But that was in another country: agents and intercultural empathy

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ABSTRACT

This paper discusses the development of a believable agent-based educational application designed to develop inter-cultural empathy for 13-14 year old students. It considers relevant work in cultural taxonomy and adaptation to other cultures as well as work showing that users are sensitive to the perceived culture of believable interactive characters. It discusses how an existing affective agent architecture was developed to model culturally-specific agent behaviour. Finally, it considers the role of interaction modalities in supporting an empathic engagement with culturally-specific characters.

Categories and Subject Descriptors

General Terms
Design

Keywords
Artificial Intelligence, Applications, Virtual Agents (Models of personality, emotions and social behavior)

1. BACKGROUND

Believable autonomous synthetic characters are increasingly used in a range of applications, including education and training [28], entertainment and therapy [18]. They enrich interaction with human users [8], drawing on and trying to reproduce the engagement of human-human interaction. This allows them to play a powerful pedagogic role in those educational and training domains where attitudes and behaviour rather than the acquisition of knowledge are at issue. Medical interviewing [27], negotiation [9] and education against bullying [23] are recent examples. In particular, synthetic characters may be designed for a specifically affective engagement through the creation of an empathic relationship between user and character [23].

To support such an affective engagement, a number of affective architectures for synthetic characters have been developed in recent research [10,13], often based on cognitive appraisal [22]

and coping behaviour theory [20] from psychology. This allows different characters to exhibit different patterns of behaviour over time as determined by their different parameterisations of the emotional variables used in their action-selection mechanisms (section 4, below, discusses this in more detail for the FAtiMA model). Such patterns of behaviour support the ascribing of personality to characters by the users interacting with them and make characters particularly suitable for applications in which emotionally expressive behaviour is required.

However, while perceived personality may be highly significant in interaction between the user and a synthetic character, it is far from the only factor in human-human interaction, especially where this takes place between subjects who do not know each other well. Here, the often unconscious application of stereotypes relating to role and culture are also important. These factors can be highly significant in the building of empathy - or not - between a user and a synthetic character. Indeed, Rossen et al [27] demonstrated that in medical interviews conducted with a synthetic character, significantly less user empathy was displayed towards a character with a dark skin tone as compared to a light one.

Studies with synthetic characters have so far infrequently considered the link between behaviour and culture. Where designers and subjects share the same culture, it may become an invisible background of shared assumptions directly encoded into the design. Thus a 2004 survey of the Microsoft Agents website [26] showed that western cultural norms determined both the appearance and the animations of the overwhelming majority of characters.

The small number of recent studies examining cultural aspects of synthetic characters have focused on visual elements relating to non-verbal behaviours [1, 19, 25], especially gesture, facial expression and inter-personal distance [17]. However, while personality relates to the level of the individual, culture relates to social groups [14]. For this reason it cannot be enough to modify the expressive behaviour of the individual character; they must also be considered as social actors.

Thus the FearNot! anti-bullying application, evaluated in schools in both the UK and Germany, dealt with cultural differences at the individual level of clothing (UK schools have uniform and German ones do not) and language (different types of insult, for example, in the two languages). However cultural differences were also taken into account through the sets in which the

characters were located and their activities within these sets. For example, German children finish school at lunchtime, making the playground a poor choice of set; German children play table tennis a great deal while UK children are much more likely to play football [14]. Verbal and non-verbal behaviour are indeed culturally mediated, but character goals, choices and ways of interacting with their environment form a superset of cultural behaviour not as yet considered from a principled model-based perspective rather than through individual design decisions such as those of FearNot!

A well-known result in social group theory is embodied in the Similarity Principle [6] which says that interaction partners that perceive themselves as *similar* are more likely to feel positive about each other and to display empathic behaviour. This was originally demonstrated in an experiment involving giving help to strangers, in which one might indeed expect role and culture to be more significant than personality in establishing similarity. This forms a strong rationale for the work already carried out in culturally-specific verbal and non-verbal behaviour: it may make for a more comfortable interaction if an embodied conversational character matches the cultural expectations of the user [25].

However the work reported in this paper takes a completely opposite stance on the Similarity Principle. It addresses education aimed at increasing adolescents' intercultural sensitivity and competence, that is, their ability to deal with situations in which the Similarity Principle is contradicted. The overall aim is to improve the experience of school students who move into a new culture as refugees or as immigrants by making the students of the home culture more responsive and sympathetic to them. Adolescents with a migration background rely on intercultural sensitivity within their culture of settlement, especially among their peers, to be able to really understand and value their bi- (or multi-) cultural identity.

