Abstract—Serious games can be used to improve people’s social awareness by letting them experience difficult social situations and learn from these experiences. However, we assert that, when moving beyond the strict realism that social simulations offer, techniques from role play may be used that offer more possibilities for feedback and reflection. We discuss the design of two such serious games for interpersonal skills training in the domain of law enforcement. These games feature intelligent virtual agents with which trainees have to interact across different scenarios to improve their social awareness. By interacting with the virtual agents, trainees experience how their behaviour influences the course of the intervention and its outcomes. We discuss how we intend to improve the learning experience in these serious games by including meta-techniques from role play. We close by describing the current and future implementations of our serious games.

Index Terms—Social simulation, serious games, role playing games, meta-techniques.

I. INTRODUCTION

In both interviews and street interventions, police officers strive to get witnesses, suspects and civilians to cooperate. Regrettably, people are not always open to this. Therefore, police officers are taught how to get them to assume a more receptive stance. Our long-term goal is the development of serious game prototypes in collaboration with the Dutch police so that these games assist in the training curriculum of police trainees by letting them practice with such interactions. The first of these is POINTER (POlice INTERview game), in which trainees train their interviewing skills with crime suspects; the second is LOITER (LOItering Teenagers, an Emergent Role-play), which lets trainees enact street interventions with loitering juveniles.

In this paper, we describe the status quo of our research efforts toward these serious games. Of prime importance to the attainment of social awareness is insight into the thought processes that drive people. Therefore, we are building a cognitive model based on a corpus of police interviews to determine the factors underlying people’s behaviour (described in Section III). We use this model to inform the behaviour of the virtual agents that enact the roles of suspects and juveniles in our games. In Section IV, we discuss the relations between social simulations and serious games. We explain how we sacrifice the realism usually found in social simulations in the design of POINTER and LOITER to provide more explicit feedback and moments of reflection. We elaborate on the work involved in implementing these games in more detail in Section V. We wrap up by discussing future research directions in Section VI.

II. RELATED WORK

There are several research projects in which social interaction between human and virtual agents has been researched for educational purposes and serious games. The negotiation training systems of [1] revolve around US military training for peace missions in the Middle-East. Their Stability and Support Operations system features extensive modelling of the emotions of virtual characters, letting them appraise and cope with user actions. An application called FearNot! was designed as a virtual drama for anti-bullying education [2]. This system is also based on virtual characters that can appraise and cope with user actions, but adopts an unscripted emergent narrative approach to let users have freedom of choice. Focusing on ‘bad news’ conversations between employees and managers, the serious game deLearyous models the interpersonal relations between the two interaction parties [3]. In deLearyous, virtual characters base their behaviour on their attitude towards the user. As a result, users (the managers) are required to learn how to behave to not let the virtual employees erupt in tears or anger. JUST-TALK is a prototype training application designed to help police officers interact with mentally ill people [4]. As in the previous systems, the focus of JUST-TALK is on the realism of the simulation. Unlike our games, the above systems do not directly address the importance of feedback and moments of reflection to stimulate learning.

III. TOWARDS A COGNITIVE MODEL FOR SOCIAL INTERACTION

We strive to use theories and concepts from social psychology to inform the behaviour of our agents in order to create a cognitive model that is both believable and explainable. Using a data-driven approach, we have investigated which theories and concepts are relevant to describe the interaction in a police interview [5]. Using an annotated corpus of enacted police
correctly determined their interaction partners. Preliminary results indicate that the majority of participants responded with a set of parameters at the same level of abstraction as the input of the participants. Then, the participants had to interpret these parameters and create a new utterance based on the model functions. Ultimately, in order to secure and strengthen the knowledge they have gained from an experience with a simulation or a game, it is vital that trainees reflect on their behaviour [9]. Of course, experiential learning can be achieved in simulations, yet simulations by themselves lack methods for explicit feedback and reflection. Police officers in training already use after-action-reviews to discuss how interactions played out, but for our serious game we plan to take the idea of role play a step further.

A. Beyond Simulation, Towards Learning

We assert that the extent to which a serious game reflects the situations from the domain can be varied. In other words, the realisation of the role play can be more loose or imaginary than strict as in a simulation [10]. This means that the created scenarios may be less realistic—even metaphorical. Nonetheless, the important point is that the model underlying the interaction with the game should remain the same. Tipping the scales towards either fantasy or realism in the design of serious games has advantages as well as drawbacks in both cases. These advantages and drawbacks relate to the capability to reflect on the experience and possible inhibition in the behaviour of players. To let players reflect on what has happened in the game, they need to transfer the knowledge gained from their experience to knowledge related to the real world. When opting for realism in a serious game, the gap that needs to be bridged between the simulated world and the real world to transfer the attained knowledge is smaller than when the simulated world less closely represents the real world. On the other hand, this distance from the real world is at the same time an advantage of less realistic scenarios. This is the case because players are more free to do what they want—not because of the possibly larger amount of actions they can perform in the game, but because they may be less inhibited by the design of the system. For example, when police trainees practice using a ‘strict’ simulation, as in the enacted interviews from the previous section, they will feel the need to do everything correctly. Serious games allow for experimentation as they may put less pressure to perform on the trainees. The crux lies in the actual design of serious games so that they still provide a challenge and convey their learning goals. To assist us in the design process, we have created a hierarchy of learning goals that our games should support [11], based on Bloom’s revised Taxonomy of Learning Objectives [12]. Below, we explain how we intend to use two techniques to support the attainment of these learning goals in our serious games.

