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D2.2. Cultural learning benchmarks and specifications for agent architectures

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1. Purpose of Document

The aim of this document is twofold. First, this deliverable will delineate cultural learning benchmarks for the eCUTE scenarios, MIXER for children and Traveller for young adults. These benchmarks will be based on the conceptualization of the project's cultural learning interdisciplinary framework presented in the Deliverable 2.1. Second, it will provide a concise overview of the agent architecture as it is used in eCUTE at this point of the project's development. Furthermore, an attempt will be made to specify the cognitive and affective components which will be modeled within this architecture to make it suitable for the scenarios supporting intercultural learning.

2. Executive Overview

This document consists of two main parts. The first part comprises a specification of cultural learning benchmarks. This entails further elaboration on the learning goals which initially have been presented in the Deliverable 2.1. Particular learning goals are assigned to the cognitive, emotional, and behavioral spheres of intercultural training and defined in detail in connection to the MIXER and Traveller scenarios. Currently, both scenarios are divided into three stages of increasing complexity: the Beginner, the Journeyman, and the Expert. At each of these stages, different learning goals are to be achieved.

The second part of the deliverable contains an overview of the agent architecture being used in the eCUTE project, together with specifications of cognitive and affective processes, which will be modeled in order to enrich the existing architecture, allowing it to create an environment which enables culturally sensitive learning. The cognitive components include planning, appraisal, and coping. Empathy is the most important affective component. All of these are subsequently related to culture and its expression in the behavior of synthetic agents.

3. Core Contents

3.1. Cultural learning benchmarks

Deliverable 2.1 contained a very broad overview of goals of intercultural training itself, as well as of general learning goals to be achieved throughout the course of such training. The former ones depended on the audience of the training and the purpose of engaging in a training program, for example in preparation for studying or working abroad or more generally, in anticipation of any upcoming interactions with members of a different culture (e.g., Carbaugh, 1990). Within the eCUTE project, the target audience to receive intercultural training has been narrowed down to two groups: (1) school children aged 9 to 11, and (2) young adults aged 18 to 25 years. For both groups, the overall aim of the training is to increase intercultural awareness, sensitivity, and to a lesser extent, communication competence. These three concepts have been previously linked to gradual changes in cognitions, emotions, and behaviors, respectively. We hold that in the area of cross-cultural competence, emotional and cognitive competences are strongly intertwined, and cannot be taught in isolation of one another; we still maintain the distinction for the sake of clarity. Additionally, based on eCUTE's objectives, school children shall develop competence, particularly in regard to conflicts with their peers arising in classroom settings as a result of perceived differences in group identities. To achieve this goal, the extension of the boundaries of the "moral circle" (see D2.1. for a detailed description of the moral circle concept) will be of crucial importance (Hofstede, Hofstede, & Minkov, 2010). Specifically, a pivotal learning goal will consist in the willingness of children to include out-group members into one's own moral circle, and to try to understand their unwritten rules. Furthermore, young adults shall learn how to manage their responses (emotional, cognitive, behavioral) to members of another culture and transfer those newly acquired skills to new intercultural situations.

The purpose of the following part of this document is to further specify the learning goals that will be the focus of eCUTE, to integrate them with the cognitive, affective, and behavioral aspects of the training, and to place them in the context of the current state of game scenarios for children (MIXER) and young adults (Traveller). For this, we will use the learning

framework as specified in Figure 1. A strategic choice was made to focus on the early stages of intercultural learning with children for conceptual and practical reasons. Thus, learning goals will be presented up to the level of the Journeyman for MIXER and on all levels for Traveller. However, at this point of the project it is expected that within MIXER, just the Beginner stage will be reached, while for Traveller it will be the Beginner stage and possibly the Journeyman stage.

-> Attitude -> v Stage of learner v	Emotional goals	Cognitive goals	Behavioral goals
Beginner (conscious incompetence) Observation and acquisition	Be able to recognize your emotions (for example fear and anxiety) when dealing with strange behaviors of another group	Start learning the specific practices and values of another group	Be fully present in attending to the other's verbal and non-verbal messages
Journeyman (conscious competence) Relating and Experimenting	Be able to observe the behavior of another group without feeling prejudice	Understand on a basic level the differences and similarities between another group and your own	Practice skills learned in the previous stage and experiment with different forms of behavior
Expert (unconscious competence) Adapting and belonging	Be able to share the emotions (such as sadness or happiness) of a member of another group and other's experiences through empathy	Players should be able to discriminate and select appropriate strategies in cultural contexts	Be able to unconsciously participate in a group as a native

Figure 1. Learning Framework specifying the emotional, cognitive and behavioral goals on the level of a Beginner, Journeyman and Expert. Blue background refers to culture general learning; pink background refers to culture-specific learning (electronic version).

3.1.1. Cognition: Awareness

The cognitive dimension of any intercultural training program is usually subsumed under the concept of intercultural awareness. Although this term refers to several phenomena and is used by different authors in somewhat different situations, a few preliminary recommendations have been proposed in the eCUTE framework. First*, intercultural awareness* should arise at the beginning of training and is thus thought to serve as a foundation for the development of sensitivity and communication competence (Chen, 1997; Cushner & Brislin, 1997). Second, it is associated with *knowledge about one's own culture* and about a foreign culture. This indicates that the most basic task of a trainee is to realize that he or she is a cultural being, which means a group being, and as such has strong in-group loyalties and a tendency to draw the line of the moral circle, and to exclude those who are not part of it. Once the learner is aware of this implicit moral circle boundary, the immediate next task is to realize that cultural influences shape deeply-rooted values which in turn affect the way people perceive others, think, and act (Chen, 1997). Naturally, trainees ought to recognize that other individuals are affected by their cultures as well, and although cultures may differ substantially one from another, an attempt is necessary to be comfortable with the dissimilarities or to admit that one is not able to adjust to some of them (Cushner & Brislin, 1997). Finally, trainees should expand their factual *knowledge about cultures*; in other words, they should embrace the "what" of a culture (Tuleja, 2008). All of these learning goals can be decomposed into more definite, practicable skills:

1. *Listening and observing* (Deardorff, 2006), in regard to both the self and the other, have an elementary purpose of gathering information. Players might be instructed to concentrate on observable behaviors and to remain non-judgmental. The next step could be:

2. *Self-reflection* (Howard-Hamilton, Richardson, & Shuford, 1998), and articulation of how the situation itself makes one want to react, and what might be the possible causes for that, or what the alternatives are for actions one would want to take.

3. *Identification of similarities and differences* between the groups involved (Howard-Hamilton et al. 1998), and articulation of underlying sources of those. This could be a

good moment to alert players to the mechanism of overgeneralization, that is, ascribing all of the similarities and differences to only one cause and doing so in other contexts as well (Allport, 1958).

4. *Shifting perspectives* (King & Baxter Magolda, 2005), attempting to describe the situation from the point of view of people from the other group, and their hypothetical reactions to the situation.

