

Challenges for Enhancing Social Connectedness at Home

Selene Mota, Wijnand IJsselstein and Panos Markopoulos

Eindhoven University of Technology,

Den Dolech 2, 5600 MB, Eindhoven, The Netherlands

{s.a.mota-toledo, w.a.ijsselsteijn ,p.markopoulos}@tue.nl

ABSTRACT

Ambient awareness at home is a concept that integrates aspects of ambient intelligence into awareness systems with the aim to support family social connectedness. This paper presents a study based on contextual interviews concerning the systematic examination of parents' communication patterns, everyday activities and perception of their family social interaction. Through the analysis of these patterns, a set of competing needs were identified. This paper argues that the perception of balance between such competing needs is paramount to "the feeling of being connected to the family".

INTRODUCTION

The everyday life of contemporary urban families can be described as a constant prioritization of things to do and a continuous dealing with the extensive demands that their busy lifestyle imposes. Specific demands reflect the idiosyncratic situations for different families. However, since the perspective of western-society, the amount of work and home demands has persistently increased over the past several decades [2,12].

This situation gets amplified in the case of double income families. They have to accomplish a long list of everyday needs in order to sustain their family well-being. They have little time and a lot to do. As a result, the entire completion of all their needs is not possible. Hence, they have the constant requirement of deciding which needs have to be solved first and which ones have to be left behind. Recent research investigating double income families [4, 13,15] points out that this situation creates fundamental tensions between both, the potential benefits and the potential costs that the fulfillment of one need may cause over the other. It argues that such tensions affect the family stability and emotional well-being.

In our research, we are interested in developing a new type of communication systems able to enhance the family social connectedness. Specifically, we are focused in a concept that we call ambient awareness at home. This concept endeavors the creation of communication systems for enhancing "the feeling of being connected to the family" through the peripheral awareness between them and their physical environment, continuously and with the minimum effort.

We refer to the "the feeling of being connected to the family" as the social connectedness fostered when family relationships are positive and family members have the skills and opportunities to interact constructively between them. In this sense, the concept of social connectedness is related to belonging and companionship [9]. For example, social connectedness makes family members feel

that they belong, are included and have a role to play in family. It makes family members perceive positively their social relationships.

Although, this concept is not new among the social psychology community, its measurement is at a very early stage of development. Current indicators do not necessarily capture informal, as well as formal, relationships. Nor do they adequately measure the quality of those relationships [9, 11].

In this position paper, we argue that "the feeling of being connected to the family" is highly associated to the perception of balance and personal control that family members have over competing needs that depict their everyday social interactions. We have clustered these competing needs as: (a) mental boundary and continuous connectivity, (b) responsibility, (c) routines & activities, (d) affection. The identification of these needs is supported by the qualitative analysis of 20 contextual interviews with working parents. The qualitative analysis involved the systematic examination of parents' communication patterns, everyday activities and perceptions of their family social interaction.

METHOD

The set up of the study involved contextual semi-structured interviews with 20 Dutch working parents. The participants were selected with the following criteria: part of double income urban families, cohabitating with their partner, at least one child and at least one elderly (grandparent).

Two researchers conducted the interviews, each one separately. Each interview was performed using an in-depth interview technique [14] and it had a semi-structured nature. Each interview lasted approximately one hour and it was audio recorded. After the interview was completed, the audio recording was fully transcribed. The transcriptions were analyzed qualitatively by two researchers in an approach that included elements of the Grounded Theory Method [14] (open coding, clustering, making contrast/comparisons and building a logical chain of evidence). Parents' communication patterns, everyday activities and the perception of their family social interaction were the focus of the questions.

COMPETING NEEDS

Mental boundary and continuous connectivity

In the study, all parents stated that a mental boundary is their most powerful tool for coping with their busy life. Results according with the context are as follow:

At work, all participants, including the ones who were not working in offices, expressed that they value not only a good management of their time, but also a good management of their thinking; it is why they do not like to know continuously about their family at work. However, when analyzing their statements according to the type of occupation and physical space, differences in the reported amount of family contacts were identified. These differences were correlated with: level of concentration required by their jobs, amount of time in personal or public spaces and third parties involved for making the contact. As an example: two male participants, who were physicians in a hospital, and one female, who was a teacher in a school, mentioned they tend to turn off their mobile phone during working hours. Whereas, participants working most of the time alone in an office highlighted that they *never* turn off their mobile phone.

