Features for Culturally Appropriate Avatars for Behavior-Change Promotion in At-Risk Populations

Christine LISSETTI

Affective Social Computing Laboratory, School of Computing and Information Sciences, FIU, Miami, USA

Abstract. We explore how avatars can be used as social orthotics defined as therapeutic computer-based social companions aimed at promoting healthy behaviors. We review some of the health interventions deployed in helping at-risk populations along with some of the unique advantages that computer-based interventions can add to face-to-face interventions. We posit that artificial intelligence has rendered possible the creation of culturally appropriate dialog agents for interventions and we identify specific features for social avatars that are important – if not necessary – when applied to the domain of social orthotic systems for health promotion.

Keywords. Cultural Avatars, Embodied Conversational Agents (ECAs), Computer-Assisted Health Interventions, At-Risk Populations.

Introduction

Embodied Conversational Agents (ECAs) or avatars have been proposed as a natural computer interface for humans because of their anthropomorphic form and their potential functionalities – from anthropomorphic expressive abilities to dialog possibilities [1-3] which necessitate little or no effort for humans to understand. One context in which ECAs might prove useful is in computer-based therapeutic interventions that assist the human therapists. In this domain which has been under-explored [4], avatars might offer a promising potential if their social realism is addressed appropriately along with their abilities to adapt to the specific needs of different patients. Indeed mental illness has been identified as the second leading cause of disability and premature mortality in the developed world. Yet the majority of people suffering from treatable mental health disorders do not have access to the required treatment. Similar statistical data can be found about at-risk people (e.g. substance abuse, HIV/AIDS). Computer-assisted (mental) health interventions and computerized interventions might be able to address this imbalance [4]. If designed properly and evaluated as efficient, social orthotics – defined as therapeutic computer-based social companions aimed at promoting healthy behaviors – could potentially complement regular therapeutic sessions. Patients could interact daily (or as needed) with their artificial agents which (or who) are personalized to their specific disorder(s), between the scheduled weekly sessions with their therapist.
1. Current Interventions for Motivating Behavior Change of At-Risk Individuals

One type of intervention documented for encouraging preventive behavior toward HIV/AIDS or substance use is referred as brief motivational interviewing (MI). Unlike more traditional confrontation-of-denial counseling, motivational interventions are intended, through support and persuasion, to increase the likelihood that people will make changes in their behavior toward healthy habits. It typically involves a brief assessment followed by feedback about the assessment results [5]. Sexual risk reduction interventions have proven most beneficial if they can individually tailor behavior change messages.

Tailoring involves the use of the participant’s name (personalization), characteristics of the user such as gender (adaptiveness), or self-identified needs of the user (feedback-provision). Tailoring can also be dialog-based by asking the user about their goals and by recommending choices about how to best achieve these goals. The key is that the personalized, adaptive, or feed-back based tailored messages are more effective in promoting attitude and behavior change than the generic ‘one size fits all’ content delivered by print or to groups [6]. Although additional studies are needed, a brief individualized computer-delivered sexual risk reduction intervention study [7] has documented the risk reduction potential of interventions via computers for adolescents.

In a similar manner than computer-based interventions can be designed to assist in motivating drug users to change some of their behavior (via web-based interventions with avatars) [8], computer-based interventions can be designed to educate at-risk population about AIDS/HIV. There is a need to teach at-risk individuals about the motivation to use protective means available, and about their own self-efficacy at negotiating risk reduction behaviors, once private information about specific current behaviors has been collected. When revealing sensitive private information, participants have been found to be more candid with automated data collection systems than when interacting with a human interviewer [9, 10].

2. Features for Embodied Conversational Agents as Social Therapeutic Helpers

Based on the observations above and the latest progress in artificial intelligence, we posit that because ECAs can be designed to (1) be personalized to a user with a user-model, (2) be highly adaptive in terms of characteristics (e.g. gender, race, culture, language), (3) gather and remember feedback voluntarily given by a user, (4) have deep knowledge of a domain with specific expert-systems, and (5) be able to engage in meaningful dialog, they might be ideal to assist in delivering tailored health information to at-risk populations. In addition, the possibility to run them on a variety of communication technologies (e.g. internet-based platforms, PCs) including mobile phones [11,12], so that their accessibility and availability becomes quasi limitless, augments considerably their potential impact for at-risk populations, in a “window of opportunity” situation (substance-related arrest) during which motivation to change may be especially malleable [13].