5. Starting to *be comfortable with the identified difference* (Brislin & Yoshida, 1994), or realizing that one is still not entirely comfortable; perhaps one could think of conditions that should be fulfilled to make oneself comfortable in the end.

To create a cognitive change in trainees, cognitive learning goals are generally ordered chronologically in three steps: (verbal) knowledge, knowledge organization, and cognitive strategies (Kraiger, 1993). Verbal knowledge focuses on factual information, knowledge organization focuses on integrating this factual information in existing mental models, and the last step, cognitive strategies, focuses on the creating and applying the mental model into cognitive strategies (Kraiger, 1993).

These three steps serve as the basis for the three levels found in the cognitive branch of our learning framework. While they may seem as three separate learning goals, in general the higher order learning goals build on the lower level learning goals. So at the final stage trainees work with all the different stages.

3.1.1.1. MIXER

Currently, the MIXER scenario depicts a peer conflict occurring when two groups of school children play a game together. As the game unfolds, it becomes evident that the groups adhere to different rules which reflect the fact that their cultural backgrounds differ. This is then the source of the conflict and the players are supposed to learn that while the other group might seem strange, or even unfriendly, they are in fact nice people, but just different. This is of utmost importance for the children's scenario. In the current scenario design, disagreements arise between children from a mismatch of how the groups with different cultural profiles

expect a common play situation to unravel, and this in turn contributes to distortions in how they perceive each other and how they react emotionally to the intercultural interaction (Ting-Toomey, 2009). Even though conflict competence is particularly related to dealing with emotional frustrations (Ting-Toomey, 2009), there are two criteria that seem to be relevant to the cognitive processing of the conflict.

- *Appropriateness* (Ting-Toomey, 2009) concerns behaviors adjusted to both the ongoing situation and the expectations of the parties involved. At this point of the game, children could generate behavioral options for themselves and for the children from the other group.
- *Effectiveness* (Ting-Toomey, 2009) refers to a shared meaning of the intercultural conflict. This can be constructed out of the knowledge about one's own group interacting with a different group with the focus on cultural influences.

Lastly, D2.1. introduced the concept of a *moral circle*. The fact of accepting out-group members into one's own circle was said to be the most fundamental goal of the eCUTE's training approach. However, it appears that in order to achieve this, previous experience with the out-group is necessary. Singer (1981) traces the idea of a moral circle back to various forms of altruism (kin, reciprocal, and group) which evolved into a form of between-group morality and justice. A sign of allowing children who belong to a different group into one's moral circle could perhaps be the comprehension that the game rules according to which they play are exactly as good as our own rules, and that our expectations as to the game are just as important as their expectations.

Starting as a **<u>Beginner</u>**, it is important to become aware of the specific practices and values of the other group.

- Children should see that the other group has different rules from their own. So far, these differences still don't have much meaning, but they increase curiosity to learn more about them. The conflict situation makes it necessary to consciously reflect on personal values and worldviews and ways in which they influence one's line of

thinking. Although these reflections may not always be objective, but rather colored by one's own beliefs they challenge existing and held assumptions.

The **Journeyman** integrates the knowledge acquired in the beginner learning goal, and tries to integrate it within their mental model of the world.

- By trying to shift perspectives, children begin to understand on a basic level the differences and similarities between their own group and another group. They should be able now to describe the game from the point of view of people from the other group. The aforementioned general skills are necessary to enable the children to meet the prerequisites to increased conflict competence, that is, to gather sufficient knowledge about the intercultural setting and to be mindful in focusing on one's own cognitions as well as trying to attend to those of other children. Subsequently, children may concentrate on the conflict itself.

3.1.1.2. Traveller

At present, the Traveller scenario includes three stages.

The first one is the **Beginner**, whose major task is to start learning the values and practices of an unfamiliar group.

- The player encounters different groups with certain values and rituals that seem different from one's own. By paying attention to the behaviors of another group, players can increase their factual knowledge about their practices. The conscious recognition of the ways in which cultures can differ enables learning of the specific practices and values of another group.

The **Journeyman** is capable of relating his or her experiences to those of other people in the context of intercultural differences.

- By having experienced different cultural scripts, they should see how various standpoints of groups lead to respective reactions and behavior. Young adults now understand in which ways certain belief systems and values are shared or not shared by groups. In this context, they also start to learn how their own behavior and apprehension of the world must appear unusual and unfamiliar to other cultures.

The **Expert** can choose the right course of action in a given setting, adapting behaviors to new acquaintances.

- The previously acquired skills oriented towards gathering information on another culture and becoming aware of one's enmeshment in one's own culture now enable cultural adaptive behavior in new situations. Young adults should be able to easily shift perspectives and select appropriate strategies for interaction with different cultural groups.

3.1.2. Emotion: Sensitivity

Emergence of intercultural sensitivity is an intermediate step towards communication competence, following directly from intercultural awareness. It covers changes in the emotional and motivational areas. Obviously, cognition and emotion are not entirely separable constructs, but they are conceptualized as such within the eCUTE framework. Similarly to intercultural awareness, sensitivity encompasses a variety of phenomena. They may be categorized as pertaining mainly to *control over negative feelings* elicited by intercultural interactions and to *empathic reactions* to members of a culture other than one's own. The former often includes anxiety, especially when people have to face entirely new circumstances knowing very little about a host culture, and ambiguity, when individuals cannot be certain whether their conduct is proper enough (Brislin & Yoshida, 1994). Moreover, effective intercultural exchange may be undermined if the parties involved do not reflect on the influence of their prejudices on behavior. The process of challenging one's own beliefs may turn out to be stressful as well. Nevertheless, trainees should be motivated to react positively to people of other cultural backgrounds. They may learn to appreciate intercultural differences, and eventually, to accept them (Chen, 1997). Indeed, being open to differences is a major advancement in intercultural development, involving recognition of the importance of these differences as well as willingness to understand how they are reflected in people's behavior and how one's own behavior should be altered in a new environment (Bhawuk & Brislin, 1992).

Another aspect of intercultural sensitivity is empathy. Actually, it also encompasses elements of intercultural awareness to a great extent. Understanding of the perspective of the other indicates cognitive empathy; emotional empathy, in turn, refers to concern evoked by the other's suffering (Stephan & Stephan, 2002). When the other happens not to be suffering at the moment, empathy may originate nevertheless from perceiving the feelings of another person and resonating with them, mindful, both verbal and nonverbal demonstration of the fact that those feelings are being attended to, and from being aware that empathic reaction is exactly what is going on between the interactants at that time. This may be the case considering cultural empathy (Mullavey-O'Byrne, 1997), which is particularly relevant to eCUTE as it acknowledges the significance of one's cultural frame. It is worth emphasizing that development of cultural empathy is an extremely complicated issue due to the fact that it relies heavily on intergroup dynamics. For example, people in general tend not to respond empathically to certain social groups (in terms of eCUTE, those outside of their moral circle), especially to those which are the targets of prejudice (e.g., Harris & Fiske, 2009; Stephan & Finlay, 1999); also, research on empathy towards in-group and out-group members usually yields mixed results (see Tarrant, Dazeley, & Cottom, 2009, for a short overview).

