

The Impact of Linguistic and Cultural Congruity on Persuasion by Conversational Agents

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Abstract. We present an empirical study on the impact of linguistic and cultural tailoring of a conversational agent on its ability to change user attitudes. We designed two bilingual (English and Spanish) conversational agents to resemble members of two distinct cultures (Anglo-American and Latino) and conducted the study with participants from the two corresponding populations. Our results show that cultural tailoring and participants' personality traits have a significant interaction effect on the agent's persuasiveness and perceived trustworthiness.

Keywords: agent, language, culture, persuasion

1 Introduction

There has been a growing interest in developing conversational agents that can motivate users to change their health behavior. Although most health behavior change interventions take weeks or months of repeated counseling sessions, change in user attitudes towards and beliefs about a health behavior must be achieved incrementally, typically within a given counseling session, using a variety of persuasive arguments and cues.

Several studies have now demonstrated that tailored messages—individualized to various aspects of users, such as demographic, personality, or lifestyle variables—are

more persuasive and effective at achieving health behavior change [1], and the more variables that messages are tailored, the more effective they are. Hypothesized mechanisms by which tailoring works include increasing attention to the message (leading to a greater likelihood of processing and comprehension), increasing effortful processing of the message, and increasing self-referential thinking [2].

One of the leading theoretical frameworks in persuasion research is the Elaboration Likelihood Model. This theory posits that there are two routes to persuasion: a “central route”, where an individual considers a message via effortful, logical thinking, and the “peripheral route”, where the decision making is more reliant on heuristic environmental cues of the message, sender, and context [3]. Studies have shown that individuals are predisposed to process messages in one way or the other, a trait referred to as “need for cognition” [4]. Message tailoring is thought to impact both routes to persuasion [2].

One kind of tailoring that has received recent attention in the virtual agents community is adaptation of an agent’s apparent culture. However, much of the existing research on this topic [5-9] have only investigated whether or not users could perceive the cultural manipulations, but not the effect of these manipulations on outcomes of practical significance.

A related form of tailoring is whether an agent speaks to users in their preferred (L1) natural language, or in a second (L2) language, assuming users are bilingual. Message tailoring theory would predict that the effects of cultural tailoring and linguistic tailoring should be separate and additive. However, a study by Luna, et al, on the effects of linguistic and cultural tailoring of websites on product evaluations demonstrated an interaction between these two factors, which the authors explained using the Elaboration Likelihood Model and differences in message processing effort between L1 and L2 text [10].

We have developed a conversational agent that motivates English or Spanish-speaking Latino adults to exercise more [11]. The agent is tailored to the Latino culture for all users, and linguistically tailored for each user by speaking to them in their preferred language. A pilot study demonstrated that when the agent counseled users several times per week for three months to motivate them to exercise, the amount of physical activity performed by the users was significantly increased, compared to a non-intervention control group.

In the current study, we explore the separate and relative effects of cultural and linguistic tailoring of a conversational agent on its ability to change user attitudes. In

order to inform the design of future counseling agents, we are interested in determining which of these manipulations are more effective, and if there are interactions between them and personality traits such as need for cognition.

2 Related Work

2.1 Cultural Tailoring of Virtual Agents

Rossen et al., using virtual agents with different skin tones, found that Caucasian subjects tend to show more empathy to the agent with a lighter skin tone [5]. Using the Virtual Beergarden project, Endrass et al. showed that German subjects preferred virtual characters speaking in the German way to those speaking in the Japanese way [6], and similar preference tendencies were found among American and Arabic subjects as well [7]. While evaluating a system featuring Afghani characters, Jan et al. also discovered that Arab subjects were able to distinguish Arabic characters from American and Mexican characters solely based on the nonverbal behaviors employed, and they perceived these Arab characters to be more realistic [9]. These studies suggest that people tend to favor a virtual agent resembling an in-group member of their culture. An experiment conducted by Mascarenhas et al. shows that cultural differences in virtual agents are perceived by human observers, even if the featured cultures are fictional [8].

2.2 Persuasion by Virtual Agents

By delivering persuasive messages via humans and virtual characters, Zanbaka et al. concluded that virtual characters can be as effective as humans at persuasion [12]. A study by Katagiri et al. has shown that virtual agents engaged in relationships with their users and other agents are effective in changing user's behaviors [13]. Also, in Schulman and Bickmore's experiment, participants had significantly more positive attitudes towards exercise after interacting with an exercise counseling virtual agent [14].

