

FOSTERING EMPATHIC BEHAVIOUR IN CHILDREN AND YOUNG PEOPLE: INTERACTION WITH INTELLIGENT CHARACTERS EMBODYING CULTURALLY SPECIFIC BEHAVIOUR IN VIRTUAL WORLD SIMULATIONS

Lynne Hall¹, Susan J. Jones¹ and Ruth Aylett²

¹*University of Sunderland, United Kingdom*

²*Heriot-Watt University, United Kingdom*

[*lynne.hall, susan.jones@sunderland.ac.uk; ruth@macs.hw.ac.uk*]

Abstract

In the 21st Century the contemporary experience of the citizen is to live and work alongside many cultural, ethnic and religious groups, however cultural differences can lead to social stresses and sometimes outright conflict. Helping children and young people to develop empathy for people from other cultures is therefore an ever pressing pedagogical imperative. Role play and case studies which support experiential learning have been shown to be highly effective in this domain, however they are difficult to organise and costly.

The 7th Framework EU project 'Education for Cultural Understanding Technology Enhanced' (eCute) aims to develop cultural understanding by providing immersive virtual role play with intelligent interactive graphical characters embodying models of culturally-specific behaviour and interaction. Targeted at two specific age groups, children aged 9-11 and young adults aged 18-25, eCute sets out to design and build two cultural Virtual Learning Environments (VLEs) based on virtual dramas and to evaluate these with stakeholder teacher and learner groups to demonstrate learning efficacy. The realisation of these highly innovative technology enhanced learning experiences for children and young people requires an interdisciplinary approach that brings together psychologists, educationalists, cultural theorists and a range of design and technology practitioners to address the key design issues involved.

Opportunities for children and young people to explore cultural difference and what this means through technology enhanced role play activities is of considerable benefit in today's multicultural contexts and for the societies we hope for in the future. This paper will explore the interdisciplinary approach needed to develop these application and in particular the overarching theoretical framework which will underpin design, development and evaluation of these highly innovative learning experiences.

Keywords: cultural awareness, virtual role play, intelligent characters, culturally-specific behaviour

1 INTRODUCTION: EDUCATION IN CULTURAL SENSITIVITY

Across Europe and beyond, patterns of migration, influenced by economic, political and social change and upheaval internationally, mean that citizens of the 21st Century – wherever they are - are more likely to work and enjoy their leisure time alongside people from other cultures, ethnic or religious groups in increasingly diverse population structures [1]. This experience of cultural diversity, coupled with unprecedented access to media infrastructures, such as the Internet and television, mean that the mechanisms which engender and influence our values, beliefs and behaviours are increasingly complex and multifaceted [2]. For those able to navigate this dynamic social milieu, with the practiced skills to recognise and respond sensitively and appropriately to cultural difference and the variety that this can bring to a shared experiential landscape, there are clear social and economic benefits to be enjoyed [3]. However, the reality for many individuals and communities is one of stress and conflict as unanticipated behaviours jar and expectations diverge, and all too often educators fail to deal with race and prejudice issues, either in the classroom or the playground [4]. It is not surprising therefore, that the goal to help children and young people to develop sensitivity and empathy for people from other cultures has never been a more pressing pedagogical imperative.

In the UK in recent decades, some would argue that education policy and successive approaches to responding to the multicultural context and educational need, have failed many children and young people. In effect, that in the UK the *multiculturalist* perspective has been suppressed in the curriculum rather than given the precedence it deserves. Furthermore, that changes which were meant to provide parents and children with better educational choice, have had an unforeseen negative impact – particularly on children from minority groups [5]. In contrast, in international education contexts and in particular those private schools that teach the International Baccalaureate curriculum, there is a clear recognition of the benefits of an educational system which prepares children and young people for living and working in an international context with all the economic advantages that this can bring; this includes children from age 3 to 19 years of age [3]. In member states across Europe educational approaches to helping children and young people to understand and be sensitive to other cultures are inevitably driven by a myriad of different historical and contemporary factors that make the sharing of pedagogical best practice problematic. Recognising the challenges of this educational domain, the project ‘Education for Cultural Understanding Technology Enhanced’ or eCute, sets out to exploit state of the art technology to explore new avenues for more generic cultural education platforms. In summary eCute aims to help children and young people anywhere, to build the knowledge, skills and confidence they need to enjoy their lives in the multicultural communities of the future.