ORIENT - Overcoming Refugee Integration with Empathic Novel Technology – is a semi-immersive graphical environment depicting an imaginary foreign culture. A small group of role-playing adolescent users are equipped with innovative interaction technology and are asked to carry out story-based problem-solving activity within this culture, as discussed in more detail below in Section 3. ORIENT requires the development of culturally specific characters. It therefore raises the problems addressed in the rest of this paper: what theory can guide the construction of such characters and how these theories can be used to develop an affective agent architecture into one that also models cultural behaviour in its full range.

2. THEORETICAL FOUNDATIONS

Three different but related areas of theoretical work are relevant to the design of ORIENT. We have already argued the need for a model allowing representation of the cultural parameters impacting action-selection in same way as theories of cognitive appraisal and coping behaviour underlie emotional parameters in affective agent architectures. This supports a culturally-specific dimension to interaction on the character side. However the social process into which users enter and through which intercultural empathy can be created must also be established. The theory of intergroup interaction is therefore a second relevant area. Finally, the theory underlying educational role-play in this type of education is also highly significant.

2.1 Cultural analysis

Work by Inkeles and Levinson [16] suggested that in any society three issues are faced by its individual members. The first of these is the relationship to authority. The second is the conception of the relations between individuals and society, and, related to this, the individual's concept of masculinity and femininity. The third and final one concerns ways of dealing with conflicts. These ideas were taken up by Hofstede [15] in empirical work carried out with IBM employees in a number of different cultures and the following cultural dimensions and definitions were then derived:

Power Distance: how far less powerful group members expect/ accept power is distributed unequally	High-PD: more coercive and referent power is used. Power Distance Index scored as 104 in Hofstede sample	Low-PD: more reward, legitimate, and expert power is used. Power Distance index scored as 11 in Hofstede sample
Individualism/ Collectivism	Iindividualism: ties between individuals are loose: everyone expected to look after themselves and their immediate family	Collectivism: integration from birth into strong, cohesive in-groups protecting members in exchange for unquestioning loyalty
Masculinity/ Femininity: distribution of roles between genders	High-M: men's values very assertive and competitive; maximally different from women's values	High-F: men's values modest and caring and similar to women's values
Uncertainty avoidance	High: Acceptance of familiar risks; fear of ambiguous situations and of unfamiliar risks	Low: Comfortable with ambiguous situations and unfamiliar risks
Long term/Short Term orientation	Long-term: values of thrift and perseverance	Short-term: values of respect for tradition, fulfilling social obligations saving 'face'

The importance of these dimensions is that they can be associated with manifestations of cultural difference, thus linking cultural parameters to cultural behaviour. These manifestations have been described [15] as the internal one of *values*, and the external ones of: *rituals* (socially essential collective actions carried out for their own sake); *heroes* (persons real or imagined acting as social role-models); and *symbols* (words gestures, pictures or objects with a special meaning only recognised by members of the culture concerned).

For this reason, Hofstede's work makes a good starting point for a computational account of culturally-specific behaviour [25] and has been used in the design of the agent architecture discussed in section 4 below.

2.2 Defining a social process

Implementing characters with culturally-specific behaviour does not in and of itself solve the problem of how the process of user-interaction should be designed. Here, ORIENT uses *contact theory*, the idea that inter-group prejudice can be reduced through contact between the groups under specific conditions [2]. The conditions given were: equal status between the groups in the situation; common goals; intergroup cooperation; and the support of authorities, law, or custom. Contact theory is controversial and some work agues against it, but a recent survey [24] of existing studies gives support to it and it has been applied with some success to the integration of child refugees [7].

Within this overall approach, Bennett's developmental model of intercultural sensitivity [4] was used. Bennett models the

dynamics of how individuals handle cultural differences between themselves and others. The model is formed of six stages along a continuum of intercultural development, of which three are ethnocentric (denial, defences, minimization) and three are ethnorelative (acceptance, adaptation, integration) as shown in Table 1.

