Investigation of the influence of virtual lifelike agents within an interactive game

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***Abstract**: This paper reports on the results from an investigation of the impact of virtual life-like agents (LVA) with various individualities on people, playing an interactive game. A version of a poker game, similar to those, realized by the casino poker machines, has been developed. Two virtual agents with different characters have been modeled – a cheerful and emotional one, and a reserved and serious one. The idea is to check which of the two agents will urge the players to play longer, to put down bigger stakes and with which of the agents the losses will be greater.*

***Keywords:** virtual lifelike agent, game playing, individuality.*

1. INTRODUCTION

Virtual Lifelike Agents (VLA) are widely used in various fields including interactive training environments [5][11] and computer games. They are supposed to be pleasant, impactive, and capable of attracting the users' attention. Therefore they should be designed carefully, following Loyall's principle [6] of avoiding mistrust: "An agent is regarded as plausible if it allows the users to suppress/block out their suspicion for a while....".

The development of incisive characters with plausible behavior comprises a range of challenges such as: modeling an appropriate design of the agent including plausible modeling of face expressions and mimics or body gestures [7], modeling of individuality and emotions [1], synthesizing emotional speech [9].

The project IDEAS4Games [2] investigates the way in which the modern ECA technologies (Embodied Conversational Agent technologies) can facilitate the improvement of the process of creating computer games with effective virtual characters. The authors have developed a powerful and easy to use programming system named Scene Maker [3] for modeling the contents, the scenes and dialogues of the designed games. According to [4] the emotions are the key to modern modeling of virtual characters' behavior. Therefore the authors convey aspects of human emotional behavior over virtual characters, modeled by them; they apply Expressive speech synthesis and 3D models to the agents, along with lip-sync facial expressions, breath simulation and body expressiveness. In order to demonstrate the effectiveness of their development, the authors of [2] have designed an interactive poker game and two virtual characters - Sam and Max. All the individual behavioral details, the details of thinking, emotions and moods define a personality [10]. Following this definition, Sam is designed to be an animation character and he is friendly, happy and sociable, while Max is a robot-terminator and he is always bad-tempered, behaves rudely and arrogantly. The two agents use different algorithm in poker playing. The poker game is appropriate as it allows for modeling the whole range of 24 emotions from the Ortony, Clore and Collins's model [8].

This paper reports on results from investigations of the impact of virtual agents with various individualities over people, playing a version of a poker game, similar to that, realized by the poker machines in casinos. Two virtual agents have been modeled, hav-

ing different characters and named Emo and Rati. Emo is emotional, kind and sociable, while Rati is conservative, rational and behaves kindly but seriously and in a reserved way, urging the user to play, following his mind, not the emotion.

The idea is to check which one of the agents will make the users play longer or put down bigger stakes and with which of these two individualities the losses will be greater.

The paper considers a number of poker games and presents the peculiarities of the developed poker algorithm in the following sections. The third section details the peculiarities of the realized programming system and the modeled emotional virtual characters. The conducted experiment and the obtained results are discussed in the fourth and fifth sections.

2. CHOICE OF A GAME FOR THE PURPOSES OF THE EXPERIMENT

The reason why poker has been chosen for conducting this psychological experiment is that it is statistically the most often played gambling game, whose rules are relatively easy to understand. According to Arthur Reber, a professional game player and author of many books on gambling, the gambling people can be divided into a number of basic psychological groups, namely: ones, who take pleasure in the game; ones, who play to raise their self-confidence; ones, who hope to win money and believe in the "big luck"; and, of course, the professional players, for whom poker is the way of life.

As it concerns character modeling, poker allows for modeling all of the 24 emotions from Ortony, Clore, Collins's model [8] and it is therefore appropriate for modeling different characters. As an example, at the point of card changing the emotion of hope arises and the agents hope that the player will receive a good combination of cards. Depending on the result, satisfaction or disappointment can arise. In case of winning, the agent can feel proud or can become reserved. In case of a loss, he/she can feel crushed or accept the loss calmly, be cautious or believe in luck to the very end.

