

entrigue: Re-picturing the Home

Judy Chen

Donald Bren School of Information and
Computer Sciences
University of California, Irvine
Irvine, CA 92697-3440, USA
judychen@ics.uci.edu

Alex S. Taylor

Microsoft Research
7 J J Thomson Ave.
Cambridge, CB3 0FB, UK
ast@microsoft.com

ABSTRACT

Despite the volume of work that has been done on awareness displays, little has been articulated about the ways in which people achieve, understand and maintain awareness in their everyday routines. We reexamine awareness through the design of *entrigue*, a simple, lightweight photo display that captures the comings and goings in a home. Initial experiences of the system in use indicate that it offers a way of defamiliarizing a space, allowing a household to playfully re-experience the home and the ways in which they moved through it. By drawing attention to the idiosyncratic ways in which people make sense of cues and routines in the home, our results suggest that awareness incorporates a sense of how one engages with the environment, and highlights the notion of intrapersonal awareness as an awareness one can explore of oneself in and through this engagement.

Author Keywords

Photo displays, intrapersonal awareness, autophotography.

ACM Classification Keywords

K.4.m [Computers in Society]: Miscellaneous.

INTRODUCTION

Since its inception, the “problem” of awareness has driven a great deal of Ubicomp research. Much thought has been put into how to capture, track and visualize people’s whereabouts, activities and presence to support or enable an awareness of others [2,3], often others at distance [6,7,12]. Technically, the problem is presented as one of what information to capture and how to do so, as well as how to transfer awareness information and, latterly, the ways in which to visualize it [2,6,12]. Alongside the technical research programs (and occasionally in reaction to them), there have been examples of in-depth empirical analyses of

Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. To copy otherwise, or republish, to post on servers or to redistribute to lists, requires prior specific permission and/or a fee. NordiCHI 2008: Using Bridges, 18-22 October, Lund, Sweden Copyright 2008 ACM ISBN 978-1-59593-704-9. \$5.00

the use of awareness technologies [5]. To take a recent example, the study of a family “Whereabouts Clock” [3] demonstrates how location information can be rendered in a relatively simple form to support the many subtleties of inter-family awareness. Stepping back for a moment and considering this corpus of work as a whole, it is striking how awareness is regularly, if not exclusively, treated as a source of information to be made visible. There is a tacit acceptance that information is, as Brown and Duguid [4] refer to it, the “tool for all tasks” and thus the “thing” to be captured and presented to support awareness. Yet viewing awareness in this way offers little help in explicating what, exactly, it looks and feels like for people in their day-to-day experiences. With this in mind, we present preliminary research aiming to reconsider awareness and reflect on how else it might feature in our routine, daily experiences. In this vein of critically reflecting on awareness, our work has something in common with research from [5,10] and others. The work we have begun, however, aims to use design—and specifically a simple, lightweight approach to design—as a resource for investigating awareness and, as it were, to unpack it as something we presumably take for granted in much of daily life.

In order to examine awareness, then—in some loose sense of the word—we built a simple situated display for use within a single household. In contrast to the numerous systems designed to support remote awareness and that regularly focus on people’s mobility, we aimed for a system to support an awareness of what happens in a particular place in a home, namely its threshold. Specifically, we wanted to design a display that would defamiliarize the home [see 1], so as to bring attention to the subtleties that so easily become taken for granted. We then built such a device into the home’s infrastructure and examined how it might fit into the lives and routines of the members of a household. In short, we felt the possibility of awareness “in action,” might be discovered in a household by simply and playfully capturing the comings and goings in a home.

DESCRIPTION OF THE SYSTEM

Our system, *entrigue*, consists of several physical components: a webcam, a break beam sensor and a mini projector. Halfway through the study, the break beam sensor was replaced with a motion sensor because the break

beam sensor required constant battery changes. The hardware components were packaged within a small 8”x8”x4” box, along with a small computer on which the software ran. We built *entrigue* using Java, Processing and the Phidget API to gather sensor data. When the break beam sensor is triggered (or in the case of the motion sensor, when a threshold value of motion is exceeded), a photo is taken and shown on the display, along with a label indicating the time and date on which it was taken. Only the three most recent photos are shown on the display, so older photos disappear as new ones are taken. The display then records the next 5 seconds of video for our observations. Neither the video nor the older photos that have disappeared from the display are viewable by the participants.

