Bringing Hollywood Storytelling Techniques to Branching Storylines for Training Applications

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Abstract. This paper describes the value of capitalizing on Hollywood storytelling techniques in the design of story-based training applications built around branching storylines. After reviewing the design of Outcome-Driven Simulations and the technical aspects of our application prototype, we describe storytelling techniques that greatly improve the level of user engagement in training simulations based on this design. These techniques concern the overall development of the story, the use of a story arc, the critical decisions in a story, notions of pay off and climax, dramatic sequences, character bibles, characters as a Greek chorus, and the significance of consequences and outcomes. Examples of each of these storytelling techniques are given in the context of the ICT Leaders Project, a prototype leadership development application for the US Army.

1. Introduction

One criticism of conventional training simulations used by organizations such as the United States Army is that they are neither engaging nor memorable. They do not capture the attention of the current population of trainees, which has been called the "Joystick Generation." Conventional simulations cannot yet realize the human and social complexities of the real world, which are necessary to induce the high levels of stress that are a critical element in many important jobs.

The Leaders Project at the University of Southern California's Institute for Creative Technologies (ICT) addresses these issues by capitalizing on the talents and skills of the Hollywood entertainment industry through a partnership with Paramount Pictures. Our prototype training application is built around fully developed Hollywood-style stories that incorporate classic dramatic structure. These stories attempt to have an exciting pace, realistic characters and rapidly changing situations. Their goal is to be emotionally engaging, with a richness that allows them to address issues of human and social complexity.

In this paper we describe the methods that we used to capitalize on Hollywood storytelling techniques in the design of the ICT Leaders Project training application. After reviewing the underlying concept of Outcome-Driven Simulations and the technical aspects of our application prototype, we discuss the process of creating the overall structure of the story and the division of the story into chapters. We show how the classic concept of the *arc of the story* can be employed to build interest as the simulation progresses. We also discuss the methods for creating strong and effective characters for use within the simulation.

2. The ICT Leaders Project

2.1 Outcome-Driven Simulations. The ICT Leaders Project was created in order to develop new technologies for the leadership training of US Army soldiers and to develop simulation storytelling techniques**.** Our application prototype was designed as an Outcome-Driven Simulation (Gordon, 2004), where a branching storyline is used to move the simulation forward based on user actions. This branching storyline structure is reminiscent of the classic Choose Your Own Adventure series published by Bantum Books (e.g. Packard, 1979). However, in the ICT Leaders application prototype these situations are presented as a series of scenes in a 3D animated virtual reality environment, where user actions are made in the context of text based conversations with virtual characters (Gordon et al., 2004).

The development process for this Outcome-Driven Simulation began with 63 teaching points gathered in interviews with US Army Captains just returning from command assignments. The points related to leadership issues these soldiers faced in the field. 35 of the decision points most relevant to US Army leadership development needs were then organized into 3 clusters that formed the basis for a three-chapter scenario. From these points our project team constructed a branching storyline where each of the points was reformulated as a user decision with only two possible choices. The branching storyline created with these decision points typically had four levels of user decisions per chapter for a total of roughly 12 user decisions in any single pass through the simulation, on average.

