Il ne voyageait pas, il décrivait une circonférence. C'était un corps grave, parcourant une orbite autour du globe terrestre, suivant les lois de la méchanique rationelle.
– Jules Verne

The mind is its own place and in itself, can make a Heaven of Hell, a Hell of Heaven.
– John Milton

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Automated Planning and Player Modelling for Interactive Storytelling

by

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To Fran, my family, and my closest friends: words have not yet been crafted to express the feelings of admiration and gratitude I hold dear in my heart for you.

Abstract

Interactive Storytelling (IS) acknowledges that people want to be participants in the unfolding of a story plot. Given the complex nature of IS, Artificial Intelligence (AI) methods can be called upon to improve and enhance interactive stories in video games. In the past decade, a number of experience management systems have been proposed but only a few have been evaluated; furthermore, none of the evaluated systems has offered both player modelling and a story generation module. In the present work, I propose PAST (Player-specific Automated Storytelling), a new experience management system that welds together two complementary approaches for increasing player agency: generative experience management and player modelling. I present a set of empirical evaluations involving 320 human participants in which my system is shown to have a positive effect on perceived player agency.

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List of Acronyms

AI   Artificial Intelligence
ANOVA Analysis of Variance
ASD   Automated Story Director
CBR   Case-based Reasoning
CYOA Choose-Your-Own-Adventure
FPS   First-person Shooter
GUI   Graphical User Interface
IDA   Interactive Drama Architecture
IS   Interactive Storytelling
MDP   Markov Decision Process
NPCs   Non-player Characters
PaSSAGE Player-Specific Stories via Automatically Generated Events
PAST   Player-specific Automated Storytelling
PBCF   Prefix-based Collaborative Filtering
RPG   Role-playing Game
SAM   Story Analogies through Mapping
SBCL   Steel Bank Common Lisp
SBDM Search-based Drama Management
wpm   words per minute

Chapter 1

Introduction

Storytelling is central to human cognition. From old campfire stories to modern movies and video games, we have always cherished stories and tales that have an impact on us and to which we can relate. A story can also take shape based on the input from the audience. Interactive Storytelling (IS) can thus be seen as telling a story when the audience has a say about its unfolding.

With the widespread use of computers and electronic devices, the field of IS[1] has been growing in importance, in no small part due to its applicability to improving digital entertainment and video games, bolstered by Artificial Intelligence (AI) research. As an example, it is now possible to create abstract models to tailor the unfolding of an interactive story to the specific audience. The interactivity in such stories requires to respond to various user inputs and feedback, which presents a dual-faceted challenge: to understand the audience while providing such systems with certain degree of automation.

IS as a research field aims to build systems that improve a story experience. Given that it is not completely clear how humans create interesting or appealing stories, designing computer systems to do it is challenging. In this work, I present a novel approach to IS in video game settings, which combines strengths of two existing methodologies. My approach, *Player-specific Automated Storytelling (PAST)*, aims to increase the perception of player agency via player modelling and player-specific stories while using automated planning to accommodate player actions in accordance with authorial goals.

This dissertation is structured as follows: in this Chapter, I motivate the work and explain basic IS concepts; in Chapter 2, I formally define the problem at hand;

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[1]Within the research community, Interactive Storytelling (IS) is also known as *interactive narrative*, *interactive fiction* or *interactive drama*.

in Chapter 3, I provide a brief overview of related work in IS; in Chapter 4, I give implementation details of my system and its underlying concepts; in Chapter 5, I explain the experimental methodology I used to evaluate PAST as well as the results obtained; in Chapter 6, I the discuss the strengths, shortfalls, and future research directions; finally, in Chapter 7 I conclude with some final remarks.

1.1 Motivation

Work in IS is of interest because it tackles storytelling: a rich, cognitive task. While a fully automated, human-quality storyteller is an ambitious long-term goal, practical applications are already possible in certain interactive environments, such as video games and interactive learning environments. This dissertation focuses on how to enhance stories in video games.

So, why is IS research important in video games? In the following sections, I answer this question by highlighting the relevance of video games in the *entertainment industry*, the use of AI to help game developers with *automation*, and how the gaming experience can be improved by *adapting to players*.

1.1.1 Entertainment Industry

Video games are a blooming industry. In 2012, the total combined revenue for this industry was $80 billion dollars worldwide (when adding software, gaming revenue and device sales), equalling the traditional film industry. Even major multinational corporations such as *Microsoft* are now observing their largest worldwide growth in the video game and entertainment segment; whereas the corporation-wide growth was 8% in 2012, the entertainment and devices division grew by 33% in the same period [6]. Economics aside, gaming habits also show a growing trend: between 2011 and 2012, the total average gaming time grew a 8% while the number of households with video game consoles increased from 50% to 56% in the United States [15].