2 SOLUTION

The 7th Framework EU eCute project aims to develop cultural understanding by providing immersive virtual role play with intelligent interactive graphical characters embodying models of culturally-specific behaviour and interaction. Targeted at two specific age groups, children aged 9-11 and young adults aged 18-25, eCute sets out to design and build two cultural Virtual Learning Environments (VLEs) based upon virtual dramas and to evaluate these with stakeholder teacher and learner groups to demonstrate learning efficacy. The showcase for 9-11 year olds will focus upon culture based conflicts and for 18-25 year olds, the showcase will focus on culturally specific communication and interaction behaviour. Fundamental to the eCute project is the user-centred design approach whereby key stakeholders – children, young people and teachers, will be directly involved in design and development from the outset.

3 METHODOLOGY

The realisation of these highly innovative technology enhanced learning experiences for children and young people requires an interdisciplinary approach that brings together psychologists, educationalists, cultural theorists and a range of design and technology practitioners to address the design issues involved. The following sections will explore the overarching theoretical framework which will underpin design, development and evaluation of these highly innovative learning experiences.

3.1 Pedagogical approaches to education in cultural understanding

In order to design cross-cultural learning opportunities for children and young people it is important to understand how interacting with someone from the same culture differs for interacting with someone from a culture that is unknown to them. A well known result in social group theory is embodied in the Similarity Principle [6] which says that interaction partners that perceive themselves to be similar are more likely to feel positive about each other and to display empathic behaviour towards one another; such effects have been demonstrated to be in part automatic, happening outside of awareness [7]. In putting learners into situations where they are interacting with individuals that may be very different to themselves, education in cultural awareness and understanding can be seen as having to consciously work counter to the Similarity Principle. In other words, the intervention needs first to give learners the experience of interacting with someone who is different so that they can experience how this feels, and opinions and judgements that such cross-cultural interactions invoke.

In examining how to counter the Similarity Principle, Contact Theory was proposed [8], the idea that inter-group prejudice can be reduced through contact between the groups under specific conditions; namely where equal status between groups, common goals, intergroup cooperation and the support of authorities, law or custom are provided. Contact Theory [8] is seen as controversial and some work argues against it. However a recent survey of existing studies [9] gives support to it and it has been applied with some success to the integration of child refugees [10]. Engineering authentic real world contact of the right type is clearly challenging. In eCute the aim will be to create interactions with

virtual characters so that the virtual contact can be carefully monitored and established under the conditions that Contact Theory suggests are required.

A developmental model of intercultural sensitivity which fits within the overall approach of Contact Theory has been proposed by Bennett [11]. Bennett models the dynamics of how individuals handle the cultural differences between themselves and others. The model is made up of six stages along a continuum of intercultural development, of which three are ethnocentric (denial, defenses and minimization) and three ethno-relative (acceptance, adaptation and integration) (Table 1.) [11].

Table 1: Bennett's Development Model of Intercultural Sensitivity [11].

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 respects	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 a situation in foreign cultural contexts	I almost feel as comfortable in another culture as I do in my own culture
AFFECTIVE	BEHAVIOURAL	

Apart from the ORIENT system [12], Bennett's developmental model of intercultural sensitivity has not been systematically applied to the design of pedagogical systems. ORIENT focussed on stage 1 of Bennett's model through a scenario in which users did have a reason to know something about a foreign culture. eCute will ground its VLE development solidly in this theoretical perspective and target further Bennett stages, looking in particular at stages 2 and 3.

3.2 Synthetic cultures, scenarios and affective states

Given that *culture* as a concept is conceptually hard to understand and communicate to children and young people, it is not surprising that most pedagogical approaches to education in cultural understanding are practitioner-led, rather than based on a strong theory of the pedagogical process. Most of this practice draws on social interaction and for example uses group discussion, often based around case-studies, and collective consideration of individual answers to questionnaires [13]. Role-play and game-based simulation such as Barnga! [14] are also widely used with the aim of creating safe environments in which participants can be exposed to emotional states such as culture shock and those experiences that arise from intercultural conflict and then reflect on their own experience. In helping children and young people to appreciate cultural difference, knowledge on its own is not sufficient. Understanding and coping with the emotional experience is vital, so technology development within eCute needs to incorporate a strong affective model. In practice, role-play and game-based simulation are widely used, but there is little or no use of ICT to support this, so eCute will be the first project to systematically examine how ICT can be used with role-play scenarios.