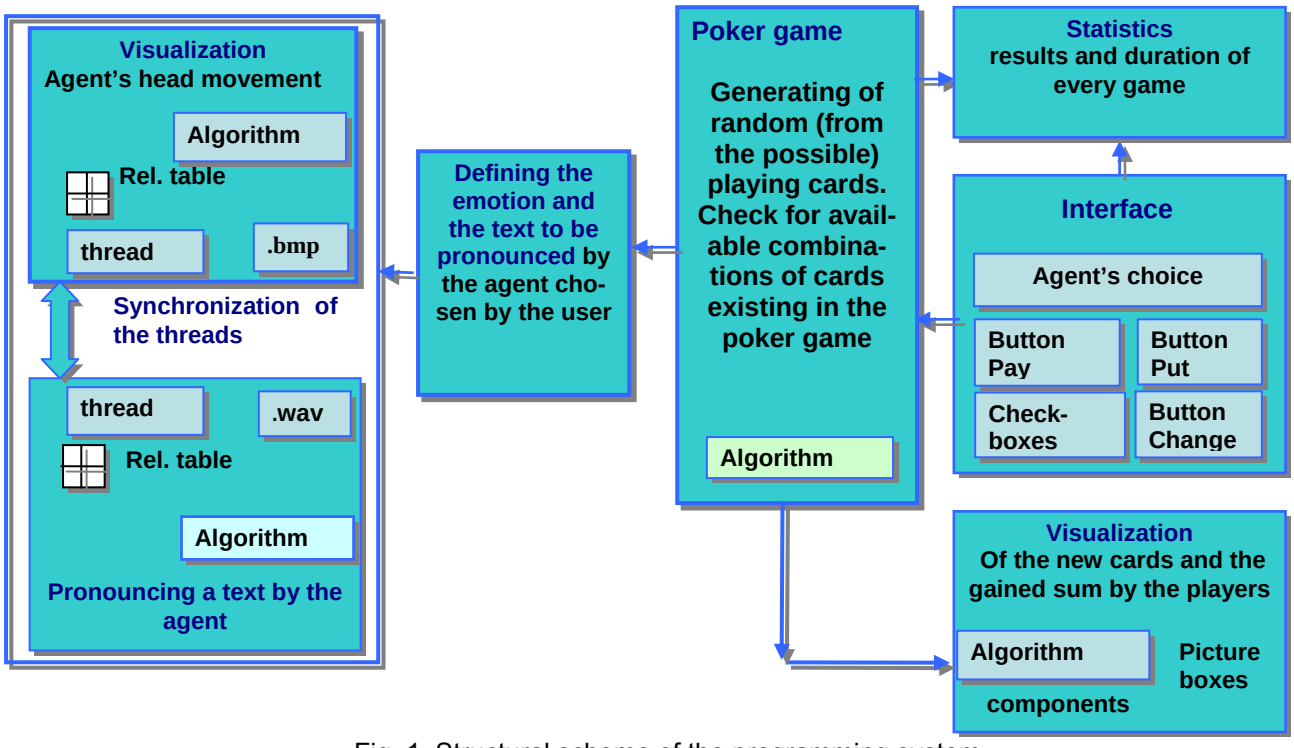

Fig. 1. Structural scheme of the programming system

There are a lot of varieties of the poker game. It was created as early as 1850. It changed with time and new rules and new varieties appeared. From all existing so far varieties two basic groups can be outlined: the Draw poker, data about which can be found back in the XVII century; and the Stud poker with the most popular versions the Texas Hold'em and the Omaha Hold'em. Mostly Draw poker and its option Caribbean Poker is played in the casinos. There are also poker machines. They work on the principle that the player puts down a stake and receives cards. Then he changes his cards and if there is not any strong combination, he loses everything. In case there is a weak combination, he does not win anything; when his combination is strong, he can win the stake multiplied by a coefficient. There are a lot of lists, showing which combinations are stronger than the others and these lists can be found on the Internet.

The realized for the purposes of the experiment algorithm is much similar to the one of the playing machines. The idea is that the user plays poker the way he/she would play it on a machine, but in this case he/she receives instructions from a virtual agent not only informing him/her about everything happening within the game, but also encouraging him/her to put down stakes or to play cautiously. The idea is to check to what extent the user will trust in his/her agent and what will be the agent's influence on his/her game.

3. SETTING

Two agents with different behavior have been realized. Rati is a reserved agent, not showing emotions, just informing the user about the current situation in the game, without "going through" his/her wins or losses.

