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"How should I say this?" Agents with culturally-appropriate verbal communication styles

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Abstract. There are several cultural differences in the way humans communicate, both in verbal and non-verbal communication. Research on creating agents that are able to simulate such differences is currently growing, in part for their potential use in designing Virtual Learning Environments for intercultural training. In this paper we analyse a particular aspect of communication that has not yet received much attention in culture-specific agents, which is the verbal style used. Using our current cultural agent architecture, a small scenario was created where the verbal style employed by the agents depends on their cultural parametrisation. With the scenario created, an experiment was conducted where users did perceive differences between two cultural versions of the agents.

Keywords: Virtual Agents, Culture, Verbal Communication

1 Introduction

In the light of globalisation, the need for novel and efficient methods of intercultural training is greater than ever before. The research presented in this paper was done in the context of eCute[3], an european-funded project that proposes a novel approach to education in cultural understanding. This approach is based on the use of Virtual Learning Environments (VLEs) where users can interact with intelligent virtual agents in a virtual drama [3]. Our goal is to develop a virtual agent architecture that is capable of simulating important behavioural differences found in human cultures.

Research on agents that are able to simulate cultural differences in their behaviour is still at an early stage. Work done so far has focused on cultural differences in aspects of social interaction such as gestures [15], proxemics [8], spoken language [9], norms [16], rituals [12] and also in patterns of reasoning and feeling [13].

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In this paper we will focus on exploring cultural differences in a different aspect of communication, namely the verbal style used which refers to how a particular message is framed. As stated in [17], "intercultural miscommunications often occur because individuals use cultural-laden habits and assumptions to interpret each other's verbal messages and verbal styles." In addition, "individuals are frequently unaware of their ethnocentric-based verbal interpretations and evaluations." [17]

To better understand the impact on users of using different verbal styles in virtual agents we created a scenario with two agents who have a small conversation with each other. Two versions of the agents were created that only differed on the verbal style employed by the agents. The different verbal styles chosen are linked to the Hofstede dimensional model of cultural variability across nations [4]. A user study was then conducted to determine how users would perceive the two different versions.

The outline of this paper is described as follows. In section 2 we present some background on culture theory. Afterwards, in section 3 the conceptual approach to linking culture to different verbal styles is discussed, followed by its integration in a virtual agent architecture in section 4. In section 5, the design of the case study used to perform an evaluation is discussed. Finally, after analysing and discussing the results obtained in section 6, we draw some conclusions and present some future work.

2   Background on Culture

The notion of culture is a very complex one with a multitude of possible definitions [10]. Nevertheless, House et al. [6] affirms that "despite lack of consensus among scholars, there are several essential common threads that run throughout the various conceptualisations and definitions of the construct generally referred to as culture." He argues that culture often refers to "collectivities in which the members share several psychological commonalities - assumptions, beliefs, values, interpretations of events (meanings), social identities, and motives - and abide by a set of shared norms in a common manner."

Geert Hofstede analysed a large-scale empirical study across many countries, from which he observed how national cultures are different from each other in terms of values. From that study [4] four dimensions of cultural variability were derived: (1) individualism vs collectivism, (2) power distance, (3) uncertainty avoidance and (4) masculinity vs femininity. Later, two additional dimensions were found and added to the theory [5], namely, (5) long-term orientation vs short-term orientation and (6) indulgence vs restraint.

Each of these dimensions indicate a different set of general behavioural tendencies that are shared by members of the society and reflect cultural values. For instance, the more individualistic a culture is the more people stress the importance of individual rights. Also, there is a greater expectation that everyone should be responsible only for themselves and their immediate family.

Conversely, in highly collectivistic cultures, everyone looks out for one another in exchange for unquestioning loyalty.

Note that these general tendencies should be not considered deterministic, since other factors such as the individual's personality, also play an important role in influencing behaviour. Still, we argue that this dimensional model is a good basis for our work because it is based on a broad empirical study and because it provides us with a framework to characterise cultural aspects of behaviour that are closely related to the different values of each culture.

3   Cultural differences in verbal communication styles

In addition to being the vehicle trough which culture is transmitted, language is also itself a product of culture, being shaped in a way that reflects cultural values. An important example of a strong relationship between language and culture is found in the different preferences for verbal styles across cultures [17]. Different verbal styles reflect different cultural values as they are manifested in the tone of voice, the intention of speaker and the verbal content of the message. In [17], three different stylistic modes of verbal interaction are identified. They can be summarised as follows.