Next, we identify specific features of ECAs that are important – if not necessary – to include in the design of social orthotic systems or computer-based interventions for health promotion behavior.

User-Modeling which combines Artificial Intelligence pattern recognition with high-level interpretation of a user’s habits and behaviors can be used to build a profile
of a specific patient [14]. This can include (a) the result of a personality test taken once by the patient to determine the major traits of its personality, (b) the preferred patient’s avatar identified either directly by the patient or inferred by the system based on the patient’s ethnicity, age, and/or personality, (c) the time and type of interaction preferred by the patient, e.g. short reminders, dialogue with avatar over the internet, dialog over a mobile phone, other multimedia delivery. The user-model can be remembered and reloaded when interacting with the corresponding patient, and used to guide the future interaction accordingly.

Dialog Abilities: A number of studies have pointed out that one of the limits of computers for psychotherapy lies in their partial ability to adequately interpret natural language inputs [10]. Whereas latest progress in natural language processing in general and in social dialog abilities of ECAs in particular [15] have been increasing ECAs dialog abilities steadily, full natural language understanding is still not within reach. However, given the domain-specific nature of our avatar-based health interventions which follow semi pre-determined scripts, meaningful interventions can be designed without full natural language processing abilities.

Believability and Engagement: The last few years have seen considerable progress in animating virtual characters via mark-up languages, making it more feasible to have text-to-speech scripted interventions [16, 17]. While issues of synchronization between text and speech as well as vocal expressiveness of the ECAs (usually very monotonic and not credible) still need to be addressed, some interventions involving partial scripted spoken interventions mixed with other modalities (screen shots, reminders) can be designed for substantial impact [8] in the domain of health promotion.

Empathy: Empathy is considered the most important core condition in terms of promoting positive outcomes in psychotherapeutic contexts [18, 19]. Specific communication skills used by physicians – including strategies for conducting patient-centered interviews and relationship development – have not only been associated with improved adherence to treatment [20, 21] but also to improved physiological outcomes. In particular, empathy is considered the most important core condition in terms of promoting positive outcomes in psychotherapeutic contexts [22]. Furthermore, [23] observe that virtually all major schools of counseling note the importance of empathy in the counseling process. Recent progress in ECA facial expression [24] and vocal intonation synthesis are making it possible to envision an ECA capable of displaying empathy, which in its simplest affective form simply involves displaying the same type of affect as someone (which can be assessed via direct prompting “How do you feel today?” or via emotion recognition algorithms). The more complex cognitive empathy which entails understanding the inner state of another would require more complex processes than mirroring affective expressions.

Ethnicity: Ethnicity was previously assessed as having meaning beyond arbitrary representation, in a study that established that the same words meant different things when coming from an ECA that had similar ethnicity as opposed to a different one. The results provided strong evidence for surprising similarities in the way people respond to ethnicity in ECAs and in humans. We have therefore created a template of avatars, (shown in Figure 1) representing different ethnic background [24].

Personality: Personality was also found to be of importance in establishing believability [25]. Personality dimensions could be added to the avatar model corresponding to long-term personality traits (stable or slow changing patterns) guiding attitudes and responses to events.
Hardware Platforms: New uses of mobile technologies are being studied [11, 12]. As shown in Figure 2, we envision an individualized ECA ‘pal’ companion available at all times on the portable device of patients that can provide them support if and when needed as a complement of counseling.

3. Conclusion

We have proposed a highly accessible type of computer-based therapeutic interventions for behavior change of at-risk populations which represents an interesting complement to what virtual reality has brought to the field of psychotherapy [26].

Acknowledgements

Part of this research was funded by a Marie-Curie grant from the European Commission.

References