Looking more specifically at role-play scenarios which are effectively cultural story-worlds, practitioners usually create synthetic cultures rather than modelling real-world ones. Real world cultures are much more complex and rich than can be represented in game-based simulation, and a caricature of a readily identifiable culture could be distracting, exacerbate existing prejudices or offend members of the portrayed culture. Synthetic cultures avoid these pitfalls and allow exaggeration of cultural characteristics to be used positively to improve the clarity of the simulation. However, constructing such a culture inherently depends upon the development at the very least of a dimensional model of culture that can be used as a framework. A further argument for the use of synthetic rather than real cultures, is that the few existing scripts for cross-cultural simulations available are based on theory; where scripts based on only one of the individualism-collectivism dimensions was used, the basis of the theory was shown to be effective [15]. The first four synthetic

cultures, based upon four of Geert Hofstede's dimensions (Individualism, Power distance, Masculinity, Uncertainty avoidance) were developed in 1993 [16] as a tool in counselling.

The successful use of these cultural dimensions in synthetic culture scenarios and the lack of similar theory based-scripts in simulation gaming led to the creation in 1999 of a 360-degree set of Synthetic Cultures applied in several simulation games [17]. Experiences with these were the basis of the 2002 book [18] that placed Synthetic Cultures within the scope of available practice. Harry Triandis, former president of the American Psychological Association, writes in his forward to the book, "In fact it has been shown [15] that theory-based cross-cultural training is more effective than training that consists of scattered samples of beliefs, attitudes and experiences. Why? It is easier for the learner to absorb the material and generalise to new situations if the training is based upon theory" [18]. Clearly an approach underpinned by theory has major benefits, but it is crucial that the learner can generalise what they are learning through the synthetic cultures to real cultures and reflection is key. Existing educational practice links role-play and simulation to subsequent individual reflection and group discussion for this reason. eCute will support both individual reflection within showcases, for example using explorative strategies from drama like Forum Theatre and 'Hot Seating' techniques which enable actors or the group watching to stop the action to ask for help or suggest a different action respectively.

Underpinning the framework of cultural dimensions are fundamental problems in society which are faced by all its individual members [19]. 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 conflict. These issues were taken up by Hofstede [20] in empirical work carried out with IBM employees in a number of different cultures and the following cultural dimensions and definitions were then derived (Table 2) [20].

Table 2. Hofstede's Five Cultural Dimensions [20]

Power Distance: how far less powerful group members expect/accept power is distributed equally	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 at 11 in Hofstede's sample
Individualism/Collectivism	Individualism: ties between individuals are loose: everyone expected to look after themselves and their immediate family	Collectivism: integration from birth and 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 unfamiliar tasks	Low: comfortable with ambiguous situations and unfamiliar tasks
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 cultural dimensions is that they can be associated with manifestations of cultural difference, thus linking cultural parameters, derived through theory, to cultural behaviour. These manifestations of culture have been described as the internal one of values and the external ones of ritual which include rituals or socially essential collective actions carried out for their own sake [20]; heroes or persons real or imagined acting as social role-models and symbols or words, gestures, pictures or objects which a special meaning only recognised by members of the culture concerned. For this reason, Hofstede's work on cultural dimensions makes a good starting point for a computational account of culturally specific behaviour [21]. G.J. Hofstede and Pedersen [17] created synthetic cultures based upon these five dimensions of culture and the aim in eCute is to elaborate and extend this approach. Subsequent to Hofstede's five dimensional model (5D), Minkov [22] in analysing his World Values Survey (WVS) data, found a complementary cultural dimension labelled indulgence versus restraint relevant to showing emotions. The intention in eCute is to incorporate this innovation into its creation of virtual synthetic cultures and it will be the first project to do so.

3.3 Development of culturally appropriate expressive behaviour for synthetic characters

3.3.1 Expressive behaviour and autonomous virtual agents

A large proportion of human-human communication is non-verbal [23], carried by facial expression, glance, gesture and posture. It is well known that, despite the biological universals underpinning some nonverbal behaviour, cultural differences involve variations in expressive behaviour [24], for example, the extent to which people look directly at each other, the meaning of specific gestures and facial expressions and the context of use vary over cultures. Thus it is not obvious whether a smile is a sign of joy or of embarrassment, without being adapted to the cultural context. Proper responses to expressive behaviour are, however, a vital part of successful interaction [25]. These behaviours are used to track the intentions and goals of others and to support the Theory of Mind, the human ability of attributing mental states such as intentions, beliefs and values, to oneself and others. Because much of the processing of expressive behaviour happens below the level of consciousness, culturally-specific assumptions about meaning can be particularly difficult to deal with in intercultural interactions [26]. They may be heavily involved in the generation of Negative Red Flags [27] in which human interaction suddenly breaks down as the expectations of one or both interaction partners are suddenly bewildered. Bringing into consciousness the processing of expressive behaviour is an important issue in education in intercultural interaction because it allows people to understand and modify their own behaviour. While this has typically been carried out through descriptive case studies [26], the use of responsive and interacting virtual agents offers a much more engaging avenue to explore.