In order to handle the emotional difficulties listed above and progress to positive, welcoming reactions and ultimately, empathy, children and young adults may need to acquire a number of distinct skills:

1. *Self-monitoring* (Chen, 1997) in terms of being conscious of one's own negative feelings, such as anger when one's expectations in regard to a certain situation are violated (MIXER) or anxiety in response to meeting and communicating with culturally distant people (Traveller); simultaneously, remaining observant and not jumping right away to definite conclusions concerning the other group or let the negative emotions drive one's overt behavior. Instead, one should try to imagine what other people are feeling. For example, one may assume that they react in a way identical to one's own reaction or make an effort to generate more alternatives.

2. Sensitive individuals are capable of having *positive emotional reactions* to others in an intercultural interaction. They also project and easily receive this type of emotions

(Chen, 1997). Thus, people who initially experience negative emotions could be provided an opportunity to reframe or reappraise the situation and come up with positive equivalents. For instance, one may attempt to replace fear or anger with interest, or to use an opportunity to draw on the freshly gathered knowledge.

3. Ability to *openly explain oneself* (Chen, 1997), bearing in mind that such communication must not be aimed at hurting other people's feelings. Therefore, one may take the time to invent an appropriate manner of sharing one's feelings – which means actually to integrate feelings and cognitions. Next, one should be ready to listen to what others wish to share.

Emotional learning goals generally can be categorized as either attitudinal or motivational (Kraiger, 1993). While we acknowledge that these two are also very important within our intercultural training, in our framework we focus specifically on establishing a breeding ground for emotional empathy. The learning goals currently focus on the user being aware of his/her own emotions in the first stage, the link between prejudice and their emotions in the second stage, and on trying to share the emotions of other characters in the third stage.

3.1.2.1. MIXER

An important learning goal for the MIXER scenario consists in the extension of the concept of the moral circle membership. In this sense, children should ideally move away from a narrow conception of in-group/out-group and adopt a worldview with flexible boundaries. In order to achieve this, the MIXER players are supposed to become aware of their prejudices. The first step towards this goal would be equipping children with enough information on the unfamiliar, different group they play with. This is covered by interventions targeting cognitions and intercultural awareness. Apart from that, management of emotions is the crucial aspect of conflict competence, and specifically the ability not to allow the negative emotions to take over, leading to distorted perception of the whole disagreement.

On a **Beginner** level, children might find themselves in a situation when they have to play a game they know very well and to the rules of which they are long used to in a completely

new, perhaps incomprehensible way. Do note that the important fact here is not just having different rules, but having another group that introduces them.

- They should be able to comment on what they think of it and how it makes them feel.

In facing one's own prejudices, the **Journeyman** becomes more open-minded by perceiving groups adhering to different practices in a less polarized way.

- For example, they take their own attitudes towards the game into consideration and reflect on their emotions. By proposing to play the game according to their own rules, they will bear in mind that the other group will probably feel similarly to how they felt in regard to the odd rules (which might be an indicator of empathy). This could contribute to the development of conflict competence as children negotiate possible way out of the discord being mindful of their own feelings as well as of those of the other children.

3.1.2.2.   Traveller

The Traveller scenario emphasizes the participants' ability to recognize their emotions, especially the negative ones such as fear, anxiety, disgust (i.e., moral), and confusion.

The **Beginner** learns to recognize these emotions as they arise in reaction to a novel situation, for instance an unexpected form of a greeting by a character that they have never encountered before. Conveying the attitude of respect and overall interest, for example through taking part in a greeting ritual, may be then particularly important because it is also a starting point for the upcoming relationship.

The complexity of the learning goals increases considerably for the **Journeyman**.

Players should be able to free themselves from prejudice. In the extreme form this might not be possible, but:

- Young adults could continue to play a role of a detached observer. Besides attending to their own cognitions and taking the perspective of others, they should now also notice their feelings. They could produce a list of possible stereotypical assumptions

about people they interact with and then try to imagine how those assumptions might have been wrong and how these affect the well-being of the other. It is also important for them to realize that their negative judgments may have induced stereotypical thinking in the first place. They could also imagine how they would feel themselves if someone made a quick judgment about them. This might further lead to genuine empathic reaction via simulation of one's own experience in a similar setting.

On an **Expert** level, previous feelings and standpoints in reaction to unusual behavior should be accepted and integrated. This allows for the open and mindful exchange of emotions with members of other groups.

- Here, players could be challenged in explaining what other people feel and how this affects one's own feelings. For example, they may play the role of a translator in an intercultural context involving two or more groups. In trying to explain the meaning of a specific message, the feelings of both groups need to be understood and acknowledged. The emphasis lies on empathic behavior and sharing of group feelings without being judgmental. By moving in and out of different worldviews, the young adult player should become intuitively aware of and accept the emotional standpoint of each group.

3.1.3. Behavior: Communication and Interaction Competence

Possessing extensive knowledge on one's own culture and culture of groups one encounters as well as proficient management of one's emotional states do not automatically lead to suitable behaviors and harmonious, intercultural interactions (Brislin & Yoshida, 1994). The eCUTE framework mainly addresses the learning goals relevant to the development of intercultural awareness via cognitive changes and intercultural sensitivity via emotional changes. Behavioral adaptations that would indicate the advancement of communication

competence might fall outside the scope of the project. Nonetheless, an attempt will be made to tackle at least the most basic of them, especially those that can be practiced within the game scenarios. As it has been stated in D2.1, achievement of communication competence is the highest, final goal of intercultural training. Trainees ought to be capable of flexible communication, the style of which is not constant across different circumstances, but rather evolves to match the preferences of the representatives of the other culture. Such an approach to communication is likely to be more successful and helpful in attaining one's objectives, which in turn greatly contributes to the enjoyment of activities to be carried out in a new setting (Brislin & Yoshida, 1994; Wiseman, 2002).

Most of the skills necessary for competent communication across cultures have already been discussed in the context of intercultural awareness and sensitivity.

1. These range from the ability to *listen, observe*, and *fully attend to the other*, to *demonstrating interest and respect* and seizing the situation from the other's point of view.

2. Moreover, they notably include routine behaviors such as *being friendly, polite, honest, and acting natural* (Dinges & Baldwin, 1996), and obviously engaging in all of the above in a culturally appropriate way, making others feel comfortable.

This implies a necessity of mastering new, culture-general and ultimately culture-specific, both verbal and nonverbal behaviors.

To create a behavioral change in trainees, skill-based learning goals are generally ordered chronologically in three steps: initial skill acquisition, skill compilation, and skill automaticity (Kraiger, 1993). Skill acquisition focuses on translating declarative knowledge to procedural knowledge, skill compilation focuses on simple elements of behavior into fluid complex behavior, and the last step, skill automaticity, focuses on automatic processing of behavior (Kraiger, 1993).

These three steps serve as the basis for the three levels found in the behavioral branch of our learning framework. These learning goals are very general, and do not focus on specific elements of interaction.

