a site for exploring evaluation of affective designs. We built two such systems, a software and a hardware version. Both versions included a logbook for participants to record both quantitative and open-ended reflections on the Intimate Object, on their relationship, and on the study itself. Furthermore, it was possible for us to track usage of both systems, to gain precise quantitative data on the extent to which the devices were used.

I discuss the results we derived from this mass of data, and problems we encountered in attempting to measure intimacy as an aspect of affective computing. In particular, I discuss the "nineteen hearts" problem of quantifying the perhaps unquantifiable, and discuss advantages and shortcomings of our approaches to the problem.

INTRODUCTION

To date, much of affective computing has focused on sensing and responding to the emotional state of a single individual. What happens when we reverse this core assumption of the field, and look at the emotional state of a couple, rather than a single individual? To explore this research direction, we performed two user studies of intimate objects.

Intimate objects are technological devices for communicating intimacy between couples in long distance relationships, and as such provide opportunities to explore and reflect on a different kind of affective computing. Here, we present two minimal intimate objects, designed to convey intimacy with the minimum amount of communication possible. These were inspired by several sources, including our own in depth interviews [9], published results of others' cultural probes [11], and work in the field of computer-mediated communication on media richness theory. [3] These devices were both used by users in conjunction with a logbook that aimed to encourage the users to evaluate and reflect on their relationship, the intimate object they used and the study itself.

Physical Intimate Objects

The Physical Intimate Object, or PIO, is a metal box with a button and a red LED that is plugged into an internet connection. Each member of a couple has a PIO: pressing the button on one box makes the remote LED glow brightly; it then fades over time. A smaller red LED

located on the side of the box shows the current brightness of the remote partner's light.



Figure 1: Physical Minimal Intimate Objects

Virtual Intimate Objects

We built a system that allows a user to send their partner a very simple, one-bit message. Each member of a couple installed our Virtual Intimate Object, or VIO, which appeared as a small circle in the taskbar of the user's Windows screen.

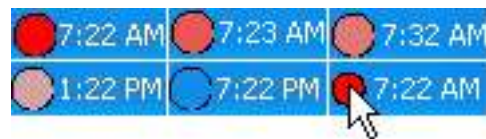


Figure 2: Virtual Intimate Object (VIO) in taskbar, showing color changes over a twelve hour period. Note initial rapid fading in top line. Final image shows display of remote partner's button state on mouseover.

When one member clicks on the circle, their partner's circle changes to bright red. As shown in Figure 1, the circle dims quickly at first, and then fades slowly over time. Eventually, it returns to transparent twelve hours after the circle was clicked. Pressing the button again restarts the cycle at maximum light intensity. Moving the mouse over the circle without clicking shows the current status of the remote partner's circle.

USER TESTING

We initially recruited ten couples (n=20) in pre-existing, long-distance romantic relationships, and, depending on the availability of networking connections and related hardware, placed them in either the PIO or the VIO group. Ultimately, we ended up with results from five couples

(n=10) in the VIO group and three couples (n=6) in the PIO group. Those in the VIO group were given a URL to download the VIO software; those in the PIO group were given a PIO each. Each participant was also sent a package by mail that contained instructions, an informed consent form, pre- and post-test questionnaires, and a daily logbook. They were also provided with a pre-stamped and pre-labeled envelope for returning the materials at the end of the study.

The pre-test questionnaire focused on the current modes, frequency, and initiation of communication with their partner. Participants were asked to subjectively rate the effectiveness and level of intimacy of their current methods of communication, and to define their understanding of intimacy in their own words.

Participants were informed that they could choose when and how much to use their intimate object during the course of the study, but that it would be available whenever they were using their computers. At the end of each day, they were to reflect on their experience with the device by answering a series of questions in the daily logbook. Some of these questions were the same each day, such as 'How connected did you feel to your partner today?' and 'I think I pressed the button ___ times today. I think my partner pressed the button ___ times today.' We also included a changing set of open-ended questions, such as 'I generally found I used my intimate object when...'; 'If my intimate object made a sound, it would be...'; and 'I would name my intimate object...'

Once the couples had used their intimate objects for 7 days, they completed the post-test questionnaire. The post-test questionnaire was nearly identical to the pre-test questionnaire, but also sought overall reactions to their intimate objects, and if the study had any noticeable effect on the participants' level of intimacy with their partner. When all stages of testing were complete, participants mailed back their test materials. Each couple was then thanked for their time, debriefed about the purpose of the experiment, and supplied with their own log data. Couples in the VIO group were also told they were free to continue using their VIOs after the end of the experiment if they so wished.