While the eCute showcase applications would easily support the use of avatars controlled by users, the use of autonomous characters that act independently and make their own decisions, have very strong advantages for three main reasons. Firstly, relying on users or briefed actors to control expressive behaviour is likely to be inconsistent, erroneous and costly. Secondly autonomous characters are scalable to deal with multiple users and learning contexts, are readily accessible and and once developed can be freely used repeatedly. Thirdly, once a culturally programmable character has been developed, it can be used in an indefinite number of scenarios and across an indefinite number of cultural variables; it particular it can be used with a controlled degree of exaggeration.

A substantial part of the research carried out so far on culture in virtual agents involves the adaptation of user interface characters to a specific user's culture. For example the study conducted by Nass et al. [28] showed that users tend to prefer to interact with a virtual agent that has a similar cultural background. Three of the eCute partners have carried out the CUBE-G project which used Hofstede's cultural dimensions to model nonverbal communication aspects of two national cultures, namely German and Japanese. In this work, during a conversation with virtual agents, the cultural background of a user is inferred by sensing their nonverbal behaviour using a Nintendo Wi remote controller; then the nonverbal behaviour of the virtual agents is dynamically adapted according to the culture inferred.

To a lesser degree, virtual agents have also been adapted to specific cultures that are intentionally different from the user's culture. For example, in the Tactical Language Training System [28], users interact with autonomous characters from a foreign culture to train that culture's spoken language alongside its gestures; the goal being to teach communicative skills in languages that are less commonly taught in the USA such as Arabic, Chinese or Russian. Learning such languages on traditional courses can be very time consuming due to their unfamiliar writing systems and cultural norms. However this system only addresses overt communicative aspects of culture, namely spoken language and gestures and does not incorporate cultural dimensions as described by Hofstede [20]. Iacobelli and Cassell [30] examined the influence of ethnicity on the interaction behaviour of children and found that ethnicity was not only being determined by the outward appearance of the character, but also by specific verbal and non-verbal behaviour patterns. To make characters adaptable to cultural differences in interaction behaviour, a set of parameters or rules is needed that enable developers to influence system processes in a consistent manner.

3.3.2 Parameterisation of culture in autonomous virtual agents

The parameterisation of culture into autonomous virtual agents is highly challenging, although inroads are being made. Jan et al. [31] describe an approach to modify the behaviour of characters by cultural variables relying on Hofstede's dimensions, see [32]. The variables are set manually in their system to simulate the behaviour of a group of characters. Starting from an empirical study of Japanese and German communicative behaviours, the eCute consortium investigated how to interpolate behaviour

along different cultural dimensions resulting in a parameterised computational model for culture-specific generation of verbal and non-verbal behaviour. They recorded and annotated over 20 hours of culture-specific interactions in three standardised scenarios - first meeting, negotiation and status difference - to empirically ground the behaviour of characters representing the German and Japanese cultures [21].

A number of approaches in this area concentrate on learning environments or interactive role-plays with virtual characters. Khaled et al. [33] focus on cultural differences in persuasion strategies and present an approach which incorporates these insights into a persuasive game for a collectivist society. Johnson et al. [28] describe a language tutoring system that also takes cultural differences in gesture usage into account. Warren et al [34] as well as Rehm et al [21] aim at cross-cultural training scenarios and describe ideas on how these can be realised by virtual characters. A different approach is described by Isbister and colleagues [35] who aimed at encouraging discussion among members of different cultures – in their case, American and Japanese students. They developed a cross-cultural video conferencing system that featured a so-called Helper agent, which intervened if communication between partners was disrupted; it was designed to be equally (un)familiar for both cultures by taking on the appearance of a dog.

