
Cultural and Linguistic Adaptation of Relational Agents for Health Counseling

Langxuan Yin

Timothy Bickmore

Donna Byron

Northeastern University
360 Huntington Ave, WVH
Boston, MA 02115 USA
{yinx,bickmore,dbyron}@ccs.neu.edu

Dharma E. Cortés

Cambridge Hospital
Harvard Medical School
Cambridge, MA
dharma_cortes@hms.harvard.edu

Abstract

Computer-based systems for health education and behavior change are becoming widely used in health care, but systems targeting specific cultures other than Anglo-Americans are few. We describe our methodology and experiences adapting a conversational health counseling agent for older Latino adults, the implications for automated patient-facing health systems, and directions of future research.

ACM Classification Keywords

H5.2. Information interfaces and presentation: user interfaces – Graphical user interfaces (GUI), natural language, user-centered design

Introduction

Culture is important in health education and behavior change interventions. In face-to-face interactions, many studies have demonstrated the importance of cultural congruity between health providers and their patients. For example, health counselors from a patient's own culture are usually "deemed more desirable because of their presumed familiarity with the cultural values" [2]. Culture is also important in print-based interventions, with several studies showing that

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Figure 1. The interactive interface of the system featuring Carmen

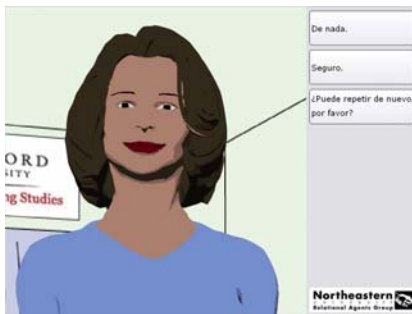


Figure 2. A close-up look of Carmen

health-related content tailored to a particular user is more effective than standard materials in promoting behavior change [3]. Although culture is becoming an increasingly important research focus in HCI, little work has been done on cultural adaptation of computerized patient health interventions, and particularly those delivered by conversational agents.

In this work, we present our experience in adapting a relational exercise promotion agent originally designed for older Anglo adults [4] for a population of older Latino adults. Relational agents are conversational agents designed to build and maintain long-term social-emotional relationships with their users, and, in the healthcare context, leverage these relationships to increase adherence to health regimens.

A relational agent to promote walking among older Latino adults

In collaboration with Dr. Abby King at the Stanford School of Medicine we developed “Carmen” as a relational agent that promotes walking among older Latino adults (Figures 1 & 2). Carmen runs in a kiosk in a community center in San Jose, and is designed to talk to people several times per week about their walking behavior, measured by pedometers. In a typical ten-minute conversation, Carmen greets the user, follows up with brief social chat, then uploads the user’s walking steps from their pedometer and discusses their walking goals. At the end of the session, Carmen says goodbye and walks off the screen. Carmen can talk with users in either English or Spanish.

LINGUISTIC ADAPTATION

Since most members of the development team did not speak Spanish, the dialogue content of the system was

first developed in English and thoroughly tested before translation into Spanish. As the target population is one with low health literacy, literal or “word-for-word” translation of the dialogue was avoided, and complex terms were broken down to simpler but longer phrases in order to convey the sense and meaning of the dialogue originally developed in English. When the translation was complete and implemented in the dialogue system, both versions were placed in parallel in the system so that the agent could switch between the languages based on user preference.

Prior to the development of Carmen, we conducted literature reviews on nonverbal behaviors of Latinos and analyzed videos of a Spanish-speaking Latino researcher counseling members of the target population about their exercise behavior. After detailed analyses of several dialogues and accompanying nonverbal behavior, we concluded that the rules used to generate nonverbal behavior for our Anglo English-speaking agent did not need to be modified. This decision was confirmed by having several Spanish speakers review the conversational behavior of the agent. There were, however, some behaviors that we observed that could not be implemented in our system, including touching.