Ethnocentric Stages		
1.Denial	**2.Defence**	**3.Minimisation**
There is no reason to know something about foreign cultures	My own culture is superior to foreign cultures in many aspects	All human beings are similar despite some superficial differences
COGNITIVE		AFFECTIVE
Ethnorelative stages		
4.Acceptance	**5.Adaptation**	**6.Integration**
Differences among people are not a problem, they are of interest for me	I use different standards for the evaluation of situation in foreign cultural contexts	I almost feel as comfortable in another culture as I do in my own culture
AFFECTIVE	BEHAVIOURAL	

TABLE 1: Bennett's Development Model of Intercultural Sensitivity

The development of ORIENT is based on Bennett´s model in that it serves as a reliable guide to the stages the participants pass through on their way to intercultural sensitivity. The "tasks" (based on the interaction with the characters) that the users are confronted with progress according to the different stages of the model, e.g. the first level of ORIENT focuses on the promotion of users' awareness that it is important to learn about a given different cultural background in order to interact successfully in an intercultural context.

2.3 Educational role-play

Role-play supports experiential learning in which learners acquire and apply knowledge, skills and feelings in a specific setting, emphasising the importance of a direct encounter with the subject of study "rather than merely thinking about the encounter [with the subject], or only considering the possibility of doing something about it" [5]. Role-play supports the creation of knowledge and meaning from concrete – though imagined – experiences and uses social interaction and emotional engagement as mechanisms for a learner-centred constructivist approach. It is therefore an effective way of covering the Bennett stages model. The educational impact of role-play draws on the 'willing suspension of disbelief' reflected in the willingness of participants to commit to the roles they have been asked to play. Believable characters are seen as fundamental both to producing the required social immersion in the storyworld and also to creating a specific social pressure to stay in role.

3. ORIENT

A subset of the Hofstede dimensions discussed above served as guidelines for the design of an artificial culture for the people on ORIENT, a distant planet under threat of destruction by a large meteor. The culture the users meet on ORIENT are the Sprytes, a tribal and hierarchical culture. Hierarchy (*power distance*) values respect and age; the Sprytes are a militarily active culture who believe in using force and power to influence others and to protect their habitat. They are a collectivistic culture (*individualism-collectivism*), being largely compassionate with each other, and living in groups where usually the majority holds power. Sprytes are highly traditional in their ways and view uncertainty as a threat (*uncertainty avoidance*). The hierarchy in Spryte culture has three layers: The top layer is represented by the Elder, followed by the members of its council (tribal elders, military generals and the like) and Spryte population). Gender is absent in the Spryte culture (*masculinity-femininity*), and their graphical representation, as seen for one character in Figure 2, is intentionally ambiguous.

Three users in the 13-14 years old age group are asked to play the role of Space Command Personnel who must land on the planet (Figure 1 shows one of the sets) and convince the Sprytes to cooperate with them in saving the planet by destroying the meteor with devices they have to locate on the surface. This meets at least two of the conditions from contact theory: a common goal of saving the planet and intergroup cooperation; the role of Space Command is to help support the task with authority and law.

The subtasks set for users are designed to take them through the Bennett stages, from the first shock of recognising they do not

Figure 1. ORIENT and a Spryte

Figure 2. A Spryte   **Figure 3: Interaction devices**

understand the culture to an appreciation of its differences. The overall ORIENT story is such that users first have to try to be accepted by a group and then to assist other outsiders to be accepted too.

In order to reinforce the believability of the characters and the sets, a large screen projection is used so that characters are close to life-size. A desktop system provides a window into a separate minaturised virtual world, tending to reinforce the feeling of a god-like presence for the users; a large screen projects the virtual world into the real one. The importance of close-to-life-size characters and world is that the users are put on a more equal footing, with their own bodies serving as the focus of interaction. For this reason, keyboard interaction is replaced by other more novel interaction modalities designed to promote cooperation between the three users as well as more direct interaction with the characters . These are discussed below in section 5.

4. EMOTION, PERSONALITY, CULTURE

4.1 Baseline architecture

The ORIENT agent architecture started from FAtiMA [10] (Figure 4), an Agent Architecture used for synthetic agents in which emotions and personality take a central role in influencing behaviour and thus achieving more believable agents. In FAtiMA emotions are based on the OCC cognitive theory of emotions [22], which sees the emotional process as based on appraisal, so that emotions are valenced (good or bad) reactions to events.

In FAtiMA there are two main layers for the appraisal and coping processes: the Reactive Layer, which is responsible for the character's emotional reactions and reactive behaviour, and the Deliberative Layer, responsible for the character's goal-oriented behaviour. To appraise an event in the world, agents use their memories and knowledge about the world, stored in a knowledge base and in an autobiographic memory. The knowledge base is responsible for storing semantic knowledge, such as properties about the world and relations, while the autobiographic memory contains information concerning past events in the character's personal experience. Every time the sensors of the agent perceive an event, that event is appraised, generating a set of emotions forming an Emotional State, and the memory components are updated simultaneously.