It turns out we underestimated the difficulties in getting a wired internet connection for many of our subjects. Furthermore, the network stack in the embedded computers we were using turned out to be insufficiently robust to deal with some of the network connections that our subjects were able to supply. For this reason, in the paper we submitted as a Late-Breaking result [10], we only discussed our work with the VIO; given the limited audience of this paper we felt it would be useful to discuss the results of the PIO in this forum, even though they are less statistically significant.

Tracking

A message from one intimate object is left for the partner's intimate object on a central server. The intimate objects checked for messages on the server every ten seconds. As such, there was up to a ten second delay between the user clicking the button and seeing the update. The server logs therefore provided data on how often each intimate object was clicked, and also the total amount of time each intimate object was in use.

In the design of our procedure, we were strongly influenced by technological probes: we wanted to collect information about the use and users of the VIO in a real-world setting, we wanted to field-test the VIO technology, and we wanted to inspire users and designers to think of new kinds of technologies. [6] We feel our design allowed us to explore a wide variety of such issues.

RESULTS: LOGBOOKS AS TOOLS FOR EVALUATION

Our logbooks contained a wide variety of questions, and we feel that these are our strongest contribution to the workshop. We present here a selection of the questions asked, answers received, and issues that arose from the logbooks.

The Nineteen Hearts Problem

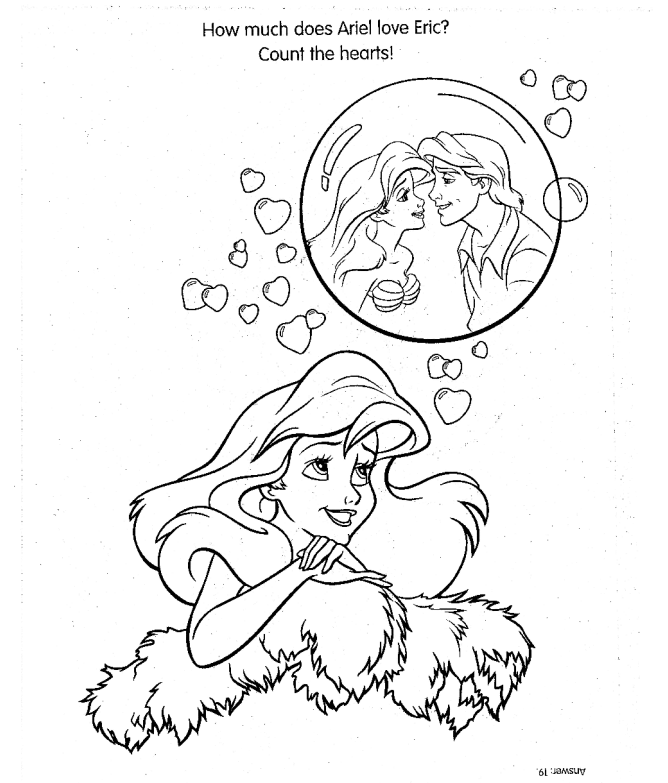


Figure 3. How much does Ariel love Eric? Count the hearts. (Answer: 19 hearts.) From the Little Mermaid Coloring Book (C) Disney 1999

Figure 3 shows a graphic that we feel illustrates many of the problems we faced in working with intimacy. Ariel apparently loves Eric nineteen hearts; if only evaluating

affective communication was so easy to measure. Despite significant research, even defining intimacy is difficult. [11,12] Despite this, there has been extensive work in building devices for communicating intimacy in the field of human computer interaction [1, 2, 5, 6, 8, 9, 11, 13, as just a sampling] As such, in our studies we asked users to define their own notion of intimacy and which we thereafter referred back to.

We claim we're building devices to communicate intimacy: it follows that to show we've been effective, traditional scientific methodology would suggest measuring the level of intimacy experienced before and after the introduction of our intimate objects. Without much hope, we did try asking our subjects to rate how close they felt to their partner throughout the week they were using the intimate object, getting at the question with three different questions on a 7-point Likert scale. We combined and averaged these scores across the week, and found that there was, on average, a one point increase in the average score across the week. However, it's not clear how significant this result was, either statistically or functionally for the couples themselves.

Server Data

As mentioned, we were able to keep track of the number of times our subjects pressed the button or clicked the icon of their intimate objects. We were also able to track when the intimate object was present and working, as it would check back with our server every ten seconds. We tried various ways to understand and evaluate this use. For example, we tried to visual the data in a way that would allow us to get an overall impression of the subjects' usage patterns, as shown in Figure 4. The couple in question are separated by eight time zones, which explains some of the patterns seen. For example, the local subject, in blue, is logged on for the latter third of Day 1. The partner, in red, wakes up at 8am, which is midnight in the time zone used by both the blue partner and this chart. They then enthusiastically use their VIOs together for several hours; finally, at about six am, the blue subject logs off, and, we hope, goes to sleep. A similar pattern happens the next day.