3.1.3.1.   MIXER

For MIXER, particular behaviors will be kept to a basic level: observing the behavior of the other group and trying this behavior out themselves. Each part of the game could be followed by a discussion phase so this seems as a plausible point for behavioral practice.

On a **Beginner** level, certain practices of other groups need to become evident for the player and be differentiated from one's own behavior.

- In specific conflict situations, children should be able to label behaviors that seem against their group rules. On a minimum level, such behavior should be noticed as being "different" and experienced as unusual or odd practice.

Acquiring the skills of a **Journeyman** requires not only the conscious reflection on different behaviors, but also their execution.

- Having acquainted themselves with respect to how cultural groups differ from another, they might experiment with various types of behavior in order to achieve certain goals. In this context, frank communication with a focus on turn taking or the use of silence can be useful ways to practice culture appropriate forms of interaction.

3.1.3.2.   Traveller

The Traveller scenario devotes more space to defining verbal messages, for example greetings, as well as nonverbal behaviors, such as handshakes or bows, eye-gaze, and proxemics. As behavioral competence is best accomplished through experience, the Traveller players are subject to a trial-and-error approach. Action selection shall be cued, however, by theoretical knowledge.

Starting as a **Beginner**, specific verbal and nonverbal behaviors should be attentively observed by listening on all levels.

- When encountering another group, the young adult might recognize certain elements of verbal and nonverbal behavior that are important to that group. These are experienced as real differences and cannot be explained based on the existing

worldview. Furthermore, they challenge reconsideration of one's own behaviors in different cultural contexts. By attending to these behaviors, additional information can be sought to help explain specific practices. The young adults should be aware of those over the course of the game and show interest.

By transferring to the level of the **Journeyman**, the specific practices previously learnt on the basis of observation are consolidated by their production in different cultural situations.

- The young adult now engages in new and different forms of behavior that are specific to certain groups. Skills are practiced on a trial-and-error basis with the aim of being friendly and keeping the interaction process smooth.

On an **Expert** level, navigation through various types of cultural behavior can be achieved on an unconscious and intuitive level.

- Players can now deal with different forms of verbal and nonverbal behavior and expand their behavioral repertoire depending on the requirements of the cultural context. Thus, they can carry out appropriate actions in, for instance, informal meetings with friends or rather formal business settings and actively participate as a native in various cultural contexts.

3.2. Specification of the cognitive and affective processes to be modeled within the agent architecture

The following chapter provides an overview of the agent architecture as being developed by WP5 (INESC) within the eCUTE project. Currently, the architecture consists of ten components that contribute to the creation and control of autonomous agents, which have the ability to emotionally appraise events in their environment and decide about their actions. Based on the requirements for this deliverable, we will review and specify these components as belonging to either a *cognitive* or *affective* dimension of the architecture. While the strict separation of affect and cognition has been much debated, this distinction has proven to be of practical value and we will thus follow current common usage of these terms. Furthermore we will suggest possible extensions for modeling the agents' verbal and nonverbal behavior to enable culture sensitive learning.

3.2.1. Theoretical foundation of the agent architecture

The architecture of the agents is generally based on the OCC theory (e.g., Ortony, Clore, & Collins, 1988) of emotions. This is a most widely used theory in architectures for synthesizing emotions in virtual agents (Dias & Paiva, 2005, see also Calvo & D'Mello, 2010). The OCC model defines emotions as valenced reactions to three aspects of the world: *events*, *agents* and *objects* (Ortony et al., 1988). These reactions are based on subjective appraisal in line with one's goals, standards and beliefs (Dias & Paiva, 2005). Individual emotions are specified according to the conditions needed for their elicitation and the variables affecting their intensity. The valenced reactions to the three aspects of the world create three basic classes of emotions: *being pleased vs. displeased* (reactions to events), *approving vs. disapproving* (reactions to agents) and *liking vs. disliking* (reactions to objects). These are distinguished into different emotion types: *fortunes-of-others, prospect-based*, *well-being*, *attribution* and *attraction*. There is also a compound group of emotions, the well-being/attribution group, which involves the reactions to both events and agents at the same time (Ortony et al., 1988). The ten components of the agent architecture can be broadly categorized into cognitive and affective components, which often overlap.

3.2.2. Specification of the cognitive components

3.2.2.1. Planner

This component is capable of creating logical plans and executing them in such a way to accomplish intentions of the agent. The planner is an essential structure of the deliberative layer of the agent architecture (Dias & Paiva, 2005). When there is an event in the environment, the planner has to update all active plans according to that event, before the emotional reaction is generated. The planner includes probability information about actions and it executes emotion-focused coping strategies. The action probability is colored by the agent's subjective interpretation and is modulated by emotion-focused coping strategies (Dias & Paiva, 2005).

The agent architecture consists of appraisal and coping processes, both of which have two layers: *deliberative* and *reactive*. The deliberative layer is in charge of the agent's planning behavior and the reactive layer is responsible for the agent's action tendencies (Dias & Paiva, 2005).

3.2.2.2. Deliberative appraisal

The deliberative layer constantly revises agents' plans in order to fulfill its current intention and the reactive layer produces fast reactions to certain emotions. The deliberative appraisal is strongly influenced by agents' plans (Dias & Paiva, 2005). Deliberative appraisal elicits emotions which are related to the achievement of goals (Rodrigues, Mascarenhas, Dias, & Paiva, 2009). These emotions, in turn, influence agent's deliberation and planning (Mascarenhas, Dias, Prada, & Paiva, 2010).

For example, according to the OCC theory, if the event has prospect relevant consequences for the self, the emotions elicited are hope and fear. These can be either confirmed or disconfirmed, and thus lead to satisfaction, fear-confirmed, relief and disappointment emotions (Ortony et al., 1988). The deliberative appraisal component of the agent architecture

operates in a similar fashion. Each agent has a set of active-pursuit goals, which are activated under certain conditions. Whenever an event occurs, the deliberative layer scans all deactivated goals to determine whether any of them became active. If this is the case, there is an intention to achieve the goal. Based on the goal's importance, the emotions of fear and hope are created at this point. Subsequently, the deliberative layer chooses with which intention or goal to continue deliberation and planning. Intentions that generate the strongest emotions are the most relevant ones, requiring the most attention from the agent, and planning and deliberation are continued with those. Now the best plan needs to be considered, and this process is called *focus*. Focus generates emotions based on prospect: hope of success, fear of failure and inter-goal fear. In the end phase of the deliberative appraisal, the success or failure (confirmed-disconfirmed in OCC) of all active goals is established. On the basis of this, more prospect based emotions will be elicited, such as satisfaction, disappointment, relief and fears-confirmed (Dias & Paiva, 2005).

3.2.2.3. Reactive appraisal

The reactive appraisal component elicits other types of OCC emotions, namely, those that are *prospect irrelevant* (wellbeing, attribution, attraction) and those that have *consequences for other* (fortunes-of-others). When an event is received, the reactive appraisal compares it against the set of defined emotional rules, producing matching emotions (Dias & Paiva, 2005).