Video game titles themselves have become objects of popular admiration. One example is a recent video game release, *Mass Effect 3* (in-game screenshot in Figure 1.1). This video game, published by *Bioware Corporation*, was the final instalment in a popular saga of science fiction that immersed the player in a rich futuristic role-playing genre, in which the player would take the role of Commander Shepard to save the Earth from destruction by evil aliens.

While highly acclaimed for the attention to details, story, elaborated characters

Figure 1.1: A screenshot from the *Mass Effect 3* video game featuring Commander Shepard's choices during a conversation [1].

and good reception by critics, the game was criticized for the lack of choices the player had at the saga's ending; this happened despite the fact that player choices were abundant throughout the story. According to Orland [19]:

> So what is it about Mass Effect 3's ending that has so many up in arms? For many, the lack of direct player control over some rather massive story threads seems to be the main sticking point. After investing dozens of hours into a story where every decision seems to matter, Mass Effect 3 players "reach the ending of ME3 and realize that everything you have done means nothing," as the Facebook protest group puts it. This isn't 100 percent true (...) But the protesters do have a point: the larger outlines for the final fate of the galaxy seem preordained no matter what decisions you've made or how hard you've worked (...).

To douse the criticism, the company made available downloadable content with alternate endings. This and many other examples suggest that players tend to feel entitled to a certain story ownership. IS can be used in similar situations to provide a higher sense of control albeit the number of choices may or may not increase substantially, while also enhancing the story based on players' actions and preferences [33]. This will be discussed in Chapters 2 and 3. My system, PAST,

Figure 1.2: A screenshot from the *Starcraft* 2 video game [7].

tries to provide players with a more entertaining and personalized experience (i.e., both more and higher quality choices), while helping video game developers cope with the added complexity of the larger narrative space of player-specific stories.

1.1.2 Automation

One of the ways video game developers can benefit from AI methods is automation. In terms of IS, this would imply automatically generating part of the story presented to the player. This is important for three reasons: (i) automation helps the game developers focus on other aspects of the game design (e.g., voice-overs, graphics, and art design), (ii) more actions and story trajectories are generally desirable to provide more player choices; and (iii) interactivity and player-specific stories require additional actions and states to cover different player preferences.

Some blockbuster game titles such as *Starcraft 2* (in Figure 1.2, the protagonist Jim Raynor choosing his next move on the game map) take years to make [18], even though little player agency is available. Adding more complexity with even more sophisticated story plots to please more players would inflate the budget and lengthen the production. Tools to help authors work with these plots would be advantageous, not only in terms of increasing story coverage, but also to plan, execute and obtain interactive stories more efficiently.

For the above reasons, partial motivation for this work lies in providing game
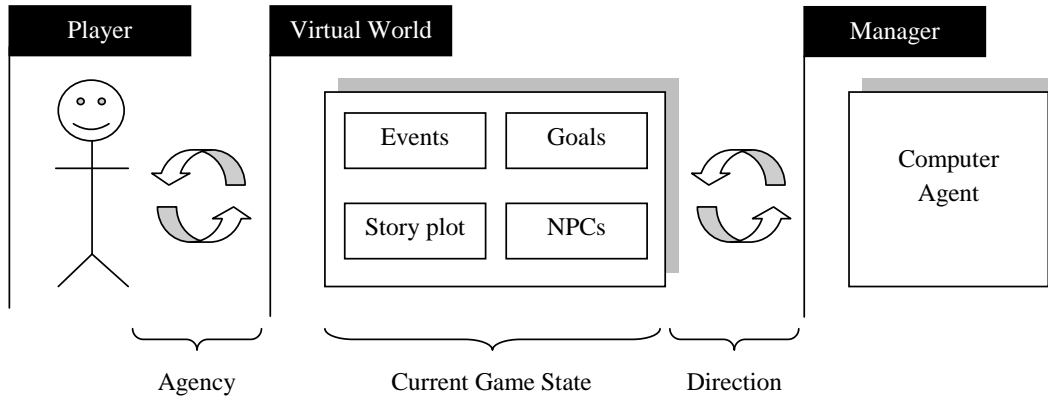
Figure 1.3: The elements of a video game under a experience management framework: the player, the virtual world along its elements (events, characters, plot, etc) and the computer agent (the manager) that directs the interaction between the virtual world and the human agent.

developers with a systematic way to craft high-level player-specific stories. PAST uses automated planning and player modelling to provide game developers with computer-generated content skeletons.

