

Position paper for workshop on Storytelling in Collaborative Virtual Environments

The value of a virtual environment for learning about narrative

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1. Introduction

Edith Ackermann has described cognitive growth as a “dance between diving-in and stepping out” (Ackermann, 1996). She argues that in order to learn from experience, it is necessary to step back from it momentarily and to reflect upon it in objective terms. With a new reflective understanding, one can ‘dive-in’ to the experience once more.

For children engaged in improvisational play, however, this is no simple matter; representations of activity in memory are ephemeral, thus, to step back to reflect on or change what they have done would require major cognitive effort (Scaife, 2002, in press; Scaife & Rogers, 2001). One of the ways that people have learned to circumvent such memory overload, is to offload some of it onto an external representation (Scaife & Rogers, 1996), for example writing (Olson, 1994). The young child’s armoury of representational systems is however, limited. Thus, their opportunity to objectify and reflect upon activity is diminished.

We suggest that a virtual environment can provide a powerful tool to enable young children to both ‘dive-in’ and to ‘step-out’. Aspects of the children’s behaviour in the environment can be recorded by the system to allow them to objectify their activity, aiding reflective thought and discussion. The children can then re-engage with the environment with any new conceptual understanding.

PUPPET, a European Union i³ funded projectⁱⁱ developed a 3D virtual environment populated by autonomous agents. In support of the claim that virtual environments can support both on-line engagement and reflective thought, this short paper describes two aspects of an evaluation of the PUPPET system: the ability of autonomous agents to engage children in playful interaction, and the potential of a dialogue recording and editing facility to promote reflective thought and discussion between the children (see Marshall, Rogers, & Scaife, (2002) for a fuller description of this evaluation).

ⁱ Mike Scaife died suddenly as this work was being conducted. He was its inspiration.

ⁱⁱ PUPPET was developed by a consortium of institutions under the EU i³ programme: DFKI, Saarbrücken, Germany, LIA, University of Aalborg and IDAU, University of Aarhus, Denmark, and COGS, University of Sussex, UK

2. The PUPPET world

The PUPPET world was designed as a virtual farmyard inhabited by two autonomous agents, a freedom-loving cow and an authoritarian farmer, both with different personalities and conflicting goals. Based on these conflicting goals, a perpetual narrative cycle emerges, intended to capture the attention of the children and get them to reflect upon the dissonance. The behaviour of the agents in this interaction is determined by their position on two emotional state parameters: status, which refers to how dominant a character is in the interaction, and attitude, which determines the means by which the agent will try to achieve its goals (Klesen, Szatkowski, & Lehmann, 2001).

A third character, the sheep, can be selected as an avatar, the child's representation in the PUPPET world. The sheep can be in three different emotional states, positive, neutral, and negative, and can be used by the children to make sounds and actions that can be directed towards the agents. The agents' emotional state changes as a function of the sheep's mood, thus, the children can engage with and change the course of the emergent narrative cycle between the two agents.

As a default the PUPPET system has non-verbal sound files for all of the characters in every combination of character and emotional state. However the default sounds can be turned off. In this situation, whenever a novel sound file is due to be played by the system, the action in the world stops, and a window appears on the screen inviting the users to record dialogue for the character about to make a sound. Once the dialogue has been recorded it remains in the system and will play whenever that combination of character and emotional state recurs.

The system also included a separate dialogue-editing mode. This allowed the user to review, and if necessary change all of the dialogue previously recorded while viewing screenshots taken at the time the recording was made. It was hypothesised in line with a theory of external cognition (Scaife & Rogers, 1996) that editing recordings off-line would facilitate discussion between the children and reflective thought about the characters and dialogue.

3. Evaluation

An evaluation of the PUPPET system was conducted in a local school. Pairs of 7-8 year-old children had repeated sessions with the PUPPET system over the course of approximately two weeks; first passively watching the interaction between the agents, then playing in the world as avatar, then recording dialogue for the three characters while engaged in the world, and finally editing their recorded dialogue off-line away from the virtual world, before re-entering the world again as avatar.

3.1 Engagement with the virtual world

Children were able to verbalise an accurate understanding of the goals of the agents as embodied in the agent architecture and were also able to accurately describe the action the characters were engaged in. Children's understanding of the agent's emotional states

however, was less clear-cut. While they seemed to understand attitude as we had designed it, describing both agents in synonyms of “happy” in positive attitude and “angry” in negative attitude, the status parameter seemed to be quite ambiguous to the children.

The children readily took on the role of the avatar, as evidenced by their use of first person speech to talk about the sheep. For example, one child, upon discovering a river near the farmyard, exclaimed, “I don’t want to fall into the water. I’m not a sheep that’s wet”. A great deal of the children’s first person speech as avatar was in the plural, for example, “How dare you hurt our friend [to the farmer]”. This suggests that the children were able to share the role of the character between the pair.

Most of the children’s time as avatar was spent exploring the virtual environment. Attempts to interact with the agents were in general directly physical, rather than by making sounds at the characters. For example, one boy explained his actions as “I’m trying to head-butt the farmer to help poor Daisy”. Unfortunately the PUPPET system did not support this type of interaction very well, thus although the children found the virtual world to be highly engaging, this may have diminished their engagement with the other characters.

3.2 Recording and editing dialogue

Children found the task of recording dialogue for the characters to be a particularly engaging one, spending much time recording and re-recording speech. Much of the dialogue was very inventive. One pair of children, for example made up songs for the characters to sing, such as the following, recorded for the farmer:

*It’s a lovely day today,
And the sheep and the cow,
Are not having rows,
Over the bread and milk today.*

The recording task was also effective in promoting discussion between the children. Topics of discussion were very varied, but included the relationship of dialogue to previous recordings, the quality of the recording, and the appearance of the characters in relation to their emotional state.

Editing recordings offline, was also highly engaging for the kids, provoking much laughter, as well as reflective discussion. Children made many, often iterative, changes to character dialogue. The types of changes made, as well as the explanations given were again varied, but included prosody: “...so that it flows more”, grammar, and sound quality.

4. Discussion

The PUPPET virtual theatre is an example of a system that provides both an engaging phenomenological experience, and the opportunity to stand back and reflect upon aspects

of narrative more objectively. Children were able to think about and refine character dialogue off-line and to enter a world where their own dialogue was spoken by believable agents.

Dialogue is just one aspect of narrative that could be objectified in this way. For example, children could be allowed to change the agent's personality traits and behaviour off-line, engaging with and standing back from the scenario to reason about how narrative relates to the personality of its protagonists (Scaife, 2002, in press).

Virtual environments provide great potential for the kind of learning proposed by Ackermann. They can offer an engaging world for children to play in, and at the same time give them the opportunity to make concrete their understanding of different aspects of that world. This is not always possible in improvisational narrative play, where representations of activity are typically short-lived. This highlights an advantage of using such a tool over more conventional narrative play in the physical world.

5. References

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