The creation of autonomous virtual agents which can express behaviour in a culturally specific manner through the incorporation of an internal model and parameterisation of culture are key features of the technology needed to implement the pedagogical approach being developed. Looking at the final piece in the jigsaw of technologies needed in eCute, users need to interact with individual ‘characters’ and the creation of autonomous virtual agents which can display culturally specific behaviour as well as manifesting individual behaviour and personality is the last technological challenge.

3.4 Building culturally-specific characters

Although a number of approaches exist to tailor an agent’s behaviour to emotional and/or personality parameters, few researchers have so far taken the challenge of modelling the influence culture has on behaviour. For the design of virtual agents, the challenge has been identified [36] but realisations are often superficial, concentrating on avatar appearance for specific cultural groups [37]. De Rosis et al. [38] illustrate this problem with their survey of Microsoft Agents web site which shows that the appearances as well as the animations of the characters are almost all based on western cultural norms. They only found four non-western style agents, which moreover only exhibited a reduced set of animations. Apart from imposing western cultural standards on all users, the danger lies in a very low acceptance of such agents by users with different cultural backgrounds.

The design of intelligent culturally-specific characters requires a model allowing representation of the cultural parameters impacting the behaviour of the characters in the same way as theories of cognitive appraisal and coping behaviour underlie emotional parameters in affective agent architectures. This supports a consistent and appropriate culturally-specific dimension of interaction on the character side. In fact, research into agent architectures that include social and cultural factors in virtual agents’ internal knowledge and reasoning is still quite new. In the Tactical Language Training System, the architecture that drives the behaviour of the characters is called Thespian [39]. It embeds cultural norms in the character’s conduct by using social relationships such as trust and by allowing the definition of cultural obligations between agents. Thespian was built on top of PsychSim, an architecture for social behaviour [40]. PsychSim implements a version of Theory of Mind. This feature is required in cultural agents that model collectivist cultures where people care a lot about the consequences their actions have on others. More recently, the Culturally Affected Behaviour (CAB) model [41] allows the encoding of specific ethnographic data on cultural norms, biases and stereotypes, which is used to influence the behaviour of virtual agents. In addition to the Theory of Mind, the model is also inspired by the Schema Theory proposed by D’Andrade [42]. This theory postulates that a culture can be represented as a shared organisation of schemas. Whereas all of the above focus on existing cultures, partners of the eCute consortium presented a quite different approach in their past work, introducing an invented culture to teach cultural awareness in experience-based role-play [43]. Their ORIENT (Overcoming Refugee Integration with Empathic Novel Technology) systems was devised as a semi-immersive interactive graphical system for educating 13-14 year olds in inter-cultural empathy. The overall aim was to improve the experience of school students moving into a new culture as refugees or as immigrants by making the students of the home culture more responsive and sympathetic to them. Drawing on educational theory, a stage-based role-play approach was chosen in which a small group of role-playing adolescent users were equipped with innovative interaction technology and were asked to carry out story-based problem-solving

activity within a culture alien to them. As with previous technological approaches, eCute aims to advance state of the art by producing an account of the interaction between cultural norms and personality via an innovative cultural-affective agent architecture and by generating parameterised culturally specific characters that can be speedily configured to new synthetic cultures.

3.5 Seamless evaluation approaches

Cultural conflict and cultural misunderstandings are more than just communication failures – they are also the root of deep emotions. Disgust, anger, fear, stress and frustration may all be experienced and, in a VLE for cultural understanding, these emotions may be deliberately invoked. In a safe educational environment, making learners aware of these strong emotions and then dealing with them is a fundamental part of the learning process. Measuring and assessing these emotional states opens up new ways of evaluating the cultural sensitivity of learners and the impact of the developmental VLEs. If these strong emotional states are to be successfully evoked within a VLE, then the believability of the environment is a significant requirement. Consequently new assessment methods are needed which do not interrupt or jolt learners out of the story-world of the VLE to assess their progress. Within the evaluation and assessment of the showcases we aim to wholly engage the learner, creating a magic circle [44] where the learner engages with a “temporary world within the ordinary world” creating a novel reality [45]. In evaluating serious games, there is a tendency to consider and implement assessment and evaluation as a discrete, separate activity where users are transformed from players and learners into subjects [46], critics [47] or designers [48-49]. Such an approach automatically breaks the magic circle.

