Holding Hands Over a Distance:
Technology Probes in an Intimate, Mobile Context

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ABSTRACT

While apart, couples can verbally and visually communicate through existing technologies such as mobile phones, text messaging, videoconferencing and email. Yet, other important means of communication, such as holding hands, can only happen when couples are co–located. We investigated if geographically distant handholding in a mobile context is important for young–adult couples by deploying a simple technology probe. Unfortunately, the design of our probe fell short in encouraging participants to engage with it. While it is important for technology probes to be simple, they need to be well designed. Our current and future work incorporates form design into the technology probe method to better support intimate, mobile contexts.

Author Keywords

Technology probe, intimacy, tactile communication, mobile, field data, touch over a distance, haptic, handholding

ACM Classification Keywords

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

INTRODUCTION

Researchers have and continue to investigate new ways to support intimate communication, including allowing for remote, tactile communication- the ability to send touch over a distance. Several concepts and prototypes were designed to explore remote tactile communication. *Intimate Objects* (Kaye et al., 2004) and *Mediating Intimacy* (Vetere et al., 2005) present sketches of hand-holding concepts. *Communicating Emotion* (Smith) created a simulated hand-stroke and explored the role of metaphor and relationship in remote haptic communication. Brave and Dahley's *inTouch* project (Brave et al., 1997) developed a communicative prototype supporting a shared, tactile experience between two people. Fogg et al. developed a haptic prototype for interpersonal entertainment between friends *HandJive* (Fogg et al., 1998). Other intimate, tactile communication prototypes include *The Hug* (DiSalvo et al., 2003), and *Hug Over a Distance* (Mueller et al., 2005).

The evaluations of these related works have been in the form of demonstrations and short laboratory sessions. To our knowledge, none of these prototypes have obtained in-context usage of remote tactile communication. Before designing a device to send touch over distance, we studied how remote, tactile communication could fit into couple's lives by deploying a technology probe. We focused on the interaction of hand-holding, since couples hold hands in public and private. We were curious as to when and where couples would desire to use the gesture of hand-holding to express their presence to their absent partner. We also wanted to know how couples would balance this new type of communication with existing technology such as mobile phones and email.

At the end of the study, we conducted interviews and a focus group meeting to collect feedback on how the participants thought remote, tactile communication supported their needs. Unexpected results generated by the probe led to an investigation of design.

PROBES

A probe has been defined as a tool that is used to "*find out about the unknown, to hopefully return with useful or interesting data*" (Hutchinson et al., 2003). Probes are not prototypes and should be used in the early stages of projects to inspire design. According to Bill Gaver and his research team, probes create a dialect between researchers and volunteers, "*providing new perspectives that can constrain and open design ideas*" (Gaver et al., 2004). A number of probe approaches have been created, including cultural, mobile, and technology probes. Technology probes, as defined by Hutchinson, are simple, flexible technologies with three goals: the social science goal of collecting in-context information about the use and the users, the engineering goal of testing the technology, and the design goal of inspiring users and researchers to envision future technologies. We chose to use technology probes to provide participants with the experience of simple, remote, tactile interaction that they could later discuss with us.

SIMPLE TECHNOLOGY PROBE

To better understand if and when intimate couples desire to hold hands when apart, we built a mobile technology probe that four couples carried and interacted with over the period of a week (Figure 1). The participants were all in long-term relationships, ranging in age from mid-20's to early 30's. Each couple reported using some form of content-rich technology (phone, SMS, email) to communicate within their relationship.

Figure 1: Mobile technology prototype in context

The probes were yellow, deformable, hand-size balls; each contained an embedded microchip. We chose to use these balls because they would give users a tactile experience, similar to holding and squeezing a partner's hand. When the participant squeezed the probe, the microchip logged the time and incremented the counter of number of "handholding" incidences. The ball was attached to a clip, so that the participants could more easily carry it. We instructed the participants to squeeze the probe when they felt like holding their partner's hand. These probes did not communicate with each other at this early stage in the project; however, all data was collected and given to the couples at the end of the week. We explained to the participants that we were looking for feedback as to when and where they would want to engage in remote, tactile communication.

