MIXER: Why the Difference?
(Demonstration)

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ABSTRACT
This interactive demo features MIXER, a Virtual Learning Environment (VLE) consisting of synthetic characters representing the various actors in a scenario group difference scenario. MIXER creates virtual dramas by using interactive narrative with those characters. The goal is to enable children to identify social rule differences, by interacting with one of the characters to which they become empathic. MIXER is evaluated in the UK and Germany with children aged 9 to 11 years. The video for the demo content can be found at: http://youtu.be/jKIndn5NPaQ

Categories and Subject Descriptors
D.m. [Software]: Miscellaneous **-** *Software psychology*

Keywords
Artificial Intelligence, Applications, Virtual Agents.

1. CULTURAL UNDERSTANDING AND MIXER

Virtual Environments, Synthetic Characters and multi-agent systems are increasingly used in the field of technology enhanced learning. MIXER (Moderating Interactions for Cross-Cultural Empathic Relationship) is a Virtual Learning Environment containing intelligent virtual characters, devised for children aged 8-11. The overall aim of MIXER is to teach children that differences in behaviour between different groups may be caused by differences in rules, using in-group and out-group relationships as an early surrogate for cultural difference [5]. The idea is to create an empathic relationship between the user and one of the virtual characters and then observe and advise while the character interacts with two groups playing a social game, each with different rules. The culture-clash card game BARNGA [10] was

used as a design inspiration. An innovative tablet-based interface running a custom-designed pictorial icon-based language (PIL) has been used to avoid problems with slow typing speeds and different languages.

MIXER starts with a group of child characters at a summer camp where they go every year and play different games. This year they are playing a game called Werewolves. In this game roles are secretly assigned as Villager or Werewolf. Play is turn-based: in the Night turn players shut their eyes, then the Werewolf wakes and points to a Villager. In the Day turn the Villager is declared dead and players make accusations against each other. At the end of this turn one player is declared dead, but only if this is in fact the Werewolf does the game end. The user assumes the role of friend to one of the characters (a boy for boy users and a girl for girl users) but is invisible to all other characters. The friend character asks for user opinion and advice both during the Werewolf game and in other situations.

2. STORY

MIXER starts by introducing the scenario and the friend character (FC) to the user, they interact so as to get to know each other. Preliminary greetings, names and other information are exchanged. The FC then invites the user to join them in meeting his/her friends. These are already known and the FC is comfortable playing with them though is new to the Werewolves game. The group shows the FC how to play Werewolves and then they play one or more rounds. During the game play the FC regularly asks for user advice and opinion. After the first group has played Werewolves for a while they want to stop playing. However the FC would like to play some more, so they find a new group of characters who are one player short. But the FC is a bit nervous in playing with this new group and the user has to convince the FC to play with them. The FC exchanges greetings and introductions with the new group. Then they start to play Werewolves. However it quickly becomes clear in this new game that different rules are being used, resulting in a Critical Incident in which the FC is declared dead. The FC becomes upset and asks for user opinion and support.

Thus overall the story focuses on subjecting the user indirectly via the FC to a situation where they encounter different rules and then get a chance to reflect on those differences.

Figure 1: Children playing werewolf in MIXER.
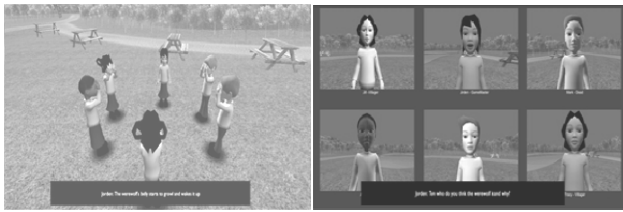
3. TECHNOLOGY INVOLVED

For the user to have an immersive, interesting and educational experience, it is necessary that the virtual characters have believable emotional and social behaviour. It is also important that the user has a meaningful interaction with these virtual characters. For this purpose several innovative technologies are integrated: the ION middleware, FAtiMA agent architecture [1], the Unity 3d game engine [2] and the tablet-based Pictorial Icon-based Language (PIL) [3] for user interaction with MIXER.

MIXER characters are based on the agent architecture FAtiMA which models agents that simulate emotions based on the OCC model. FAtiMA agents have been used before and have proved to be very suitable for modeling autonomous empathic characters, a key point in any application that strives for deep emotional engagement based on empathy [1]. This architecture has been modified to include explicit social parameters and a simulation-based theory of mind to allow the deceptive behaviour needed to play Werewolves.

The ION-framework [3] is a generalized, discrete time step and fully synchronized simulation framework, based on an entity-component design paradigm. In an ION-simulation everything is defined to be an Entity (an identifiable object), a Property or an Action. Entities can be connected to Properties and Actions to describe more complex Entities.

Unity3D is used with ION as the Realizer-component in eCute [2]. The Unity3D game engine delivers a visual representation of the virtual world simulated in ION.. Speech output comes from the unit-selection text to speech based system Cereproc [5].

4. INTERACTION WITH MIXER

Applications such as FearNot! [4] have shown that this age group can have difficulty with full language and keyboard based modes of interaction. For MIXER, a different approach is used with the PIL, which represents emotions as well as offering a way construct sentences [6].

Figure 2: Interaction interface in MIXER.
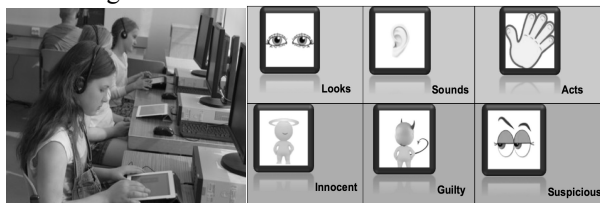
The VLE is shown on a desktop screen and a separate tablet computer is used for interaction. The user can observe what is going on in the story on the desktop screen. When the FC needs

advice from the user, the FC comes closer in the VLE, while a set of contextually-appropriate icons are provided on the tablet computer along with slots into which to move selected icons forming a sentence.

5. MIXER EVALUATION

Several evaluations have been conducted in the classroom in both Germany and the UK with 9-11 year olds over 3-4 weeks, using three major evaluation measures: the Cultural Intelligence Scale (CQS) [6], Bryant's Empathy Index [7] and MESSY (Matson Evaluation of Social Skills) [8]. The results achieved from this evaluation are detailed in [9]. Initial results were unexpected though vital in understanding the difficulties faced by innovative technology in Technology enhanced learning paradigm. These results prompted the need for further evaluation [9] that has shown the significant role of post-experience collective discussion in producing a pedagogical effect.

6. REFERENCES

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