Typically, evaluations focus on the requirements of teachers and the development team, with approaches and instruments geared towards result provision rather than on enhancing the immediate user experience [50]. Where evaluation is not based upon the use of observed or logged data, this can include the use of questionnaires, structured interviews, narrative reporting, ethnographic methods and discussion groups. Participation in such standard evaluation activities often places a tiresome burden on the user, diminishing their enjoyment of the learning experience. With interactions supported through innovative input devices and tangible interface elements, the rupturing of the Magic Circle is even more dramatic. Pervasive games involving the use of the real world as part of the application and of novel interaction technology require innovative approaches to evaluation [51]. To ensure ecological validity, such approaches need to occur within the context of the user's experience. This does not simply relate to evaluating within the physical play space, but additionally including evaluating within the user's virtuality, based on their role and perceptions as a learner. Adding value to the user experience whilst meeting complex evaluation and assessment requirements poses considerable challenges in eCute. However, with user enjoyment related to their sense of immersion, there is clear potential for immersing assessment and evaluation directly into the learning experience.

4 CONCLUSION

This paper has explored the underpinning research needed by the eCute team to design, develop and evaluate cutting edge technology with target users. The main objective of the project is to produce novel technology in the form of two VLEs for education in cultural awareness, understanding and sensitivity. To achieve this overall strategy requires extensive, sustained and effective collaboration by all stakeholders. Opportunities for children and young people to explore cultural difference and what this means through technology enhanced role play activities is of considerable benefit in today's multicultural contexts and for the societies we hope for in the future. Over the next three years the eCute project team sets out to explore and advance state of the art in this extremely challenging, but imperative domain in educational provision for children and young people.

REFERENCES

- [1] Cartledge, G. and Loe, S.A. (2001). Cultural diversity and social skill instruction. *Exceptionality*, vol. 9, nos 1 & 2, pp. 33-46.
- [2] Berry, G.L. (2003). Developing children and multicultural attitudes: the systemic psychosocial influences of television portrayals in a multimedia society. *Cultural Diversity and Ethnic Minority Psychology*, vol. 9, no. 4, pp. 360-366.

- [3] Resnik, J. (2009). Multicultural education – good for business but not for the state? The IB Curriculum and Global Capitalism. *British Journal of Educational Studies*, vol. 57, no. 3, pp. 217-244.
- [4] D'Angelo, M.D. and Dixey, B.P. (2001) Using multicultural resources for teachers to combat racial prejudice in the classroom. *Early Childhood Education Journal*, vol. 29, no. 2, pp. 83-87.
- [5] Tomlinson, S. (2005). Race, ethnicity and education under New Labour. *Oxford Review of Education*, vol. 31, no. 1, pp. 153-171.
- [6] Byrne, D. (1971). *The attraction paradigm*. New York: Academic Press.
- [7] Chartrand, T.L. and Bargh, J.A. (1999). The chameleon effect: The perception-behaviour link and social interaction. *Journal of Personality and Social Psychology*, vol. 76, pp. 893-910.
- [8] Allport, G.W. (1954). *The nature of prejudice*. Reading, MA: Addison-Wesley.
- [9] Pettigrew, T.F. and Tropp, L.R. (2006). A meta-analytic test of intergroup contact theory. *Journal of Personality and Social Psychology*, vol. 90, pp. 751-783.
- [10] Cameron, L., Rutland, A., Brown, R. and Douch, R. (2006). Changing children's intergroup attitudes toward refugees: testing different models of extended contact. *Child Development*, vol. 77, no. 5, pp. 1208-1219.
- [11] Bennett, M.J. (1993). Towards ethnorelativism: A developmental model of intercultural sensitivity. In M. Paige (ed.) *Education for the intercultural experience*. Yarmouth, ME: Intercultural Press.
- [12] Aylett, R., Paiva, A., Vannini, N., Enz, S., Andre, E. and Hall, L. (2009). But that was in another country: agents and intercultural empathy, 8th International Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2009), Budapest, Hungary, May 10-15, pp. 329-336, 2009.
- [13] Brislin, R. W. & Yoshida, T. (1994). *Intercultural Communication Training: An Introduction*. Thousand Oaks, CA: Sage Publications.
- [14] Thiagarajan, S. (1990). *Bamga: A Simulation Game on Cultural Clashes*. Intercultural Press.
- [15] Bhawuk, D. P. S. (1998). The role of culture theory in cross-cultural training: A multimethod study of culture-specific, culture-general, and culture theory-based assimilators. *Journal of Cross-Cultural Psychology*, 29 (5), 630-655.
- [16] Pedersen, P.B. and Ivey, A.E. (1993). *Culture-centred Counselling and Interview Skills: A Practical Guide*. Greenwood Press, Westport CT.
- [17] Hofstede, G.J. and Pedersen, P. (1999). Synthetic Cultures: Intercultural Learning Through Simulation Gaming. *Simulation and Gaming*, vol. 30, no. 4, pp. 415-440.
- [18] Hofstede, G.J., Pedersen, P. and Hofstede, J. (2002). *Exploring Culture, Exercises, Stories and Synthetic Cultures*. Yarmouth, Maine: Intercultural Press.
- [19] Inkeles, A., & Levinson, D. J. (1969). National character: the study of modal personality and sociocultural systems. In B. Lindzey & E. Aronson, (eds.), *The handbook of social psychology*, vol. 4, pp. 418-506.
- [20] Hofstede, G. (1991). *Cultures and Organizations: Software of the Mind*. Maidenhead: McGraw-Hill.
- [21] Rehm, M., André, E., Bee, N., Endrass, B., Wissner, M., Nakano, Y., Nishida, T. And Huang, H. (2007). The CUBE-G approach – coaching culture-specific behaviour by virtual agents. *Proc. 38th Conf. Int. Simulation and Gaming Ass (ISAGA)*.