B. Techniques for Improving Learning in Serious Games

In our serious games, we do not opt for maximum realism or fantasy, but for a balance between the two. To do so, we take inspiration from techniques used in improvisational
the simulated nature of larp as they cannot take any IC. Effectively, these techniques impinge upon information—information that would normally not be available to them IC. Out-of-character (OOC) roles can be utilized by the players. For example, a player may know, OOC, that another character has deceived his character—but this player’s character may not know. The player can then use this OOC knowledge to steer the play IC in a certain direction.

In the design of our serious games, we expand the distinction between in-character and out-of-character by looking at so-called meta-techniques used in larp [11]. These are techniques with which players can communicate OOC information—information that would normally not be available to them IC. Effectively, these techniques impinge upon the otherwise simulated nature of larp as they cannot take place in-character. An example of such a meta-technique is the inner voice, which lets players speak out their IC thoughts so that the other players get insight into how these players feel. Act breaks can serve as intermissions during a larp in which the IC play is paused and the players discuss OOC what has happened and what may happen in the play. With the help of such meta-techniques, players of a larp can ‘deepen’ a larp by exploring the feelings and motivations of their characters.

As explained above, reflection and feedback on their actions constitute a large part of the learning process for trainees. Therefore, when police trainees practice their skills with actors, their experience is evaluated during an after-action review. We choose a similar approach in our serious games by implementing meta-techniques that offer moments for reflection and feedback during gameplay. In our games, when players interact with virtual characters, we will enable these characters to express their thoughts to players in the form of comic-like ‘thought bubbles’, alike to the inner voice technique. Such information would assist players in determining the attitude and feelings of characters as a supplement to the signals they read from the nonverbal behaviour and utterances of characters. We are also exploring how act breaks can be implemented. For example, at set points during gameplay, the interaction can be paused to give players and characters the opportunity to ask each other questions. These questions include asking the reasons for certain actions or inquiring about the feelings of either the characters or players at specific points in the interaction.

Key in implementing these techniques is the decision when they should be used. As in all games, there needs to be a balance between the challenge of the game and the skill level of the player. Therefore, we propose to monitor the progress of players during the game and provide them with help in the form of the above meta-techniques when they seem not to be up to the challenge. For example, when players keep acting aggressively in an interaction with the effect being that a virtual character does not cooperate, this character may use a thought bubble to give feedback on why the interaction is unsuccessful. Alternatively, an act break may be used to have a more in-depth discussion as to what went wrong. Both techniques may also be used together to reinforce each other. For example, if a character shows a thought bubble during gameplay to provide feedback, it can explain its thoughts in more detail during a subsequent act break.

Aside from providing feedback and reflection, we are investigating ways to let the virtual characters adapt their behaviour to help players achieve their learning goals. This adaptation reflects the methods used in improv and role play as well: the virtual characters are able to adapt their behaviour to the learning goals of players. For example, if it turns out that a player has difficulties to negotiate with withdrawn people, the virtual characters can choose to behave more withdrawn, providing the player with the possibility to gain more experience with such interactions.

V. IMPLEMENTATIONS

As said above, we are designing two serious game prototypes: POINTER for interview training and LOITER for street intervention training for police officers. Until now, we have largely focused on the conceptual and technical aspects underlying these systems. Currently, we are exploring how to implement our games. The balance between realism and fantasy plays an important role in visualising the interactions. We do not choose a highly realistic appearance for our games, as this will stand at odds with the meta-techniques we wish to use. Additionally, it may evoke false expectations when players expect behaviour from very realistic looking characters that may be more complex than our cognitive model supports. Therefore, we opt to keep things simple in terms of graphical quality, but we do investigate the effects of different types of visualisations. Using AGENT, the Awareness Game Environment for Natural Training [14], we are able to let players play the same scenario with different user interfaces. The two types of interfaces we are developing have different fidelities. One is a 2D visualisation with a comic-like style and interaction through button commands, see Fig. 1. The other is a 3D visualisation with higher fidelity, see Fig 2. In an improved version, this visualisation will offer multi-modal input to attempt to stimulate the feeling of presence in the virtual world. While providing a more realistic environment in terms of graphical quality, the 3D environment is not intended to feature strictly realistic character behaviour.

To experiment with different game mechanics and concepts that we can incorporate in POINTER and LOITER, a board game called Sequacious was created, see Fig. 3. This was done to give an indication that a very playful system can already give rise to reflection and can be used to improve the players’ awareness of social interaction. In this game, players
(police officers in training) can experience and experiment with different ways of interacting with loitering juveniles. This can be done through letting them assume either of two roles in the game: the role that they normally play, namely that of a police officer, or the role of the group of juveniles. The game is played on a gridded board with the juveniles trying to form groups and grow in numbers and the police officer having the goal of keeping the groups of loitering juveniles as small as possible by dispersing the juveniles and stopping them from taking over control of the board. Together with more game mechanics that are related to the needs of both parties, Sequacious lets players explore this conflict. After play sessions, we observed that players were enthusiastic about the game and discussed tactics for winning the game by either side and how the gameplay could relate to the real world.

VI. CONCLUSIONS AND FUTURE WORK

The approach we take in designing POINTER and LOITER, our serious games for interpersonal skills training in the domain of law enforcement, expands the possibilities of social simulation by infusing it with techniques from the fields of improv and role play. Our next step is to implement and evaluate our ideas in more detail. The serious games will not replace the teachers of the Dutch police, but serve as addenda to the training curriculum. Through evaluation and further cooperation with the Dutch police, we seek to fit our games in their curriculum and find the correct balance between fantasy and realism so that they will be accepted by the trainees. Additionally, we wish to iteratively improve the cognitive model we have created by letting players provide feedback on the virtual characters in the system themselves. Lastly, we hope to encourage other researchers to look beyond simulations by investigating other ways to design educational systems, such as serious games and techniques from the arts.

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