3.2.2.4. Coping

This component is inspired by the coping theory of Smith and Lazarus, even though related concepts exist also in other flavors of appraisal theory (e.g., Scherer). There were two types of coping implemented in the agent architecture: problem focused coping and emotional focused coping. *Problem focused coping* involves acting on the environment: planning and executing the set of actions, which obtain the final result. *Emotional focused coping* involves changing the agent's subjective interpretation of conditions (like importance and probability of goals), therefore attenuating strong negative emotions. Coping strategies are influenced by emotions, the general emotional state and personality (Dias & Paiva, 2005).

3.2.2.5. Memory

This component stores both Semantic and Episodic memories, which influence emotion elicitation, planning and action.

3.2.2.6. Advanced memory

This component is currently being developed, and it will build upon the main memory component and present more memory-based processes such as forgetting, retrieval and generalization.

3.2.3. Specification of the affective components

3.2.3.1. Empathy

In order to develop cultural sensitivity, empathy represents one of the most important elements of the agent architecture. The term empathy is generally used to refer to a heterogeneous set of phenomena which involve processes at different levels (for an overview see Krumhuber, Swiderska, & Kappas, 2011). According to Batson (2009, see also Eisenberg & Strayer, 1990), for example, these range from knowledge of another person's internal state, facial and postural imitation (including shared neural representations) to perspective taking and imagining how the other person is feeling and how oneself would feel in a similar situation. Clearly, all these different elements cannot be operationalized within eCUTE. The component to be modeled as part of the agent architecture is based mainly on *neuropsychological models of empathy*. These appear to be most relevant and have considerable empirical support. The empathy component elicits and modulates empathic emotions based on the already existent appraisal processes, allowing the agents to be empathic with the user as well as among themselves (Rodrigues et al., 2009).

The empathic component integrated in the agent architecture consists of two distinct phases: the *Empathic Appraisal* (in charge of the Potential Empathic Emotion elicitation and modulation) and the *Empathic Response* (responsible for generating an Empathic Action). The empathic appraisal works in parallel with the two other previously implemented appraisal processes (deliberative appraisal and reactive appraisal). The empathic appraisal phase is

activated when the agent notices a change in the emotional cues (e.g., facial expression, voice, body posture…) of the observed agent in response to an Event. This activation leads to determining the potential empathic emotion, which is achieved by employing two mechanisms: *Emotion Recognition* and *Self-Projection Appraisal* (Rodrigues et al., 2009).

The *emotion recognition factor* defines a set of Candidate Emotions that are matching the emotional cues displayed by the observed agent. There is always one default emotion, which is most strongly related to the emotional cues displayed. The *self-projection appraisal* evaluates the event that caused the emotional cues, as if the empathic agent was in place of the observed agent. However, unlike humans, agents use their own appraisal mechanism, unaware that the observed agents may appraise the situation in a different way. An emotion elicited by self-projection appraisal may not match any of the candidate emotions proposed by the emotion recognition, and in that case the default emotion will be taken as the potential empathic emotion (Rodrigues et al., 2009).

In order to add the potential empathic emotion to the agent's general emotional state, its intensity is first modulated by the following factors: *Affective Link*, *Similarity*, *Mood* and *Personality*. The former two address the relationship between the empathic agent and the observed agent, while the latter two concern the empathic agent only. In this model, *similarity* presents the extent to which the agent identifies with the observed agent, which is operationalized as similarity between the emotion elicited by self-projection appraisal and the potential empathic emotion. The more similar the agents are, the higher the potential of the empathic emotion is. The *affective link* value presents the relationship between the (empathic) agent and the observed agent. If this value is positive, then the affective link factor enhances the potential of the empathic emotion, and if it is negative, then it decreases it. Similarly, positive *mood* gives the potential of a positive empathic emotion and lowers the potential of a negative empathic emotion; while negative mood operates in the opposite way. *Personality,* in the present context, represents the agent's resistance to feel certain emotions, so the empathic emotions to which the agent is highly resistant will have smaller chances of being added to the agent's emotional state; and those to which it has lower resistance will have higher

chances. Additionally, there is another variable in the intensity modulation equation, which denotes the weight of the affective link with respect to the similarity factor (Rodrigues et al., 2009). This flexible architecture is able to produce empathic and counter-empathic effects, depending on social relationships, which in turn may change over the course of experience.

The empathic response is triggered by a cause event, which produces the empathic emotion (through the empathic appraisal process) that is then added to the general emotional state if its intensity is higher than zero, and the end product is the empathic action (Rodrigues et al., 2009). This model of empathic appraisal is integrated into the agent architecture, where it is possible to manually specify goals, personality traits and social relationship for each agent. The architecture already incorporates appraisal processes that take into account the agent's personality and mood (Rodrigues et al., 2009).

Overall, empathy will be modeled mainly as interpersonal response between the agents that allows them to perceive and behave in similar ways (see Rodrigues et al., 2009). For example, agent A witnessing agent B being excluded from a cultural group and looking depressed will feel sadness for B (empathic appraisal) and probably engage in an empathic action of supporting B (empathic response). A crucial aspect of the empathic modeling that should be highlighted, however, also concerns the empathic response of the user. In this sense, the emotional reaction of an agent needs to be sufficiently strong to trigger empathic feelings in the user. If those are not recognized by the user, the best empathic model may not succeed in achieving a learning experience. For example, if agent B's depressed state is not evident or does not logically follow from the previous event, the empathic response of agent A might not be detected or misattributed as an independent new action. This is particularly an issue in game scenarios in which several cultural groups of agents interact with each other and the unit of communication constantly changes. The user's perception should be therefore considered as a third-person perspective in the implementation of empathy in the architecture. In the ideal case, the cognitive and affective responses of the user evoked by the behavior of the agents should be so strong that they apply to characters outside the game setting. This would then allow for the generalization of empathy to people in real-life cultural conflict situations.

Given that such empathic experience represents the highest form of cultural learning, it can be a desirable, but not a firm goal as part of the cultural learning benchmarks within eCUTE. Nonetheless, it should help to clarify that empathy can be achieved at different levels that not only happens between agents, but also between agents and users. It is here where behavioral and physiological measures of user responses might be informative for the achievement of such goals.

Testing of the empathic model

In a study by Rodrigues et al. (2009) the empathy model of the agent architecture was used in a simple multi-agent "bullying" scenario and tested in two experiments. In the first experiment, the characters were John (the victim), Luke (the bully), Ollie (a friend of John, dislikes Luke) and Paul (a friend of Luke, dislikes John). In the second experiment, another character, Frances, was added to the scenario, whose only role was to greet all the characters at the beginning and to remain emotionally neutral throughout the scenario, in order to contrast other characters in data analysis.