At the end of the seven day study, we held a focus group with the participants. We envisioned hearing their unique usage experiences about how they used the probe at work, the library, while shopping, on the bus, and in their cars. While the participants did openly discuss their experiences and thoughts about the probe, their feedback was not centred on ideas for usage, as we had hoped, but on the design of the probe itself. The participants discussed their dislike of carrying it around. They felt the probe's appearance drew too much public attention, so they hid it in their backpacks or "forgot" it at home. One of the probes went missing in a participant's bedroom for four days. The participants stressed how they wanted a device that was more personal and easy to carry. They desired it to be small enough to fit it in their pocket. One participant noted that she wanted something she could relate to personally, and not "*everyone has the same yellow ball.*" The data the probe collected showed participants using it during the first couple days, and then rarely during the rest of the week.

One might argue that the probe did not collect satisfactory data because the participants did not find a reason to send their partner a 'touch,' or they quickly lost interest in the study. However, this loss of interest or desire is inconsistent with the participant's excitement in the beginning of the study. We feel the participant's lack of interaction with the probe was due to its design.

INTIMATE COMMUNICATION & TECHNOLOGY PROBES

We intentionally made our technology probe simple; it was merely a stress ball with a chip for logging data. While we put time into considering the feel of the probe, we had not considered its appearance. We felt our decision was inline with Hutchinson's advice: "*A well-designed technology probe is technically simple and flexible with respect to possible use*" (Hutchinson et al., 2003). By making the probe highly tactile and free of complicated buttons and interactions, we hoped the minimal design would influence the participants to think of creative future devices and interactions. Our team was aware that the bright yellow color of the ball was not the most desirable choice. However, we reasoned that a probe is not a prototype: as long as it serves the purpose of collecting usage data, its appearance does not matter. Unfortunately, we were incorrect in thinking that the design was unimportant. Probes are meant to collect usage data, but, if users are deterred from using them because of their appearance, design should become a priority.

Other projects working with technology probes have either created them to be stationary or partially mobile, with the mobile interaction presented through mobile phones, a familiar device that participants were comfortable to use in public. Thus, we believe, participants of these projects were not as sensitive to the researcher's design choices. In Hutchinson's work, researchers investigated communication between family members in distributed households. The probes used were located only in the home and participants did not report them being of privacy or of identity concern. In Cheverst's work, researchers created a technology probe for displaying messages between workers in two disjoint residential care establishment (Cheverst et al., 2004). The probe displays were placed inside the facilities and could be updated outside the office with mobile phones, which the participants did not report feeling uncomfortable to use in public.

We agree with Hutchinson that technology probes should be as minimal as possible as to not restrict participants' ideas about future designs. However, 'simple and flexible' should not be interpreted as quick and easy. To adjust our technology probe approach to better fit our goals, we looked at DiSalvo et al.'s work exploring robotic form for intimate communication (DiSalvo et al., 2003). DiSalvo states that designers can use form to "balance the needs of people, the capabilities of technology, and the context of use to support an activity or action" (DiSalvo et al., 2003). Our initial probe did not sufficiently balance the needs of the participants with our goal of collecting data. While DiSalvo's work centered on exploring form to create a final product, we believe form design can be valuable for technology probes as well.

In hopes of collecting rich feedback on tactile communication, we are in the process of designing and deploying a second probe. Incorporating form design, we utilized DiSalvo's suggestion to replicate human gestures with form (DiSalvo et al., 2003) and investigated forms

with the affordance of hand-holding. In addition to experimenting with shape, we explored fabrics that people enjoy touching.