3 Experiment Design

To determine the effects of linguistic and cultural tailoring of a conversational agent on persuasion, we conducted a 2x2 factorial between-subjects experiment. Independent variables are linguistic congruity (whether the agent speaks the language that is L1 or L2 for a subject) and cultural congruity (high or low, relative to a subject's cultural affiliation).

The experiment protocol was similar to that from Schulman and Bickmore [14]. Participants performed a ranking task designed to measure attitudes towards exercise. Following this, they held a conversation with an agent, which consisted of a social dialogue and a persuasive dialogue, during which the agent argued for the importance of statements about the advantages of exercise and argued against the importance of statements about the disadvantages of exercise. Finally, participants completed the same ranking task again, and perceptions of the agent were assessed.

3.1 Anglo-American and Latina Agents

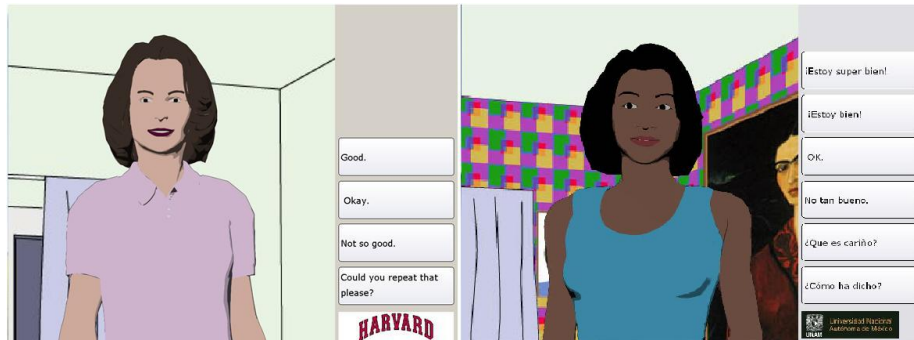


Fig. 1. Katherine (left), designed to resemble a member of the Anglo-American culture, and Catalina (right), designed to resemble a member of the Latino culture.

Two agents were developed for this study (Fig. 1). Based on a preliminary ranking questionnaire completed by 11 Latino students and 8 Anglo-American students at Northeastern University of six virtual agent characters, the character ranked as most Anglo and the one ranked most Latino were selected for use in the study. Both agents were developed with the ability to speak both English and Spanish.

Katherine (the “Anglo-American” agent) was designed to resemble an Anglo-American in appearance, behavior and values, and was situated in a background picturing an Anglo-American-looking household. Katherine told participants that she was born in New Hampshire and later entered Northeastern University, and talked about her experience switching between majors.

Catalina (the “Latina” agent) was designed to resemble a member of the Latino culture and was situated in a Latino-looking household background. Catalina talked to participants about her recent visit to her mother, and about her parents and sister. This was done based on research documenting that family is often the primary source of self-identity and self-esteem among Latinos and Latinas [15].

Table 1. Sample persuasive conversations with the Anglo-American agent (left) and the Latina agent (right)

<p>A: Do you feel that it is hard to find time to exercise? U: Sometimes. A: I see. Tell me more. U: I have a busy schedule. A: Well, I know it sounds tough, but half an hour each day is all you need. U: OK. A: Some people find it helpful if they schedule time just for exercise. U: That sounds helpful. A: You can also try exercising by getting off a stop early on the train or bus when you go to work, or park your car further away from your work place. U: I see. A: That way you get to walk more on your way back home. That could be as good an exercise as any.</p>	<p>A: Do you feel that it is hard to find time to exercise? U: Sometimes. A: I see. Tell me more. U: I have a busy schedule. A: Well, I know it sounds tough, but half an hour each day is all you need. U: OK. A: Some people find it helpful if they schedule time just for exercise. U: That sounds helpful. A: You can also try exercising along with family or friends, so that you also get to spend time with them. U: I see. A: Try to make exercise something you enjoy with your family and friends, and that will also benefit people around you.</p>
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At the beginning of an interaction, the agent walks on to the screen and greets the user, and then she talks about her personal background. Following this, the agent presents a persuasive dialogue similar to that used by Schulman and Bickmore [16]. The agent argues for the importance of statements about the benefits of regular exercise, including stress reduction, mood improvement, and the fact that regular exercise leads to more energy and a better outlook. Both agents also argued against the importance of statements about the disadvantages of regular exercise, including time consumption, complex routines, and wearing uncomfortable clothes. However, the two agents argue for and against the same statements in different ways: the Anglo-American agent focuses on participant's well-being, whereas the Latina agent expresses more interest in the participant's family and friends, still due to the importance of these aspects in the Latino culture [15]. Table 1 presents sample dialogues regarding the time-consuming aspect of regular exercise by each agent.