In each experiment, two videos were created, whose scenarios differed only in respect to empathy: one involved the empathy model, the other did not. The goal of the first experiment was to determine whether users were able to recognize the empathic interactions that happen in the empathy model. The second experiment had a goal to measure the effect of the empathy model on the user's opinion about the characters. Results of the first experiment showed that, based on self-report, the majority of users empathized with John and not with Luke. Ollie was users' favorite character when the empathic model was added (61% of users chose him, in comparison to only 10% in the non-empathic condition). Luke was the most disliked character in both scenarios. Users were able to perceive Ollie's empathy towards John and could perceive Paul's empathy towards Luke when the empathy model was added. These results indicate that the users were able to perceive the empathic interactions which occurred when the empathic model is added to the scenario.

Overall, results of the second experiment showed that users again perceived Ollie as the most favorite character in the empathy condition (60% of user chose him, in comparison to only 9% in the condition without the empathy model). Ollie was also significantly perceived as more caring, likeable, trustworthy, intelligent and dominant in the empathy condition than without the empathy model. Moreover, Paul, the second most disliked character, was significantly perceived as less caring, likeable, trustworthy, intelligent and dominant in the empathy condition. These results imply that users were able to perceive the empathic agents differently from the non-empathic agents.

3.2.3.2. Theory of mind

This component gives the agent the ability to attribute mental states (beliefs, desires, and intentions) to other agents and to understand/explain these states. It also helps the agent to judge whether an event is desirable or undesirable for the other agents involved. According to the OCC theory, appraising events as *desirable for other* elicits happy-for or resentment emotions, while appraising events as undesirable for other elicits the emotions of gloating or pity (Ortony et al., 1988).

3.2.3.3. Motivational needs

This component is based on the PSI model of human behavior (Dorner, 2003) and it integrates five different human needs in the agents: *energy, integrity, affiliation, certainty,* and *competence*. Different agents attribute different weights to each of the needs. This component is also relevant for the appraisal of events. If the event is positive for the agent's needs, then the event will be evaluated as desirable. At the deliberative level, motivational needs modify the choice of the most appropriate goal and coping strategies (Mascarenhas, Dias, Afonso, Enz, & Paiva, 2009).

3.2.3.4. Culture

This component is built out of three cultural elements: *Dimensions* (for now only Individualism and Power Distance are included), *Symbols* and *Rituals*. Culture affects goal utility. People from individualistic cultures will evaluate goal utility primarily through the impact the goal has on themselves, and also on others, who are closely related to them. On the

other hand, collectivistic cultures will evaluate goal utility using the impact the goal has both on themselves and on others, regardless of their relationship. Similarly, people from a high power distance culture should favor goals that positively affect others who have a higher status, while one's status would not be of concern for people from a low power distance culture.

Culture influences emotional appraisal. In the agent architecture, the variable of praiseworthiness is of particular interest. In OCC, approving/disapproving of actions of agents leads to a group of emotions named the Attribution emotions. These emotions are caused by reactions to the agents' actions, when they are viewed as being praiseworthy or blameworthy (Ortony et al., 1988), and this judgment is largely depended on agent's cultural standards (Mascarenhas et al., 2009). Events that are praiseworthy will eventually elicit pride and admiration emotions, while events that are blameworthy will elicit shame and reproach (Ortony et al., 1988).

Testing of the cultural model: Rituals

In a study by Mascarenhas et al. (2009), two different videos were created with the same scenario in all components apart from rituals, which were designed to show the two differing extremes in the power distance dimension (low-power vs. high-power culture rituals). There were three rituals in total: *greeting*, *welcoming* and *dinner ritual*. The setting was a regular dinner party, attended by 5 similarly, yet oddly dressed characters (in order not to be associated to any known culture). Even though obviously belonging to the same culture, the five characters had individual differences, among which was the social status: two characters had low, two had medium and one had high social status. All the characters had the same available goals, but their activation depended on the character's properties and on the calculated utility of the goal.

When assessing the culture of characters on different traits, only the adjective pair serious/cheerful yielded significant difference: Users found the low-power culture cheerful while the high-power culture was considered slightly serious. Only 4 users did not find any

difference between the videos. From the remaining 37 participants, 67% of them said that the differences were related to the character's culture and 30% though it was personality. These results indicate that the rituals were powerful enough to create an impression of different culture for the users. This finding is not trivial, as there is the risk that the behavior of agents would mostly concern properties of particular individuals, in the sense of the fundamental attribution error (Krull et al., 1999), that is often discussed in social psychology – attributing behavior to an individual rather than, for example, circumstances.

Testing of the cultural model: Values

In another study by Mascarenhas et al. (2010), two dinner party scenarios were created, depicting two different cultures: one extremely individualistic and one extremely collectivistic. All other parameters remained the same in both scenarios. The goal of the study was to determine if users will be able to recognize one culture as more individualistic/collectivistic, based on altering only the corresponding dimension in the model.

Results showed that users were able to recognize individualistic/collectivistic values as more suitable for the respective culture, which suggests that they noticed differences related to cultural values in two different cultures. When rating the cultures on different traits, collectivistic culture was seen as significantly more approachable, sharing, hierarchical, polite, pleasant, collectivistic, relaxed, compassionate and cheerful than the individualistic culture. In contrast, the individualistic culture was seen as significantly more distant, independent, equalitarian, impolite, unpleasant, individualistic, unfriendly, tense, indifferent and serious that the collectivistic culture. Generally, the results suggest that, only by changing one dimensional parameter, this cultural model can create cultures with differences that are noticeable by users.

3.2.4. General aspects with respect to the modeling of verbal and nonverbal behavior of agents

3.2.4.1. Nonverbal behavior

As nonverbal acts supplement verbal information and help to express motivation, intentions and emotions of the agents, the modeling of expressive behavior is an important element. Currently, the architecture offers little possibility in controlling specific forms of nonverbal expression. Moreover, aspects such as body posture, paralinguistic vocal cues (e.g., pitch, voice quality), gaze orientation and gestures are not part of the architecture and need to be modeled independently in an ad-hoc manner. Whether these can be integrated depends on technical feasibility, specifically game play related issues of the software. Independently of whether such goals can be achieved, it is important to highlight that nonverbal communication is never a linear process in which agent A emits some signals which are then perceived by agent B. Rather agent B might interpret any nonverbal behavior of agent A as signal, regardless of whether they are intentional or not. In this sense, no direct interaction between two agents is required in order to exchange signals. On the other hand, an interaction partner may not perceive a nonverbal signal which was transmitted by the other partner. Such asynchrony in nonverbal communication is captured by the modified Brunswikian lens model (Kappas, 1997; Kappas, Hess & Scherer, 1991). It identifies on the one hand, states or social motives, which are encoded by a sender, and on the other hand, those which are perceived by a receiver. Cues from both the sender and receiver side may be linked, but can equally be restricted only to one side.

