Merging the virtual and the real:
A collaborative cross-reality game

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Abstract. In this paper, we present a collaborative cross-reality game for two players, Lab[2], which blends tangible board game and immersive virtual reality playing spaces in a gameplay that aims to promote and train collaborative behaviour. The game uses two different interfaces, each providing a different view of the game scenario and set of game controls: One player controls a physical game board showing a moveable maze of "pathway" tiles, while the second uses a spatially tracked HMD to find himself inside a virtual-reality version of the board's maze. The goal of the game is to collect a set of tokens spread over the maze. Reaching these tokens requires the players to collaborate via their complementary roles. As collaborative learning has been stressed as an effective teaching method for many years, Lab[2] could assist learners in exploring and further developing their collaborative skills in a playful manner. We will first outline the game design concept and then detail the user-testing based evaluation of our game prototype.

Keywords: Virtual reality, tangible interfaces, multiplayer, serious game, motion tracking

1   Introduction

Within the context of further promoting collaboration in educational and professional environments, the goal of this project was to develop a serious game for training collaborative communication skills, thereby exploring the potential of digital games for training these in a playful manner. A complementary aim was to employ intuitive, immersive game interfaces in order to help players concentrate on their communication with each other rather than on the handling of the game controls.

The development of the game design concept was based on a set of design heuristics distilled from an extensive analysis of related literature and game examples, with a particular focus on collaborative gameplay and intuitive interface design. The resulting concept was evaluated through the qualitative user testing of a game prototype.

2 Game design concept

2.1 Game principle

The game principle of Lab^2 was inspired by the "treasure hunt" style board game "The Amazing Labyrinth" [1]. The board presents a maze of "pathway" tiles that can be re-arranged. The goal of the game is to collect a set of tokens spread over the maze.

2.2 Cross-reality interfaces

It was felt that the principle of a moving maze offered potential for cross-reality problem solving for two players. The game therefore uses two different interfaces, each providing a different view of the maze and set of game controls: One player controls the maze on a real-life game board as in the original game, and the other player experiences the game from within the maze's walls by means of a virtual reality HMD.

2.3 Fully collaborative gameplay

The gameplay was designed to require a variety of collaborative interactions between the players for a successful resolution of the game's scenario: The players take asymmetric roles which are both required to reach the in-game tokens, they have to perform joint tasks and they can only win or lose the game ("sink and swim") together.

3 Qualitative user testing results

The evaluation's key questions were whether the system could successfully promote collaboration in problem solving, and also whether the cross-reality setup offered any advantages over a more traditional game configuration with mouse/keyboard controls. Pairs of players were briefed on the game scenario, and then asked to play the game, first using the cross-reality set, then with a desktop PC version of the game. Data was collected through observation of players and post-test surveys.

The results showed that despite encountering some technical issues, the game and interfaces were found to be both fun and exciting, and to generate a wide range of desired collaborative behaviours. Participants felt that more games using similar cross-reality interactions would be highly desirable.

4 Conclusion

Although this early prototype had a number of technical issues, the overall results support the game concept idea. We therefore foresee a rich future for collaborative and innovative cross-reality games.

References.

1. Kobbert, Max. The Amazing Labyrinth. Board game. Ravensburg: Ravensburger Spieleverlag, 1986.