- [22] Minkov, M. (2007). What makes us different and similar, a new interpretation of the World Values Survey and other cross-cultural data. Sofia: Klasika i Stil.
- [23] Mehrabian, A. and Ferris, M. (1967). Inference of attitudes from nonverbal communication in two channels. *Journal of Consulting Psychology*, vol. 31, pp. 248-252.
- [24] Elfenbein, H.A. and Ambady, N. (2002). On the universality and cultural specificity of emotion recognition: A meta-analysis. *Psychological Bulletin*, vol. 128, pp. 203-235.
- [25] Kappas, A. And Descôteaux, J. (2003). Of butterflies and roaring thunder: Nonverbal communication in interaction and regulation of emotion. In Philippot, P., Coats, E.J., and Feldman, R.S. (eds.) *Nonverbal behaviour in clinical settings*, pp. 45-74. New York: Oxford University Press.
- [26] Singelis, T. (1994). Nonverbal communication in intercultural interactions. In: Brislin, R.W. and Yoshida, T. (eds). *Improving Intercultural Interactions: Modules for Cross-Cultural Training Programmes*. Sage, pp. 268-294.
- [27] Seelye, H.N. (Ed.) (1996). *Experimental Activities for Intercultural Learning*. Intercultural Press, Yarmouth, ME.
- [28] Nass, C., Isbister, K., Lee, E-J (2000). Truth is beauty: researching embodied conversational agents. In: J. Cassell, J. Sullivan, S. Prevost and E. Churchill (eds.), *Embodied conversational agents*, pp. 374-402, MIT Press.
- [29] Johnson, W.L., Choi, S., Marsella, S., Mote, N., Narayanan, S., and Vihjálmsson, H. (2004). Tactical language training system: supporting the rapid acquisition of foreign language and cultural skills. In: *Proceedings of InSTIL/ICALL-NLP and Speech Technologies in Advanced Language Learning Systems*.
- [30] Iacobelli, F. And Cassell, J. (2007). Ethnic identity and engagement in embodied conversational agents. In: *Intelligent Virtual Agents (IVA)*, pp. 57-63. Springer.
- [31] Jan D., Herrera, D., Martinovski, B., Novick, D. And Traum, D. (2007). A computational model of culture-specific conversational behaviour. In: Pelachaud, C., Martin, J-C., André, E., Chollet, G., Karpouzis, K., Pelé, D. (eds.) *Intelligent Virtual Agents (IVA '07)*. Springer, Berlin, pp. 45-56.
- [32] Hofstede, G. (2001). *Culture's consequences: comparing values, behaviours, institutions and organisations across nations*. Thousand Oaks, Calif.: Sage Publications.
- [33] Khaled, R., Biddle, R., Noble, J., Barr, P., and Fischer, R. (2006). Persuasive interaction for collectivist cultures. In: Piekarski, W. (eds.). *The Seventh Australasian User Interface Conference (AUIC 2006)*, pp. 73-80.
- [34] Warren, R., Diller, D.E., Leung, A., Ferguson, W. and Sutton, J.L. (2005). Simulating scenarios for research on culture and cognition using a commercial role-play game. In: Kuhl, M.E., Steiger, N.M., Armstrong, F.B., Joines, J.A. (eds.). *Proceedings of the 2005 Winder Simulation Conference*.
- [35] Isbister, K., Nakanishi, H., Ishida, T. And Nass, C. (2000). Helper agent: designing an assistant for human-human interaction in a virtual meeting space. In *CHI '00: Proceedings of the SIGCHI conference on Human Factors in Computing Systems*, pp. 57-64. New York, NY, USA: ACM Press.
- [36] Payr, S. and Trappl, R. (eds.) (2004). *Agent Culture: Human-Agent Interaction in a Multicultural World*. London, Lawrence Erlbaum Associates.
- [37] Krenn, B. Neumayr, B., Gstrein, E. And Grice, M. (2004). Life-like agents for the Internet: a cross-cultural case study. In: *Agent Culture: Human-Agent Interaction in a Multicultural World*, (eds.) Payr, S. And Trappl, R., pp. 197-229.

