MANAGING ACTORS IN SERIOUS GAMES

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ABSTRACT

Researchers at the University of Central Florida have developed a process for structuring social interaction in serious (i. e. education-oriented) games through the creation and management of a team of "on-line actors" called *cast members.* This paper describes the evolving theory of *Cast Member Performance Management (CMPM).* Pilot studies have concerned applications in math, cultural and language learning and entertainment.

CAST MEMBER PERFORMANCE MANAGEMENT

An imaginary vignette.

Jason logs into the *Turtle Haircut Network* to complete a homework assignment in his eighth grade social studies class. He puts on his headphone/ microphone; this is an audio-interactive game. He finds himself in a role-playing game where he is a British junior clerk in a trading company in Hong Kong in the year 1840. The First Opium War is about to break out. He interacts with other British and Chinese characters – soldiers, taipans, street vendors – that he has read about in his textbook. He has to make decisions, and ultimately has to run for his life when his trading company is burned down. He gets an up-close and personal experience of an important piece of history.

Sounds like a typical adventure game, right? But the game itself was built by college students and high school seniors, and the "British" and "Chinese" characters are all being controlled by other students, in other schools, who are themselves studying various aspects of world history. Jason discovers links that lead to other games in which he can learn to speak Chinese by interacting with people in China, or create comic book-style stories about his experience in Virtual China.

The key intended benefits of Cast Member Performance Management are these:

1)   Complex and interesting scenarios can be developed without extensive programming to support the activities of non-player characters or interactive props – because live human beings will be controlling these entities;

2)   The cast members themselves will learn at least as much as the guests. They will have to master the subject matter of the world sufficiently to deliver it in an effective and interesting way. And they will learn to think about others' learning and entertainment experience, thus enhancing their own ability to plan and present information and action in electronic media.

Our initial experiments indicate that these goals are achievable.

Making it happen.

Young people are learning many things by playing games (Gee, 2003; Shaffer et al., 2004; Prensky, 2001, 2006; Aldrich, 2005). They develop skills at solving complex problems, exploring intricate universes, and organizing and leading group activities. Our mission is to seek ways of harnessing this self-organized, un-commanded, often addictive behavior to teach essential skills and concepts. To this end, we are developing a methodology for structuring the experience of students engaged in multiplayer online role playing games for learning.   We have borrowed terminology from Disney's theme parks, as follows:

Guests are students who enter our role-playing games without prior background, and who are the "customers" in the sense that the game is designed primarily for their benefit. *The character played by the guest is called the Protagonist.*

Cast Members are other people who are playing roles within the game, with the primary purpose of providing a high quality, interesting/exciting/creative experience for the guests. The cast members might be other students in the same or different school, university students, or even retirees. *Characters played by the cast members are referred to as Non-Guest Characters (NGC) – by analogy to the automatically controlled Non-Player Characters (NGC) that often occur in games.*

To make the CMPM vision real, we must solve a number of problems including world-building, cast and guest training, performance management and infrastructure. This paper describes our work toward these goals with students at the University of Central Florida during fall 2006 and spring 2007. In both semesters, approximately a dozen Digital Media students participated. In Spring 2007 we also had participation from eleven students in their first year of studying the Chinese language.

World Building is not the principal focus of our current phase, but we had to build worlds for our experiments. Tools for building online worlds are rapidly evolving. We have used three of them. *Neverwinter Nights* (Bioware 2002) has been used by a number of experimenters, and offers simple and reliable multi-player support, so we used it during the Fall of

Figure 1. The Cursed Dark City

2006. Constructing worlds is simple using the built-in tools, if you plan to build medieval-style towns, villages and rural scenes and populate them with knights and monsters.

However it proved quite difficult to add features such as 2d Cartesian coordinate system that we needed for our math lessons. The Torque Game Engine (Garage Games 2007) also came highly recommended, and so we adopted it during Spring 2007. However, to build assets you need expertise in either 3Dmax or Maya, and students with these skills were in short supply. Since Torque is a combat-oriented engine, there is always a weapon in view (e. g. a crossbow.)

By mid-semester, it was clear that world-building was consuming too much energy, so we began to use *Second Life* (Linden 2007). Its built-in tools for construction of scenes, objects and scripts proved sufficient for the short term. We extracted imagery from our Torque world to build our Second Life environment.

In Figure 2, you will see some urban landscape built in 3d in Torque, that was used as a source of texture maps in the Second Life world (below). See (Moshell 2007a) for an extended discussion.