1.1.3 Adapting to Player Preferences

Different players play differently, as evidenced by the variety of genres available (e.g, Role-playing Game (RPG), First-person Shooter (FPS), sports, adventure). Even within each genre one can find varied playing types. As an example, in the RPG category many authors and game connoisseurs define several types depending on the preferred playing style (e.g., Laws [11] identifies seven different RPG player types).

Consequently, some studies have focused on creating cognitive models of players to make implicit decisions about the plot [30] in order to keep the interactive experience in line with the preferred style; others focused on automatically determining the difficulty level of a given game to prevent the game from becoming too easy or too hard, thus keeping it at a desirable sweet spot between challenge and feasibility [8]. My system is based on the former idea and builds a player model by observing their in-game actions; then, it uses the model to adapt the narrative on the fly.

Adapting to player preferences also implies adapting to the player's wishes and desires, which translates in empowering players with *agency*–the ability of the player to modify the world around her [22]. Providing agency in IS is non-trivial, and will be discussed below.

1.2 Interactive Storytelling in Computer Systems

The term IS encompasses two different terms: *interactivity* and *story* [5]. By inter-activity in computer systems, we understand it to be the capacity of such system to respond and act as an agent that complies–insofar as possible–with the requests from the human agent and vice versa. By story, we understand it to be a set of co-articulated, consistent and believable set of events, characters, and their interaction. In other words, agency in IS entails the ability of a computer system to respond to an audience's desires, actions, or goals while telling a story.

The explanation above is illustrated in Figure 1.3: in IS, the player interacts with the virtual world (i.e., video game), and the computer agent directs the unfolding of the story. As Riedl [24] states it:

> Interactive narrative is a form of digital interactive experience in which users create or influence a dramatic storyline through actions, either by assuming the role of a character in a fictional virtual world, issuing commands to computer-controlled characters, or directly manip-ulating the fictional world state. It is most often considered as a form of interactive entertainment, but can also be used for serious applications such as education and training. The most common form of interactive narrative involves the player taking on the role of the protagonist in an unfolding storyline.

In the specific case of video games, the goals of IS systems are three: (i) agency, (ii) enjoyment, and (iii) replayability [28]. These elements are desirable in any aesthetic gaming experience; however, I argue that the latter two elements can be indirect consequences of greater agency. More player choices–or more influence over the story plot–increase the replay value by providing novelty (i.e., new content not previously seen on a previous interaction) and more entertainment. Consequently, I focus on increasing agency as it can address the other two goals as well.

1.2.1 Drama and Experience Management

Agency in interactive settings may be provided by using an AI-enhanced computer agent to handle the unfolding of a story, which is of interest in IS research since it requires striking a balance between different aesthetic elements. According to Riedl and Bulitko [25], "The core research challenge is how to balance the need for
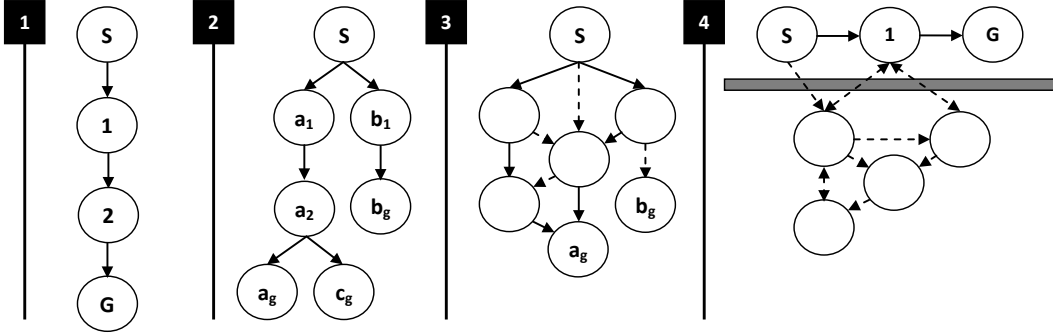
Figure 1.4: Different video game narrative types shown as directed graphs: (i) linear story, (ii) branching story, (iii) player story and (iv) layered story [28].

a coherent story progression with player agency, which are often at odds. (...) The key challenge to interactive narrative is how to balance these competing needs to ensure the player feels he or she has agency to affect the direction and/or outcome of his or her narrative experience while still ensuring the experience is coherent."

Based on the degree of agency a player may have during an interactive experience, Thue [28] identifies four different types of stories, as seen in Figure 1.4 (circles represent events or game states, solid lines fixed plot lines, dotted lines represent optional plot lines; s denotes the start event, numbers indicate temporal ordering, letters depict independent story lines, and subscript g denotes a final story state).

