Chapter 26
Avatars and Robots as Social Companions in Healthcare: Requirements, Engineering, Adoption and Ethics

Lundy Lewis
Southern New Hampshire University, USA

ABSTRACT

Elder care is of increasing global concern. The aging population is expected to increase two-fold by 2050. It is anticipated that there will not be enough caregivers to assist the elderly very soon, and thus researchers and entrepreneurs are looking at various types of information systems (IS) that will help alleviate the challenges in elder care. This paper examines one such IS: conversational agents in the form of avatars or robots as an aid to (i) decrease loneliness and depression among the elderly, (ii) increase cognitive function and quality of life, and (iii) generally help manage patient care. We discuss the state-of-the-science of research prototypes and commercial off-the-shelf ISs. We propose a novel concept and design, and we discuss the ethical ramifications of elderly patients possibly bonding with inanimate objects as if they were human companions.

INTRODUCTION

Socialization through narrative and story-telling is important for elder care and quality of life. The elderly enjoy reminiscing and communicating. They enjoy being reminded of past experiences and having conversations with other interested parties such as family and friends about their life history or particular life events. However, there are common reports of frustration that caregivers who are around on a daily basis do not know the elderly person in the way that families do and thus cannot engage in such meaningful conversation. Further, with staff turnover, it is difficult for a single staff member to get to know the patient well enough to provide meaningful conversations about the older person's life history or to generally bond with the patient. And further, due to advances in healthcare, a better understanding of living healthy, and birthing trends, in the next few decades there is expected to be a large number of

DOI: 10.4018/978-1-5225-2237-9.ch026

elderly patients but fewer professional caregivers, thus reducing the amount of time that caregivers can spend with individual patients beyond the provision of essential services. This prediction holds for all developed countries, most notably for Japan.

To make matters worse, young students in psychology, sociology, nursing, and related disciplines are less interested in elder care than in areas such as child development and disability management. For these reasons, a current interest among researchers and entrepreneurs is to develop ways to allow the elderly patient to enjoy narrative, conversation, and reminiscing without requiring human accompaniment but yet without diminishing the quality of conversation, e.g. by using avatars or robots rather than human caregivers. The idea is worthy of pursuit, but it is a hard problem. A good resource that explores how avatars and robots will be used in the next ten to fifteen years is (Robots+Avatars, 2014). In particular, the resource (Robot-Era, 2014) provides information on research in robotic systems and intelligent environments for the aging population.

Many people will argue that human touch is essential and indispensable for elderly care, where by "human touch" we mean proximity and sympathy with another human being. Others will argue that even if one were able to substitute human touch with some technological device, it would be unethical to do so.

This paper will explore socialization through narrative from perspectives of both technological possibility and ethical ramifications. In particular, the paper discusses the possibilities of technologies such as avatars and robots to provide the service of narrative and human touch effectively, i.e. to provide an experience that is at least as acceptable, albeit not identical, to traditional family-oriented conversation.

A challenging question from a technology perspective is how to structure personal knowledge regarding the patient's interests and experiences into an avatar or robot, called *knowledge representation* in the Artificial Intelligence community. A second challenge is how to extract knowledge and insert it into the structure, called *knowledge acquisition*. Clearly, the apparatus must know about some of the patient's history and local or global events occurring during the patient's lifetime and be able to converse interactively with the patient about them. A possible approach is that the elderly person or her/his family could work though exercises or games in which participants answer questions regarding past experiences. This could be assisted by family, care staff, or students on placement. Answers to the questions could be compiled into a composite view of the person's experiences.

A benefit of this approach to knowledge acquisition is that the process itself may enhance family involvement and personalized care that does not require additional resources or specialized skills. In addition, the same knowledge could be inserted into a humanoid robot whereby the robot converses with the elder person, laying aside for now the question of whether the approach is ethical.

Beyond the knowledge of personal experiences, there could be a standard, public ontology for various geographical locations, events, or time periods that the patient would know about, and to which the avatar could appeal when engaging the patient in conversation (Pradel et al., 2010). As an example, for a patient in the United States, an ontology describing basic facts about the assassination of President John F. Kennedy and the appointment of Lyndon B. Johnson to the presidency could be a standard ontology or knowledge store. Or, an ontology that contained geographical and temporal facts and relationships about Atlanta Georgia might be useful. An avatar could then use this knowledge to converse with the elderly person in a meaningful way.

Consider a possible embodiment of the avatar to be a cyber-relative of the patient. The patient would be interacting with a representation of a cyber-relative in the form of an avatar, where the avatar has the appearance of the real relative and has knowledge to converse about things relevant to the patient. However, the approach raises ethical concerns, e.g. is the patient being deceived and if so, is it morally