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Props: 3D-game-like mediator for improvisational storytelling ☆

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ABSTRACT

This paper introduces Props, a 3D-game-like system for mediating collaborative and improvisational storytelling. Props combines a virtual 3D stage and the surrounding physical world into a hybrid space for storytelling. Prop master sets the stage for a story that is narrated by a narrator by speaking or acting. The iterative and collaborative process of staging, narrating and acting goes on until the players agree that the story has been told. We evaluated Props by hosting several storytelling events where Props was played by audiences from different age groups. As the theoretical framework in the analysis of the storytelling events we use an extension of the Church–Murray aesthetics of virtual environments. The data shows that the interaction from props and prop masters to narrators dominates storytelling, and that the participants generally enjoyed playing Props.

1. Introduction

Storytelling is a way of conveying a message with speech, sounds, movement or imagery. It is an inherent form of communication and entertainment, an ancient tradition. A story box is an age-old concept of an item that contains a collection of images and features to remind people of a story and to give them visual focus when the story is told. Related traditions are present in many cultures such as kamishibai in Japan and kavat in India [1,2]. Modern environments especially designed for storytelling are diverse. Restricted areas like story rooms, mats and boxes combining digital material and physical objects have been created to complement and enhance especially children's storytelling [3,4]. In digital interactive storytelling computers, projectors and screens are used to create immersive environments to present stories that may be branching but are nevertheless predetermined [5,6]. A particular form of storytelling is improvisational theatre where actors and audiences create a story from cues originating from their reciprocal interaction. Improvisational theatre is an inherently creative and playful way of telling a story. While there are already many games to aid improvisational storytelling, not that many of them make use of digital media or game technology [5,7–9].

In this paper we present Props, a 3D-game-like system for mediating collaborative and improvisational storytelling. As a platform for storytelling, Props first creates a virtual 3D scene depicting a performance stage that is modelled in detail after a real-world performance stage at downtown Oulu, Finland. The virtual stage is presented to the audience in a suitable manner, for example on a laptop's screen, as a large-scale projection or in a computer assisted virtual environment (CAVE). Together with the surrounding real world, the virtual stage establishes a hybrid space for collaborative storytelling. A prop master sets the stage for a story with a computer, by selecting from an inventory of virtual 3D assets a background, a scene and various objects and effects, i.e. virtual props placed on the virtual stage. The props serve as cues to a narrator who narrates the story by speaking or acting. The iterative and collaborative process of staging, narrating and acting goes on until the players agree that the story has been told. In its simplest form Props can be played by two people, a prop master and a narrator, with a laptop. However, we have targeted Props to larger audiences so that the virtual 3D stage is projected onto a large flat surface or on the multiple walls of a CAVE, and the members of the audience dynamically take different roles during storytelling. To explore the narrative potential of Props, we conducted three field trials involving eight separate storytelling events where Props was played by audiences from different age groups. As a theoretical framework in the analysis of the storytelling events we employ an extended model of the Church-Murray aesthetics of virtual environments (VEs) [10], adding enjoyment as a fifth dimension to the original four dimensions of agency, narrative potential, transformation, and presence and co-presence.

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The remainder of the paper is structured as follows. We first review related work on digital interactive storytelling systems in Section 2. The design and technical implementation of Props and a pilot study conducted with children are presented in Section 3. The theoretical framework of the study is introduced in Section 4 with illustrative observations from the pilot study. Section 5 outlines research methods, the field trials and the materials collected from the storytelling events. Section 6 presents the analysis and results, first for each field trial and then for selected dimensions of the theoretical framework. Section 7 discusses our findings and Section 8 concludes the paper.

2. Related work

Storytelling aids in creative processes, coincides with children's literacy development, cements social bonds and provides insights on silent knowledge in social situations on small scale or in big organizations [3,11–14]. Storytelling systems for fictional storytelling are mainly targeted at children; hence much of the research on them has been conducted in collaboration with child audiences [3,4,15]. There is an inherent agreement that storytelling is also a part of adults' communication, though. Collaborative fictional storytelling is used with adolescent and adults to create social interventions [11–13] and in play and narrative therapy. Yet there is little research on expanding storytelling systems to audiences outside child demographic [16].