Linear stories offer little agency to the player, as they are heavily based on preauthored trajectories. Classical examples are found in early console games (e.g., *Super Mario Bros*), in which the player always had to play the same temporal sequence of events in order to win the game.

Branching stories, by contrast, allow the player to take different trajectories, experience different events, and sometimes have different endings. An early type of these stories are *Choose-Your-Own-Adventure (CYOA)* books, which allow the reader to choose from different story trajectories.

In the player story category no main story plot is presented, and the player has freedom to decide which events to play and when to go through them, such as in simulation games. Finally, the layered approach presents a main story line with the option of side-quests (diverging from the main line and then merging back into it).

To tackle the problem of guiding a player through different story trajectories while improving the aesthetic experience, the concept of *drama manager* was introduced as an intelligent agent capable of monitoring the unfolding of a story while

Attribute	Addresses the Question	Types
Authorial Intent	How much human authorial intent is preserved throughout the interactive story experience?	Manually authored, Hybrid, Automatically generated.
Player Modelling	Does the system learn from observing the audience's actions and responses?	No player modelling, Explicit player modelling, Implicit player modelling.
Virtual Characters	How much control does the experience manager exert on the virtual characters?	Strong story, Strong autonomy.

Table 1.1: Attributes of Interactive Storytelling (IS) systems.

directing it towards a model of *experience quality* (which could be a model of agency, suspense, drama, or other aesthetic model) [25]. This idea is further generalized with the concept of an *experience manager*, acknowledging that all the elements in this virtual domain, including Non-player Characters (NPCs), should be used to produce a consistent, believable experience in which the player is unaware of the existence of such an agent, which aims to maximize the experience quality [25].

Three different attributes (Table 1.1) need to be considered when designing an experience manager: *authorial intent*, *player modelling*, and *content generation* [25].

Agency as Experience Quality

For the purpose of this dissertation, increasing agency will be considered improving the experience quality of a story. Increasing agency may require more player choices, ultimately translating into the need for generative approaches (i.e., more story trajectories to account for player actions, as shown in Figure 1.4). However, previous research suggested that *perceived agency* is also linked to factors other than the number of actions available to the player at a certain time step [30, 33].

For instance, a free-roaming virtual world could be too distractive or overwhelming, making story goals hard to identify, possibly resulting in disorientation and in a lower sense of control; other factors, such as the quality of player outcomes, also need to be taken into account. Thue et al. [33] investigated this phenomenon pointing out the difference between agency, understood as the capacity to perform an action and have influence over the world, and *perceived agency*, which is the agent's perception of such influence. Increasing the former has been the traditional approach in video games: "Although much of the games industry is concerned with providing more
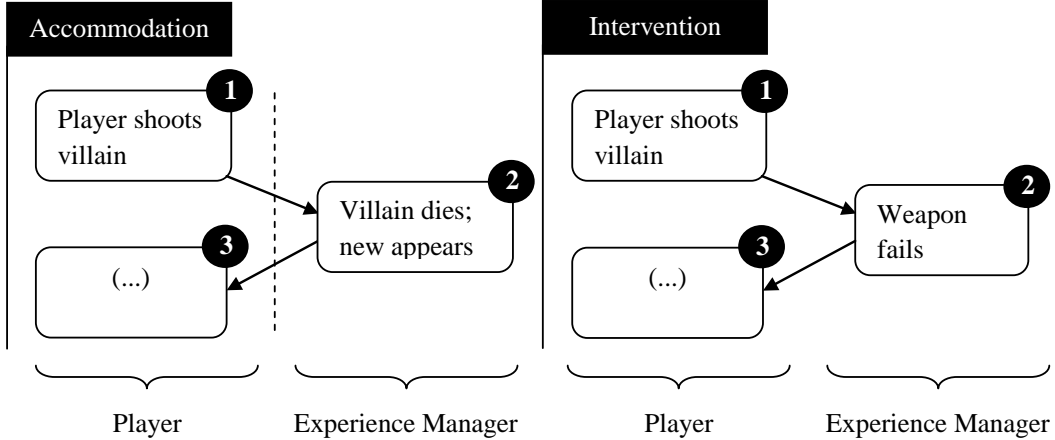
Figure 1.5: Generative management approaches; dotted line is the story boundary.

agency to its players, what seems to matter more is how much agency each player will actually perceive." [33]. Therefore, it seems that agency-based experience managers need to not only provide more player actions, but also understand the player and her individual perception.

