Exploring Connectedness and Social Translucence in Awareness Systems

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Abstract
This research explores how context sensing and ubiquitous communication media can support remote family members with new ways of caring for each other using awareness systems. An important design dimension in awareness systems is reflected by the concepts of symmetry and social translucence. We explore the effect of ensuring symmetry versus ensuring social translucence upon the social connectedness and the privacy satisfaction that people experience through the use of an awareness system. We built the SoPresenT prototype which uses audio and video technologies to support these concepts. We are currently investigating these through controlled experiments.

Keywords
Awareness systems, social connectedness, social translucence, symmetry, social presence.

Introduction
It is well-known that humans have a pervasive and fundamental need to belong. The fulfillment of this need entails having frequent and intimate interactions within long-term caring relationships [2]. In today's society, families are burdened by separation due to studies, work, or are split when offspring start new families at distant locations from home. Distant family

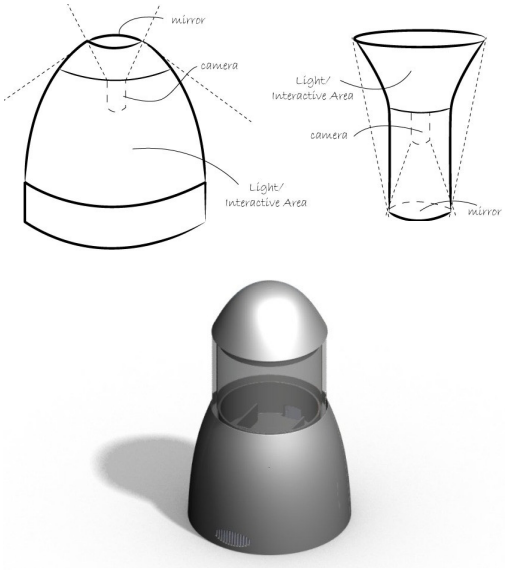

figure 1. The SoPresent prototype equipped with a microphone, camera and a mirror to provide a 360 view for context determination.

figure 2. An example of the SoPresent device conveying awareness of a remote party's motion.

members often struggle to stay connected and might lose touch with each other. Although they can share news with communication media, the distance that separates them makes it harder to care for each other.

This research explores how context sensing and ubiquitous communication media can support remote family members with new ways of caring for each other. It addresses the desire of remote parties for a feeling of *social connectedness*, understood as a positive emotional experience, characterized by a feeling of staying in touch within ongoing social relationships [3]. The class of systems we concern ourselves with is often referred to as *awareness systems* to indicate that their primary purpose is to create awareness of context rather than to provide goal-oriented and efficient information exchange. Several researchers have explored ways in which awareness systems can support social connectedness. Some examples are the ASTRA system [3], the Digital Family Portrait [10], and Aurama [5].

Markopoulos [9] presented a design framework for awareness systems, emphasizing socially salient aspects of the relevant design space. An important design dimension is reflected by the concepts of symmetry and social translucence. These concepts are discussed further below to motivate the design and the empirical study regarding the SoPresenT (Social Presence Technologies) prototype.

Symmetric vs. Social Translucent Systems

A large tradition in Computer Supported Cooperative Work (CSCW), has examined how the mediation of technologies can create asymmetries in the interaction between communicating parties. The pursuit of symmetry between users of groupware systems has been research that characterizes the last two decades of work in the field of CSCW. Technical characteristics of the systems may need to be overcome to allow symmetrical access to information, symmetrical presentation of users, applying principles such as What You See is What I See (WYSIWIS). The symmetry regarding the information about ourselves that we don't mind others to know and the information that we would like to see about others, is a typically voiced requirement of users; see for example Friedman et al. [7] and Khan and Markopoulos [8].

However, a careful review of reports on deployments of such systems has shown that despite the sustained attempts by researchers who create and design related systems, almost all empirical studies to date report asymmetries emerging during actual use [12]. This asymmetry is perhaps not surprising, as even with a level playing field technically, people will have differing needs, different opportunities for participation and desired levels of social interaction.

In order to level out some of the anomalies that are so created, flexible mechanisms that support interacting parties to negotiate their availability for interaction and for sharing information are needed [11]. It appears that it is not symmetry as such, but the accountability that is engendered by one's visibility that enables the emergence and application of social norms and lets people apply their social skills from the physical world in a mediated setting. The concept of *social translucence* introduced by Erickson and Kellogg [6] provides a framework for guiding design choices regarding how and what to make visible to two interacting parties.

While clearly, related symmetry and social translucency have not been compared or validated empirically regarding their impact upon user's ability to satisfy their affective needs from interpersonal communication and to protect their privacy needs. We aim to fill this gap by evaluating the effect of ensuring symmetry versus ensuring social translucence upon the social connectedness and the privacy satisfaction that people experience through the use of an awareness system.

SoPresenT

At Philips Research we have developed new Social Presence Technologies (SoPresenT) to capture and convey contextual information, with the aim of exploring mechanisms that will strengthen the caring relationship between two remote parties.

Typical context-aware systems entail distributed sensors strategically placed in an environment [4,5,10]. The SoPresenT system entails having one dedicated device (e.g. placed in a living room) that will capture awareness information and render it on a similar remote device). The working principle is based on audio and video scene analysis algorithms to capture presence and activity, together with computational intelligence for interpreting contextual data (see Figures 1,2).

Contrary to a video based system, this application allows to deal separately with the communication of awareness information and the communication of information regarding what an observer can see of the observed. More specifically, two versions of the systems were created: one where the presence and activity of the other party is displayed to the remote participant, without letting the observed know whether anyone can see this information. This unidirectional flow of information is completely symmetrical: both parties see the same about each other.

The second version of the system requires the observer to actively invoke the device to present information about the observed. By tapping on the device the display is lit up to represent the presence or not of the remote person (and their relative position compared to the remote device). However, this tapping causes the remote device to also light up showing to the observed that someone is watching them. In this way the watcher becomes accountable through a socially translucent system to the watched.

Experiments

We want to explore the impact and value of social translucence using the SoPresenT system in a controlled lab-based experiment. We want to also explore the differences of the effect and the value perceived of such systems between related pairs (e.g. parent and child) versus non-related pairs.

We are interested in testing the following hypothesis:

- The visibility of a remote party's observation of one's own information enhances acceptance, connectedness and presence, and reduces privacy concerns.
- The differences on the effect of social translucence on connectedness and presence are higher between two related subjects than between non-related ones.

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