In addition, as the camera zooms in and out during the interaction, the Latina agent is shown at a closer proximity to the user more often than the Anglo-American agent. This is because Latinos are found to "interact at closer distances and employ more touching behaviors when interacting with family and friends" [17]. A short clip of music representing the agent's culture is also played as the agent walks on the screen.

3.2 Linguistic Congruity

All dialogue content was first developed in English, and then translated to Spanish by a bilingual research assistant (native Spanish speaker). The Spanish scripts were then reviewed for accuracy by a native Spanish speaking researcher in our research team. The scripts were processed by a text-to-speech engine at runtime, using a female English voice and a female Spanish voice respectively.

3.3 Measures

Four 7-point scale Likert questions were used as a manipulation check for cultural congruity: "How much do you feel that the agent is a member of the American culture", "How much do you feel that the agent is a member of the Latino/Hispanic culture", "How easy was it to understand the agent's language", and "How much do

you feel you and the agent are from the same culture”.

The ranking task consists of a list of ten statements about regular exercise from most to least important (see Figure 2), and a score ranging from 1 (least important) to 10 (most important) was used to create a composite measure, subtracting the total score of the items argued against from the total score of the items argued for. The difference between the two measures before and after the conversation was calculated to measure persuasion.

Need for Cognition was measured using the Need for Cognition Scale short form [3].

Agent trustworthiness is measured by a standardized trust scale [18].

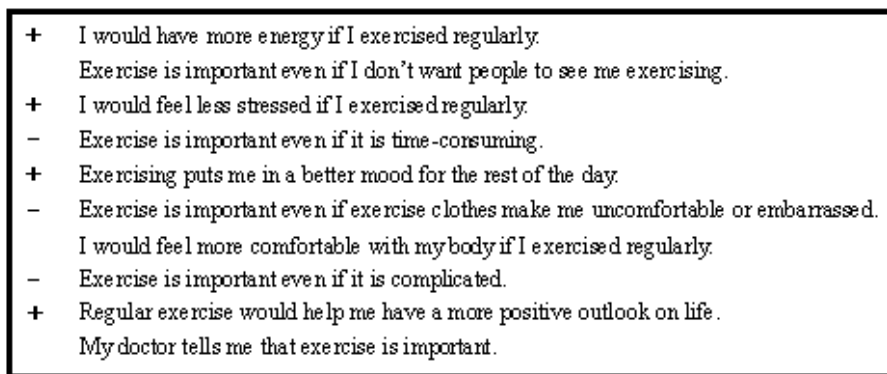
- 
- + I would have more energy if I exercised regularly.
Exercise is important even if I don't want people to see me exercising.
 - + I would feel less stressed if I exercised regularly.
 - Exercise is important even if it is time-consuming.
 - + Exercising puts me in a better mood for the rest of the day.
 - Exercise is important even if exercise clothes make me uncomfortable or embarrassed.
I would feel more comfortable with my body if I exercised regularly.
 - Exercise is important even if it is complicated.
 - + Regular exercise would help me have a more positive outlook on life.
My doctor tells me that exercise is important.

Fig. 2. Ten statements of regular exercise. Statements starting with a “+” are those that the agent argued for, and those starting with a “-” are those argued against. Statements starting with neither were not mentioned.

In order to assess the participant’s attitude towards the two cultures under investigation, which may affect their opinions of the culture-specific agents, we used the Social Distance questionnaire developed by Link et al. [19]. This questionnaire assesses an individual’s willingness to participate in social contacts of varying degrees of closeness with members of diverse social groups [20], in this case, Anglo-Americans and Latinos. Acculturation (i.e. the process through which immigrants and their offspring acquire the values, behavioral norms, and attitudes of the host society) was also assessed using an eighteen-item seven-point Likert-scale questionnaire revised for the general Anglo-American and Latino populations based on Cortés’ work [21].

Finally, a semi-structured interview was conducted at the end of the study. The

interview focused on the user's opinions on the agent's cultural background and on their interaction with the agent.

4 Results

4.1 Participants

Participants were recruited via fliers and advertisements. Participants were enrolled only if they were either: a) an Anglo-American born in the United States who had stayed in Spanish-speaking Latin American countries for at least two months, able to speak, read and understand both English and Spanish fluently, with English being their first language, or b) a Latino/Latina born in a Spanish-speaking Latin American country who had lived in the United States for at least two months, able to speak, read and understand both English and Spanish fluently, with Spanish being their first language.