Figure 1 presents the full 3 chapter branching storyline created for the ICT Leaders Project. The number for each of the 35 states indicates the teaching point that was formulated into the user decision to create the state. Note that at the end of each chapter the user encounters a global event that brings all the possible branches back together and enables the next chapter to start from a single point once again. This convergence of the branching structure at the end of every chapter enables an extensive simulation to progress without requiring an intractable number of branches.
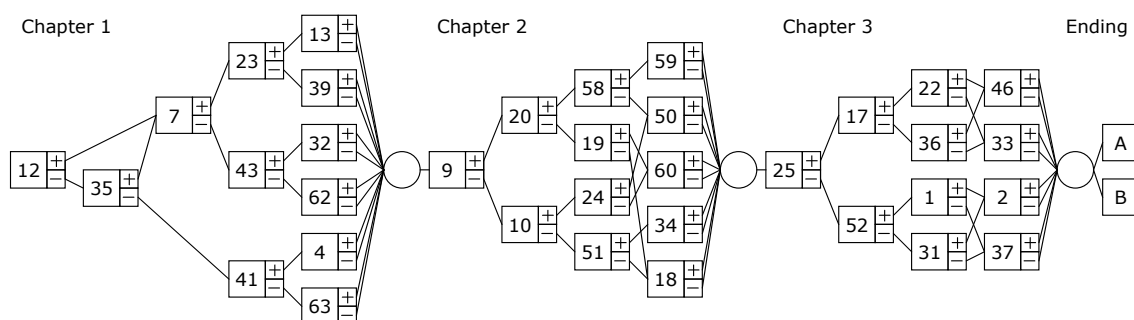
Figure 1. The Simulation State Graph for the ICT Leaders Project

2.2 Technical Approach. To improve the level of immersion and user interaction offered by the branching storyline structures used in Outcome-Driven Simulations, the ICT Leaders project visualizes storyline situations and outcomes as fully animated audiovisual scenes created in a 3D virtual environment, and supports user decision-making through text-based natural language dialogues with virtual characters. This approach affords a much simpler control algorithm than seen in planning-based

interactive narrative systems (e.g. Riedl et al., 2003; Cavazza, 2002), while supporting a high degree of user interactivity and immersion.

The ICT Leaders project uses a heavily modified version of the commercial game Unreal Tournament 2003 (Epic Games) as its visualization environment. The storyline is presented as a series of cinematic cut-scenes, where programmed character, audio and camera actions are scripted to generate a series of machinima-style animated movie clips. A mix of scripted foreground characters, with dialogue audio voiced by professional actors, and fully autonomous background characters add an additional element of real-time emersion where the world maintains a level of continuity while the system is waiting for the user to make a decision that will move the story forward. A custom xml-based client-server control system was constructed to control visualization in Unreal Tournament 2003 from outside processes, and a suite of authoring tools were created to facilitate the scripting of hundreds of unique camera shots. Sequences of these shots are used to present the user with a set-up scene and two outcome scenes for each of the 35 states in the branching storyline structure.

Each set-up scene ends with a problem that is presented to the user by one of the virtual characters in the environment, prompting the user to make a decision. The user makes these decisions by responding to these characters by typing natural language utterances, and the outcomes of the decisions are then presented as additional scenes. This text-based natural language dialogue component of the ICT Leaders project is supported by statistical natural language processing algorithms, where each decision point in the branching storyline is coupled with one text classifier trained to route user inputs into one of some number of utterance classes (typically around 12). Two of the utterance classes in each classifier correspond to the two possible decisions that the user can make in their current storyline situation, and the classification of a user input into one of these classes causes the storyline to continue down the appropriate arc in the graph. The remaining utterance classes correspond to questions that the user directs to the virtual character, non-decision statements that they may make, and decisions that the user would like to make but are unsupported in the branching storyline structure. In response to these user inputs, the virtual character delivers a scripted response and the conversation continues with the next user input. We employed a Naïve Bayesian classification algorithm with training data and user inputs encoded as large feature vectors, where each dimension in the vector corresponds to one of all of the single words (unigrams) and adjacent pairs of words (bigrams) seen in the training data. Additional technical information is found in Gordon et al. (2004).

3. Story Design and Execution

3.1 Requirements. In order to create the ICT Leaders prototype, it was necessary to develop a story that could include a great variety of leadership decisions with powerful and obvious consequences. The story itself would provide location, context and grounding for the decisions as well as a series of situations through which the simulation could play out. Our aim was to demonstrate that the methods used for story development by the entertainment industry could be applied to the creation of stories for training simulations, and that this approach to simulation design would lead to learning experiences that were more compelling and more memorable than simulations developed in conventional ways. Toward this aim, the University of Southern California

partnered with Paramount Pictures in the development of this simulation, with experienced Hollywood screenwriter Terry Borst scripting the scenarios and dialog.