As stories are evolving into digital and visual form, so are the sites where they are told changing. Digital interactive storytelling (DIS) systems are designed to support static story content although they have slight differences in how much the participants can affect the authoring process [17,18]. DIS systems are not to be confused with storytelling support systems that are designed to complement freeform storytelling. They often rely on either static images that can be very suggestive [13] or at the opposite end of spectrum are too generic to inspire [19]. When storytelling support systems are designed for inspired improvised storytelling and acting, some amount of suggestion must come from the game content. Then again, the content should not be too static to prevent the storytellers from having freedom with the storyline or force them to ignore the suggestions of the storytelling system and other participants. Traditionally, immersive environments for digital storytelling have been demanding to set up, and they are constrained to displaying a specific setting with a specific branching interactive storyline. Freeform portable storytelling support environments such as Narratarium recognizes words in stories and projects accordingly light and colours to the storytelling site. Even more portable is Pico Tales that combines pico projectors and mobile phones into a storytelling system that has been deployed in rural India [6,18–19,20].

Stages, real or virtual, are locations where one expects to see a display. When a 3D virtual model of a city is combined with a storytelling system, a stage that has a representation in both realities seems like an obvious choice. Many storytelling systems, interactive digital dramas, augmented reality displays or performances that mix virtual and real life performances are in fact located on stages [21,22]. Augmented reality and mixed reality games are sub-genres of pervasive games. Pervasive games are expanded out of their usual context either spatially, temporally or socially. Expansion is the defining term for pervasive games and many pervasive games are in fact expanded versions of traditional arcade or board games expanded spatially to be city wide [23–25]. Props was initially designed as a pervasive storytelling game with the expansion of storytelling event in mind. Improvisation in music has already been expanded spatially to enable remote collaboration in improvised performance [26]. Similarly, interactive theatre has been expanded to have actors at different locations act and play together in a virtual environment [27]. Props is presented in this paper in the form of a mixed reality experience that has more in common with storytelling support systems and sandbox games due to the freedom the participants have in creating their own narratives [28].

3. Props

3.1. Design

Stories are elemental in most games, but most games are not just about telling a story like Props. The initial motivation for Props was to create a pervasive storytelling game for an upcoming 3D virtual model of the City of Oulu in northern Finland. The basic idea of the game is to mediate collaborative fictional storytelling and to expand the storytelling event into hybrid environments. Although Props stage spans two realities, the virtual stage in the 3D virtual model of the city and the real stage, the actual physical stage used in the game play does not have to be tied to any specific location. The real-world stage houses the players who can adopt different roles during the game play. Narrators tell the story, prop masters set the stage and audience enjoys the play.

There is no obvious competition in Props, unless one accounts the dynamics between the prop master and the narrator as some sort of battle of minds. There is no declared winner or winners at the end, but everyone gets the same reward, the story that they have created in collaboration. Some forms of games are similar in this regard, sandbox games or simulations like Sims or Microsoft Flight Simulator and performance games like Guitar Hero or SingStar. The lack of competition and too much stress can support creativity [29].

One could argue that having paper cut-outs as props could give the participants the same experience with less effort. When the virtual 3D scene is visualized on a screen, the output is always a flat surface. However, repositioning multiple props on the stage brings out depth perspective which is further enhanced by animated objects and effects, creating the illusion of extension of space into the stage. Monocular cues to depth perception, i.e. those that can be perceived with just one eye or from a flat surface, are more dominating in creating the illusion of depth than binocular [30].

3.2. Technical implementation

Props is implemented as a 3D scene atop the realXtend open source game engine for building collaborative 3D virtual worlds [31]. The 3D scene is modelled after a real-world performance stage located at downtown Oulu, Finland, and its surroundings (Fig. 1). The 3D scene is viewed with dedicated viewer software called Meshmoon Rocket that is available for Windows and Mac OS [32]. The 3D scene can be hosted either locally on a PC or in the public Internet on a Meshmoon server [33] which is a commercial instantiation of the realXtend server. If so, then also remote participants can connect via the Internet to the Props scene to view and potentially modify the configuration of the scene. A PC equipped with the Meshmoon Rocket software is needed to use the Props. The 3D scene is visualized in a suitable manner, on the PC's display, on a separate screen, as a projection, or in a CAVE.

The user interface of Props includes a menu for selecting backgrounds, scenes, objects and effects from the 3D asset inventory, i.e. props that are placed on the 3D stage (Fig. 1). The prop master can move, add and delete props with keyboard commands, either individually or in groups. The menu also includes a random button