1.2.2 Generative Experience Management

When considering agency and player actions in an experience management framework, stories could be based heavily upon a pre-authored sequence of events (the traditional approach to video game stories), or be partly generated by a *generative experience manager* [25]. In this continuum, hybrid systems can also exist and rely on story plots and trajectories generated both by human authors and computers. When taking agency as the experience quality, a higher demand for more story actions and states arises. Generative experience management (i.e., procedural generation) is thus desirable and should also be taken as part of increasing agency. With current technologies, fully automated content generation is far from being feasible, and is the reason why generative experience managers are limited to making small changes in story trajectories in terms of narrative generation.

Therefore, generative experience managers are equipped with a module capable of supporting the generation of the *emergent narrative*–a "sequence of player's perceptions and actions over time" [21]. Thus, the emergent narrative is not necessarily built from the original authorial intent or story, but rather *ad hoc* by a combination of player actions, original story, virtual world, and the creativity of the manager.

Two different approaches to generative experience management are possible: *in-*

tervention and *accommodation* [25], both with different ways of handling actions that transgress the *story boundary*–the extent to which the player is allowed to diverge from the intended story [12]. These approaches are illustrated in Figure 1.5.

By intervention, an experience manager modifies the virtual world in a way that the player's actions do not achieve the intended effects, which would transgress the story boundary; thus, the manager prevents the breaking of the original story. For example, in an FPS game, a player could try to kill the villain before the expected end. If the player is allowed to shoot with the intention of killing the villain, then the manager could intervene to keep the villain alive (e.g., via faulty weapons).

In the accommodation approach, the manager allows the player to deviate from the original story, subsequently generating story situations based on consistent events and characters. Using the same example above, the player could shoot and kill the villain. Such approach translates into more freedom to the player and likely more perceived agency. Given this action and subsequent states were not pre-authored in the original story trajectory, the experience manager needs to accommodate the action into the plot by allowing the villain to die; this could also introduce inconsistencies (e.g., the antagonist is now dead and has to be alive until the end of the story). Addressing this objective, the accommodation should be done in an appropriate way for the player. Should the antagonist die and be replaced with another antagonist? Or should he die, and then a former friend will betray and antagonize the protagonist?

In Chapter 2, I present an accommodation, agency-based experience management framework as a formal problem. Furthermore, in Chapter 4 I introduce a new experience manager that aims to solve the problem at hand by using elements from two previously introduced experience managers: the Automated Story Director (ASD) and Player-Specific Stories via Automatically Generated Events (PaSSAGE). From the former, the automated planning and procedural generation are taken and complemented with the player modelling and event selection from the latter. Specifically, the contributions of this dissertation are the integration of these experience managers, the underlying new model adjusted to maximize agency (i.e., on-line planning and a new player model learning function), and the empirical evaluation of planning-based experience management toward increased agency as well as the evaluation of the proposed system.

Chapter 2

Problem Formulation

In this Chapter, I present agency-maximizing experience management as a formal problem, while also discussing it from two different perspectives. I conclude the Chapter by emphasizing the importance of empirical evaluation to assess the effectiveness of an experience management framework.

2.1 Experience Management as a Formal Problem

To define the problem formally, I use the idea proposed by Thue and Bulitko [29] in which experience management in IS is cast as the "task of changing the game's dynamics in player-specific way" (i.e, using player modelling). Under this framework, the player is the agent in the virtual world depicted as a Markov Decision Process (MDP). Specifically, a tuple $\langle S, A, \mathcal{P}, r, \pi \rangle$ in which:

- S is a finite set of states ($s \in S$), each describing a configuration of the virtual world in terms of the story; a state is a narrative snapshot of the world at a given time step. Within this set, an initial state ($s_0 \in S$) is the starting point of the interactive experience.

- $S_G \subseteq S$ is the set of author-specified goal states ($s \in S_G$) that the player is required to traverse. This gives the author additional control over the story being told. Some of the states in S_G are designated as intermediate goal states ($s \in S_{IG}$) while others are final goal states ($s \in S_{FG}$). The player must experience all intermediate goal states, but only one final goal state.

