AGENT: Awareness Game Environment for Natural Training

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ABSTRACT

We propose AGENT, the Awareness Game Environment for Natural Training, as a virtual environment in which serious games can be enacted. AGENT combines research on interactive storytelling, game design, turn-taking and social signal processing with a multi-modal UI in a modular fashion. Current work in progress will deliver a first demonstrable prototype within 2013.

Categories and Subject Descriptors

K.3.0 [**Computers and Education**]: General; K.8.0 [**Personal Computing**]: General—*Games*

1. INTRODUCTION

Patrolling police officers can get involved in a multitude of social situations during their daily round. For example, they may have to reason with someone who they have fined for a minor offense or they have to convince a group of loitering juveniles to cease their disruptive behavior. To be able to deal with these interactions peacefully, Dutch police officers receive social skills training before they head out on the streets. However, current training protocols are fairly limited: most of the training curriculum is theoretical in nature, with only selected police officers receiving practical exercises with actors due to both monetary and time costs.

We believe that this limitation in training can be overcome by incorporating a serious game into the curriculum that will improve police officers' social awareness. Therefore, we are developing such a serious game in an environment called AGENT: the *Awareness Game Environment for Natural Training*. As its name implies, AGENT is designed to be more than one game—it is a game environment. At its basis, AGENT relies on three modules, namely the communication module that regulates which modules are connected and used during a game; a storytelling engine that keeps track of the virtual world and controls the non-player characters (NPCs); and a user interface (UI) that processes

input and output. This is made possible through the use of a message broker that serves as middleware between the different modules. During the design process, the most important factors that are taken into account are: NPC behavior, such as planning to take actions and turn taking in dialogs; the inclusion of gaming elements that give feedback about progress in the game; and social signal processing (SSP) to determine how the player behaves. Within AGENT, different scenarios can be chosen and played with different UIs. Planned UIs include 2D and 3D environments and a multimodal UI, the *Small Unit Immersive Trainer* (SUIT), developed by our partner re-lion, through which the player's body movements will be tracked.[1]

2. RELATED WORK

Serious games similar to ours have been developed and evaluated in previous years. One of the longest running efforts to create 'tactical language training systems' created environments such as the *Mission Rehearsal Engine* and the *Stability and Support Operations Extended Training system* [9]. These systems were developed to train military officers in negotiating with their own team members, civilians of other cultures and enemies. Another virtual environment that focuses on negotiation with people from different cultures is the *First Person Cultural Trainer* in which the player is given the task to ascertain an NPC's mood by looking at his or her non-verbal behavior [10].

3. AGENT

For AGENT, we make use of interactive storytelling techniques developed for the *(Interactive) Virtual Storyteller* (VST) system [1, 8]. The emergent narrative approach used in this system relies on the interactions between players and autonomous NPCs, which offers more freedom than the systems described above. Recent research has focused on making the NPCs aware of the story by using out-of-character (OOC) reasoning [6]. In order to make the game more effective, we will incorporate the theory of the *Serious Game Lemniscate Model* [5]. Additionally, AGENT will use Bartle's player types [2] to let the NPCs react based on the players' behavior as if they are players as well.

To have more realistic dialogs, we plan to incorporate a system called *LearIS* [3] that lets NPCs take turns in conversation based on their stance toward others. Research on SSP will be taken into account during the design process [4, 7].

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[1]See http://www.re-lion.com/products/suit.

In our serious game, the meta-goal of the player is to become more socially aware. Therefore, he or she needs feedback on how other people respond to his or her behavior. Through the use of AGENT, we plan to offer feedback in various ways, namely on both overarching and local story levels—with the NPCs reacting (and the story playing out) in different ways—and on a game level, supplying the player with additional feedback on their progress and development.

4. SCENARIO

For the domain of law enforcement by police officers, we have designed a scenario that gives ample room for storytelling and gaming techniques and features social interaction in a variety of ways. This scenario consists of five scenes, which allow for these techniques to be demonstrated and evaluated.

Scene 1 takes place in a police office in which players (police officers) are introduced to the game environment and given the time to familiarize themselves with the presented UI (2D, 3D or SUIT) without affecting the rest of the game.

Scene 2 takes place in a shopping street in which players can interact with various bystanders who will respond differently to them depending on their chosen actions.

Scene 3 captures the essence of the game, as players are confronted with a group of loitering juveniles who need to be dispersed peacefully. In this scene, social signals will play an important part as the juveniles will respond to the player's behavior which in turn determines how the conflict is resolved.

Scene 4 will zoom in on one-on-one interaction in the form of an interrogation of one of the juveniles by the player.

Scene 5 is a concluding scene where aspects such as an in-game debriefing will be incorporated.

Scenes 2 and 3 are most suited for the interactive storytelling techniques we wish to implement. When a player is offered freedom in an interactive story, there is a trade-off between that freedom and having a good narrative structure, often called the 'narrative paradox'. In our context, this means that when the player's actions influence how the story plays out, he or she may not attain the meta-goal of improving his or her social awareness. To overcome this paradox, we are developing techniques that let NPCs use out-of-character (OOC) reasoning [6]. That is, the NPCs will be able to use knowledge they would not have access to in-character (in the story world). For example, in scene 3, they will be able to reason OOC about the player's stance towards them. Then, in order to create a conflict, the NPCs will adopt a stance that opposes the player's. We hypothesize that, by trying to cope with and resolve this conflict, players will become more aware of how their behavior influences that of other people. Furthermore, NPCs can reason OOC to infer when they should initiate conflict resolution in order to create a dramatic story arc.

An important part of learning is becoming aware of how a game's content translates to real-world practice. To facilitate this in our game, we are investigating ways to incorporate the Lemniscate Model [5] into the game's design. This model states that a player can learn when his or her gaming state is interrupted in order to initiate a learning state in which the connection of the game to the real world is made explicit. Additionally, we are researching how gameplay in AGENT can be adapted automatically to improve learning, for example by letting NPCs behave differently for different player types [2]. Turn taking in dialogs will be showcased in scene 4, in which the player interrogates one of the juveniles from scene 3.

Re-lion's SUIT will be used as a UI during all scenes to make the social interaction more life-like and offer the players more natural ways to express themselves. The multimodal UI will also serve as a demonstrator within which evaluations of the different implemented techniques will be carried out. We will evaluate whether players are able to attain the game's meta-goal, examining the effects of OOC reasoning and the Lemniscate Model and how players experience the game in terms of NPC believability, story coherence and immersion.

We expect to complete a first version of the AGENT environment, incorporating NPC behavior and SUIT, within 2013. In this version, scene 2 and a small part of scene 3 will be demonstrated. Work on connecting the different modules—in particular the middleware layer, the storytelling engine and SUIT—is currently nearing completion.

5. ACKNOWLEDGMENTS

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