

Zoomorphic robots used by elderly people at home

Tineke Klamer, Somaya Ben Allouch

University of Twente

Enschede, The Netherlands

T.Klamer@utwente.nl; S.BenAllouch@utwente.nl

ABSTRACT

The goal of this study was to improve our understanding about how elderly people use social robots in domestic environments and in particular whether elderly people are able to build relationships with them. Three participants interacted with the Nabaztag, a zoomorphic robot, for 10 days in their own home environment. The results yielded some interesting findings, such as (1) utilitarian-, hedonic- and social factors are important when accepting zoomorphic robots, (2) the physical location where the Nabaztag is situated is important for acceptance and use, (3) utilitarian-, hedonic and social factors are important for building a relationship with the Nabaztag, (4) there is a relationship between name-calling and relationship building and (5) there is a relationship between using non-verbal and verbal communication and relationship building.

Author Keywords

Zoomorphic robots, acceptance and use, relationships.

INTRODUCTION

It is assumed that in the near future, social robots will be able to aid the elderly to live longer autonomously at their homes. For example, robots will do household tasks for them, monitor their health and be a social companion. Therefore it is important to study the acceptance and use of social robots, so that future types can be adapted to the wishes and demands of the elderly, which is important for the future diffusion and adoption. The study presented in this article aims to improve our understanding of how elderly people use zoomorphic robots, social robots resembling animals, in domestic environments in general, and in particular how elderly people build relationships with zoomorphic robots. This article describes the first of three studies. Research questions are: (1) How are zoomorphic robots used by elderly people at their homes? (2) Which factors play a role in building and maintaining a

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.

CHI 2010 pre-conference event, April 10, 2010, Atlanta, Georgia, USA.
Copyright 2010 ACM 978-1-60558-246-7/09/04...\$5.00.

long-term relationship with zoomorphic robots?

METHODS

The zoomorphic robot used in this study is the Violet's Nabaztag, type Nabaztag:tag: a rabbit-shaped Wi-Fi enabled ambient electronic device (www.nabaztag.com). The Nabaztag was installed for 10 days at the participants' homes. Participants (n=3) were told that the goal of this study was to improve their health. Conversations regarding health activity were initiated at four different times of the day and participants received a daily weather report and messages, e.g. "did you have a good time at the opera", from the researchers. All conversations were video recorded. All participants were citizens of the United Kingdom, female and older than 50 years of age. Participants received an incentive of £20 as a compensation for made energy costs during the study.

After the 10 days usage of the Nabaztag, a semi-structured interview was conducted to evaluate the 10 day period. Questions were asked about the following topics: utilitarian factors, social factors, hedonic factors, general use, personal interest in technology (PIIT) and relationship development with the Nabaztag. After the interviews, the audio recordings of the interviews were transcribed verbatim. Simple serial indexing and cross-sectional analysis were used to analyse the interview data. The interview data was categorized via the used categories and the literal transcribed answers of the participants were added to these categories. After analyzing the video data, the results of the video data were used to verify/disconfirm the results of the interviews and vice versa.

RESULTS

A schematic review of the results is presented in this section.

Topics	Results
Utilitarian Factors	(1) Participant A and B: Nabaztag not useful due to technological problems/limited conversation abilities. Participant C: an indication is found that the Nabaztag was useful; (2) All participants: the Nabaztag is easy to use;
Hedonic Factors	(1) Participant A and B: did not perceive enjoyment; Participant C: the Nabaztag is fun to use; (2) All participants: no perceived playfulness;
Social Factors	(1) All participants discussed the Nabaztag with family and friends; (2) Participant A and C did not

	show the Nabaztag to family and friends, but showed photographs of it. Participant B showed the Nabaztag several times to family and friends; (3) Participant A and C interacted the first time alone with the Nabaztag; Participant B interacted the first time with the Nabaztag with her partner;
General use	(1) Participant C embedded the Nabaztag into everyday life, e.g. combining household tasks and interaction; (2) Participant C experimented with the Nabaztag and found ways to trick it, e.g. by using the spare keys when going out to get groceries;
Interaction	Participant A: used verbal communication when interacting with the Nabaztag, Participant B used non-verbal communication and Participant C used both. An example of non-verbal communication : waving;
PIIT	Participants A and B were early adopters [3]. Participant C belonged to the majority [3];
Relationships	Participant C did built a (not very strong) relationship with the Nabaztag, gave it a name, Harvey, found the rabbit enjoyable to use and interacted with it via both verbal and non-verbal behaviour.