- A is a finite set of player actions ($a \in A$) feasible in the virtual world. Some actions are state-specific and might not be available in some states if the action preconditions are not met. This will be explained in detail in Chapter 4.
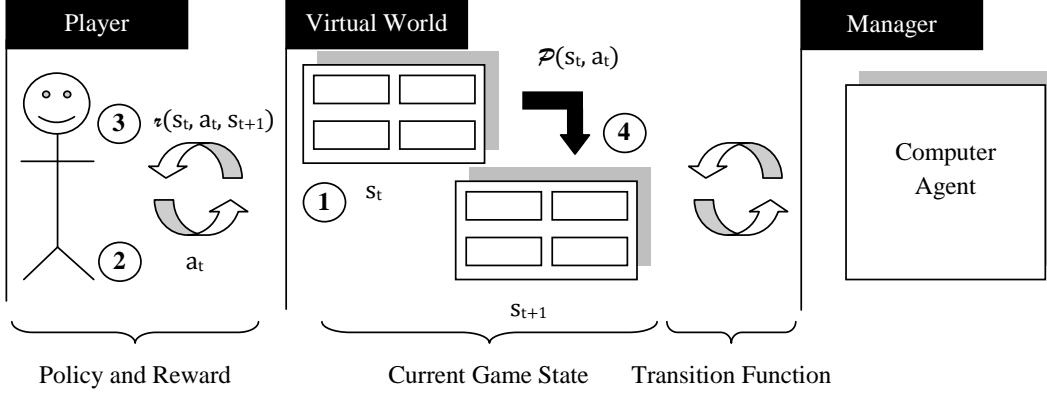
Figure 2.1: The elements of a video game under a experience management framework modelled as an MDP.

- $\mathcal{P} : S \times A \to S$ is the transition function, which for a given state $(s \in S)$ and an applicable action $(a \in A)$ provides the next state $(s' \in S)$.[1] $\mathcal{P}$ is restricted to transitioning to a state $(s' \in S)$ that has not been visited before (i.e., $s_i \neq s_j \forall i < j$) under any player policy. Note that the states capture narrative information only, and thus other details (e.g., player's position on a map) are not considered. **P** is the set of all such functions. The designer can constrain the set of transition functions by specifying a subset **B** of **P**.

- $r : S \times A \times S \to \mathbb{R}$ is the reward function, which provides a reward to the player agent at time step $t+1$ for an action $(a \in A)$ taken at time t and a pair of states $(s \in S)$ involved in the transition, both former and current state. Furthermore, each individual reward adds up to the total return $R = \sum_{t=0}^{n-1} r(s_t, a_t, s_{t+1})$, where n is the total number of actions taken by the player. This return is the formalization of the experience quality previously introduced. Since we are concerned with agency, the return represents the total agency perceived by the player during the interactive experience.

- $\pi : S \to A$ is the player's policy which selects an action $(a \in A)$ for a given state $(s \in S)$ in the virtual world.[2]

Consider the following walk-through (Figure 2.1). (1) At time step (t), the player observes the current game state (s_t) and (2) takes an action according to

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[1]For simplicity, I only consider the deterministic case in this dissertation; however, my approach can also be extended to the stochastic case.

[2]Again, I consider a deterministic player policy for simplicity; stochastic player policies are left for future work.

her policy ($a_t = \pi(s_t)$). Afterwards, ③ a reward ($r(s_t, a_t, s_{t+1})$) is given to the player. Concurrently, ④ a new state (s_{t+1}) is presented to the player based on the transition function ($\mathcal{P}(s_t, a_t) = s_{t+1}$). This process is repeated until the player arrives at a final goal state ($s_t \in S_G$). The sequence of states seen by the player from start to finish is called a *trajectory*. Throughout the narrative unfolding, the role of the experience manager is to observe player actions and to modify the transition function, based on the designer constraint function ($\mathcal{B}$), in order to lead the player through more desirable trajectories (this will be discussed in detail below).

I will revisit the example in Chapter 1 (i.e., the villain shooting scenario) using these concepts and the steps above. ① The player observes the villain at a specific time step in the virtual world. ② The player decides to shoot the villain, ③ thus perceiving a certain amount of agency ④ while at the same time the experience manager modifies the transition function to take the player to a more appealing state (e.g., a fighter-inclined gamer would prefer a tougher villain replacement).

2.1.1 The Problem from the Authorial Perspective

The traditional approach to enabling agency is to provide several player actions by manually authoring trajectories (i.e., manually defining all the transitions between states and actions) and defining how the virtual world reacts to such player's actions. This implies that the author must design all possible story trajectories. Given time and resource constraints on the developers' side, actions have to be limited in number and enable only these pre-authored trajectories.

An alternative approach is to specify the story trajectories procedurally. In this approach, states are represented by sets of predicates describing the virtual world state. State transitions are specified as AI planning operators: a list of *preconditions* and *postconditions* (i.e., effects) enables the use of AI methods for procedural generation. Such automation can help developers keep track of possible story states.