- **Direct vs Indirect** - refers to the degree to which the content of the message and the tone of voice reveal the speaker's intentions. In the direct verbal style the intentions of the speaker are enunciated in a clear and direct manner. On the other hand, in the indirect style the intention of the speaker is implied rather than being stated in an explicit manner.
- **Person-Oriented vs. Status-Oriented** - these two styles differ on the importance of formality when addressing others. In the person-oriented verbal style, informality and casualness are preferred over formal codes of conduct. Conversely, in the status-oriented verbal style the status distance of the role relationship between the communicators is emphasised.
- **Self-Enhancement vs. Self-Effacement** - the self-enhancement verbal style is characterised by the importance attributed to self-boasting. In this style, individuals are encouraged to talk often about their accomplishments and qualities to others. On the other hand, the self-effacement verbal style emphasises being modest and humble.

Even though individuals from all cultures use each one of these verbal styles for specific situations, different cultures exhibit a different general preference for one style over the other [17]. These general preferences can be associated to different scores on Hofstede's dimensional model. For instance, individualistic cultures usually prefer the direct style since a core belief of these cultures is that "honest people speak their mind" [7]. In contrast, in a collectivistic culture people tend to adopt the indirect style to avoid confrontations and preserve harmony. Concerning the status-oriented style, it is preferred in a culture with a high power distance where "style of speech is formal and acknowledges hierarchical positions. [7]. Finally, one of the key characteristics of feminine cultures is that "everybody is supposed to be modest, soft-spoken and empathetic". As such, the self-effacement verbal style should be preferred in these cultures.

4   Modelling Culturally-Appropriate Verbal Styles in Agents

A diagram of the agent architecture for creating virtual agents with different culture-specific behaviour is shown in figure 1. This architecture was implemented by extending FAtiMA, an emotional agent architecture [1] based on the BDI paradigm [2] that implements the OCC model of emotions [14]. In the resulting architecture, there are three types of cultural parameters that influence the agent's appraisal and action selection: (1) symbols, (2) rituals, and (3) dimensions.
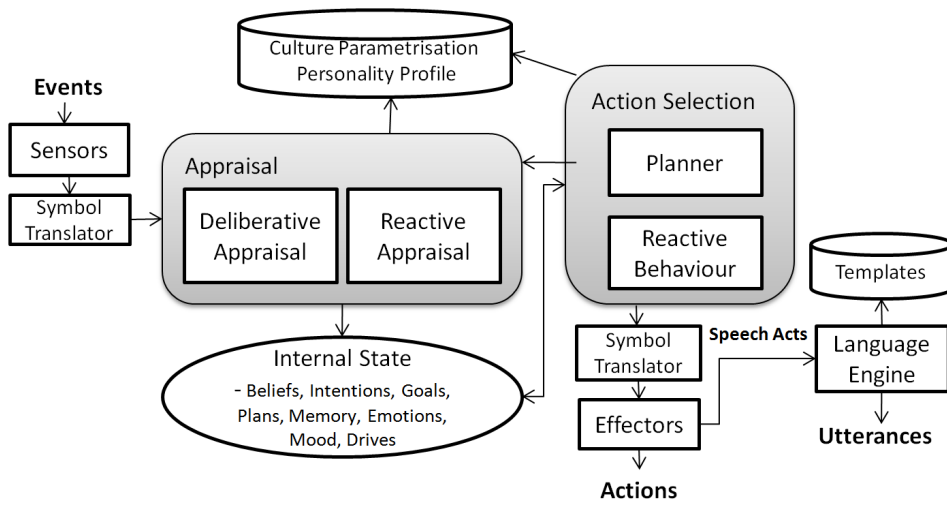

Fig. 1. Cultural Agent Architecture Diagram

In this architecture, when an event is perceived by the agents' sensors its meaning is translated according to the culture's predefined symbols, using a simple association mechanism. For instance a waving-hand can be translated as a casual greeting in one culture or as an insult in a different culture. Afterwards, the event is appraised to determine the emotional response of the agent. There are two main appraisal processes, the *Deliberative Appraisal* handles emotions related with goals (e.g. satisfaction, disappointment) while the *Reactive Appraisal* generates the other OCC emotions (e.g. pride, shame).