Once the emotional state has been updated by the appraisal process, it is used by the reactive level to trigger action tendencies, generating the agents emotional reactive behaviour. In
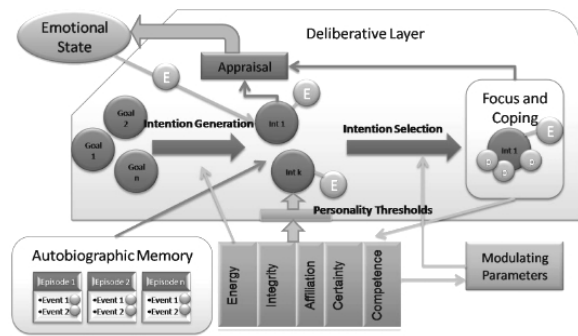

Figure 4: FAtiMA

Figure 5: Adding motivations to FAtiMA

parallel the deliberative level (which includes a continuous planner [3] selects the most appropriate goal and the most adequate coping strategies. Note that the event perceived will also be used to update existing plans triggering the goal activation process. Finally, after an action is selected for execution, it is performed in the virtual world through the agent's effectors.

A character definition, held as XML, includes settings for every one of the 22 emotions in the OCC set. Each includes a threshold, below which the emotion does not influence Reactive or Deliberative Layers, and a decay factor, which allows the emotion to disappear as time passes after the triggering event. By setting different thresholds and decay factors, different patterns of response are created, which are perceived by users as a personality. Thus a fearful character will have a low threshold for fear and a slow decay, but probably a high threshold for anger and a rapid decay. Its actions will be much more determined by fear than by anger. An aggressive character might be the reverse, so that in the same situation their actions will be different.

4.2 Incorporating needs

While FAtiMA has been very successfully applied in the FearNot! application [10] it is subject to certain disadvantages common to symbolically-represented cognitive appraisal architectures. The OCC taxonomy is extensive but still fails to capture significant outcomes of empathic processes, especially in relation to social behaviour. FAtiMA in its original form also requires a substantial authoring effort in which goals, emotional reactions, actions and effects are all authored. For this reason, the architecture was extended for ORIENT by incorporating aspects of a needs driven architecture, PSI [11].

This is a comprehensive psychologically-grounded model of human-action regulation encompassing perception, motivation, cognition, memory, learning and emotions. It is based on a set of five drives, personal-survival, group-survival, certainty, competence and affiliation. This seemed a good way of extending FAtiMA with a motivational structure that could allow goals to be dynamically managed rather than pre-set. The drives set was modified slightly and the five drives Energy, Integrity, Certainty, Competence and Affiliation were implemented. The strength of a drive ranges from 0 (complete deprivation) to 10 (complete satisfaction) and goals and actions are tagged with their expected contribution to Energy, Integrity and Affiliation, allowing their update. Competence is related to success in the environment and thus to goal achievement, so that goal outcomes change its value. Certainty is also related to goal success but less directly, since it
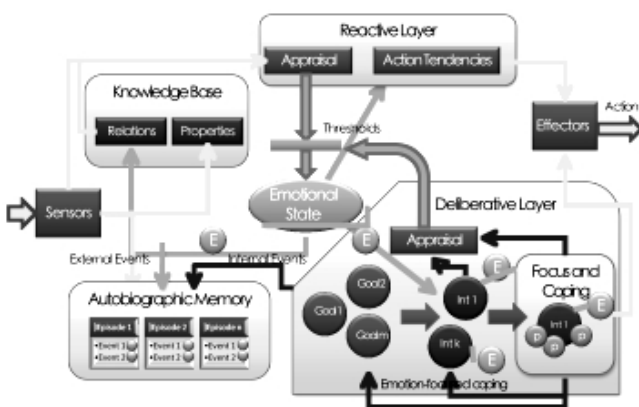
represents the extent to which current knowledge about the outcomes of goals and actions are inaccurate. It is represented as an error prediction based on past successes and failures and thus as an exponential moving average. The need for certainty is not about avoiding those goals with high uncertainty but rather trying to reduce estimation errors; this may mean selecting uncertain goals in order to examine their outcome and reduce their uncertainty via trial-and-error.