During the transition from work to home, parents described that they make a considerable effort for switching their mind to the family sphere. 12 of them expressed that this switch of thinking comes naturally when they travel home. Whereas 8 of them, mainly the ones working on hospitals or with a high level of responsibility in their jobs, expressed they have to invest considerable effort in order to induce this switch of mind. For instance, one participant female (who is a nurse in a hospital) described that each time before leaving her work she has to walk for few minutes before going to her car. Once in her car, she turns on the radio in order to change her mind and recover. During transitions, all participants reported to increase their mental connectivity with the place of destination. In particular when they travel home, they try to induce themselves in a good mood and think about their family.

At home, all of them described their evenings as a busy time in which they have to do multiple tasks at the same time (e.g. prepare dinner and put attention to the children). Participants, who had children younger than 5 years old, highlighted that often they get less attentive to them because stress and fatigue. They mentioned that they get often stressed because they must finish with many family-related tasks such as house-keeping and laundry. Besides, they have to prepare their work and children's school for next day.

Results from the study suggest that a continuous connectivity is not the most appropriate solution for connecting double income families. All our participants described several instances where the "always on connectivity" had a higher cost than a benefit. They highly valued the possibility of being able to place a mental boundary between work and home.

The value of the mental boundary in urban settings [6] and the flow of thinking [3] have been previously investigated. However, such investigations have focused on work or urban environments rather than home. Results in our study suggest that the mental boundary has a different nature at work than at home. At work, participants' mental boundary was associated with a good management of their thinking and the ability to handle interruptions and distractions. Whereas at home, it was associated with a good management of stress and fatigue and the ability to keep peripheral attention for taking care of children, for showing

emotional engagement and interest in a conversation.

Thus, a challenge for future ambient awareness systems at home is to ease the communication between family members and support the control for establishing different levels of mental boundary between contexts, instead of breaking it.

Responsibility

The issue of responsibility emerged along with themes such as interchange of roles and continuous connectivity. These themes were related to issues like who has the responsibility, where and when.

As an example: participants emphasized that they have to assume the responsibility they have towards their children, which is 24/7. 11 out of 20 participants remarked that it is very important to answer "always" to their family in particular their children. It is just in case that something urgent could happen. It gives them "peace of mind". The males of this subgroup expressed that their female partner would not contact them just for nothing, e.g. a male participant who is professor at the university stated "she always have a reason". Participants who had children at elementary and middle school highlighted that responsibility must not be only seen as an obligation, but also an important component for children education. They expressed that teaching their children "how to be responsible" is a challenging task. They pointed out that children have to learn how to manage their own responsibility and understand its importance.

The issue of responsibility brings forward the problem of how to create appropriate mechanisms to support its management. The design of communication systems at home should not only take into account the problem of what family members want to know from each other, but how they will manage the responsibility of knowing such information. On one hand, future systems connecting family members 24/7 could bring "peace of mind" to parents. However, on the other hand, there is a high risk it could also create tensions affecting the division of family responsibilities. Therefore, the management of responsibilities should not only account for practical benefits, but also family values, age of children and family roles.

The management of responsibilities is an important need for enhancing the family social connectedness as it triggers the family members' awareness about their individual and collective contribution to support their family well-being. As a consequence, this information could be an implicit driver for motivating each member of the family to enhance his or her connectedness with all or a specific member of the family.

Routines and activities

The Home is a complex setting for classifying activities because spaces and objects are used in more than one way. In our study, we recognized three categories of activities according with the needs that participants tried to satisfy. These categories are: routines, crossover and parental activities.

Routines

The everyday routines were referred as contributors for maintaining the stability of the family structure and its organization. In our study, parents described their evenings as a hectic time in which they have to do multiple tasks at the same time and cope with a lot of practical work e.g., preparation of meals, attention of the children demands, house keeping, financial issues, laundry, preparation for children's next day at school or for themselves at work. The regularity of these routines contributed to the experience of family stability. This stability was identified as a driver for family social connectedness because it added predictability for ensuring time together at home.

Routines were pointed as strong markers for the rhythms of family life. Then, information about their regularity, ownership and who participate on performing them have a high possibility of being good observable features for the inference of social connectedness in smart environments.

Crossover activities

The crossover activities were associated to the need of effectiveness and practicality. The perception of crossover activities was recurrently referred by participants as a source of stress and fatigue. For example, most of our female participants reported high amount of crossover activities while they prepare dinner. The handling of several crossover activities was accounted for increasing the perception of effectiveness and practicality, but for lowering the perception of attentiveness and emotional engagement in social interactions.