Among the 43 participants recruited for the study, 65.0% were Latinos, and the rest were Anglo-Americans. Participants' ages ranged from 18 to 65, and 44.2% were female. Most of the participants had high school or some college education, and over half of them (65.0%) had been doing regular physical activity for more than 6 months.

4.2 Manipulation Checks

MANOVA tests reveal that the Latina agent was perceived as significantly more Latina than the Anglo-American agent, $F(1,42)=18.1$, $p<.001$. The Anglo-American agent was perceived as slightly more American than the Latina agent was, although the difference was not significant, $F(1,42)=1.05$, n.s. Agents that spoke English were rated as significantly more American, $F(1,42)=6.98$, $p=.012$, while Spanish-speaking agents were rated as significantly more Latina, $F(1,42)=13.06$, $p=.001$. Participants were also significantly more likely to rate the agent as a member of their own culture if the agent's simulated culture was congruent with theirs, $F(1,42)=5.299$, $p=0.026$

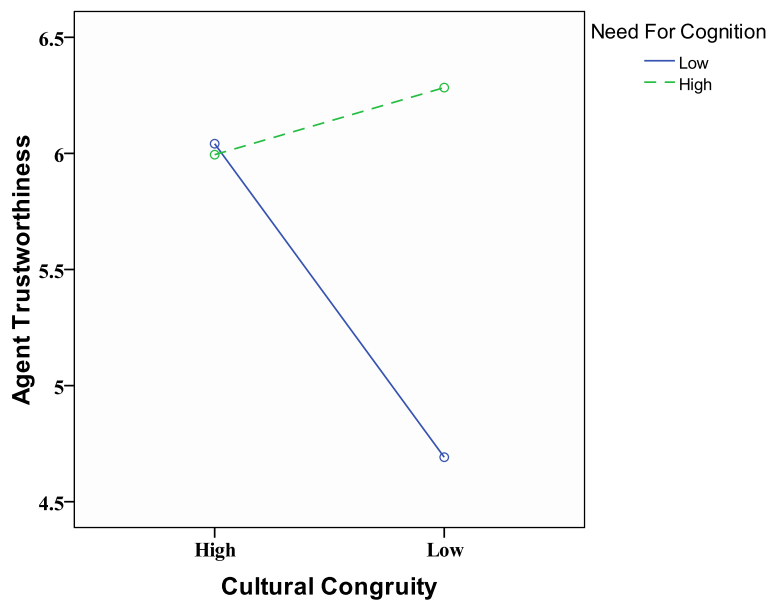
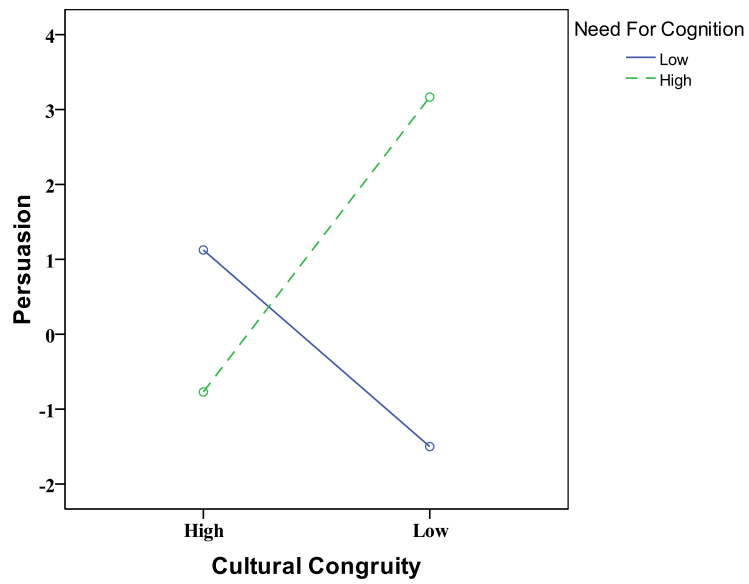


Fig. 3. Effect of need for cognition and cultural congruity on persuasion and agent trustworthiness

4.3 Quantitative Results

We analyzed the data with a 2x2x2 between-subjects MANOVA, using linguistic congruity, cultural congruity and need-for-cognition (split at the median) as independent variables, and persuasion and agent trustworthiness as dependent variables. A significant interaction effect of congruity and need-for-cognition was found on both persuasion, $F(1,42)=5.537$, $p=0.024$ and agent trustworthiness, $F(1,42)=4.583$, $p=0.039$. Figure 3 shows this effect. A near significant main effect of need-for-cognition was also found on agent trustworthiness, $F(1,42)=4.070$, $p=0.051$.