FIELD USAGE

We installed the display in a London flat being shared by three women: Ann, Kate and Soo Young. The participants were working professionals in their late 20’s and early 30’s. Because we wanted to capture the comings and goings in the home, we installed the display as close as possible to the front door entrance to the flat. We placed the physical components of the *entrigue* system on a bookshelf in the hallway and projected the image onto the opposing wall adjacent to the front door (see Figure 1). To give the participants control over when the display was running, as well as to reduce power consumption, we asked the participants to switch it on and off at their convenience. At the end of the study, we conducted hour-long semi-structured interviews, where we reviewed the videos and photos captured by the display with the participants.

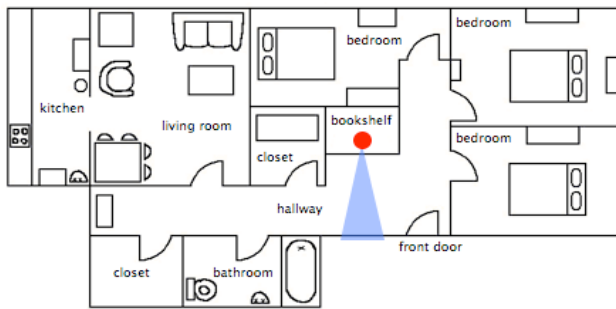


Figure 1. The layout of the flat and location of *entrigue*.

Results

Our deployment lasted five weeks, starting on 8 January 2008 and ending on 12 February 2008. The participants powered on the display on 16 different days, with a total running time of 55 hours and 18 minutes. The camera was triggered 390 times, with an average of 7.05 photos being captured per hour. Two people other than the participants and authors visited the flat while the display was running and appeared in 10 of the photos. Table 1 lists the amount of time and number of photos taken for each day on which the display was running. We were interested in what the householders would make of the display and gave them

little explanation for its use, only instructing them on turning it on and off. In our observations and interviews, we noted how they interacted with the display and the space around it, their perceptions of the display and how it tied into the household’s temporal flows and routines.

	Running Time (Hours)	Photos Taken	Ave. Photos per Hour
8 Jan	6.75	78	11.56
9 Jan	4.88	28	5.73
13 Jan	1.95	54	27.69
14 Jan	4.35	42	9.66
15 Jan	5.02	30	5.98
16 Jan	1.12	8	7.16
19 Jan	4.53	29	6.40
20 Jan	2.07	2	0.97
22 Jan	1.23	7	5.68
23 Jan	0.48	4	8.28
24 Jan	0.52	3	5.81
26 Jan	6.20	42	6.77
27 Jan	9.28	25	2.69
28 Jan	0.55	2	3.64
11 Feb	5.30	20	3.77
12 Feb	1.07	8	7.50

Table 1. System usage throughout the study.

Intrapersonal and Interpersonal Awareness

In general, the participants liked the display. However, perhaps unsurprisingly, the display proved to offer little help in determining an awareness of other householders. Participants seemed far more likely to use physical cues similar to those reported in [8]. Indeed, they had well-established routines through which they conveyed information about each other’s whereabouts, including communicating frequently during the day with instant messages or exchanging text messages and phone calls. The participants also reported that upon entering the flat, the bedrooms are the first thing one sees and a light or a closed bedroom door would indicate who else was home. These cues were available before a householder could see the display, so the participants found the information on the display often redundant.

While the display was not often used to gain an awareness about others, the participants expressed a sense of intrapersonal awareness, that is, a greater awareness of themselves. Both Soo Young and Kate admitted to stopping to fix their hair before they walked past the display on a number of occasions as a result of being more conscious (and self-conscious) of their self-presentation at home. They also reported that they had not previously considered how often they walked between their bedrooms and the living room until they saw themselves repeatedly in a “stream of images”. Soo Young said that seeing herself on the display prompted her to compare her appearances at home and outside the home. By seeing herself in the photographs, she began to reflect upon her movements: “You can see how I move... how I walk, and I thought it was quite fun... that I make a lot of big movements. Like I didn’t really think that putting my hands up like that and turning, like going around, like turning around in the hallway... that it looks like how it looks like on the [display]. And I thought that I make a lot of big movements. It is quite interesting.”