After the agent's internal state is updated, a continuous planner revises the agent's plans and selects the best action for its current intention. The agent also has a reactive behaviour component that is capable of triggering fast emotional reactions. All the dialogue is carried out through a special type of action: *Speech Acts*. Similar to regular domain actions (e.g. eat, kick, push), speech acts are defined with an arbitrary set of preconditions and effects. This enables the plan-

ner to make no distinction between regular actions and speech acts, interleaving them both when constructing a plan to reach a certain goal. The only difference is that speech acts are sent to a language engine that converts it to a specific utterance using a template based mechanism.

To enable different verbal styles, the following simple mechanism was implemented. Whenever the agent wants to perform a particular speech act, it chooses the verbal style that it wants to use. This selection is directly based on the scores for the cultural dimensions specified in the agent's cultural profile. This means that if the culture is defined with a high individualism/collectivism score, the agent selects the direct/indirect verbal style. The same logic is applied between the power distance and status-oriented vs person-oriented styles and between masculinity-feminity and self-enhancement vs self-effacement verbal styles. The selected verbal style is then sent to the language engine who is responsible to retrieve a matching predefined utterance. For more detailed information on how the cultural parametrisation affects the other components of the agent's behaviour please refer to [12], [13].

5 Case Study

To study how users perceive different verbal styles in agent communication, a small agent scenario was created, which consists of a short social interaction between two virtual agents, named Francesco and Horatio (see Figure 2).

Fig. 2. Horatio and Francesco talking to each other

Two different versions of these agents (IML and CFH) were created, the IML version is defined as a individualistic, masculine, low power distance culture, whereas the other is defined as a collectivistic, feminine, high power distance culture. As such, the IML version adopts a verbal style that is direct, person-oriented and self-enhancing, whereas the CFH version employs a style that is indirect, status-oriented, and self-effacing.

The plot of the interaction can be described as follows. The agents meet for the first time in the woods and greet each other. Table 1 shows the subtle difference between the greeting in the two versions. After the greeting, Horatio asks Francesco if he is familiar with the place, to which Francesco replies no.

Francesco then asks Horatio if he could show him around, using a direct verbal style in the IML version or using an indirect style in the CHF version, as shown in Table 2. In both versions, Horatio agrees to the request. Finally, Francesco asks Horatio if he knows the place well. Horatio then replies using either a self-enhancement or a self-effacement verbal style (see Table 3).

Table 1. Francesco (F) and Horatio (H) greet each other.

IML: Person-Oriented	CFH: Status-Oriented
F: Hi! My name is Francesco.	F: Good afternoon! My name is Francesco.
H: Hello! My name is Horatio.	H: Greetings! My name is Horatio.

Table 2. Francesco asks a favour to Horatio.

IML: Direct	CFH: Indirect
F: Can you show me around?	F: It would be nice if someone could show me around.

Table 3. Horatio (H) expresses his knowledge about the place.

IML: Self-Enhancement	CFH: Self-Effacement
F: Do you know this place well?	F: Do you know this place well?
H: Are you kidding? I know these woods like the palm of my hand.	H: Well yes, but there's not much to know. It is a small place.

6   Evaluation

Using the small case study presented, we performed an evaluation to analyse the impact on users of using different verbal styles in a simple virtual agent interaction. The goal was to see if the user's opinions about the characters would change and to investigate which particular verbal styles the users would find more appropriate.

6.1   Design

A video of each cultural version of the characters was created. Both videos were then segmented into three different clips, one for each verbal style manipulation applied in the interaction (see Table 1, 2, and 3). All of the clips were then used in an online questionnaire. Before starting the questionnaire, participants had to read a small introduction text that indicated they were about to watch two versions, named A and B, of a situation where two characters interact with each other. Since the experiment used repeated measures, participants were randomly assigned to a visualisation order. This means that roughly half of the participants saw version A first, while the others saw version B first.

After each clip of each version, participants were initially asked to state their opinion (using a 7-point Likert scale) about a statement that is related to the

perception of the verbal style manipulation that was applied in the clip. For the first clip this statement was "I feel the characters greeted each other in an formal manner"; for the second clip it was "I feel that Francesco asked Horatio to show the place around in a direct manner" and finally the statement for the third clip was "I feel that Horatio expressed his knowledge about the place in a modest manner." The rationale behind these questions was to verify if the different verbal styles applied were being perceived accordingly.