This links naturally into the Autobiographic memory component of the architecture which holds information about past success and failure and thus acts as a mechanism for learning about the outcome of goals and actions.

The incorporation of aspects of the PSI architecture provides a flexible and context-sensitive goal-management system. A goal may satisfy one or more needs, and a need may be satisfied by many goals. Consider a goal *g* that contributes to all needs with *Strength(g)*, contributes to a particular need with *ExpCont(g, d)* in an agent with current competence *ExpComp(g)*. Then the overall utility of a goal, used for selecting the most urgent goal, is given by:

$$EU(g) = (1 + goalUrgency(g)) * ExpComp(g) * Strength(g) * ExpCont(g, d)$$

This gives the highest importance to goals that should be activated immediately and to the goal that satisfies the need(s) most in deviation from their satisfaction values.

4.3 Symbols, rituals and culture

FAtiMA was also extended beyond the individual affective settings to allow for cultural adaptation of the agents. The cultural aspects of the character mind are set through XML representing: the Hofstede cultural dimension values for the culture of the character; cultural specific symbols; culturally specific goals and needs, and the rituals of the culture.

Here we will focus on how FAtiMA was modified to deal with cultural symbols, with a discussion elsewhere of the interaction between the FAtiMA planning system and rituals. Figure 6 shows the changes in the architecture.

Agents still perceive the world based on their sensors. However, once an event is perceived, it is passed to a symbol translation process that captures specificities of communication in the culture of that agent. Different cultures perceive events differently according to their symbols, so that the symbol translation process logically precedes the cognitive appraisal process relating events to individual goals. For example, in Bulgaria, shaking the head means 'yes' rather than 'no' so the translation of this gesture is different from in the UK.

The architecture captures this by allowing for a specific culture parametrisation of the symbols in a culture. Once the event has been identified by the agent, the appraisal process is triggered. As in FAtiMA, appraisal structure contains three variables associated with the OCC model. They are: *desirability for the agent; desirability for others* and *praiseworthiness*. The desirability for the agent is calculated based on the motivational system and thus depends on the agents' needs and drives. If an event is positive for the agent's needs, the desirability of the event is high, and vice versa.

The second variable in the appraisal structure is related to how good the event is for other agents, a social judgement, and so some of the aspects of the culture are taken into account in this
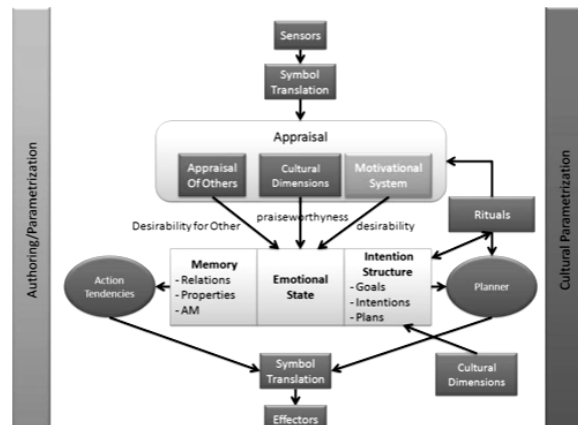

Figure 6: Culturally-modified FAtiMA

appraisal using the Hofstede cultural dimension values. For example, in a collectivist culture events that are good for others are appraised more positively than in an individualist culture.

Finally, the praiseworthiness of the event is here considered as a cultural appraisal in that it captures the social norms of the culture that the agent is part of. For example, an event that shows that the agent is not following the steps of a ritual is appraised as negative. The appraisal component will then, as in the original FAtiMA, activate an emotion producing an update of the memory of the agent and starting the deliberation process. Once an action is chosen, symbol translation is invoked again, and the agent translates the action taking into account its symbols, before the action is performed by its actuators. Figures 7a and 7b give an indication of some of the content of the cultural settings file, with some Hofstede values and symbol definitions for two cultures.