Emo goes through the game together with the player. He hopes that the player will have a good combination whenever the cards are changed, he feels a winner when the player wins, he is always good-tempered and he does not admit losses. He is ready to put down everything again as he believes in his own and in the player's luck.

The two agents look the same, have the same voice, but the emotions they show through their speech and the way they pronounce words are different. This can help to focus the investigation entirely on the influence of the agent's character, temper and emotions over the player's game.

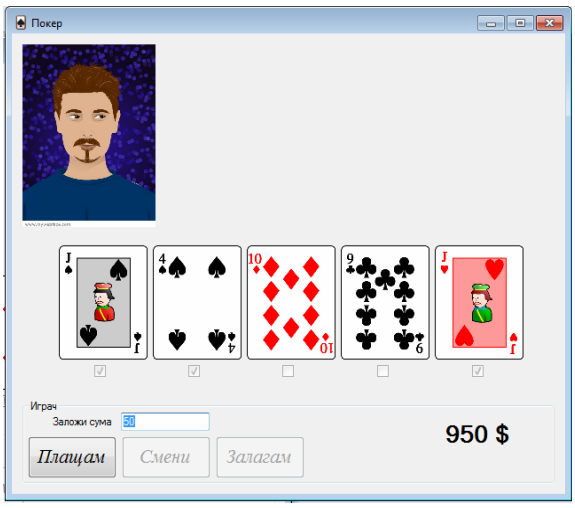

Fig. 2. Form of a game with Emo

Most agents on the Internet are similar to Rati, as they play the role of operators, leading the user through the pages of a site and explaining its capabilities to him/her, making offers and answering questions. It is needed in these cases to create an impression in the user that the attitude to him/her is serious and he/she is regarded as important part of the company's marketing.

However, when one player is alone at home, he needs emotions. The best part of the online gambling lovers needs them and therefore it is very much likely that Emo will be preferred to Rati.

The present programming system allows for collecting data about what types of people prefer one or another type of an agent to play with; the length of game playing; the amount of money made; the stage at which the players give up etc.

The structural scheme of the programming system is given in figure 1, and the form of the game is shown in figure 2.

The resources of the project consist of 52 pictures, representing all the cards in a pack in .png format. 20 more .png files with the agent's head at different eye, brow and lip positions and 50 .wav files with the agent's remarks related to the different game situations are also added to the resources.

Tab. 1. Profile of each of the participants in the experiment

Name	Occupation
Player 1	Student of Informatics at PU
Player 2	Candidate-student
Player 3	Retired officer
Player 4	Accountant
Player 5	Student CST at TU
Player 6	Pensioner (tour-operator)
Player 7	Doctor
Player 8	History teacher
Player 9	Graphics designer
Player 10	Lecturer at TU-Plovdiv
Player 11	Student CST at TU
Player 12	Student CST at TU
Player 13	Student CST at TU
Player 14	Student CST at TU
Player 15	Student CST at TU

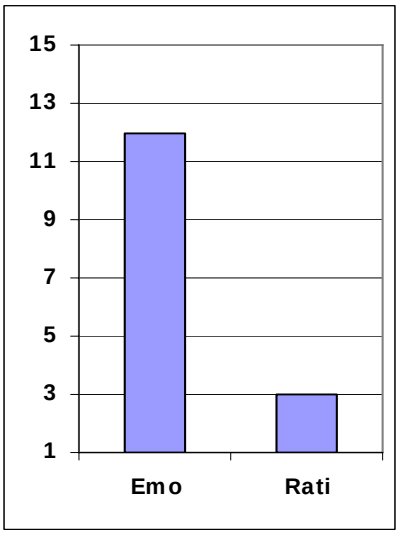

Fig.3 Preferred agent.

The threads for realizing the lips and eyes movements and for pronouncing the text are synchronized according to each game situation. The program system tracks the stakes, generates the possible combinations of cards at cards changing, checks which combination is received by the user, defines the loss or win, count the win of points, determines the emotion and the remark to be pronounced by the agent, with which the user plays. A timer is switched on at the beginning of the game, counting the time to the end of the game. When the game is ceased, the time of playing it by the user is recorded in the database together with his/her number and the sum left.