Parental activities

Parental activities were linked to the need of parental involvement and quality of family social interaction. The evening activities were reported to happen around children: cooking for them, playing with them, helping out with homework, bathing them, reading a book and putting them to bed. Participants highlighted dinner and going-to-bed as activities of great relevance for the family ritual.

It became apparent that parenting activities involved higher level of attention and emotional engagement than everyday routines. These parental activities were identified as involving aspects of mutuality, time together and affective stimulus. For instance, dinner gave the opportunity to have a moment together, express what happened during the day and provide a pleasant moment for children. Whereas, going-to-bed offered an opportunity to teach children new things, talk with them, read a tale, play and enjoy being together. For some participants this activity usually takes even one hour.

Parenting activities were identified as a contributor of social connectedness since they provided a powerful implicit meaning of mutual care and love. For some participants, parental activities such going-to-bed and homework time were almost a family ritual.

Consequently, parenting activities could be meaningful indicators for social connectedness since they could establish an interaction protocol for family outsiders. In our study, parents didn't like to break with the parenting ritual. It seems that parenting activities determine the rules of the family social protocol with outsiders.

Affection

We classified the participants statements related with affective experiences in two ways, explicit and implicit. Explicit affective experiences were reported to be triggered by highly special positive or negative events. Positive events involved birthdays, completion of an important interview or trip. Negative events mainly involved emotional support (e.g. when a very bad experience or an emergency happened). This category of experiences involved an effort, which was perceived as special and positive by the receiving party. Messages or objects were used as amplifiers for the affective meaning. All instances associated with explicit affective experiences were triggered by an exceptional event.

Implicit affection was reported to occur when all family members were together face-to-face, but also when they interacted by phone. In the case of phone interactions, participants reported that most of their communication with family members at work involved practical issues. However, they highlighted that when they call each other (e.g., just before leaving work) they are not just communicating dry facts. By verbally communicating practical information, such as "I am about to leave the office", "is there anything we need from the supermarket", they have the opportunity to infer their partner emotional status. They expressed they are able to infer "how" their partner is feeling through implicit affective cues such partner's voice, short answers, little attention and attempts to keep the conversation short. Thus, a communication event for a practical reason actually carries with it much more than that. This might be a serious challenge for awareness systems if they would serve automatically the practical information mentioned before.

In the case of face-to-face interactions, participants remarked that typically at home it is difficult to trigger implicit affection because stress or fatigue. What is more, they have often to find a reason or pretext, otherwise, they could be perceived as inappropriate.

It seems that, during face-to-face interactions, the experience of implicit affection was linked with the perception of involvement and mutuality by participants. For example, an activity (e.g. dinner time) could be interpreted as a parenting activity rather than as a part of the routine, if the perceived implicit affection is positive. Thus, the enhancement of affection into everyday routines could increase the perception of involvement between parents and children.

FURTHER DISCUSSION

Since our perspective, these preliminary findings indicate that future awareness systems have seriously to consider that social connectedness is not only about connectivity, dry exchange of information or "one bit" availability. But also it is the balance of competing needs involving the dilemma of continuous connectivity, management of responsibilities, family stability, parenting and affection.

Although, these needs may sound almost trivial for who is already a working parent, the goal of this study was not to investigate the nature of these needs. Rather, identify the most relevant ones for supporting the family social connectedness; examine how parents' experience them; and investigate how they can be supported with

the prism of ambient awareness systems. We consider that solutions that focus on just one side of the equation may provide only limited value, and are more likely to fail, than those that attempt to support the dynamic and continuous balancing act that characterizes everyday social communication.

One part of the challenge for ambient awareness systems at home will be to adequately support the family in negotiating its own optimal balance of competing needs. This is not an easy problem taking into account that each member of the family may have different perception of what the optimal balance should be, as well as, variable personal control over such needs. The other part of the challenge is to identify reliable and meaningful observable indicators coming from sensor signals that adequately depict and capture the family social interaction.

CURRENT WORK

In our research we are interested on the automatic capture of awareness information at home and how it can assist to enhance the family social connectedness. Specifically, this research involves three main aspects: behavioral research for the identification of adequate contextual indicators of social connectedness; development and implementation of context capture algorithms with basis on social protocols; design framework for the interface conceptualization of the ambient awareness systems.

