Acceptability of a Robotic Agent in Older People using ICT ability

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ABSTRACT

Objective: This research is aimed to promote the use of robotic agent among older people by providing analysis of robotic agent in various acceptance factors. Background: Due to the increase of older adult population, having the ability to independently participate in social activities for older people has been recognized as a solution to problems arising in the aged society. Since it is not required to utilize an input device to use a robotic agent, the control method is intuitive, allowing older people to interact easily without prior experiences with ICT. Method: In this experiment, with the use of text-to-speech program, eight topics of conversations were pre-recorded. Conversational interaction was allowed by voice transmission through computer from speaker by experimenter. Seven-point Likert scale was used to measure the acceptability of robotic agent and the ICT ability of the subjects. Results: From the research, in order for the older people to perceive robotic agent as a social presence, an improved design of the robotic agent that can increase the trust must be developed. Furthermore, it is also essential for older people to realize the usefulness and sociability of robotic agent. Conclusion: With the use of robotic agent, various acceptance factors were analyzed among older people in this research. Robotic agent would provide various opportunities in conversations in certain situations when one is having difficulty controlling devices and for people with disabilities.

Keywords: Robotic agent, ICT ability, Acceptance, Older people, Human Computer Interaction

1. Introduction

The population of older people is continuously increasing with the development of medical technology. In an accelerated aging society, older people’s independence and participate in social activities is an important factor to solve the problems in the aged society (Gordon, 1993). In recent years, a number of assistive devices have been actively researched to assist older adult’s social isolation and loneliness due to loss of social position and role. Among the various input method to manipulate such devices, the interface using voice recognition have the advantage of being easy and natural to access (Portet et al., 2013). Since the robotic agent using voice recognition does not need a special input device, the way of input is intuitive and the adaptation of the interaction method is relatively easy even for older adults who have little experience with existing Information and Communication Technology (ICT). The purpose of this study is to analyze how each factor of acceptance is perceived by the older adult in order for interactive agents to be actively used among older adults. In addition, it was studied that the tendency-positive or negative-of acceptance factors differs according to the abilities of older people using ICT.

2. Method

There were 51 subjects (23 males and 28 females). The age range was from 60 to 82 (average age was 70). The ICT ability of the subjects and acceptance of robotic agent was measured through a survey applying 7 point Likert scale. The ICT ability was measured
through five factors including the attitude, technical ability, cognitive ability, social-emotional participation, and satisfaction towards ICT (Ng, 2012). For the acceptance of robotic agent, eleven factors were measured. These include anxiety, attitude towards using the robot, intention to use, perceived adaptability, perceived enjoyment, perceived ease of use, perceived sociability, perceived usefulness, social influence, social presence, and trust (Heerink et al., 2010).

In the area of the subjects, a speaker functioning as robotic agent was placed and a computer was placed in the area of experimenter to transmit the recorded voice file to the speaker. The experiment site was set for the experimenter to hear the voice of the subjects over the partition and send a voice file accordingly from computer to the speaker to keep conversation flowing. The Wizard of Oz method utilized in this experiment was designed for the subjects to believe that the automatic system through robotic agent allows a conversation to happen (Portet et al., 2013).

The experimental device introduced to the subjects was NU100 by SK Telecom. In this experiment, we removed the voice recognition function and only utilized the device as a speaker. The equipment and experimenter’s computer were synchronized and through Bluetooth allowing to provide the pre-recorded voice.

Considering the fact that the order of the topics might impact the experiment result, the order of conversation topics was randomly assigned using a table of random numbers. After finishing one topic, the subjects were asked to fill out a survey regarding the acceptability of robotic agent. Upon completing the experiment of hearing the conversation topics, subjects were then asked to complete a survey regarding ICT ability.

3. Results

3.1 ICT ability

Based on the research data of ICT ability, we conducted cluster analysis. Consequently, the research data of ICT ability were separated as two parts; cluster A which have high ICT ability and cluster B which have low ICT ability. There were 38 participants in Group A and 23 participants in Group B. To compare the difference among the five factors of ICT ability according to cluster groups, t-test was conducted. Cluster A showed significantly high effect on two factors; attitude and satisfaction regarding ICT (p<0.05). No significant difference was found in other factors, such as technical, cognitive, and social-emotional factors.

On the contrary, cluster B showed significantly low effect on three factors; technical, cognitive, and social-emotional regarding ICT (p<0.05). Therefore, from the results it is evident that technical, cognitive, and social-emotional factors of ICT ability were the main factors that distinguish Cluster A and B, while attitude and satisfaction ICT ability were not the factors that divides the two clusters.

3.2 Acceptance

To compare the difference among the eleven factors of acceptance according to cluster groups, t-test was conducted. Cluster A showed significantly remarkable negative effect on factor social presence which demands the subjects to perceive robotic agent as social presence (p<0.05). Similarly, a trust factor, whether or not the subject trust the robotic agent, has significantly remarkable negative effect. And there were positive effects from the factors of attitude towards using the robot and perceived ease of use (p<0.05). Meanwhile, there was no significant difference in other factors, such as intention to use, perceived adaptability, and perceived sociability.

Cluster B showed significantly remarkable positive effect on perceived sociability factor which asked if participant commune with robotic agent socially (p<0.05). Similarly, a perceived usefulness factor has significantly remarkable positive effect (p<0.05). And there were positive effects from the factors of perceived enjoyment and social influence which asked if the robotic agent has a value to be seen around the acquaintance (p<0.05).

4. Conclusion

This study investigated the acceptance of robotic agent for older people using various factors. The result
of this experiment contributes to establishing guidelines for robotic agent development in interaction design. Future works will investigate the usability and affective factors to induce the use of the robotic agent. Robotic agent would henceforth function as an opportunity not only for older people, but also for situations when controlling certain body parts is difficult, and for users with difficulty controlling devices with certain body parts.

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References


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