Re-experiencing space

Aside from simply walking past the display, something we frequently observed in the photos captured by the display was the participants turning to face the camera and posing for a photograph as they walked by. Each householder had her own idiosyncratic way of playfully engaging with the display. Soo Young typically smiled at the camera, while Ann would make comical faces. These instances usually took place as the participants walked past the display without pausing and always ended with the participant glancing over her shoulder at the display to see the resulting photograph. Because the camera was located across the hallway opposite the projection on the wall, one could either only look at the display or look at the camera. As Soo Young explains, “[If] I’m only watching the display, I could only see the back of myself, so I said, ‘Okay, if I go in the front, I will see my face.’” When asked about her motivations for wanting to see her face on the display, she replies, “It’s for myself because I like to see myself.”



Figure 2. The householders interacting with *entrigue*.

Playful interactions with the display occurred in other forms as well, though they tended to occur much more frequently in the beginning of the study, indicating a novelty effect. On the first night *entrigue* was installed, Kate jumped across the space in front of the camera and immediately returned in the direction she came from by deliberately walking slowly past the display, watching the display as she tiptoed past it. On the following night, Soo Young engaged in playful, exploratory interactions with the display when she held up a cup in front of it (Figure 2). After several minutes of moving the cup around, she began shuffling back and forth, triggering the camera another five times before she paused and bent over backwards until the sensor was triggered and a new photo appeared. She then waved an arm around and started dancing in circles through the hallway. She later explained that she was experimenting to find out how differently sized objects would affect when the display was triggered.

Routine displays

In our interviews, the householders all mentioned that, in general, they did not find the photographs captured by the display particularly interesting, given that the majority of the photos were “just people passing by.” In spite of this, we observed them glancing at the display at nearly every passing. The monotony of the photographs, however, served to draw out mundane details about the space that was captured in each photo, namely the hall and the objects in it. Kate, in particular, noticed that the photos did not reflect a sense of when they were captured, due to

unvarying lighting conditions in the hallway, coupled with objects that, for the most part, remained stationary throughout the duration of the study.

Interestingly, however, an awareness of the household routines came about through less direct interactions with *entrigue*. For example, the householders developed a routine for turning the system off without explicitly discussing it. On its initial deployment, responsibility for turning *entrigue* on and off fell to Ann, as she was the only person home during installation. She subsequently explained to the others how to operate the system, and over the weeks, a routine was developed where the display was tied to the state of the hall light. On most days, the display was turned on in the early evening by the first person to come home for the day. The last person to go to sleep was responsible for turning off the hall light, and when the hall light was switched off, the display was turned off as well. In the interviews Kate was also very surprised (if not disconcerted) to find how the amassed photos revealed the household’s daily rhythms, commenting that not only could the photos be used to determine what time everyone wakes up, leaves the house or goes to sleep, but that they also revealed the household’s long-term rhythms as well. In particular, she noted that because clothes drying racks were kept in front of the display within the camera’s line of sight, the photos captured by the display could reveal how often she did (or did not do) her laundry. Soo Young also reported occasionally looking at the display in the morning and determining what time her flatmates had gone to sleep the night before, something she normally was not aware of because she is usually the first to go to sleep every night.

DISCUSSION

The materials presented above foreground several potentially interesting aspects to awareness. Broadly, they highlight a notion of intrapersonal awareness, suggesting that awareness incorporates a sense of how you engage with the environment you are in. Especially salient in the use of *entrigue* was the awareness one can explore of oneself in and through this engagement. Though the system did not provide our study’s householders with new awareness information about each other, it did serve to draw attention to how things in the world might be assembled to compose an awareness of one’s own relationship to a space and with others. It seemed *entrigue* prompted householders to play with photographing themselves—not something usually done—so as to configure a relationship with not only the device but also with their movement in the hallway. Indeed, by enabling the capture and display of movements in a simple, throwaway fashion, *entrigue* became a tool for what might be thought of as a kind of *autophotography*. Here, we refer to “auto” in two senses of the word: first, that the photo capture mechanism was automated through the use of sensors, and second, that the participants were often more interested in the photos that featured themselves than those captured of their housemates or visitors.

Through this autophotography, then, *enrigue* offered the householders a means to re-see their hallway and the ways they moved through it, as if the camera were acting to defamiliarize the space and captured setting. Seemingly important in this were the idiosyncratic ways in which household members interacted with the system. We observed the three participants interacting with varying degrees of playfulness and spontaneity, and, consequently, their particular interactions and orientations appeared to offer slightly different ways of seeing themselves and understanding the space they lived in. For one householder it was a self-awareness of personal movement that was brought to the fore. For another, it was the relationship she had to the larger rhythms of the household. In short, *enrigue* shed some light on the unfolding nature of awareness and routines, and how they can be configured in an ongoing fashion through oneself, one's movements and one's relation to the material world. Even though the hallway itself remained relatively unchanged, the things people wore, what they carried and the ways they oriented to the space built up a picture of the patterns and interrelations between the wider movements of the household. An awareness thus emerged from an interleaving of the space, various aspects of *enrigue* and each of the householders rather than from the system itself.