Table 1. Schematic review of the results

DISCUSSION

First, although Participants A and B did not perceive utilitarian factors, they still wanted to continue usage of the Nabaztag in the following studies. Second, Participant C did show hedonic factors and was able to built a relationship with the Nabaztag. Therefore it is assumed that there is a relationship between these two factors. Third, regarding social factors, the results showed that: (1) all participants discussed the Nabaztag with family and friends; (2) Participant B tended to show the Nabaztag to family and friends. Participants A and C showed photographs of the Nabaztag to family and friends; These results imply that all participants did not see the Nabaztag as a simple piece of technology. (3) Participants A and C interacted individually with the Nabaztag the first time. This finding differs with [3] probably due to the fact that the data of the earlier mentioned studies were gathered in a public area instead of the domestic area. Participant B did not interact alone with the Nabaztag for the first time. This could be due to the fact that Participant B did not live alone like the other participants. Fourth, regarding general usage, the results showed that: (1) Participant C seemed to have embedded the Nabaztag into everyday life. This could be due to the physical place where the Nabaztag was situated in the participant's house; (2) Participant C experimented with the Nabaztag by tricking it. Similar results were found when studying usage of Roomba, a vacuuming robot, in domestic environments [2]. Fifth, regarding interaction with the Nabaztag, participants used verbal and non-verbal communication. This implied that human-human communication was used when interacting with the Nabaztag [4], namely that social rules guiding human-human interaction can be applied to human-computer

interaction. This could imply that human-human interaction can also be applied to human-robot interaction. Sixth, regarding the influence of PIIT Participants A and B, early adopters, did not perceive utilitarian and hedonic factors when interacting with the Nabaztag. Participant C, belonging to the majority in adoption of technology, did perceive utilitarian and hedonic factors. This could imply that Participants A and B had too high expectations about the Nabaztag, which could not be realized due to their personal interest in technology. Last regarding relationships, the results showed that Participant C was able to built a relationship with the Nabaztag. The results showed that relationship building seemed to be related to (1) naming the Nabaztag, (2) perceiving utilitarian and hedonic factors and (3) using both verbal and non-verbal behaviour when interacting with the Nabaztag. Participant C showed all these behaviors, while Participants A and B did not show these behaviors.

CONCLUSION

A limitation of this study was that the goal presented to the participants, to improve the health of the participants, was not accomplished for Participants A and B due to technological problems and a limited activity plan. The Nabaztag should be technically improved and the interactions related to the activity plan should be extended. Another limitation was the small number of participants. However, small, qualitative studies are an essential step to provide in-depth insight into this phenomenon.

This study yielded interesting insights which will be further explored in studies which are currently being undertaken: (1) to establish whether utilitarian-, hedonic- and social factors are important when accepting zoomorphic robots, (2) to explore the influence of the physical location where the Nabaztag is situated on acceptance and use, (3) to explore whether utilitarian-, hedonic and social factors are important for building a relationship with zoomorphic robots, (4) to explore the relationship between name-calling and relationship building and (5) the influence of using non-verbal and verbal communication on relationship building. Although there are still many interesting questions unanswered, this study provides a first understanding in the usage of the Nabaztag by elderly people in the domestic environment and relationship building with it.

REFERENCES

1. J. Forlizzi and C. DiSalvo, Service robots in the domestic environment: a study of the Roomba Vacuum in the home, *HRI'06* (2006), 258-266.
2. C. Nass, Y. Moon, B.J. Fogg, B. Reeves and C. Dryer, Can computer personalities be human personalities, *CHI1995 Mosaic of Creativity* (1995), 228-229.
3. E.M. Rogers. New product adoption and diffusion, *Journal of Costumer Research 2* (March), (1995), 290-301.
4. M. Shiomi, T. Kanda, H. Ishiguro an. N. Hagita, Interactive humanoid robots for a science museum, *HRI'06* (2006)