CULTURAL ADAPTATION

Hofstede’s cultural dimensions research shows the Latino culture is high in power distance and collectivism [1]. Much of the dialogue content from the original project that Carmen is based on was adapted to match the Latino culture on these dimensions. For instance, Carmen’s coaching strategy puts an emphasis on walking with friends or with other walking partners (emphasizing collectivism). Also, appeals to authority,

such as healthy behavior recommendations framed with “experts say” in the English system, were reworded or removed to increase the counselor’s affinity (emphasizing power distance) [2]. Latino music well-known to the community, such as “El electricista” and “Pasito Tun Tun”, is also played when Carmen walks on and off the screen, as well as at other appropriate points.

RELATIONAL ADAPTATION

Having the agent demonstrate cultural congruity [6], through any means, improves solidarity and like-mindedness, which should boost rapport and trust with users. In addition, we extended the system so that limited information about users’ lifestyles (e.g., culturally appropriate leisure time activities) and social networks (e.g., names of friends and family members) could be input to the system at enrollment time, enabling the agent to refer to these in dialogue. Reference to social networks is especially important in collectivist cultures. Reference to this information by the agent demonstrates mutual knowledge, knowledge of users’ personal lives, and integration into users’ social networks, which should all serve to decrease social distance with users

PILOT STUDY

An evaluation study has just been completed with forty participants aged 55 and over. Those in the intervention group were asked to wear pedometers daily and check in three times a week for four months with Carmen. Half of participants chose to conduct their counseling sessions in Spanish.

Preliminary results indicate that intervention group participants talked to the counseling agent an average of 1.1 times per week, and retention in the intervention group over the four months was 95%. Anecdotal feedback about the agent and the walking intervention was very positive. Intervention participants increased their step counts by an average of 1,276 steps per day over their baseline at enrollment. Comparisons to the control group are still underway.

LESSONS LEARNED

Cultural differences can be very subtle and difficult for non-members of a culture to even perceive, thus increasing the importance of participatory design with members of the target population. Two obstacles prevented us from using these methods as much as we would have liked in our development: lack of access to the user population due to geographic constraints, and the fact that most of our development team did not speak Spanish. Future efforts should take care to address both of these issues.

Holding off the translation until the system is completely tested in one language turns out to be a successful approach. However, the translation process required several iterations. Since most users in the target population have low health literacy, some of the original Spanish translation had to be revised to improve readability, generally by breaking complex wordings into longer phrases. According to one of our translators, it would be helpful if translators could review the scripts to spot discrepancies before the English system is finalized.

User feedback in the study shows that participants felt sad when Carmen joked about herself being trapped “in

the box" (of the computer), and when she says she is staying "in the box" over the weekend. The participants expected Carmen to be able to walk freely, and have friends to hang out with during the weekend. We initially restricted Carmen to talking about herself as a computer since we were worried about the potential dishonesty perceived by the participants, but a recent experiment shows that in this context, first-person human autobiographical stories can in fact increase engagement without users feeling deceived [5].

Future work

As an initial attempt at the cultural-specific design of health counseling systems, we integrated counseling strategies based on Hofstede's theory. Two of the five dimensions defined by Hofstede, namely power distance and individualism vs. collectivism [1], were explored in this system, although power distance plays less of a role due to the specific context of the dialogue. One direction of future work is to develop guidelines for

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Citations

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cultural adaptation of a counseling agent between any two cultures, by identifying the modifications required for movement along any of Hofstede's five axes.

Another important research question is the individual impacts of language and cultural congruity on outcomes for health counseling systems. Cultural congruity, defined by Luna [6], is "the agreement of the cultural manifestations expressed ... with the cultural manifestations of" the users of a computer system. In the system presented in this paper, language is chosen by the user, and the congruity level of the system does not vary between languages, thus we cannot tell whether language or cultural congruity, or both, have an impact on the participants' attitude towards the system, and on their health behavior outcomes. We plan to conduct a study that teases apart the impact of these factors to provide further insights into the design of culture-specific systems.

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