OSSE: an Open Source Socio-Emotional simulator

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1. Introduction

In the last decade, emotion modeling has taken an increasing place in research in virtual agents and synthetic actors. One challenge is to be able to design believable characters that show a coherent behavior with respect to a personality. Much work has been done for virtual affective characters but, more recently, research has shown the importance of social relation and its tight relation with emotions. Not only the social context influence the emotional behavior of virtual characters, but also emotions do affect the social relations. As a consequence, when designing virtual characters with a believable socio-emotional behavior, one need to take into account the social context, the emotions and the personality. These three elements together represent the *socio-emotional context*.

In this article, we present the Open-Source Socio Emotional (OSSE) simulator. This software was first designed in the context of game industry. It allows game designers to describe characters and scenes, as a set of emotional events, so as to study the dynamics of emotions and social relation among characters. In the next section, we briefly present the theoretical model that undergoes our system and we show how the different elements can be settled in the OSSE simulator. Last section illustrates the functionning of the OSSE simulator with a concrete example.

2. The OSSE simulator

In the OSSE simulator, the socio-emotional context of a virtuel character includes: the *personnality* of the virtual character, its *social relations* with other characters, the different *social roles* it can undergo, its *attitude* toward each element of the scenario, and its *emotions*. The OSSE simulator allows game designers to describe the scene as a serie of *events* that trigger emotions on social characters. Our appraisal model is based on the well-known OCC model and uses the character's attitudes toward the objects and characters that participate in the event to determine the triggered emotions and their intensity. These emotions are altered by the character's personality. The resulting character's emotion is then used to modify the social relations of the virtual character with all characters that participate in the event (for more details on the model see [1]).

In order to design such a scene in the OSSE simulator, one must first define a set of *game concepts* that can be either action verbs, passive objects (such objects cannot perform any action) or so called *game characters*, i.e. elements that can perform actions (but whose socio-emotional state is not relevant for the game designer). Once the game concepts are defined, the game designer must define a set of roles that future virtual characters can undergo. Each role can be associated to other roles to settle the initial social relation between characters. It is also possible to provide character-specific attitudes toward each game concept. The

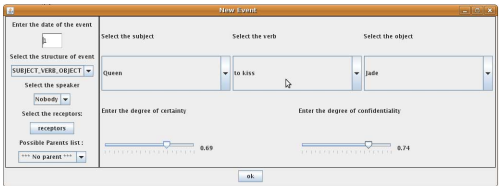

Figure 1. Screen shot of the interface for an event creation

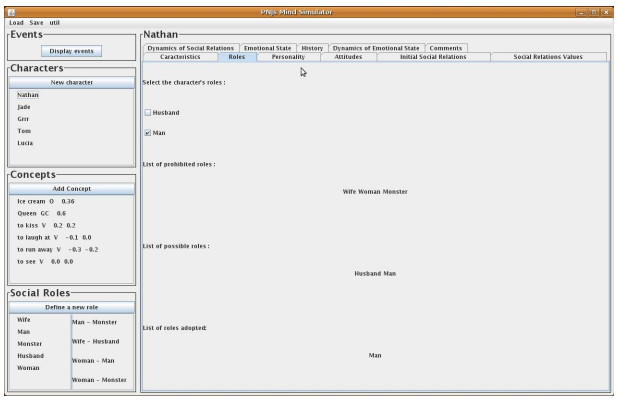

Figure 2. Screen shot of the interface for the creation of a character

concepts, roles and characters can be seen as a *library* for the scene. Based on this library, the game designer can set up a list of events as triples. Figure 1 show the creation of such an event. The events are put together in a scene, as shown on figure 3. Using the *play* button, the game designer

can play the scene (either step by step or in as a whole). The

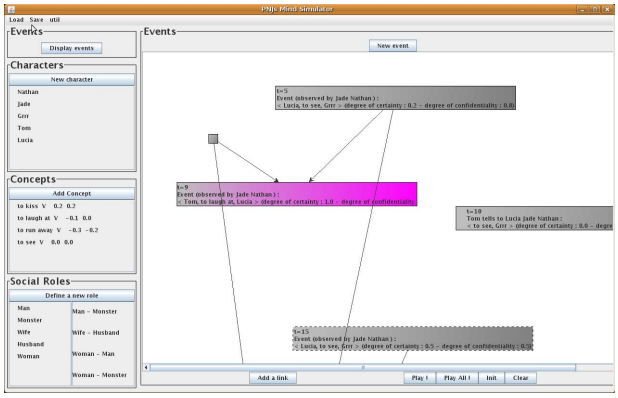

Figure 3. Screen shot of a scene

resulting emotions and social relations can be seen on the virtual character's data sheet, as shown on Figure 4.