The novelty of this approach is that it deals with the problem of coupling behavioural research with the development of machine learning algorithms. It aims to map the qualitative indicators found through behavioural analysis and human evaluations to properties for context capture algorithms. This approach leads to two main research challenges. The first one is the development of new methodologies for the analysis of people's behavioural cues and their relationships with their affective experience. The second is the choice and implementation of the *right* algorithm properties for interpreting such cues. Current work involves the development of a study that we call augmented diary. The aim of the augmented diary is to obtain momentary subjective assessment related with the competing needs found in our first study. The subjective assessment will evaluate the qualitative indicators according with their significance for family social connectedness. Also, it will allow us to determine the most useful sensor signals for the automatic capture. Specifically, the augmented diary combines the logging of data gathered through the day in the home through the triangulation of the following methodologies: defamiliarization [1], experience sampling method [8] and day reconstruction method [7].

ACKNOWLEDGMENTS

We thank Javed Khan for performing half of the interviews and for helping out with the first round of the data analysis. Also, we thank Andres Lucero for helping out with the second round of the data analysis.

PARTICIPANT BIOGRAPHY

Selene Mota is a Ph.D. candidate at the Eindhoven University of Technology, under the guidance of Dr. Panos Markopoulos and Dr. Wijnand IJsselsteijn. She holds a Bachelors degree in Electrical

Engineering with highest honors from Monterrey Institute of Technology in Mexico, and a Master in Media Arts and Sciences from the Institute of Technology (MIT) in U.S.A. During her master she collaborated with Prof. Rosalind Picard in the affective computing group at MIT Media Lab. There, she developed an automated posture recognition system for detecting learner's level of interest. Afterwards, she developed for the Swiss Federal Institute of Technology (EPFL) in Switzerland a system that recognizes continuous hand gestures using Hidden Markov Models and a stereo camera. Her research interests involve analysis of non-verbal behaviour, pattern recognition, machine learning, affective computing and user-centred design. Currently, she is cooperating with Philips Research in developing ambient intelligent systems for supporting social connectedness at home.

REFERENCES

1. Bell, G., Blythe, M., and Sengers, P. 2005. Making by making strange: Defamiliarization and the design of domestic technologies. *ACM Trans. Comput.-Hum. Interact.* 12, 2 (Jun. 2005).
2. Centraal Bureau voor de Statistiek (CBS - Statistics Netherlands)
3. Czerwinski, M., Horvitz, E. & Wilhite, S. (2004). A Diary Study of Task Switching and Interruptions. In *Proceedings of ACM Human Factors in Computing Systems CHI 2004*, p. 175-182.
4. Darrah, Charles N., *Busy Bodies: The Anthropology of Busy Lives*. Winter Symposia Series, Center for Science, Technology and Society, Santa Clara University. Santa Clara 2003.
5. Giddens, Anthony, *The consequences of modernity*, Stanford University Press, 1990.
6. Green N., *On the Move: Technology, Mobility, and the Mediation of Social Time and Space*, The Information Society, Routledge, part of the Taylor & Francis Group, Volume 18, Number 4 / July 01, 2002, 281 - 292.
7. Kahneman, D., Krueger, A. B., Schkade, D., Schwarz, N., & Stone, A. A. (2004). A survey method for characterizing daily life experience: The Day Reconstruction Method (DRM). *Science*, 306, 1776-1780.
8. Larson, R. & Csikszentmihalyi, M. "The Experience Sampling Method", *New Directions for the Methodology of Social Behavioral Science*, 15, 41-56. 1983.
9. Lee, R.M. & Robbins S.B. (1995). Measuring Belongingness: The Social Connectedness and the Social Assurance Scales. *Journal of Counseling Psychology*, 42 (2).
10. Markopoulos, P., Romero, N., van Baren, J., IJsselsteijn, W. and de Ruyter, B., *Keeping in touch with the family: Home and away with the ASTRA awareness system*. CHI 2004, April 2004.
11. Procidano, M.E., & Heller, K. (1983). Measures of perceived social support from friends and from family: Three validation studies. *American Journal of Community Psychology*, 11, 1-24.
12. Schor, Juliet B. *The overworked American: The unexpected decline of leisure*. New York: Basic Books, 1992.
13. Sellen, A. J. Hyams, J., and Eardley, R., *The everyday problems of working parents: Implications for new technologies*. Hewlett-Packard Labs Technical Report HPL-2004-37, 2004.
14. Strauss, A., & Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory, Procedures and Techniques*. Newbury Park, Ca: Sage Publications.
15. Weisner, T.S., Catherine Matheson, Jennifer Coots, and Lucinda P. Bernheimer, *Sustainability of Daily Routines as a Family Outcome*, New York: Kluwer/Plenum, In Ashley Maynard and Mary Martini, Eds. 2004. *Learning in Cultural Context: Family, Peers and School*.