‘Being Home’ Over Distance: Long Distance Couples and the Use of Telepresence Robots

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Introduction

Many people experience a long distance relationship (LDR) at some point in their lives [5,7,11]. Common reasons include relocating for school, work, or family obligations. One challenge with LDRs is that their notion of ‘home’ is spread across distance because partners may live in different residences, and travel between residences to be together. This fractured nature of ‘home’ can cause strain on the relationship and be difficult to manage [12].

As a result, couples often use computer-mediated communication (CMC) tools to stay connected [2] and create a virtual sense of ‘being home’ in a joint home. Common technologies include email, text, mobile phone call, video chat, and social network sites, which are often used throughout the day to stay connected in almost a continuous way [8]. With the widespread adoption of video chat tools like Skype and FaceTime, it is clear that distance-separated loved ones value rich, high content connections [8]. However, current video chat communication is not an adequate surrogate for in-person interactions. Studies of video chat usage by LDR couples show that they often leave video connections open for long periods of time to share life between homes and support ‘virtual shared living’ [8].

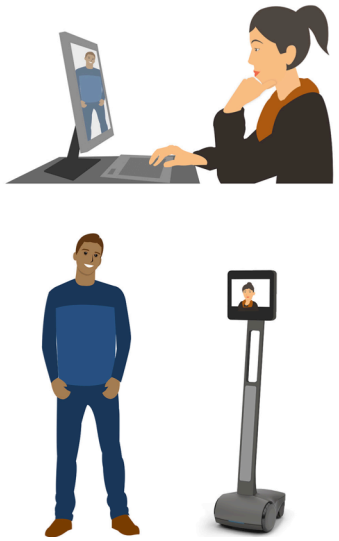

Figure 1: Illustration of telepresence robot usage. Upper panel is remote partner controlling robot. Lower panel is local partner interacting with robot.

Carrying video chat devices around the home can be cumbersome though, as they are not optimized for such usage [8]. Due to this challenge, our research explores telepresence robots (Figure 1) as a communication tool for LDR couples. With telepresence robots, users gain the ability to remotely control the position and movement of their remote representation. The control of one's own movements, and therefore one's own view, brings user presence into the home in a way that traditional video conferencing systems do not. User presence is elevated from passive viewer to a presence in the home where the user has the agency to choose where they go, what they look at, who they talk to, and what activities they want to be a part of. The goal of our research to date has been to understand how LDR couples would use telepresence robots to share a sense of social presence over distance where they might create feelings of 'home' over distance.

In-Home Usage of Telepresence Robots

Telepresence robots are commercially available and increasingly affordable, but their audience remains predominantly in the workplace. Because telepresence robots have the potential to better replicate the qualities of in-person interactions than traditional communication tools, we see value in exploring their use in a domestic context. In our first study of telepresence robots in the home, we explored how two long distance couples used commercially available telepresence robots called Beam® Smart Presence™ systems (Beam+ model) for one month.

We recruited two long-distance couples through word-of-mouth. Each couple received a Beam+ telepresence robot to use for 4 weeks, placed in the local participants' homes. They were instructed to use the Beam+ a minimum of 4 times during the first week. We chose to set a minimum usage in the first week, so the couples could familiarize themselves with the Beam+. Following the first week, we had no usage rules, because we wanted to see how the couples would use the Beam+ naturally. Remote users could connect into the Beam+ whenever they wanted to. They could use it to move around their partners' homes where they could see and hear things as they would in person (Figure 2). Beams are moved by using a mouse and keyboard, smartphone, or Xbox controller. One camera faces forward for seeing the environment and a second camera faces the floor to aid navigation and movement.

We collected data through three semi-structured interviews. We interviewed partners at the end of the first week and asked about the couple's relationship and existing communication patterns prior to using the Beam+. An interview at the end of Week 2 functioned as a check-in where we asked couples how they were using the Beam+ and whether they were experiencing any issues. A final interview occurred at the end of Week 4 where we began by separately asking partners about their experiences and how they felt in the role of local user (in the same place as the Beam) or remote user (driving the Beam). A combination of open, axial, and selective coding was used to extract important themes from our data.

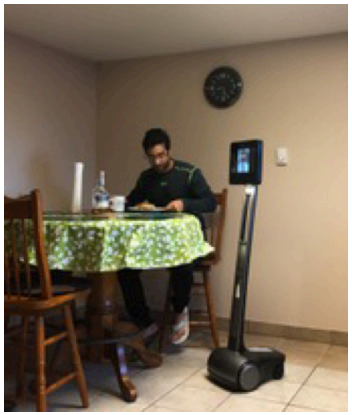

Figure 2: Participant having a meal with his partner using Beam+.

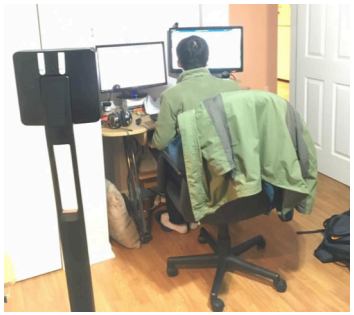

Figure 3: Remote partner stands behind local partner using Beam+.