In addition, agent B might infer specific behavior simply from the appearance of agent A. This is a critical issue in the context of intercultural exchanges. For example, agent A's appearance (e.g., clothes, skin color, hair style) might lead agent B to think that s/he behaves in certain ways. In the context of paradigms intended for interaction with children (e.g., MIXER), the color of the school uniform would be sufficient to know that the person belongs to a different group with their own rituals. Behaviors therefore always take place within a framework of expectations and representations (Kappas & Descôteaux, 2003). Thus, the perception of the sender through the receiver is in fact an attribution process that relies on beliefs and biases. Such influences on the interpretation of nonverbal behavior have been demonstrated with respect to the ethnicity (e.g., Hess, Blairy, & Kleck, 2000; Hugenberg & Bodenhausen, 2003) and gender of the sender (Hess, Adams, & Kleck, 2004) as well as

specific aspects of the physical appearance of the person such as attractiveness (McArthur & Apatow, 1983/1984; Zebrowitz, Voinescu, & Collins, 1996).

One question of interest is whether novel nonverbal displays should be implemented to allow for the plausible display of synthetic cultures. Here it is relevant that there are culturally specific gestures (nodding or shaking the head, or shrugging would be examples), but very little variance in the *pattern* of emotional expressions shown. Instead, there seem to be differences with regard to frequency, intensity, and context in which they are shown, in the sense of display rules, as discussed by Ekman and Friesen (see Kappas, 2003) or current models on social context influence (Kappas & Descôteaux, 2003).

3.2.4.2. Verbal behavior

Speech behavior consists of integrated sets of verbal acts that appear in concert to produce the communicative exchange. A widely held assumption of verbal communication is that it is as a sequential process in which two or more interaction partners are independent partners that act in sequence as senders and receivers (Kappas & Descôteaux, 2003). Accordingly, each interaction partner is considered as autonomous individual taking turns in sending and receiving information. For example, agent A might make a remark that s/he is feeling sick today, whereas agent B might worry about where to get help for painting the house. Each agent's statement is valid in its own right, but it requires considering the dyad as a relational unit. Such unit is a dynamic net of concurrent interactive processes in which each participant is both sender and receiver at the same time. In this sense, agent A might have made a remark about his/her health status due to the conversation before or because A feels close to agent B and might want to receive help. Based on this example of dyadic interaction, it is then not clear anymore whether agent A is only sender, or also receiver. Furthermore, there are generally mutual and simultaneous exchanges across several verbal and nonverbal channels that transcend the unit of communication into a meaningful whole, rather than molecular parts. This has the potential to expand the boundaries of information processing between interaction partners, by generating an entity that can be studied on its own (Kappas & Descôteaux, 2003; see discussion on adjacency pairs below).

Such an approach seems to be of particular value in implementing dialogue models in which different synthetic cultures with their own values and rituals are represented. For example, the communicative unit in individualistic cultures may differ from that of collectivistic cultures. In addition, agents of different cultures may share different goals and plans as a group which may not be directly evident from the behavior or interaction style of a single individual. In this context, agent A's remark of being sick could have different meanings depending on the cultural group membership and/or relationship with agent B. Respectively, the goal of agent A could be to get medicine or to receive emotional support as part of the conversation. Given that behaviors not only serve as signs or symptoms, regulatory effects in interpersonal communication are therefore important parts of verbal feedback systems. Later versions of the architecture might emphasize the role of context information for the inference of meaning as cultural differences would affect the externalization of affective responses to the point that members of such a culture would react empathically to responses that are only anticipated, but not displayed.

Currently, the dialogue model of the agent architecture features several verbal styles such as *direct vs. indirect*, *person-oriented vs. status-oriented*, and *self-enhancement vs. self-effacement* (see D5.1, Paiva, Mascarenhas, & Figueiredo, 2011). These are necessary components for making the conversation more flexible and adaptable. However, so far speech acts are still considered as regular actions such as eating or walking that are focused too much on the agent itself. As a consequence, the conversational unit does not rest between two or more interacting partners, but instead in a single utterance of an agent. This leads agents to interrupt each other because the system does not recognize the conversation as a relational unit.

In order to account for this problem a new approach has been taken by introducing adjacency pairs that represent the fundamental unit of conversations (Holtgraves, 2008, as cited in Mascarenhas, Figueiredo, & Paiva, 2011). In this sense, adjacency pairs only rely on joint actions that are executed by two or more people. This allows for the representation of a dialogue in which each agent's behavior is not considered as an independent act, but related in

meaningful ways. An important aspect of intercultural learning consists in the ability to take someone else's perspective and to feel with the other person. This usually takes place within a conversation or dialogue among two or more people. If an agent architecture is constructed in a way that implements the relational unit of the dialogue, empathic behavior of the user can go beyond simple information exchange scenarios.

4. Conclusion

In this deliverable we have specified learning goals for each stage of the MIXER and Traveller scenarios being currently developed within the eCUTE project. Achievement of these goals would indicate cognitive, emotional, and behavioral changes resulting in increased intercultural awareness, sensitivity, and communication competence, respectively. These learning goals will later serve as a basis for work on the game scenarios which have to provide an opportunity for gathering particular knowledge and skills necessary in intercultural interactions.

Moreover, we have described the agent architecture, extended by specification of its cognitive and affective components which will be modeled to enable for creating agents meeting the requirements of eCUTE, that is, displaying different behaviors depending on the cultural influences involved and fostering culturally sensitive learning.

5. References

Allport, G. W. (1958). *The nature of prejudice.* Garden City, NY: Doubleday Anchor Books.

Batson, C. D. (2009). These things called empathy: Eight related but distinct phenomena. In J. Decety & W. Ickes (Eds.), *The social neuroscience of empathy* (pp. 3-15). Cambridge, MA: The MIT Press.

Bhawuk, D. P. S., & Brislin, R. W. (1992). The measurement of intercultural sensitivity using the concepts of individualism and collectivism. *International Journal of Intercultural Relations*, *16,* 413-436.

Brislin, R., & Yoshida, T. (1994). *Intercultural communication training: An introduction*. Thousand Oaks, CA: Sage Publications.

Calvo, R.A., & D'Mello, S. (2010). Affect detection: An interdisciplinary review of models, methods, and their applications. *IEEE Transactions on Affective Computing, 1*, 18-37.

Carbaugh, D. (Ed.). (1990). *Cultural communication and intercultural contact*. Hillsdale, NJ: Lawrence Erlbaum.

Chen, G.. (1997, January). *A review of the concept of intercultural sensitivity*. Paper presented at the Biennial Convention of the Pacific and Asian Communication Association, Honolulu, HI.

Cushner, K., & Brislin, R. W. (1997). *Improving intercultural interactions: modules for cross-cultural training programs* (Vol. 2). Thousand Oaks, CA: Sage Publications.

Deardorff, D. K. (2006). Identification and assessment of intercultural competence as a student outcome of internalization. *Journal of Studies in Intercultural Education*, *10*, 241-266.

Dias, J., & Paiva, A. (2005). Feeling and reasoning: A computational model for emotional characters. In C. Bento, A. Cardoso & G. Dias (Eds.), *Progress in Artificial Intelligence* (pp. 127-140). Berlin/Heidelberg: Springer.