- [38] De Rosis, F., Pelachaud, C. And Poggi, I. (2004). Transcultural believability in embodied agents: a matter of consistent adaptation. In: *Agent Culture: Human-Agent Interaction in a Multicultural World*, (eds.) Payr, S. and Trappl, R. (2004), pp 75-106, Lawrence Erlbaum Associates.
- [39] Si, M. Marsella, S.C., and Pynadath, D.V. (2006). Thespian: modeling socially normative behaviour in a decision-theoretic framework. In: *Proc. IVA (2006)*, pp 369-382.
- [40] Pynadath, D.V. and Marsella, S. (2005). PsychSim: Modeling Theory of Mind with decision-theoretic agents. *Proc. 19th Int'l Joint Conf. Artificial Intelligence (IJAI 05)*, Kaufmann, M., pp. 1181-1186.
- [41] Hill, R., Belanich, J., Lane, H., Core, M., Dixon, M., Forbell, E., Kim, J. And Hart, J. (2006). Pedagogically structured game based training: development of the ELECT BiLat simulation Conference Proceedings (Orlando, FL, Nov. 2006).
- [42] D'Andrade, R.G. (1992). Schemas and Motivation. In: D'Andrade, R.G. and Strausse, C. (eds.), *Human motives and cultural models*, pp. 23-44. Cambridge, UK, Cambridge University Press.
- [43] Aylett, R., Paiva, A., Vannini, N., Enz. S., André, E. And Hall, L. (2009). But that was in another country: agents and intercultural empathy. In: *Proceedings of AAMAS*, vol. 1, pp. 329-336.
- [44] Huizinga, J. *Homo Ludens: A Study of the Play-Element in Culture*, Roy Publishers (1950), New York, NY, USA.
- [45] Salen, K., and Zimmerman, E. (2003). *Rules of Play: Game Design Fundamentals*, MIT Press MS, USA.
- [46] Baranowski, T., Buday, R., Thompson, D. I., and Baranowski, J. (2008). Playing for real video games and stories for health-related behaviour change. *American Journal of Preventive Medicine*, vol. 34, no. 1, 74-82.
- [47] Klesen, M. (2005). Using theatrical concepts for role-plays with educational agents. *Applied Artificial Intelligence*, vol. 19, no. 3-4, pp. 413-431.
- [48] Gabbard, J. L., Hix, D., and Swan, J. E. (1999). User-centered design and evaluation of virtual environments. *IEEE Computer Graphics and Applications*, vol. 19, no. 6, pp. 51-59.
- [49] Stromberg, H., Vaatanen, A., and Raty, V. (2002). A group game played in interactive virtual space: design and evaluation. *4th conference on Designing Interactive Systems*, pp. 56-63.
- [50] Sheng, S., Magnien, B., Kumaraguru, P., Acquisti, A., Cranor, L. F., Hong, J., and Nunge, E. (2007). Anti-phishingphil: the design and evaluation of a game that teaches people not to fall for phishing *Privacy and Security*, vol. 229, no. 1, pp. 88-99.
- [51] Vavoula, G. and Sharples, M. (2006). Meeting the challenges in evaluating mobile learning: A 3-level evaluation framework. *International Journal of Mobile and Blended Learning*, vol. 1, no. 2., pp. 54-75.

ACKNOWLEDGEMENT

This work is partly supported by the European Community (EC) and is currently funded by the eCute project [FP7-ICT-2009-5] with university partners Heriot-Watt, INESC-ID, Augsburg, Wageningen, Jacobs University Bremen, Sunderland, Seikei and Kyoto.