We used the Ventrilo (Flagship 2007) audio communications system, which worked well for our purposes. A number of game engines including Second Life and Olive (Forterra 2007) now incorporate audio chat into their core technologies.
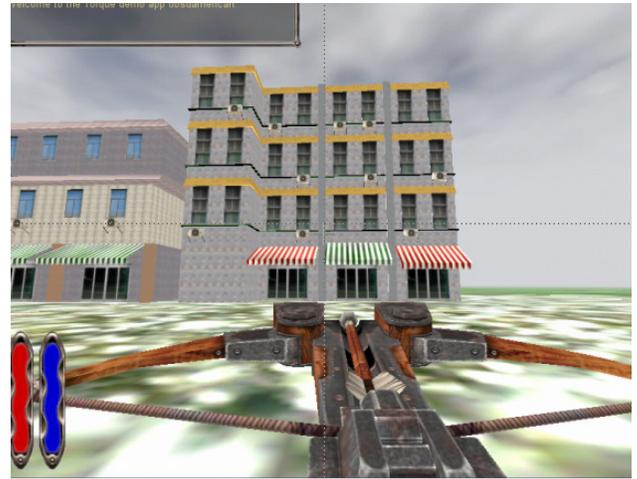

Figure 2. Torque as a Testbed

Figure 3. The Beijing Library in Second Life

Story Lines and Story Guides.

We invited our students to develop stories around themes that we specified. In 2006 the theme was built aroujnd a middle school math requirement to understand and use two-dimensional Cartesian coordinates. To develop a story we had student teams create and "pitch" a variety of protagonists, antagonists and story lines, then select the most promising. *The Cursed Dark City* was a quest game in which the protagonist moves through a village, going to various X,Y coordinates to gather necessary resources from shopkeepers. The protagonist then goes into the cursed dark city to restore it to life and light. (The story is discussed in more detail below.) The plan was for shopkeepers, antagonists and the protagonist's companion/guide to be played by cast members.

The key problem: how do you guide the cast members? If they have too little structure, the entire burden of delivering useful learning falls on the environment. If you give too much structure, there is no scope for creativity by cast members –

and you must anticipate every possible choice and action by the guest. Our response was to design documents called *Character Profiles* and *Segment Guides*.

Character Profiles provide to the cast member (and to the guest) a summary of each character's background, knowledge, capabilities and goals. It is often the case that a cast member will be controlling more than one NGC as the story evolves (though not usually at the same time.)

Segment Guides (SG) are, obviously, based on segments – that is, the discrete parts of a story, or situations that may arise. They are known to (and rehearsed by) the cast members but not to the guest. For instance in the Cursed Dark City, there is one Segment Guide for each shop into which the protagonist may go. A SG specifies the conditions that must be true for this segment to occur. These include the presence of the appropriate characters in the appropriate environment, and prior events that must have happened to trigger this segment. More than one segment can occur in a given location. Sometimes not all of the preconditions for a segment are present; the cast members must then rely on their character profiles to decide what to do.

Segment guides do not dictate actions. Rather they express local goals for the NGC, as well as for the cast member. Goals might look like:

"Merchant: try to sell the protagonist at least one communications device."

"Cast member: try to guide the protagonist to discover the (x,y) coordinate grid that is on the ground."

Segment guides can suggest dialog. The degree of detail varies greatly depending on the level of subject matter. In introductory language work, the segment guide provides a complete skeletal dialog, that should be memorized and used as a starting point for improvised discussion.

Goals for characters are limited to issues that make sense within the story. Characters within the imaginery universe have no knowledge of the educational objectives of the game. Cast members (real humans controlling imaginary characters) on the other hand, have goals at a higher level: they are charged with leading the protagonist's action so that the guest ultimately has the intended experience. There are an infinite number of ways to accomplish any given learning objective, depending on the cast's creativity.

Training

An obvious way to train cast members would be for them to serve first as guests. However, with new worlds, someone must initiate this "feedback process". If the world is still under construction, training presents additional challenges. We have had good success in developing game concepts and in training our initial cast members by building table-top "board games". We use concept art (e. g. photographs from the Internet) and first-draft Character Profiles and Segment Guides. We have the cast members play through the story several times, and then invite an outsider to serve as the Guest. On some occasions (e. g. foreign language training) we use native speakers or faculty members as initial cast members, so as to help organize the cast members' skills.

Show Management

Cast members do not only control avatars. They also control the 'props' – that is, any objects or interactive aspects of the world itself. For instance, if lights are to come on, gates to open, threats to appear, rather than having to program these interactions, we assign a student Prop Manager the responsibility for managing them, improvising as the story evolves. An Show Director provides guidance to the cast members so as to make sure that overall goals are set.

HOW DOES IT WORK IN PRACTICE?

We have conducted four trials, as summarized in Table 1. "DM"=undergraduate Digital Media majors. "Language"=various majors taking Introduction to Chinese. "Chinese" = graduate students from China, serving as cultural consultants.