In general, females trusted the agent significantly more, $F(1,42)=5.059$, $p=0.030$, as do participants with low computer experience, $F(1,42)=3.854$, $p=0.017$. We also found that participants that ranked higher in the cross-cultural Social Distance Scale (i.e. more socially close to their out-group members) trust the agent significantly more, $F(1,42)=4.879$, $p=0.040$, in the low cultural congruity setting.

4.4 Qualitative Results

Language, rather than the agent's skin color, household background or nonverbal behavior, seemed to serve as a strong indicator of the agent's culture. Although one participant claimed that the language spoken by the agent did not affect his judgment of the agent's cultural background, many others explicitly mentioned the impact of language on their opinions. As an example, the following quote is from a Latino participant interacting with an English-speaking Latina agent.

“She seems more American, no but she said that... she came from Latin America right? Since she spoke English I'd say she's more Americanized than um... her original background. But she could be like me, you know, because I speak English and I'm a Hispanic. ... Yeah, I think she's more American because you know she spoke um... perfect English.” (Participant 33)

The English-speaking Latina agent was generally not perceived as an “Anglo-American”, and a few participants even considered her as an African-American because of her skin tone, but these findings indicate that an English-speaking agent with a Latino appearance is considered, to a large extent,

a member of the American culture, or at least highly “Americanized”. The Spanish-speaking Anglo-American agent was also considered as a Latina or as “neutral”, as much as she was considered an American, regardless of her appearance.

When asked about the Latina agent’s cultural background, several participants thought she was from the Caribbean:

“Este personaje se me hizo muy caribeña, sudamericana. Y nosotros somos un poquito mas reservados. Viv íen Las Vegas, y todos all íson mexicanos.”

Translation:

“This character was very Caribbean, South American. And we are a little more reserved. I lived in Las Vegas, and everyone there is Mexican.” (Participant 25)

This indicates that subtle cultural traits specific to one or a few Latin American countries, when implemented in the agent, can be easily picked up by a member of the Latino culture, and that “Latino” should not be treated as a unitary culture.

5 Discussion

Our findings suggest that participants who are predisposed to being influenced by peripheral route cues (i.e. those with a low need-for-cognition score) tend to trust and be persuaded by an agent that is tailored to their culture more than by an agent from a different culture. This is because individuals taking the peripheral route to persuasion rely on environmental characteristics of the message delivered, and an agent resembling their in-group members is considered more credible and trustworthy, which is consistent with the Elaboration Likelihood Model. However, our findings also suggest that participants who are predisposed to process information deeply (i.e. high need for cognition) tend to be persuaded more by an agent from a different culture compared to one from their own culture. Experiments conducted by Dolinski et al. indicate that short-term engagement and relationship between speaker and hearer can in fact reduce the impact of the speaker’s persuasiveness on

high-involvement topics (important topics that require thorough analysis) [22], which may be why participants predisposed to being influenced more by logical thinking were less likely to be persuaded by an agent of high cultural congruity (and presumably high engagement). Studies by Bahry et al. [23] suggest that many factors, from cultural stereotypes to political views, influence interpersonal trust among and within ethnic groups. This means that, in addition to need for cognition, other factors may have affected the extent to which participants trusted the agent.

The fact that the agent's persuasiveness and trustworthiness were affected by cultural congruity and need for cognition on the same direction has led us to consider the possibility of trust being a mediating factor of persuasion and said independent variables. However, we did not find evidence of this mediation effect through statistical analysis in this study, which is perhaps because our sample size is relatively small.

Linguistic tailoring had no effect on persuasion. This may be explained by the fact that participants were bilingual and their level of fluency in both languages was very high (all rated their proficiencies of both languages as 5 or higher on a 7-point scale).

5.1 Future Work

Our results are from a single conversation between a user and a counseling agent. As pointed out in the introduction, health behavior change can take weeks or months of regular counseling sessions, so one important direction of future research is to examine whether our results hold over repeated interactions, or whether the effects of cultural tailoring eventually fade away.

The correlation between persuasion and the agent's trustworthiness needs to be examined in greater detail. Future studies should be designed to examine trust as a mediating factor of persuasion and the interaction of cultural congruity and need for cognition. Another important aspect that needs to be explored is the mechanisms that lead participants to trust one agent over another.

There is also significant work to be done on developing a systematic methodology for cultural tailoring of conversational agents, whether driven by a taxonomy such as Hofstede's cultural dimensions theory [24] or deeper knowledge of the norms and practices of the target culture.

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