These charts, although initially hard to read, were able to give us some good impressions of the experience the couple had with their VIO. However, we wanted to try and explore other approaches to evaluating couples' intimate object use. Some interesting data came from comparing the server logs to the self-reported data from the couples themselves. Each subject was asked every day to estimate how many times they had used their intimate object, and how many times their partner had used their intimate object. This gave us results like this, from the VIO group:

<i>Couple</i>	<i>Average daily self prediction</i>	<i>Actual daily hits</i>
1	12	11
2	42	44
3	11	27
4	78	168
5	17	14
Average (SD)	32 (28)	53 (66)

We spent a great deal of time working on various ways to extract information from these figures. We were able to come up with generalizations for individual cases (“Couple 1 always estimate accurately”; “Couple 4 are very heavy users, and underestimate their usage.”) but there were no aggregate, across-the-board generalizations possible. In many ways, this is what we expected: individual relationships are very different, and it seems not unreasonable that there should be differences between their results. We had been hoping to compare between PIO and VIO results, but the variety of network difficulties have made such a comparison unproductive.

Logbook Data

One of the basic techniques we found effective was to encourage reflection and evaluation by our subjects on their relationship, on the intimate objects themselves, and on the research process itself. For example, names proposed for the VIOs included “*Flipper*”, “*Zit*”, “*Little Dumbo*” and “*Bethie’s Love*”. We asked the subjects to name us, the people conducting the research (“*Intimacy Dream Team*”, “*Match sustainers (like matchmakers)*”, “*Mysterious Watchers*”) and to write what they thought the research was really about (“*People in relationships trying to connect throughout the day without using or needing words*”, “*Can a simple computer program enhance a long-distance relationship?*”, “*Creating computer dependency and spreading and marketing it to the general public.*”)

These answers are hard to interpret in a traditional manner, but we found that the qualitative, impressionistic answers gave context and explanations for patterns we saw in individual quantitative data. For example, 7 of our 10 respondents in the VIO group said the season that most represented their relationship was spring, while one subject reported summer. Interestingly, the one couple who used their VIO the least of all reported fall and winter as their answer to that question. The point is not that this is a statistically significant result. What we do suggest is that there’s a richer picture given by this combination of qualitative and quantitative data than we’d get from standard survey techniques.

Finally, one user in an extremely long-distance relationship, spanning ten time zones, wrote to us on the last day of the

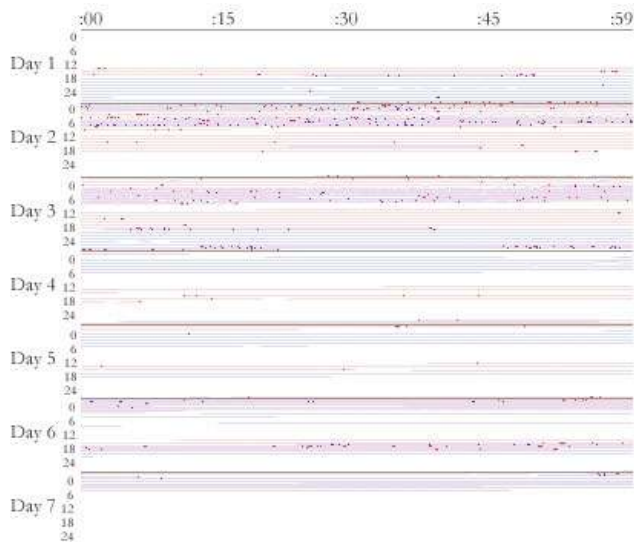


Figure 4: One week of one couple's VIO usage. One partner is shown in red; their clicks are shown as bright red dots. The other is shown in blue, with bright blue clicks. A purple region indicates their simultaneous VIO use.

study. He asked, “Must we uninstall it? I am asking these things, because my girlfriend and I enjoyed a lot using it and I wanted to know if we can... ‘keep using it’ after this study...” In fact, perhaps the strongest indication that couples found their VIOs effective in communicating intimacy is that three of the five couples – six of our ten subjects – continued to use their VIOs after the study ended.

DISCUSSION

We believe the key part of our technique is the integration of quantitative diary/survey methods and quantitative log analysis with extremely open-ended, qualitative diary questions. This is similar to work done with technological probes [6] and the Presence Project [7], among many others. However, for us the key realization was that the “intimate object” was not just the software or the hardware, but the entirety of the experience and the reflection.

Looking back on this pilot study, the data suggest that the logbook is as much part of the experience of using the intimate object as the object itself. What this further suggests is an attitude to evaluation wherein the process of evaluation is inherent in the system, rather than supplementary to the experience. Much work in affective computing has focused on automatic sensing and evaluation: in contrast, we suggest recognizing, respecting and embracing the meaning-making activities of our subjects as a rich source of both experience and evaluation.

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