Afterwards, for each clip users had to answer how much they disagreed or agreed that the behaviour observed was appropriate. A 7-point Likert scale was again used. Our hypothesis was that participants would consider the cultural version of the characters that was closer to their cultural background as more appropriate.

Furthermore, to determine how their opinion of the characters would change, participants were asked to characterise the characters according to the following set of bipolar adjective pairs: Approachable / Distant; Trusthworthy / Untrustworthy; Assertive / Unassertive; Independent / Dependent; Polite / Impolite Proud / Humble; Respectful / Disrespectful; Unfriendly / Friendly; Relaxed / Tense; Warm / Cool; Caring / Uncaring; Collectivistic / Individualistic; Serious / Cheerful and Equalitarian / Hierarchical.

6.2   Results

In total, 28 participants (23 male and 5 female) did the experiment. All of the participants were Portuguese aged between 19 and 25 years old. Because the data obtained did not follow a normal distribution and because repeated measures were used, the Wilcoxon statistical test was applied to determine if there were any significant differences between the perception of the two versions.

Verbal style differences - Regarding the user's perception of the different verbal styles applied in each clip of the interaction, users found no significant differences in terms of the formality used in the greeting clip. This result indicates that the difference applied in that clip was too subtle to be noticed. However, there was a significant difference in the other two clips. The direct style was perceived as more direct ($p < 0,001; r = 0,65$) and the self-effacement style was perceived as more modest ($p < 0,001; r = 0,83$). Both results have a large effect size.

Appropriateness of verbal styles - In Hofstede's dimensional model [4], the Portuguese culture is rated as strongly collectivistic, strongly feminine and with a power distance that is slightly above average. As such, we were expecting that users would regard the indirect and the self-effacement verbal styles as significantly more appropriate than the direct and the self-enhancement ones. Interestingly, the results obtained confirm this hypothesis only for the self-effacement verbal style, with a large effect size ($p < 0,001; r = 0,60$). As for the direct vs indirect style, the majority of users found that for this situation both styles were

appropriate. There was also no significant difference in the perceived appropriateness of the Person-Oriented vs. Status-Oriented styles used in the greeting, most likely because the difference was too subtle.

Adjectives - In terms of adjectives there were several significant differences between the two versions. The CFH agents were significantly perceived as more polite ($p = 0,031; r = 0,40$), more humble ($p < 0,001; r = 0,78$) and more respectful ($p = 0,005; r = 0,52$). On the other hand, the IML agents (individualistic, masculine, low-power distance) were perceived as significantly more cheerful ($p = 0,043; r = 0,38$) and relaxed ($p = 0,046; r = 0,37$). There were no significant differences for the rest of the adjectives used in the questionnaire.

7   Conclusion and Future Work

In this paper we presented a model of different cultural preferences for verbal styles that is based on a dimensional model of cultural variability. The model was then integrated in a virtual agent architecture that enables different cultural parametrisations for the agent's behaviour. In the architecture presented, the agent's dialogue actions are treated just like regular actions, with the main difference that they need to be converted to utterances by a language engine. When performing a dialogue action, the agent selects the verbal style it wishes to employ and sends it to the language engine as a parameter. This selection is based on the specified dimensional scores in the agent's cultural profile.

To investigate the impact that the use of different verbal styles would have on the user's opinion about the characters we created a simple scenario where two agents have a small conversation between each other. An experiment was then conducted where participants from Portugal observed two versions of these characters using different verbal styles. Since Portugal is rated as a strongly collectivistic and feminine culture, our hypothesis was that they would regard the indirect and the self-effacement styles to be more appropriate, yet we only could confirm this for the latter. More scenarios would give clearer results. Still, the results obtained indicate that the approach adopted is promising as it can give rise to detectable differences in users' opinions about agents behaviour.

As future work, the proposed model needs to be applied an evaluated in different scenarios with richer situations, where the virtual agents do not only interact between themselves but also with the user. Moreover, the current selection for the verbal style can be significantly improved by considering not only the cultural dimensional score but also other contextual factors, such as the social relationship between the agents.

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