3. Example

To illustrate our tool, we have tested it with a simple scenario described in the following. The context of the scenario is a police interrogation (a burglar facing a policeman) at the police station. After a break-in in a jewelry, the police arrested the burglar but the loot is missing. The policeman wants the burglar to confess where the money and the jewels are hidden:

1. Policeman : The facts are not in your favor, you know. Ten people saw you threaten the manager with a weapon

2. Burglar : So, what do you want?

3. Policeman : You know, I'm not a bad guy...*(the policeman is preparing a cup of coffee)*

4. Policeman : Do you want some coffee? *(the policeman offers a cup of coffee to the Burglar)*

5. Policeman : ...I know that your child has been kidnapped. Same thing happened to me last year, I had to negotiate with those b*** I know what it is *(expression of distress)*

6. Policeman : I want to help you. Just tell me where you hid the money

7. Burglar: I need this money to save my child!

8. Policeman : We have received new information about the kidnappers. We know where your kid is being kept

9. Policeman : Tell me everything and I'm sure I can find a solution to avoid you going to jail.

We have tested this scenario on the NPC burglar. At the beginning of the interaction, given the social roles of the characters, we suppose that the burglar is submissive related to the policeman (the initial value of dominance is -0.3) and dislikes him (the initial value of liking is -0.5). The dynamics of the burglar's emotional state and social relation are illustrated Figure 4.

The first utterance, encoded in the scenario as event $< policeman, arrest, burglar, 0.8 >$, triggers an emotion

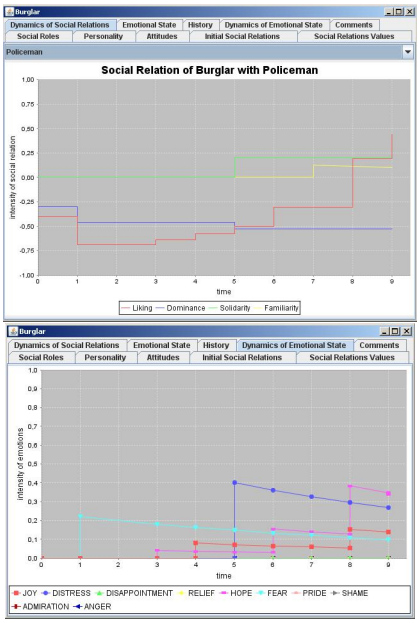

Figure 4. Dynamics of Burglar social relation with the Policeman (top) and the Burglar's emotions (bottom)

of fear for the burglar because the effect of the action *arrest* is negative (-0.8) and because the burglar has a positive attitude toward himself (0.3). This emotion of fear induces a decrease of the degree of liking the burglar has for the policeman. The preparation of the coffee (third utterance), which corresponds to the expectation of a desirable event for the burglar who has a positive attitude toward the coffee (0.4), triggers hope emotion. This emotion induces an increase of the degree of liking. The intensity of the emotion depends on the value of the attitude and the degree of certainty of the event (0.4). Consequently, the joy emotion triggered by the fourth utterance is lower that the one triggered by eighth utterance. An emotion may also be triggered by the retrieval of a desirable or undesirable event, as illustrated utterance 5: this utterance triggers distress with a high intensity for the burglar. But, since the policeman is not responsible for this negative emotion (he is not the kidnapper), the event has no impact on the degree of liking.

The OSSE simulator, under constant developpement, can be downloaded on our SVN server: https://webia.lip6.fr/svn/OSSE (login: etudiant, passwd: etudiant)

References

[1] M. Ochs, N. Sabouret, and V. Corruble. Simulation of the dynamics of virtual characters' emotions and social relations. In *Affective Computing and Intelligent Interaction (ACII)*, 2009.