Findings
As with each CMC tool, the telepresence robot has unique features that help it serve a unique communication scenario. Couples in this study used Beam+ to spend leisure time together after work. Other CMC tools were used during the day when the partners weren't at home, and at night when the partners were too tired to be fully engaged.

Autonomy/Freedom
With the Beam+, local partners reclaimed some of the free movement that they enjoy when communicating face to face. Rather than sitting in front of their computers or holding mobile phones to their faces, they could walk around their homes with their hands free. The convenience of being able to stay in view without local users having to carry a laptop or phone around meant that connections sometimes lasted longer as local partners didn't need to end calls when beginning activities, such as cooking.

As for the remote partners, they were no longer restricted to seeing only the things their partners wanted to show them. With regular video chat tools, they would only see things from their partners' computer or phone cameras, but with Beam+, they could control the video view by moving the Beam+ around.

While the Beam+ allows remote users to move around, this movement is confined to indoor environments in areas with WiFi. Users found this very limiting, and expressed the desire to take the Beam outdoors.

Surprise/Unpredictability
An interesting finding was the effect of surprise on creating a sense of presence. With traditional video chat tools, an incoming call needs to be accepted for communication to begin, so partners tended to plan out the times when they would call. With the Beam+, the user could 'Beam in' unexpectedly. The partners felt that the spontaneous and unannounced calls made the connections feel more like in-person communication.

The surprise from being able to physically bump into things also created a sense of presence.

Movement as a Form of Body Language
During disagreements, partners can move away to show displeasure or move closer to show a willingness to reconcile differences. The ability to use meaningful distance cues turned out to be a very important benefit of Beam+ communication. Partners said they were more willing to have serious conversations when using Beam+ than when using traditional video chat tools.

One local partner explained that being able to move towards his partner after she moved away allowed him to express his willingness to surrender his position for the sake of resolving their issues.

Viewing Perspectives
The ability of remote users to move around the home created new views and perspectives that users were previously not used to seeing. One couple noted that with a traditional video chat tool, she never saw the perspective of looking at the back of her partner's head, but, with the Beam+, she could stand behind him and look over his shoulder as she would in person (Figure 3).

Participants said that the added perspectives also generated natural conversational topics when the users would notice things in their partners' homes and comment on them.

While the Beam allowed users to view new perspectives, users noted viewing issues such as ineffective zooming.

Discussion & Conclusions

The mobility and physicality of telepresence robots led to interesting findings under the themes of autonomy, unpredictability, movement as a form of body language, and viewing perspectives. The autonomy that comes with using the Beam+ was immediately evident to our participants. In our study, the users repeatedly mentioned enjoying the control of their views. Unpredictability made one couple feel closer on multiple occasions, allowing for a more natural pattern of communication. The importance of spontaneous interactions for building connections was described in a study of telepresence robots in the workplace [6]. Allowing movement as a form of body language made the Beam+ valuable for conflict resolution. In a previous study on LDR couples, some couples either chose not to argue over video chat or had difficulty resolving conflicts over video chat because they couldn't leave the room [8]. Couples using telepresence robots could leave the room to make a point or to cool off during an argument. Using Beam+ to have serious conversations can help couples avoid the problem of conflict avoidance [13,14]. The additional perspectives that the user could see by moving the Beam was also beneficial to the couples in our study. The users were able to participate in watching their partners cook—an activity that was less convenient with traditional video chat tools.

We feel that these findings elucidate areas of importance for future designs of telepresence robots as a means to connect LDRs across home residences.

Author Biographies

Lillian Yang is a PhD Student in the School of Interactive Arts and Technology at Simon Fraser University. Her research focus is on usability, as well as user experience surrounding technology. She holds a Master's degree in Neuroscience and a Bachelor's degree in Psychology.

Dr. Carman Neustaedter is an Associate Professor in the School of Interactive Arts and Technology at Simon Fraser University. Research projects heavily focus on technology designs for family communication and the design and use of video-based communication systems. He has designed three smart home installations and created more than a dozen advanced domestic communication, telepresence, and coordination systems for mobile, situated, and robotic devices to combat social isolation and improve quality of life.

Dr. Thecla Schiphorst is a Professor in the School of Interactive Arts and Technology at Simon Fraser University. Her research explores embodied interaction, movement knowledge representation, tangible and wearable technologies, media and digital art, and the aesthetics of interaction. She has designed interactive wearable systems for families and technology-enhanced clothing to augment human-to-human interactions.

Point of Debate

Should one be more concerned about a robot in our home than its human counterpart? This question was inspired by the experience of being treated differently when interacting with others through the Beam versus in person.

Demonstration

A video of Beam use will be shown, as well as a brief demo of Beam use.

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