Figure 7a: Hofstede variables defined in XML

```
<CulturalDimensions>
      <PowerDistance> 100 </PowerDistance>
      <Collectivism> 30 </Collectivism>
      <Masculinity> 70 </Masculinity>
      <UncertaintyAvoidance> 60
</UncertaintyAvoidance>
      <LongTermOrientation> 50
</LongTermOrientation>
</CulturalDimensions>
```

Figure 7b: Symbol definitions
Culture 1:

```
<Symbols>
   <Symbol name="bow" meaning="respect-
gesture"/>
   <Symbol name="wave-hand" meaning="greeting-
gesture"/>
   <Symbol name="give-object" meaning="offer-
gift" />
</Symbols>
```

Culture 2:

```
<Symbols>
   <Symbol name="bow" meaning="greeting-
gesture"/>
   <Symbol name="wave-hand" meaning="disagree-
gesture"/>
...
```

One other component included in the architecture is *rituals* capturing in an explicit way some specific rituals of that culture. A ritual is defined as a set of actions with symbolic value for which performance is prescribed by the culture. As such, we have created a way to use the planning system but constrained the activation and execution of the plans taking into account the specificities of a ritual, in particular, its success and invariance.

5. INTERACTION IN ORIENT

As argued above, culture is a social process and not merely an interaction with an individual. It is vital to the success of the role-play and to the establishment of *social* believability that user interaction modalities reinforce the storyworld and bring it into the real world.

For this reason, user interaction is based on the real, physical and tangible objects surrounding them. In the real world the user can see, touch and manipulate objects whose material and shape may support intuitive use and represent real issues. These are always visible and ubiquitous, encouraging a pragmatic approach to problem-solving. Multiple objects support multiple users and parallel interaction. Finally, movement in physical space supports social behaviour (gestures, speech, movements) and full body interaction that are particularly important in supporting the social nature of culturally-specific interaction.

Appropriate interaction devices for ORIENT were based on a controlled study with 18 children exploring different multi-user settings for pervasive games [21]. This study revealed that an appropriate distribution of interaction devices may have a positive effect on collaboration in role play. There was clear evidence that a setting where each user was assigned a role via an interaction device with a dedicated function helps organize interactions within a group, balances the level of interactivity and avoids dominant users. This setting promoted collaboration among users in a better way than a setting where just one interaction device was given to the whole group or a setting where each group member was equipped with an identical device. Based on this study, the assignment of roles in ORIENT is supported by the use of three different interaction devices: a Game Mat, a mobile phone and a WiiMote. Each interaction device has a different function, but all of them are necessary to accomplish the overall goal of the game.

Navigation within the ORIENT world is via walking on the spot using a Game Mat. The Sprytes speak a 'gibberish' related to the language output generated on the fly by the character minds, and this is represented in English (or German) text on the screen with the storyworld explanation of a high-tech translator device embedded in a mobile phone carried by a second user. This phone also allows the user to speak 'magic words' that act as symbols within the culture and for SMS communication with the characters. It can recognise RFID tags attached to real world objects that also have an existence in the virtual world.

The third user carries a WiiMote, and this is used to replicate important gestures in order to successfully enter into greetings rituals for example. Figure 3 above shows the devices used. The intention in using novel interaction devices was to incite the children's curiosity and increase their motivation to learn more about the Spryte culture. In this vein, the children are not only taken through the different stages of Bennett's model by the story line. In addition, they may actively experience these stages by engaging in interactions with the characters. To increase the effect of having the children pass the single stages of Bennett's Model, we make use of interaction devices that require bodily activity, such as the Game Mat and the WiiMote. By employing interaction devices that are intuitive to use and support collaboration among the children, we also hope to encourage intergroup collaboration which is one of the conditions of Contact Theory.

6. EVALUATION

ORIENT poses a number of different issues for evaluation. From a user perspective, a successful outcome is saving the planet. From the design team perspective, success involves both a resulting change in intercultural awareness and behaviour (the pedagogical and psychological impact) and a high degree of user immersion, engagement and suspension of disbelief (interaction and technical impact). As has been discussed in the context of pervasive games [29], the use of the real world as part of the application and of novel interaction technology make some traditional forms of evaluation, especially of usability in its narrow sense, somewhat problematic. In the wider sense, the presence of a large number of interacting factors make it hard to evaluate which part of the overall design is responsible for which specific effects.

A pilot evaluation of the new agent mind was carried out in a small study featuring two episodes of two cultures with one opposite dimension: an individualist, high-power distance culture and an individualist low-power distance culture. These two cultures were created just by changing the rituals embedded in the architecture presented above. The results show that of 41 participants, only 4 – about 10% of the participants - did not find any differences in the cultures. Of the other 37 participants 67% attributed the differences detected to the character's culture and not to the character's personality. These results, which were statistically significant, show that the agent architecture that has been discussed allows for the creation of culture-specific behaviour in a believable manner.