4. DESCRIPTION OF THE EXPERIMENT AND RESULTS.

The programming system was offered to fifteen people to play poker, choosing an agent to assist them. The people were chosen randomly. Since most of them wanted to stay anonymous, they are numbered as Player1, Player 2 etc. Each of the players could play as long as they wanted and could give up at any time, respectively. The aim for everyone was to make the biggest possible amount of money. Table 1 gives the profiles of the players. In order to compare the participants in the experiment, they were put under the same conditions. They did not exchange between each other any information on the game or the way to play it and the statistics lead.

The results from the experiment are shown in figures 3 and 4.

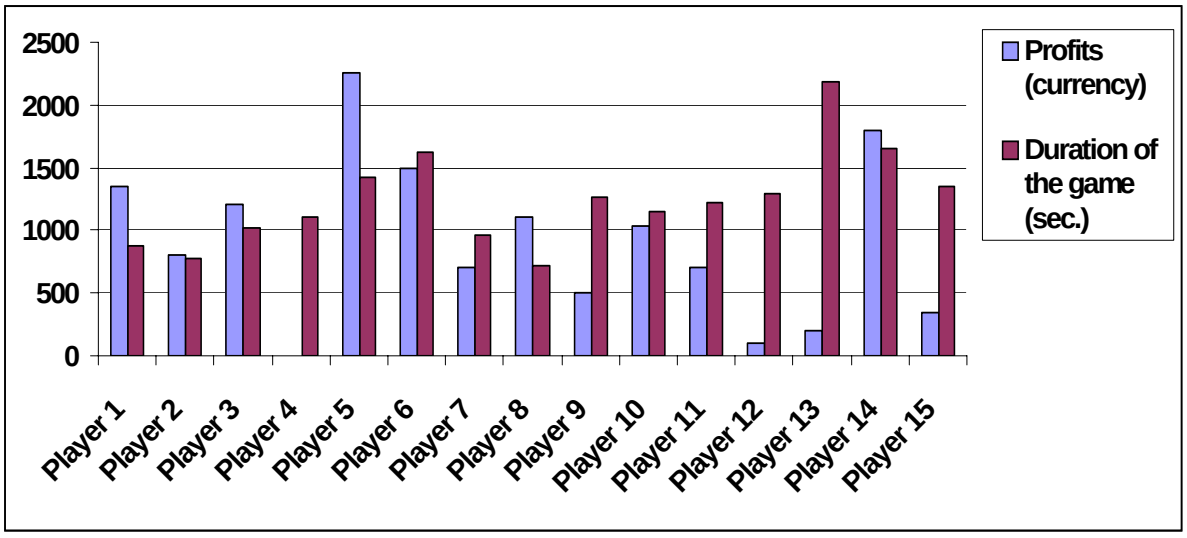

Fig. 4. Duration of the game of each participant and their profits.

5. CONCLUSION AND DISCUSSION

The results show the desire of the users to play together with the emotional, happy Emo, going through the game together with them and believing in his luck – fig. 3. Only three of the participants have chosen to play together with Rati and they have ceased the game quickly. The participants, who have chosen to play with Emo, have played poker longer. The longest game has been realized with the help of Emo. Only one of the participants has played until bankruptcy and he has been assisted by Emo.

The results show that the character of the modeled virtual agent for assistance in a poker game influences the participants in the game. It is therefore important to conduct experiments of this kind with a bigger number of participants and a bigger number of modeled individualities.

The participants in the experiment are people, who do not gamble in principle. Nevertheless they kept their attention attracted to the game for quite a long time. One of them even gambled to going bankrupt. It would be of interest to investigate how the different models of virtual characters would influence real gamblers.

At this stage of the investigation the preference of the players toward Emo could be explained, according to us, in the following way: the participant in the experiment do not make or lose money for real; they belong to those 65% of people, who just play for the game, they play to win the game, to think and to receive a winning combination; therefore when playing they prefer the happy and self-confident Emo, who encourages them. The serious and reserved Rati would do well in a business site but he is not preferred here.

As the virtual agents have a great basis for development as a contemporary version of the usual graphic interfaces, such experiments would help a lot in defining the effectiveness of each modeled virtual character, in deciding what individuality it is most appropriate to use for a particular programming system and for achieving a particular goal. The experiments would clear out what should be changed in order to make a virtual character preferred by the users, bringing more and more visits of the sites, more profits to the shops and more pleasure to the players.

6. REFERENCES

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