2.1.2 The Problem from the Experience Manager's Perspective

The formal problem of providing agency via an experience management framework could be viewed as a problem of finding a trajectory through a series of virtual world states that maximizes the return (i.e., agency) for a given player. The trajectory must satisfy authorial goals in order to maintain the author's control over the story. The AI experience manager has no direct control over the player's actions (π) or

rewards (r). Thus, the experience manager is limited to manipulating the transition function $\mathcal{P}$ in an attempt to lead the player through a trajectory $T = (s_0, s_1, ..., s_n)$ with the highest return such that $S_{IG} \subseteq T$ and $s_n \in S_{FG}$ (Equation 2.1).

$$\mathcal{P}_{max} = \arg\max_{\mathcal{P} \in \mathbf{B}} R \tag{2.1}$$

$$= \arg\max_{\mathcal{P} \in \mathbf{B}} r(s_0, a_0, s_1) + r(s_1, a_1, s_2) + ... + r(s_{n-1}, a_{n-1}, s_n) \tag{2.2}$$

$$= \arg\max_{\mathcal{P} \in \mathbf{B}} r(s_0, \pi(s_0), s_1) + r(s_1, \pi(s_1), s_2) + ... + r(s_{n-1}, \pi(s_{n-1}), s_n) \tag{2.3}$$

$$= \arg\max_{\mathcal{P} \in \mathbf{B}} \sum_{t=0}^{n-1} r(s_t, \pi(s_t), s_{t+1}) \tag{2.4}$$

$$= \arg\max_{\mathcal{P} \in \mathbf{B}} \sum_{t=0}^{n-1} r(s_t, \pi(s_t), \mathcal{P}(s_t, \pi(s_t))). \tag{2.5}$$

Given that the agent policy π and the reward function r are neither known *a priori* nor modifiable by the experience manager, an additional challenge is to estimate these by means of player modelling. Specifically, suppose that $\tilde{R}$ is an estimator of R, then the experience manager selects a transition function as follows:

$$\tilde{\mathcal{P}}_{max} = \arg\max_{\mathcal{P} \in \mathbf{B}} \tilde{R} \tag{2.6}$$

User studies can be conducted to measure if agency (or any other experience quality) is increased with a different style of experience management. Post-experience surveys are used to measure the perception of the quality after the unfolding of an interactive experience.

Chapter 3

Related Work

In this Chapter, I briefly review related research in the field of IS. I examine this approaches and indicate how these are insufficient to solve the different facets of the problem formulated in Chapter 2.

3.1 Interactive Storytelling (IS), Drama and Experience Management

An early IS system was proposed by Laurel [10] almost three decades ago. The author's background in dramatic theory and the perception of technological advances that she described as "sensational discoveries of the moment" led her to envision an *interactive fantasy system*; in her own words "One may hear glib remarks about interactive movies at science-fiction conventions (...) The body of this study is intended to persuade the reader that an interactive fantasy system is possible and desirable–in short, that it should be built; (...)". While this work set the foundation for future research (focused on three properties: drama, fantasy role, and interactivity), the work was a theoretical foundation rather than an actual implementation.

Drama managers emerged partly based on the aforementioned work, being initially proposed by Bates [2]. These focused on three concepts: (i) cognitive/emotional agents, (ii) presentation, and (iii) drama. One influential drama manager was *Façade*, a notable case in IS research as it involved a five-year collaboration project to create "...a novel architecture that integrates emotional, interactive character behaviour, drama-managed plot and shallow natural language processing." A story created in the *Façade* framework (Figure 3.1) is divided into fragments called beats, used to create rising and falling dramatic tension, in line with an Aristotelian arc (i.e., an arc that comprises an exposition, rising action, climax, falling action and
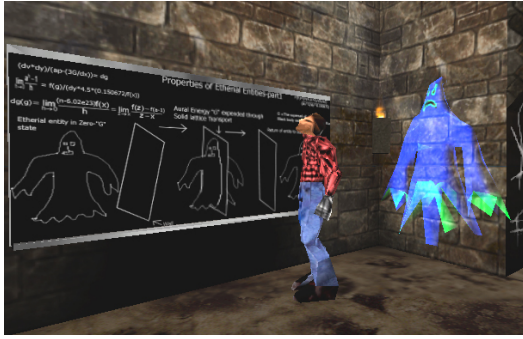
(a) Haunt 2

(b) Merchant of Venice

(c) Façade

(d) ASD

Figure 3.1: Four Interactive Storytelling (IS) systems.

resolution phase) [13]. Although Façade tackled agency by affording its players a great degree of freedom, partly due to the interaction with other characters using natural language, it was not evaluated specifically for perceived agency.

Later, *experience managers* were proposed, generalizing the former approach to both dramatic and non-dramatic situations. Non-dramatic situations can be found in some video games (for example, educational and serious games), interactive tutors, or even dramatic settings in which the experience quality is not drama. For example, a system presented by Cheong and Young [4] was aimed at managing suspense in the audience. Even though these experience managers might have also increased the perception of agency, these were not empirically evaluated for it.