FORM INVESTIGATION

To design the form of the second probe, we conducted an image study of hand-holding. We then modeled three of the more common hand-holding styles into three form prototypes, using cotton stuffing, foam rods, and velvety fabrics (Figures 2, 3, 4). We took these three prototypes to a popular outdoor recreation area and interviewed nine couples who were seen holding hands. While the couples initially seemed slightly annoyed to talk to researchers on a sunny afternoon, they quickly gained interest when given the form probes to hold. Two of the nine participants asked to be contacted later to further contribute to the project. The couples' responses were detailed and lengthy.
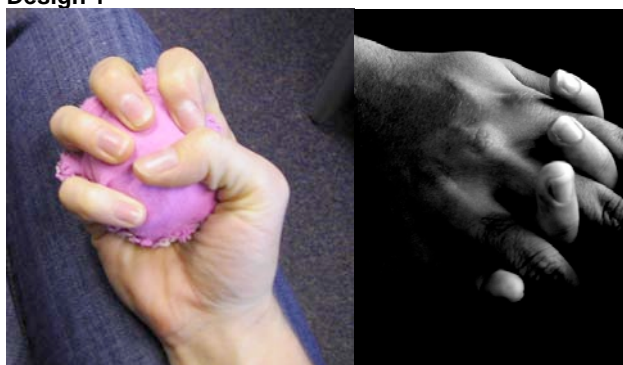
Design 1

Figure 2: Design for intertwining fingers

- Female participant: *"(I prefer) that one (Design 1). Well, it depends on how you hold hands. You see, we would intertwine our fingers. So that's why I like that one. So that one (Design 3) wouldn't do anything for me, and that one (Design 2) is just strange."*

- Male participant: *"This is nice and firm (Design 1), not soft and squishy which is not really a human hand, you know? So that's pretty good."*

Design 2

Figure 3: Design for clasping hands

- Male participant: *"It's (Design 2) got ribs in it. It's got too much looseness in it. I like the firm one (Design 1), it feels more secure."*

- Male participant: *"This one (Design 2) feels like a packet of sausages as opposed to a human hand, or like bones."*

Design 3

Figure 4: Design for wrapping fingers

- Male participant: *"This one (Design 3) reminds me of a severe teacher at school that had horned rimmed glasses and a big-bunned hair and skinny fingers with veins showing. You don't want something that's a bit scary."*

- Female participant: *"That is quite comforting that one (Design 3), cause you can put your fingers between them, feels like actually holding a hand cause you can feel it's fingers in-between your fingers."*

We received positive remarks about the fabric we chose. One female interviewee noted, *"They feel quite nice to press... comfortable... they feel quite good to touch."* While a male interviewee commented, *"The texture is good too... I know little babies love this sort of feeling."*

Contrary to our previous probe, the forms allowed the participants to personally identify with them. We observed that the prototype each couple preferred resembled how they naturally held hands. The affordance of the forms was intuitive: the partners knew how to hold each form without being shown. While the forms were roughly the size of the previous yellow probe, none of the couples commented that they were too large. A few, however, wished the forms were bigger so that the base of the form would cover the entire palm of their hand. When presented with the three forms, the partners initially grabbed the one they liked the best, possibly showing that the form appealed to them both visually and physically. There was not a 'one form fits all' design. Out of the nine couples interviewed, five couples preferred Design 1, three preferred Design 3, and one couple liked both Design 1 and 3. Though there were varying preferences between the couples, within the couples, there was total agreement: both of the partners in each couple concluded that they preferred the same form.

While the design probes lacked technology to log usage, by deploying them directly into the context of use, we were able to observe how couples responded and interacted with them. The design probes were simple, yet, the combination of supporting the affordance of handholding and bringing the probe directly into the context of use led to a far more engaged participant response than the previous probe.

CONCLUSION

Our initial goal was to investigate whether partners in intimate relationships would want to hold hands when apart. We built a simple technology probe to monitor when participants desired a tactile exchange to occur. Instead of obtaining usage data as we had hoped, we discovered that participants did not want to use the probe in public, so hid it in their backpacks or forgot it at home. The probe design had played a deciding role in the probe's effectiveness of collecting data. Hutchinson stresses the importance of probe simplicity and flexibility so that probes encourage creative and unexpected interactions. Our study shows that while probe design can be simple, thought needs to be put into both the material and aesthetic aspects of the probe in order to encourage participant interaction. Our new approach to using technology probes in intimate, mobile contexts incorporates form design to more strongly balance the intent of the probe with the needs of the participants.

Probes are not meant to be a final design. They are meant to inspire future design early in a project, and be discarded afterwards. However, collecting data from the real world is a complex task, especially in sensitive cases such as intimate communication. It may be just a probe, but once it crosses the line between intimate purpose and public use, appearance is important.

ACKNOWLEDGEMENTS

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