3.2 Designing the Premise. In creating stories for television, where high quality scripts must be developed very rapidly, the central idea of the story (the premise) and the plotline of the story itself are designed before the story is written. That is, the major events of the story are arranged so that they will achieve the greatest possible effect. In television a team of writers often carries out this task before an individual writer begins work on the script.

The ICT Leaders Project team began with a series of such sessions in order to design a premise for the story. We wanted a situation that would allow a US Army Captain to address all of our teaching points within a non-tactical military operation which included time pressure, a variety of personal issues and cross cultural encounters. In short we wanted situations typical of those faced by military leaders today.

We chose a premise that had been developed the previous year for a related and well-received training film called Power Hungry that was part of the TLAC-XL project developed by the ICT (Hill et al. 2003). Power Hungry dealt with a food distribution operation being carried out near a remote village in Afghanistan. A new commander is dropped into the operation to lead the site preparation and food distribution. His troops must set up checkpoints and arrange security so that the food can be handed out in a fair and orderly way. A local Afghani militia serves as part of the security operation. The situation becomes complicated when an Afghan warlord appears and demands a major role in the operation. In the original film, a series of leadership mistakes and miscalculations causes the operation to unravel. When the food distribution trucks show up early, things spin out of control and a potentially deadly melee ensues.

Our goal in the ICT Leaders Project was to expand this basic premise so that the commander could avoid the disastrous outcome by making the right leadership choices. We organized the decision points into major categories and set about building the 3-chapter story. Chapter 1, set the night before the food distribution operation, had to do with personnel issues that confronted the Captain from the moment he arrived at the camp. We placed most of the points that had to do with "taking care of soldiers" into that chapter. Chapter 2 related to establishing authority and dealing with procedural issues. So we selected points that related to those issues and assigned them to chapter 2. Chapter 3 had to do with the arrival of the warlord and his demands. Here we placed issues about sensitivity to cultural differences, managing subordinate perceptions and mission focus.

Once we were satisfied with the general distribution of teaching points along the plot line of the story we wrote a treatment, a traditional Hollywood document that describes the basic story in a few short pages. When our US Army advisors approved the treatment, we began the next phase of story development: fleshing out the story details.

3.3 The Arc of the Story Hollywood wisdom is that people most enjoy stories that build from a critical incident, through a series of difficulties, to a moment of high drama and then resolve themselves completely. In his book on screenwriting, Robert McKee describes this formula as a story arc (McKee, 1997). We feel strongly that story-driven simulations should also have this kind of structure. This structure should drive the entire

simulation as well as the structure of each chapter within the simulation. Accordingly, step one in our process was to identify the inciting or critical incident. The inciting incident for our Captain is clearly his sudden assignment to the food distribution operation. From the time of the assignment until its completion the Captain's success turns on whether or not he can accomplish this important mission.

We now had the inciting incident for the overarching story, but we still needed to identify inciting events for each individual chapter. Each chapter in our simulation had to end in such a state that the next chapter could start fresh, from a single point. This required that something happened at the end of each chapter that was so important, so unnerving, or just so basic that whatever had been going on before came to an end, enabling a new focus in the next chapter. A theatrical and Hollywood technique that we used to meet this requirement was the third act twist. Movie and TV episodes often end with a twist that becomes a cliffhanger ending and which also serves as the kickoff for the next episode. We realized that if we could add a twist at the end of each chapter, it would become the inciting incident for the next chapter.

For example, at the end of chapter 2 in our branching storyline the preparation for the food distribution operation is disrupted when Colonel Omar, an Afghani warlord, and his paramilitary troops suddenly appear on a hill above the camp. Our twist here is simply, "Who are these guys and what do they want?" It becomes the cliffhanger for the end of chapter 2 and the inciting incident for chapter 3.

