

## Chapter IX

# Developing Relationships Between Autonomous Agents: Promoting Pro-Social Behaviour Through Virtual Learning Environments Part I

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### ABSTRACT

*This chapter discusses certain issues in the development of Virtual Learning Environments (VLEs) populated by autonomous social agents, with specific reference to existing applications designed to promote pro-social behaviour among children. We begin by describing the ways in which human groups are organised and maintained, and present the primary school class as a particular example of a social network. Contemporary psychological descriptions of bullying are explained, and current anti-bullying interventions are briefly reviewed. Two VLEs are described, which have been designed to counteract the problems inherent in bullying as exemplars of social and educational environments. This chapter concludes in Part II where the requirements for believable, autonomous agents, used in virtual learning environments, are outlined.*

## INTRODUCTION

Virtual environments have progressed quickly from simple text based interfaces, including internet chat rooms and instant messengers, to more visual and immersive environments (such as IMVU<sup>1</sup>). Furthermore, the popularity of such virtual environments as a medium for interaction has become cemented in recent years for both escapist purposes in the case of online video games (e.g. World of Warcraft, 2004) and also for more 'ordinary' interactions (e.g. Second Life, 2003).

Within these environments users are able to create social networks with other users, whom they may never even meet in the real world. The appeal for such interaction is widespread though, and opens up new questions for developers of artificial intelligences. Virtual autonomous agents are increasingly developed as social agents, i.e. agents can interact not only with objects in their environment, but also with each other, and with users, e.g. Gratch & Marsella (2001), Rickel et al. (2001), Malfaz & Salichs (2006).

Some virtual environments are now also used for educational purposes, and the phrase *Virtual Learning Environment* (VLE) has been coined to describe such applications. Mostly these are internet based environments that are used for uploading teaching materials and information for students (e.g. the University of Hertfordshire's 'StudyNet'<sup>2</sup>), but with powerful computers becoming more readily available, the scope for more sophisticated environments is also increasing. See, for example, the MRE (Mission Rehearsal Exercise) project, which developed a VLE designed to educate American military officers regarding peacekeeping scenarios in the Bosnian conflict (Swartout et al., 2001), and Treasure Hunt which includes empathetic synthetic agents (McQuiggan & Lester, 2006).

This chapter argues that carefully constructed graphical and interactive VLEs populated by socially interactive virtual agents can be an invaluable and innovative educational tool, with the potential to reach a wide audience providing educationally valuable and useful applications for the general public.

Children are an especially approachable audience to reach with VLEs. They are generally open to new and exciting experiences and are becoming

much more technology friendly (Clements, 1998). Furthermore, they are usually very honest and direct in voicing their opinions, which can be very useful (if sometimes a little blunt) for software developers (Druin et al., 1998).

Most children of primary school age have already developed an extensive set of cognitive and emotional skills, but it is around this time that children will really begin to experience the social world for a protracted period of time. They will find other children that they like and some that they don't; friendships will be formed and some children will be left alone. At such a critical point in a child's social development life can become very difficult for some children if they are being victimised by their peers. Indeed, these early experiences can shape our social development for many years to come. Given the social nature of this development, interaction with social agents seems a natural way in which to address the issues involved in bullying, victimisation, and how to make friends.

Objectives of this chapter are to describe some of the psychological literature concerning human social networks, with specific reference to primary school classes and the phenomenon of childhood bullying. We will also describe some existing VLEs aimed at helping children's social development, which have been developed by members of the e-CIRCUS project consortium.

## GROUPS AND SOCIAL NETWORKS

By his very nature, man is a social animal (Aronson, 1998). Indeed, groups of some kind have existed from mankind's earliest inception if only to guard against threats to their survival (Baron & Byrne, 1996). Group activity is responsible for almost all human achievement from building the physical structures that house us, to developing the moral and legal codes that we live our lives by.

Groups are extremely diverse in nature; they can differ in terms of size, longevity, and purpose. As well as differences between each other, groups can also vary within themselves along a whole range of dimensions including (but not limited to) age, gender, or ethnicity. Take, for example, the differences between a man and woman married for 50

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