Dinges, N. G., & Baldwin, K. D. (1996). Intercultural competence: A research perspective. In D. Landis & R. S. Bhagat (Eds.), *Handbook of intercultural training* (2nd ed., pp. 106-123). Thousand Oaks, CA: Sage publications.

Dorner, D. (2003). *The mathematics of emotions. In: Proceedings of the Fifth International Conference on Cognitive Modeling. Bamberg, Germany* (pp. 75-79), Bamberg, Germany., Universitäts Verlag.

Eisenberg, N., & Strayer, J. (1990). *Empathy and its development*. Cambridge, MA: Cambridge University Press.

Harris, L. T., & Fiske, S. T. (2009). Social neuroscience evidence for dehumanized perception. *European Review of Social Psychology, 20,* 192-231.

Hess, U., Adams, R. B., & Kleck, R. E. (2004). Facial appearance, gender, and emotion expression. *Emotion, 4,* 378-388.

Hess, U., Blairy, S., & Kleck, R. E. (2000). The influence of facial emotion displays, gender, and ethnicity on judgments of dominance and affiliation. *Journal of Nonverbal Behavior, 24*, 265-283.

Hofstede, G., Hofstede, G. J., Minkov, M. (2010). *Cultures and Organizations: Software of the Mind*. (3rd ed.). McGraw-Hill.

Howard-Hamilton, M. F., Richardson, B. J., & Shuford, B. (1998). Promoting multicultural education: A holistic approach. *College Student Affairs Journal, 18,* 5-17.

Hugenberg, K., & Bodenhausen, G. V. (2003). Facing prejudice: Implicit prejudice and the perception of facial threat. *Psychological Science, 14,* 640-643.

Kappas, A. (1997). The fascination with faces: Are they windows to our soul? *Journal of Nonverbal Behavior, 21,* 157-161.

Kappas, A. (2003). What facial activity can and cannot tell us about emotions. In M. Katsikitis (Ed.), *The human face: Measurement and meaning* (pp. 215-234). Dordrecht: Kluwer Academic Publishers.

Kappas, A., & Descôteaux, J. (2003). Of butterflies and roaring thunder: Nonverbal communication in interaction and regulation of emotion. In P. Philippot, E. J. Coats, & R. S. Feldman (Eds.). *Nonverbal behaviour in clinical setting* (pp. 45-74). New York: Oxford University Press.

Kappas, A., Hess, U., & Scherer, K.R. (1991). Voice and emotion. In B. Rimé & R. Feldman (Eds.). *Fundamentals of Nonverbal Behavior* (pp. 200-238). Cambridge: Cambridge University Press.

Krull, D.S., Loy, M.H., Lin, J., Wang, C.F., Chen, S., & Zhao, X. (1999). The fundamental attribution error: Correspondence bias in individualist and collectivist cultures. *Personality and Social Psychology Bulletin, 25*, 1208–1219.

King, P. M., & Baxter Magolda, M. B. (2005). A developmental model of intercultural maturity. *Journal of College Student Development, 46*, 571-592.

Kraiger, K., Ford J. K., Salas, E. (1993). Application of cognitive, skill-based, and affective theories of learning outcomes to new methods of training evaluation. *Journal of Applied Psychology, 78*, 311-328.

Krumhuber, E., Swiderska, A., & Kappas, A. (2011). *State of the art report into the measurement of affect and empathy.* Milestone 3 report of eCUTE, Education in Cultural Understanding, Technologically-Enhanced, FP7-ICT-2009-5, Project No: 257666.

Mascarenhas, S., Dias, J., Afonso, N., Enz, S., & Paiva, A. (2009). Using rituals to express cultural differences in synthetic characters. In Decker, Sichman, Sierra and Castelfranchi (Eds.) *Proceedings of the 8th International Conference on Autonomous Agents and Multiagent Systems* (pp. 305-312). Budapest, Hungary.

Mascarenhas, S., Dias, J., Prada, R., & Paiva, A. (2010). A dimensional model for cultural behavior in virtual agents. *Applied Artificial Intelligence-Intelligent Virtual Agents, 24*, 552-574.

Mascarenhas, S., Figueiredo, R., & Paiva, a. (2011). *Advances in FAtiMA (Speech and Dialogue)*. Paper presented at the eCUTE project meeting in Reykjavik, Iceland (September).

McArthur, L. Z., & Apatow, K. (1983/1984). Impressions of baby-faced adults. *Social Cognition, 2*, 315–342.

Mullavey-O'Byrne, C. (1997). Empathy in cross-cultural communication. In K. Cushner & R. W. Brislin (Eds.), *Improving intercultural interactions: Modules for cross-cultural training programs* (Vol. 2, pp. 205-220). Thousand Oaks, CA: Sage Publications.

Ortony, A., Clore, G. L., & Collins, A. (1988). *The cognitive structure of emotions.* London, England: Cambridge University Press.

Paiva, A., Mascarenhas, S., & Figueiredo, R. (2011). *Culturally-sensitive agent architecture specification.* Deliverable D5.1. for eCUTE, Education in Cultural Understanding, Technologically-Enhanced, FP7-ICT-2009-5, Project No: 257666. August, 2011

Rodrigues, S. H., Mascarenhas, S. F., Dias, J., & Paiva, A. (2009). "I can feel it too!": Emergent empathic reactions between synthetic characters. In *Proceedings of the International Conference on Affective Computing & Intelligent Interaction (ACII)* (pp. 1-7). Amsterdam, The Netherlands (September).

Singer, P. (1981). *The expanding circle: Ethics and sociobiology*. New York, NY: Farrar, Straus & Giroux.

Stephan, C. W., & Stephan, W. G. (2002). Cognition and affect in cross-cultural relations. In W. B. Gudykunst & B. Mody (Eds.), *Handbook of international and intercultural communication* (2nd ed) (pp. 127-142). Thousand Oaks: Sage Publications.

Stephan, W. G., & Finlay, K. (1999). The role of empathy in improving intergroup relations. *Journal of Social Issues, 55,* 729-743.

Tarrant, M., Dazeley, S., & Cottom, T. (2009). Social categorization and empathy for outgroup members. *British Journal of Social Psychology, 48,* 427-226.

Ting-Toomey, S. (2009). Intercultural conflict competence as a facet of intercultural competence development: Multiple conceptual approaches. In D. K. Deardorff (Ed.), *The Sage handbook of intercultural competence* (pp. 100-120). Thousand Oaks, CA: Sage Publications.

Tuleja, E. A. (2008). Aspects of intercultural awareness through an MBA study abroad program: Going "Backstage". *Business Communication Quarterly*, *71*, 314-337.

Wiseman, R. (2002). Intercultural communication competence. In W. B. Gudykunst & B. Mody (Eds.), *Handbook of international and intercultural communication* (2nd ed., pp. 207-224). Thousand Oaks, CA: Sage Publications.

Zebrowitz, L.A., Voinescu, L., & Collins, M.A. (1996). 'Wide eyed' and 'crooked-faced': Determinants of perceived and real honesty across the life span. *Personality and Social Psychology Bulletin*, *22*, 1258-1269.