Table 1: Trials of Cast Member Performance Management

Topic	Scenario	Engine	Participants
Cartesian coordinates	*The Cursed Dark City*	Neverwinter Nights	14 DM
Cultural Immersion	*New Student in China*	Torque	12 DM + 2 Chinese
Chinese Language 1	*Beijing Library*	Second Life	12 DM + 11 language
Entertainment	*Murder Mystery*	Second Life	12 DM

The Cursed Dark City served to develop the concept of the Segment Guide and the role of Show Manager. In the *New Student in China* scenario, we consulted Chinese graduate students and American students who had lived in China, to simulate the experience of living in a Chinese city and shopping in a computer store. In the Beijing Library story we developed an intensive role-playing language practice session, based on one chapter of the introductory language text in use at UCF (Liu, 2002). The *Murder Mystery* explored more elaborate Segment Guides and plot situations.

Cast Members In Action

A typical session involves four to six laptop computers. The cast members (including actors and controllers) sit around a table, with their computers networked together. The guest is in a separate room (if we are using Ventrilo audio) or in the same room if we are simply speaking out loud. The guest's game viewpoint is projected on the wall so that all cast members, managers and observers can see the guest's experience.

Figure 4: Cast Members in Action

A typical scenario lasts for five to ten minutes. Guests are initially told the starting premise: e. g. "you are a new student in China. You do not yet speak Chinese. Go into the city, find your way to a computer store, and buy a new monitor for your computer." After each session, the guest is invited to observe following guests; most accept this invitation. A typical evening will involve three or four sessions, with careful debriefing of cast, guest and observers.

Key observations

1) There is a wide variety of natural talent for cast member performance. Some students instantly "get it", while others struggle with the challenge of remaining in character. It will be necessary to pre-qualify cast members when we move to the delivery of actual instruction.

2) Cast members must actually know more about the subject than guests, for effective learning to occur. Lack of second year language students forced us to use first year students for both guest and cast. When the stronger students served as cast members, useful learning took place- especially after they had several sessions of experience. When weaker students tried to be cast members, they often tried to read from the Segment Guides rather than working from memory and improvising.

3) The role playing experience is highly motivating. Students exerted great effort to build intriguing worlds and story lines, and to enact them in creative ways. We have not formally measured the effectiveness of subject matter learning since we have been focusing on development of the management methodology. However, this model (CMPM) may have a great potential in providing a more interactive and proactive environment in foreign language studies, especially in light of a recent MLA (Modern Language Association) report which signals a paradigm shift from the traditional grammar/literature based model to more cultural oriented, task-based models (Geisler et al., 2007).

4) We still seek the right game engine. Second Life's advantages are its accessibility from anywhere, and the ease of world-building and interactive use. But only one team can use a given 'set' at a given time. A scaleable model must allow hundreds of concurrent sessions in a given world. In Second Life, you would have to purchase and maintain large amounts of real estate to accomplish this goal. We continue to seek an engine that is easy to use, supports interactive audio and does not incur additional cost for concurrent sessions.

Conclusion

Cast Member Performance Management (CMPM) is a new approach to organizing peer interaction in on-line role playing games for learning. We have reported on a pilot study in which we have developed and tested some ideas and techniques, working with middle school mathematics objectives, cross-cultural learning, foreign language learning and entertainment.

We have focused on learning how to structure and guide the interactive dramatic activity of untrained (or lightly trained) student "confederates" called *cast members*, so as to deliver specific learning experiences to other students, called *guests*. At this early stage of development, we have not undertaken to measure the impact of these techniques on learning. We have focused our investigation on the dramatic experience itself.

We are now designing a set of Internet-based collaborative work tools to facilitate the coordination of cast member/guest interaction. We plan to develop and test these tools during 2007 and 2008, and to conduct formal studies of learning effectiveness.

More details about the work can be found in (Moshell 2007a, b).

Acknowledgements

BIOGRAPHIES

J. MICHAEL MOSHELL is a Professor of Digital Media and Computer Science at the University of Central Florida. He founded the Institute for Simulation's Visual Systems Laboratory in 1989, initiated the Digital Media program at UCF in 1995 and was the first Director of the Florida Interactive Entertainment Academy in 2005. He received his Ph.D from Ohio State University in Computer Science. His research concerns the application of computers to learning.

RUDY MCDANIEL is an Assistant Professor of Digital Media at the University of Central Florida. He currently directs the Partnership for Research in Synthetic Environments (PROSE) lab at UCF. His research interests include narrative theory, "serious" video games, knowledge management frameworks, and XML. He has published and presented on the topics of interactive narrative, virtual teams, knowledge management, and the critical analysis of video games. He received his Ph.D. from UCF's Texts and Technology program in 2004.

LI WEI is a Lecturer of Chinese and Asian Studies at Rollins College. As an ethnomusicologist-turned-language teacher, he has a broad interest in music, language and culture. His current research projects include linguistic idiosyncrasy in textbook presentation of culture, appropriation of Buddhism in "world music," and the interplay of music and politics in Post-Mao China. He is currently completing his Ph.D. in Ethnomusicology at Columbia University.References

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