3.4. The Critical Decision With the inciting incident in hand, we could turn our attention to identifying a teaching point that could serve as a critical decision about the incident. If the inciting incident is that a warlord suddenly appears, then the critical decision must concern how the Captain deals with him. This decision should be based on the most instructionally important decision point in the chapter. If the simulation follows a branching tree structure, then the first decision is the one that users experience regardless of what other decisions they make subsequently. The very first decision sets the tone and direction for the entire chapter, and it allows the evaluation system within the simulation to identify every user's response to this most important point.

3.5. The Pay Off And Climax Having used a pedagogical rationale to identify the inciting incident and critical decision at the start of each chapter, the next question was how to end the chapter. In this case the answer had to do with the dramatic possibilities inherent in the situation. This is because the dramatic possibilities will tell you how the simulation should play out.

In the case of chapter 3, for example, the dramatic possibilities were obvious. The chapter is about the Warlord Omar and his arrival, so the chapter should end with a decision by the Captain concerning the warlord, which has very strong positive or negative consequences. In Hollywood we call this a payoff, and a cardinal rule is to make sure that you provide a payoff for all the dramatic possibilities in the story. If you introduce an important warlord, you had better allow the participants to meet him, and that meeting should have a substantial effect on the story outcome.

Within Chapter 3 each of the possible decisions relating to the meeting with Colonel Omar is made at the same decision level. As Figure 1 illustrates, there are typically four levels of branching in each chapter. The number of simulation states grows from one (in

the first level) to as many as eight in the forth. Because of the dramatic need to have a pay off in the story about how to handle Omar, we needed to identify several of the same kinds of decisions that could be used alternatively in a meeting with Omar that would occur at the last decision level in the chapter. We found four decision points that were appropriate. These were all issues that could affect Omar and his perception of the Captain and, in this case, give him a reason to support or not to support the operation. According to our design of the simulation story, if Omar refuses to support the Captain his absence from the actual food distribution will have disastrous consequences. With the start and the end of each chapter identified, our attention turned then to the events in between.

3.6. Building Dramatic Sequences A dramatic sequence is defined as a series of scenes that culminate with a greater impact than any previous scene. In our design each decision point is a scene. Once you have created the beginning and end of the simulation chapter, the rest of the effort involves looking for scenes that can be brought together logically, to build on one another to create sequences with rising conflict. For example, one of our teaching points concerned the deployment of an undermanned unit. Should the Captain replace the unit or ask the soldiers in that unit to do their job though understaffed? The way we turned this simple decision point into a story sequence was to figure out who the unit was and why they were understaffed. In the previous chapter, we introduced a newly arrived detachment of Military Police (MPs) who had joined the operation to provide route security. The user is faced with a decision related to building team spirit: Do you invite the new MP unit to have dinner with a unit already on the scene? With a little bit of creative storytelling we said that the new MP unit should be invited to dine with a Civil Affairs Group that is charged with building relations with the local population. The Civil Affairs Group is familiar with the local cuisine; the MPs are not.

In the chapter that followed this event, the new MP unit was undermanned because of the food that they ate the evening before. The Public Affairs Group didn't have any problem with the local cuisine, but it made the MPs sick. We then strung a series of decisions together so that the Captain had to deal with more and more difficult problems arising from the MPs illness and the consequences of whether or not he should provide them with reinforcements. Tying the decisions together by focusing on the MPs gave us a chance to create continuity, maintain interest and tell a more memorable story.

3.7. Character Bibles One of the easiest ways to bring believability to a simulation and help drive the story is to populate it with realistic characters, and the key to creating believable characters is to determine who they are and what they want. That is, to answer the actor's inevitable question: "What's my motivation?" In Hollywood, TV shows and movies require that the writer of a screenplay create *character bibles*. The writer has to invent and document the characters' life experiences and their goals. Once these things are known, these characters can be written in a believable, consistent and useful manner.

