Exploring the effects of interaction with a robot cat for dementia sufferers and their carers

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Abstract— **Research has previously demonstrated the positive effects of robotic companion pets, but while this is important from a research perspective, their cost renders their widespread use currently unfeasible. This research seeks to explore the potential of an affordable robot, with a view to making a realistic difference in quality of life for people with dementia and their carers. Early research results involving participants in the community have proved very positive.**

Keywords—companion robots, dementia, assisted living

I. INTRODUCTION

This study is investigating the effect of interaction with a robot cat for people with moderate to severe dementia and their carers. The research builds upon previous research carried out on psychosocial effects of companion robots, previously undertaken in a care home setting. The background to this is that the health benefits of pet ownership are well known and have been reported in the literature as long ago as 1999 [1]. Companion animals can provide comfort and meaning to a person [2] but because they require care and attention, they may not be allowed in certain homes (sheltered accommodation for example) and an individual may be unable to make a commitment to own a live animal because of their condition and safety risks [3].

The most well-known studies undertaken in the field of companion robots identify the benefits of interacting with a robot seal, known as Paro [4]. The results show that robots can encourage communication between care home residents [5, 6], and have a positive effect on loneliness among residents in a residential care facility [7]. Also, increased activity during sensory group therapy and older people with dementia has been observed [8].

Most of this previous research has taken place in a controlled environment with multiple residents over a short period of time. Our study involves individual interaction over a longer period. Also, the robot seal is extremely expensive (over £4,000 at the time of writing this paper), whereas the robot cat used in our study costs less than £100. Although the cat is much less sophisticated in its functionality, it has a range of interactive elements that may engage a human pet lover, such as reacting to stroking with purring and animation, and sensing movement nearby with responsive *miaow* calls.

II. METHODOLOGY

The ongoing study is taking place over a 6 month period involving 10 participants living at home with dementia and their carers. We are currently into the second month of this work, so are able to report early research indications.

At the beginning of the study, a quality of life tool was administered (QOL-AD) to test the carer's and the person with dementia's perceived quality of life [9]. At this point, the cat was introduced to the participant and family.

The QOL-AD tool is a validated tool that elicits the quality of life of the carer and person with dementia in two separate documents. It was initially anticipated that administering this tool would give a quantitative element to the research that could facilitate triangulation with the qualitative data obtained from in-depth interviews with the carers, where they are encouraged to tell their story, including with the aid of other media if available (e.g. photographs).

At the end of week one, the carers were contacted to ask how the cat was being used and at what times of the day. They were also asked whether the person with dementia was still interacting with the cat. This was also done at the end of week two and an appointment made to interview the carer and to administer the QOL-AD tool at the end of week three. Unfortunately, following initial piloting of the tool, it has been considered to be inappropriate for the present study, as it is not focused enough for our purposes. We are currently considering alternative tools.

Towards the end of this study, participants will be re-visited on one more occasion, where their whole experience over this period will be evaluated.

III. EARLY RESULTS

Given the nature of the robots and previous research that has supported robot animals in care homes, it is hypothesized that the participants and their carers will feel a growing attachment to the cats, and may derive benefit from their 'company' and presence in the home. Whether this has an impact on the quality of the participants' lives is less certain, and this study aims to identify this.

Asking the carers about their experience of having the cats in the home is interesting, since it is not known whether there will be a sense of ownership of the cats in the same or a similar way to owning a live pet, but 'sense of attachment' is being evaluated in this study, as we consider it would be unethical to remove the cats at the end of the study in case of attachment.

So far, five cats have been distributed to participants who have volunteered for the study. Two of these were returned, as the participants felt unable to bond with them. This rejection was fairly immediate. Of the three remaining participants, all of them have accepted the cat, and it is clear from the second round of interviews that a progressive companionship is developing.

One participant in particular, has been reported by their family and carers as experiencing an enormous positive change since being given their robot cat (fig. 1). She is getting up better in the mornings, interacting with other people more, as well as with the cat. She picks it up, strokes it, and treats it as her companion. It is interesting to note that the three (thus far) successful experiences with the cats are with people who had pet cats in their earlier lives, and who have always been known as cat lovers. The two participants who rejected the cats were not previously 'cat people', although one relative enquired whether there was a similar dog robot as the participant was more of a 'dog person' (there is, but this is outside the scope of this study).

Fig. 1.   Robot cat with proud new owner (images used with permission).

Another participant has taken to her cat, even though she knows it isn't real. She has anxiety issues, and has found that stroking and petting the cat produces a calming effect when she feels anxious.

Our preliminary results indicate a positive effect on the participants' well being. Interaction with the cat has increased conversational interaction, and has acted as a comforting distraction by relieving distress.

IV. Future Work

Our research with this affordable robot cat is continuing. One of the aims of this work is to consider a minimum viable product that is programmable and can be adapted or enhanced for individual needs e.g. reminders, communication, and monitoring, if so required.

This is the focus for future technical research and development, as strictly speaking, the cats used in this study are not robots in the purest sense of the definition, according to the Oxford English Dictionary:

"A machine capable of carrying out a complex series of actions automatically, especially one programmable by a computer."

If however, the affordable option provides companionship for some dementia sufferers, and helps to improve their quality of life, we will regard our research as a success and a contribution to the field we define as 'Companotics': *the research and development of computerized companion devices, especially companion robots.*

REFERENCES

[1] Raina, P., Walter-Toews, D., Bonnett, B., Woodward, C. and Abernathy, T, "Influence of companion animals on the physical and psychological health of older people: An analysis of a one-year longitudinal study." Journal of the Americal Geriatrics Society vol. 47, pp. 323-329, 1999.

[2] Baun, M. and Johnson, R, "Human–animal interaction and successful ageing." in: Fine, A (Ed) Handbook on animal-assisted therapy 3rd Ed. San Diego CA: Academic Press, 2010.

[3] Cherniak, E.P. and Cherniak, A.R, "The benefit of pets and animal-assisted therapy to the health of older individuals." Current gerontology and geriatrics research, Article ID 623203, 2014.

[4] Broekens, J., Heerink, M. and Rosendal, H, Assistive social robots in elderly care: a review. Gerontechnology 2009; vol 8(2), pp. 94-103.

[5] Wada, K. and Shibata, T, "Living with seal robots – its socio-psychological and physiological influences on the elderly in a care house" IEEE transactions on robotics, vol. 23 (5), pp. 972-980, 2007.

[6] Wood, N., Sharkey, A., Mountain, G. and Millings, A, "The Paro robot seal as a social mediator for health users." in 4th International Symposium on New Frontiers in Human-Robot Interaction, 21-22nd April 2015 Canterbury UK.

[7] Robinson, H., Macdonald, B., Kerse, N. and Broadbent E, "The psychosocial effects of a companion robot: a randomized controlled trial.", Journal of American Med Dir Assoc. vol. 14(9), pp. 661-7.

[8] Chang, W-L. and Šabanović, S., "Studying Socially Assistive Robots in Their Organizational Context: Studies with PARO in a Nursing Home." in Proceedings of the ACM/IEEE International Conference on Human-Robot Interaction Extended Abstracts (HRI'15 Extended Abstracts), pp.227-228, 2015.

[9] Logsdon R., Gibbons L.E., McCurry S.M, Teri L. Quality of Life in Alzheimer's Disease: patient and caregiver reports. J Ment Health Aging. vol 5, pp 21–32, 1999.