Virtual Partners for Seniors: Analysis of the Users' Preferences and Expectations on Personality and Appearance

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Abstract. This paper investigates the preferences and the expectations of end-users related to the appearance and personality of a Virtual Support Partner (VSP); namely an Embodied Conversational Agent (ECA) that attends to the daily activities and safety needs of the seniors. The results presented in this paper, reveal that end users are in favor of an emphatic, emotional and friendly companion, preferably represented by a human-like or an animal-like body, that provides to them both social support and assistance through a guiding attitude.

Keywords: Embodied Conversational Agents, Virtual Partners, End-Users, Seniors, Caregivers, User-Centred Design.

1 Introduction

In the last years, different efforts have been undertaken to provide technological solutions for supporting seniors to remain longer independent and active at home [1,2]. In this line, Embodied Conversational Agents (ECAs) found application as supporting partners for seniors in several assistive systems. ECAs are computer-generated characters that demonstrate many of the same properties as humans in face-to-face conversation, including the ability to produce and respond to verbal and non-verbal communication [3].

Research shows that ECAs have the potential to help seniors in various ways: i) preventing loneliness and social isolation [4,5], ii) acting as a motivating factor for performing daily activities at home, thus remain active for longer, iii) stimulating social participation [6] and iv) facilitating a continuous and 'healthy' interaction with the system [7]. All these factors, improve the quality of life of seniors and help prolonging their autonomy, with positive consequences, in their everyday life.

The benefit of ECAs as supporting mediums, is primarily their capacity to simulate a face-to-face conversation; a skill that many seniors retain, even if they suffer signif-

icant cognitive impairment [7]. Face-to-face dialog incorporates a vast range of non-verbal and para-verbal behavior to enrich semantic content redundantly with speech, enabling impaired individuals (e.g., hearing) to compensate by exchanging superfluous information in a different way (e.g., hand gestures). In addition, the human-like appearance of an ECA, can also play a crucial role in facilitating the development of a relationship of trust with the users and allowing for a more personal interaction [8].

This research is part of the Miraculous-Life (ML) project. ML aims at designing, developing and testing an ECA, the Virtual Support Partner (VSP), which attends to the daily activities and safety needs of seniors in their everyday lives. This paper presents and discusses the results of a study performed to identify the preferences and the expectations of end-users related to the appearance and personality of the VSP.

2 Methods

A comprehensive study on the needs of the primary (i.e., the seniors that were going to actually use the system) and secondary (i.e., seniors' formal and informal caregivers) end-users was performed at the beginning of the ML project. A questionnaire was administered to a group of seniors (n = 15; mean age = 79.7; 9 females and 6 males) and a group of formal and informal caregivers (n = 22) from MRPS (Switzerland) and Zuyderland (former Orbis Medisch en Zorconcern) (Netherlands), with the aim of identifying (1) the social and daily activities of the senior population, (2) the preferences related to the functionalities and the services offered by the ML solution and (3) the expectations related to the personality, the appearance and the behavior of the VSP. All participants signed an informed consent form and had the right to discontinue their participation at any time without any repercussions.

This paper focuses on the personality, the appearance and the behavior of the VSP and presents the results on six multiple-choice questions that were asked to both seniors and caregivers in order to investigate their preferences. Note that missing data and questions with multiple answers were not taken into account during the analysis.

3 Results

According to the replies we received, seniors would prefer the VSP to take the role of a friend or a companion (36.36%), followed equally by a member of the family, a personal assistant at home, others roles (18.18% accordingly) and lastly by a personal caregiver (9.09%). Caregivers, on the other hand, would prefer the VSP to take the role of a personal assistant at home (40.91%), followed by a friend or a companion (22.73%), others roles (18.18%), and lastly equally a member of the family and a personal caregiver (9.09% accordingly). With respect to the preferred VSP's personality, seniors suggest the VSP should express a friendly/cheerful informal attitude (61.54%) followed by a neutral/professional attitude (23.08%) and a person dependent personality (e.g. act like friend Maria, act like my spouse; 15.38%). Similarly, caregivers would prefer a friendly/cheerful informal attitude (54.55%) followed by a

person dependent personality (27.27%), a neutral/professional attitude (9.09%) and others personalities (9.09%).

Seniors (100%) and caregivers (81.82%) share the same opinion for a preferred VSP's attitude: they would strongly prefer a guiding VSP (i.e. the VSP helps the elderly to decide what he/she should do by giving him/her advice) over a directive one (i.e. the VSP just tells the elderly what he/she should do). On the other hand, according to a Chi-Square test ($X2 = 4.15$, $df = 1$, $p = 0.04$), a significant difference between seniors' and caregivers' preferences was observed on the interaction mode: 66.67% of the seniors would prefer a passive VSP (i.e. only the end-user is able to initiate a conversation with the VSP), while 72.73% of the caregivers would prefer a proactive VSP (i.e. the VSP is able to initiate an interaction with the user).

Most seniors and caregivers would prefer the VSP appearance to be human-like (61.54% and respectively 81.82%). The animal-like agent solution was preferred by only 30.77% of the seniors – and none of the caregivers. Surprisingly, no participants selected the cartoon-like option. Note that these results were not in line with the preferences expressed by seniors when they were shown mock-ups of different human and animal-like agents: the rabbit (4.31 ± 2.36) and the bear (4.11 ± 2.32) were the most appreciated VSP's body followed by the human-like bodies (woman: 3.43 ± 2.47 and man: 3.36 ± 2.37). Interestingly, as for the preferred VSP's gender, caregivers would prefer a female VSP (61.90%), followed by a male (23.81%); while seniors did not express any particular preference regarding the gender of the VSP (female = 30%, male = 30%, other = 40%).

4 Conclusion

ECAs that will interact with their users for extended periods of time require special design considerations compared to systems that are either only used for brief interactions or do not engage their users in social interactions [7]. The results of our study highlight the importance of the VSP's "social intelligence" (i.e. personality, attitude, and aspects of face-to-face interaction). The VSP's verbal and non-verbal behavior should also be designed in order to fit a supportive and a cheerful attitude, suggesting that an empathic and emotional VSP represents an added value to the end-user's experience. Moreover, according to the seniors, the VSP should play the role of a companion or a friend. Then again, caregivers tend to prefer the role of a personal assistant, suggesting that the VSP should provide both social support and assistance at home, meeting thus the needs of both primary and secondary end-users. Consequently, a VSP characterized by emotional understanding, sharing and offering guidance for executing daily activities, are main factors of keeping seniors positive.

Our findings are in line with a recent qualitative study [9] exploring perceptions and expectations about virtual assistive companions, however, our study provides additional evidence that seniors do acknowledge the potential benefits of introducing ECAs in their daily living context. Also, similarly to our study, senior participants in [9] emphasized the importance of human-like communication and behavior, namely natural language and synchronized nonverbal conversational behavior (i.e., facial

expressions). In addition, behavior traits such as being non-intrusive, considerate, proactive and controllable were considered important. Psychologists participating in the study, cited that from a clinical perspective it is important that an ECA is "guiding", rather than "directing" the seniors, and "reminds" them to perform tasks on their own, rather than acting on their behalf, as this would have the effect of undermining rather than increasing their self-confidence and independence.

Finally, although several ethical issues are commonly raised regarding the use of human-like "socially intelligent" computer-generated characters, particularly for the sensitive population of seniors, we believe that if carefully designed, ECAs can be used to provide cognitive and emotional support as well as to improve socialization and social inclusion of the seniors. The results of this study will act as a catalyst factor and guide the definition of technological development and support provided to seniors, through a VSP in the context of ML project.

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