Evaluation of ORIENT itself is necessarily group-based and focused on qualitative rather than quantitative responses. The instruments used are incorporated into the role-play as Space Command debriefing and as support for the users' "mission" to gain greater awareness of the Spryte culture rather than being presented as explicit evaluation. This approach seeks to capture relevant data in an interesting and engaging way for users and to extend their sense of role in the ORIENT scenarios.

Pre-interaction, users fill in a Space Command recruitment form, allowing the capture of demographic characteristics and personal traits (e.g. age, gender, ethnicity, aggression, empathy) and a 20-item Cultural Intelligence Scale. During the interaction, users are observed and the Organizational Readiness Assessment Tool (ORAT) and the interactions between team members are rated by researchers. After the interaction, users are asked to fill in a variety of instruments that focus on their views of the Sprytes, the interactions that they had (including their view of the devices and the Oracle) and the ORIENT interaction questionnaire aimed specifically at assessing the believability and impact of the characters.

Here, we discuss two pilot studies (4 men, 2 women) focusing on the interactions and the users response to interacting with the Spryte of ORIENT. The pilot identified that the in-role approach to evaluation was interesting and engaging and the experience

added to the ORIENT experience. Users noted that they did not feel as if they were being evaluated, rather that the completion of the instruments was an additional part of the "game." Key issues emerging from the pilot evaluation of ORIENT are:

Sprytes:

In completing the instruments related to the Sprytes, users identified that they considered the Sprytes to be friendly, peaceful, trusting, happy, relaxed, natural and social. Their culture was considered to be "not similar at all" to our culture in general, although two users (both of the women) did identify that they were similar as they "communicate using speech and gestures." The Spryte culture was considered to be less advanced than our own culture by most participants and very different, with 3 users commenting on this difference being due to the fact that Sprytes are "frog-like."

ORIENT experience:

All of the users were very engaged with ORIENT and were keen to explore, to interact with the Sprytes and were interested in the overall storyline. The responses to the interaction evaluation questionnaire focused on interest in the Spryte culture; believability and interest in Spryte conversations; the Sprytes view of us and the overall view of the story. Most users were interested in the story and wanted to know what happened next in ORIENT. However, in general the story was found to be too short and too simple. The users all felt strongly that the Sprytes considered them to be friends. However, whilst the Spryte conversations were considered to be interesting, most users found the conversations unbelievable. Further, users found it impossible to remember which Sprytes they had interacted with, thus had no particular opinions on individual Sprytes.

Devices:

In both pilots, the users found it difficult to interact with ORIENT, with the devices often hampering the users' activities and demanding considerable effort and concentration to support interaction. This led to considerable interaction within the teams, with much discussion about device use and how to improve. However, in rating the devices, with the exception of the scanner phone, the users were typically very positive. The Dance Mat was viewed as "cool" and it was "obvious how to use it." The Oracle was described as "nice," but was considered to be "too keen to intervene," with 1 user commenting that they felt "like a puppet on a string." Only 1 user was positive about the scanner phone "quite exciting" and this was considered to be "hard to use" and users "lost track" of button presses. The Wiimote whilst viewed as "fun and exciting" was also identified as needing "a lot of practice" and users found it "hard to communicate as too many difficult gestures."

A key result from the pilot was that whilst the users engaged with and enjoyed ORIENT that they did not particularly empathise or engage with any individual Spryte. Although device use did hamper interaction at times, this does not explain the lack of engagement with individual Sprytes. Rather, it can be suggested that the cultural aspects dominated the interaction and thus, whilst users were aware of the sense of interacting with a different culture, this was in terms of a generic interaction rather than with Sprytes as individual personalities. These issues will be further considered in the ORIENT evaluation taking place with 13-14 year old users in both the UK and Germany, with results expected for the end of February.

7. CONCLUSIONS

The ORIENT application is an innovative character-based educational role-play aimed at developing inter-cultural empathy in participating users. A culture-specific character architecture has been developed based solidly on theories of cultural dimensioning and intergroup interaction. Initial evaluation shows that this architecture can meet the demands of the social process and storyworld of ORIENT and that, combined with the novel interaction modalities discussed above, it offers a new approach to an increasingly important area of Personal and Social Education in which beliefs, attitudes and behaviours are necessarily the pedagogical focus. Evaluation has raised the interesting question of the relationship between personality and culture in synthetic character models and interaction, and further work will be carried out investigating this.

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