The challenge of putting a real character into a simulation is finding an opportunity to create the character. A simulation storyline based on a set of teaching points may require one or two identified personalities and then many non-specific people. The key is to combine these non-specific people into a single personality as often as you can. In

this way you create a small set of consistent characters that will appear regularly throughout the simulation.

For example, in Chapter 2 of our simulation story we introduced a very senior NCO named Pullman who attends the food distribution operation in order to make a documentary video. Pullman asks the Captain if he can borrow some of the men who are involved in a key part of the security preparation. This request might affect the manpower assigned to the mission and is an immediate challenge to the Captain's command. We made this confrontation one of the higher-level decision points in chapter 2.

Having created the one dramatic decision point, we could then have forgotten about Pullman and used different characters to deal with the rest of the teaching points in the chapter, but we did not. Instead we chose to have Pullman question the overall location of the distribution site. He suggests that the entire operation should be moved. Using Pullman to address this point allowed us to continue to build tension between him and the Captain. Finally, we had Pullman criticize one of the junior officers in the unit and urge the Captain to remove him from the operation. Once again, we added another dimension to the decision because it came from Pullman. A self-involved character who comes in from the outside and begins to question decisions, challenge authority and create conflict is a terrific ingredient in any story.

3.8. Characters as Greek Chorus When looking for ways to add realism to a simulation, it is important that its characters have a multi-dimensional quality. Two of the most important characters in the ICT Leaders Project storyline are First Sergeant Jones and the company Executive Officer, Perez. We chose to give these two characters especially rich backgrounds and as a result they became complex personality challenges for the Captain. For example, we gave Perez personal ambitions of command so that he would not be especially cooperative with the new Captain. This allowed us to employ one of the most important teaching points in the simulation, the need for the leader to establish control and credibility.

Because the ICT Leaders Project is about decision-making, the principle characters are able to play another valuable role: representing opposing decision options. On the issue of whether or not to seek the advice of experienced people before addressing Colonel Omar, First Sergeant Jones argues that it is critical to do so, but the more impetuous Executive Officer Perez provides arguments about why it is better not to waste time, but to respond immediately. The logic of these positions is well grounded in the background personalities and the goals of these characters, so they provide a natural way of presenting both sides of the argument to the user before he or she makes the decision.

3.9. Consequences and Outcomes A particularly effective way of achieving learning objectives in a simulation is to show the users the results of their decisions (Iuppa, 2001). There cannot be highly dramatic consequences for every one of the decisions that are part of the scenario. However, there should be consequences for the most important of these decisions. Because of the branching storyline structure that we used, these consequences could not appear immediately after each decision, nor could they appear at the end of every chapter. However, with some additional computation, the branching storyline structure could allow for consequences to appear at the very end of the entire simulation, which is very much in keeping with the Hollywood model.

When discussing the arc of the story we noted that the story as a whole has a major arc that builds to the ultimate crisis where the protagonist must make a final decision. Every good Hollywood writer takes his or her story to this point, and every good writer considers all the possible outcomes before selecting the very best one to use as the end of the story. This is the pay off for the entire effort.

In the ICT Leaders Project we came up with a unique way to take advantage of this situation. We designed an outcome chapter for the simulation that had two different paths so that there were two different ultimate outcomes. These outcomes correspond to strong or weak decision-making on the part of the user throughout the duration of the simulation. The strong outcome could only be achieved if the user exhibited strong leadership decision-making in all of the previous chapters combined, and likewise the weak outcome is achieved if bad decisions were made throughout. But both of the outcomes were dramatically rich, providing a strong pay off in either case.

4. Conclusions

Many of the techniques that Hollywood uses in creating engaging narratives are easily adaptable to interactive branching simulations. Applying these techniques in both military and non-military training applications will help achieves both dramatic and pedagogical goals, by promoting the development of rich, character-driven stories that can capture the attention of today's trainee population.

Acknowledgments

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