

Incorporating Emotion Regulation into Virtual Stories (extended abstract)*

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In recent years, there has been an increasing interest in the area of virtual storytelling, addressing the development of computer systems that generate fictive stories in which the characters show realistic behaviour. In order to develop virtual stories, a large variety of approaches have been proposed, e.g., [4, 5]. A trend that can be observed in many of these approaches is the movement from stories with a fixed, pre-scripted storyline towards emergent narrative, i.e., stories in which only a number of characters and their personalities are fixed, rather than the precise script of the story [1]. In the latter type of storytelling, ideally, all the designer (or writer) has to do is to determine which (types of) characters will occur in the play (although usually it is still needed to roughly prescribe the course of events). Hence, advantages of emergent narrative are the reduced amount of work that has to be spent by the writer, and the non-deterministic and unpredictable behaviour of the story.

In parallel with the shift from fixed storylines to emergent narrative, there has been a development in the nature of the involved characters as well. Recently, the characters (or agents) that are present in virtual stories are transforming more and more from shallow avatars to complex personalities with human-like properties such as emotions and theories of mind. To accomplish this, researchers have started to incorporate cognitive models within virtual characters, e.g., [9]. Despite these first promising attempts, there is still a wide area to explore when it comes to enhancing virtual agents with cognitive capabilities.

The paper explores the possibilities to equip the characters involved in virtual stories with the capability of emotion regulation. Informally, emotion regulation can be described as the process humans undertake to increase, maintain or decrease their emotional response, see e.g., [6, 7]. The idea is that, by offering virtual agents the capacity to actively regulate their emotions, they will be able to select those kinds of behaviours that they feel most comfortable with. As a result, such agents will 1) behave more realistically and 2) have more freedom in the choice of their actions, which enhances the emergent narrative effect. This approach is similar to the approach taken in [8], which aims at incorporating coping behaviour into virtual humans.

To this end, the informal model by Gross [6] was taken as a basis, and has been formalised using a dynamical system style modelling approach (see also [3] for some initial steps). A virtual environment has been created, which includes a number of virtual agents that have been equipped with the formalised model for emotion regulation. To test the behaviour of the model in a prototyping phase, a series of simulation experiments has been performed using the LEADSTO simulation language [2]; in the Vizard Virtual Reality Toolkit [10], such simulations have been visualised in a graphical environment. The resulting movies provide a first indication that the emotion regulation strategies as described by [6] have been implemented successfully within the virtual characters. The simulation results have been compared with the behaviours for

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different situations as described by Gross [6, 7], and found consistent. Validation involving comparison with detailed empirical data is left for future work.

Concerning related work, an approach in the literature that has similarities to the current approach is [8]. In that paper, a computational model is introduced that can simulate several strategies about how humans cope with emotions, such as 'positive reinterpretation' and 'denial'. However, that approach makes use of plan-based causal representations, augmented with decision-theoretic planning techniques, whereas our approach uses dynamical systems representations. Another difference is that our model is meant to correspond tightly to one specific psychological theory (i.e., the one by Gross).

Virtual stories involving characters with elaborated cognitive or psychological capabilities can be used for a number of purposes. On the one hand, they may be used for entertainment (e.g., for creating computer games with more complex, unpredictable and more human-like characters). On the other hand, they may be used for educational purposes (e.g., to create a virtual training environment for psychotherapists, which enables them to practice anger management sessions with virtual clients). Further research will investigate whether the model is suitable for such purposes. As soon as these types of challenges will be tackled, also a more precise evaluation will be performed of how humans perceive the current characters (e.g. in terms of believability)

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