CONCLUSION

Although it was originally intended to capture the comings and goings in and out of the home, *enrigue* became a display for playfully revealing the comings and goings *within* a home and the subtleties of routines and communication that takes place in a household. It is telling that one of our participants struggled to articulate how she pieced together a sense of where her housemates were and what they were doing, despite her often knowing. In the end, it was her use (and misuse) of *enrigue* that helped her identify at least some of the cues she used. The crux here is that this process of people adeptly using and making sense of the world is not something that must be actively sought out or that can be easily distilled into some presentable format. The bedroom door ajar or front door left unlocked have not been purposefully chosen or designed to convey the status of others, but they do so as a matter of course. As we have said, *enrigue* also drew attention to the personal and idiosyncratic ways in which such cues can be made meaningful.

If our results of deploying *enrigue* are anything to go by, we might consider as a starting point building technologies that allow us to re-experience the places we routinely inhabit and help us reconsider how we construe that "information" we already have at our disposal. It is only recently that researchers have begun to explore how playful designs can offer ways for people to experience life from new perspectives [9, 11]. In our case, the householders saw themselves in their day-to-day routines as *enrigue* captured them. From these first steps we might then go on to imagine what else in the world could be re-experienced.

ACKNOWLEDGMENTS

We are indebted to our participants for their time and patience. Thanks also to our colleagues at UCI and Microsoft Research for their feedback throughout the study.

REFERENCES

1. Bell, G., Blythe, M., & Sengers, P. Making by making strange: Defamiliarization and the design of domestic technologies. In *ACM Transactions on Computer-Human Interaction*
2. Brewer, J., Williams, A., & Dourish, P. A handle on what's going on: Combining tangible interfaces and ambient displays for collaborative groups. In *Proc. TEI 2007*, ACM Press (2007), 3-10.
3. Brown, B., Taylor, A.S., Izadi, S., Sellen, A., Kaye, J., & Eardley, R. Locating family values: A field trial of the Whereabouts Clock. In *Proc. UbiComp 2007*, Springer-Verlag (2007), 354-371.
4. Brown, J.S. & Duguid, P. *The Social Life of Information*. Harvard Business School Press, Boston, MA, (2000).
5. Chalmers, M. Awareness, representation and interpretation. In *Proc. CSCW 2002*, Kluwer Academic Publishers (2002), 389-409.
6. Dey, A.K. & De Guzman, E.S. From awareness to connectedness: The design and deployment of presence displays. In *Proc. CHI 2006*, ACM Press (2006), 899-908.
7. Dourish, P. & Bly, S. Portholes: Supporting awareness in a distributed work group. In *Proc. CHI '92*, ACM Press (1992), 541-547.
8. Elliot, K., Neustaedter, C., & Greenberg, S. Time, ownership and awareness: The value of contextual locations in the home. In *Proc. UbiComp 2005*, Springer-Verlag (2005), 251-268.
9. Gaver, W.W., Bowers, J., Boucher, A., Gellerson, H., Pennington, S., Schmidt, A., Steed, A., Villars, N., & Walker, B. The drift table: Designing for ludic engagement. In *Proc. CHI 2004*, ACM Press (2004), 885-900.
10. Heath, C., Svensson, M.S., Hindmarsh, J., Luff, P., & Vom Lehn, D. Configuring awareness. In *Proc. CSCW 2002*, Kluwer Academic Publishers (2002), 317-347.
11. Hutchinson, H., Mackay, W., Westerlund, B., Bederson, B., Druin, A., Plaisant, C., Beaudouin-Lafon, M., Conversy, S., Evans, H., Hansen, H., Roussel, N., Eiderback, B., Lindquist, S., & Sundblad, Y. Technology probes: Inspiring design for and with families. In *Proc. CHI 2003*, ACM Press (2003), 17-24.
12. Wisneski, C., Ishii, H., Dahley, A., Gorbet, M., Brave, S., Ullmer, B., & Yarin, P. Ambient displays: Turning architectural space into an interface between people and digital information. In *Proc. CoBuild '98*, Springer-Verlag (1998), 22-32.