3.2   Agency

Enabling player agency has been the main objective for other IS systems. In the words of Riedl and Bulitko [25], "The core research challenge is how to balance the need for a coherent story progression with player agency, which are often at odds." One such system is the *ASD* [26, 23]. This experience manager allowed the user to deviate from the original authorial narrative trajectories, using automated planning to accommodate those actions. This system was not empirically evaluated. The procedural generation module does not use player modelling but rather a built-in heuristic, which could be useful in some domains, but potentially provides accommodations that are unfit for individual players [26].

Another experience manager targeting agency is *PaSSAGE* [30, 28, 31, 32, 33], which works by selecting player-specific stories using a player model (acquired online implicitly by observing player actions), aiming to increase perceived agency. This system was validated via empirical studies and was shown to increase player agency. PaSSAGE relied on a fully pre-authored set of narrative trajectories; thus, the branching factor in the story tree increases the design complexity, and puts an extra burden on the game developers.

Other systems learnt a player model by explicitly requesting feedback. This is the case with the *Prefix-based Collaborative Filtering (PBCF)* [37, 38], which learns a player model based on player ratings of experience after an event; posteriorly, the drama manager system uses that information to guide the player to more appealing choices while still allowing a certain degree of freedom. This approach also depends upon stories with fixed trajectories and no procedural generation. The use of explicit player model learning by ratings of experience provides valuable information. However, unlike systems such as PaSSAGE with implicit player model learning, this approach breaks the player's immersion, which can be undesirable in video games.

3.3   Automation and Emergent Narrative

Automation and emergent narrative have been also researched, possibly starting in 1976 with *IN-TALE*, a computer program that can produce text stories in English based on a series of user feedback such as characters, personality characteristics, and relationships [14]. This system generates prose rather than story trajectories in a formal description language. This makes it more difficult for AI methods to

detect when player actions break the story and how to accommodate them.

Following work has predominantly focused on two types of generative managers: automated planning and Case-based Reasoning (CBR) [24]. In the planning category, one well-known manager is ASD (described above); other examples include the *Merchant of Venice* [20] and *Mimesis* [36], none of which used player modelling or learnt from player interaction (Figure 3.1). The lack of player modelling prevents the experience manager from estimating rewards and returns in a player-specific way, rendering it unable to adjust the transition function to maximize the experience quality in a personalized manner. Player-specific stories are possible in PaSSAGE and PBCF because the experience manager has a model of the player to make adequate adjustments.

Another procedural generation approach is found on the system proposed by Ontanon and Zhu [17] using case-based reasoning. The *Story Analogies through Mapping (SAM)* system presents an analogy-based story generation of narrative by taking a source story, finding analogies in a target story, and generating a new story. Similar to IN-TALE, SAM's output is complete prose, thus facing the same limitations in an interactive narrative setting.

3.4   Evaluation

While empirical evaluation in IS is paramount, doing so in a formal fashion is challenging. Only a few published systems have been duly evaluated. Additionally, a unified methodology with a rigourous statistical analysis has not been widely used to compare across different experience managers. Furthermore, it was not until recently that a validated instrument for IS evaluation was proposed by Vermeulen et al. [34]. This validated instrument, the *IRIS Evaluation Toolkit*, for which "(...) the subscales for the assessment of important components of the user experience in interactive storytelling meet the requirements for systematic, comparative research on IS prototypes and systems.", presents a method for measuring the perception of different feelings, one of them being agency [34].

A system evaluated with this instrument is PaSSAGE, which had over a thousand participant-hours across multiple user studies. This system obtained positive results in increasing fun and agency [30, 33]. This indicates that human-authored player-specific stories are possible and can improve the aesthethic experience; however, no procedural generation approach with player modelling has been evaluated under the

same conditions.

Other evaluations without validated instruments have been performed. For example, a system called *Anchorhead*, relies on Search-based Drama Management (SBDM) to take the "(...) the drama management problem as a search problem" in which search can be performed to improve the player's experience by using "(...) a set of plot points, a set of actions the drama manager can take, and an evaluation of story quality" [16]. Such systems can be used with agency as the evaluation of the story quality and rely on player modelling, but may be too slow for real-time experience management. Unlike PaSSAGE, the system was run against a *randomly simulated user* instead of human participants, showing positive results but possibly not generalizable to other stories [16].

Based on the Interactive Drama Architecture (IDA), *Haunt 2* guided the player through a story, foresaw possible conflicts and planned ahead to persuade the player away from those situations (Figure 3.1). This approach could be seen as a variation of intervention rather than accommodation. Results indicated that it was possible to predict user actions and act accordingly; albeit the "(...) the low-cost nature of the experimental design, there are several dependencies that may influence the results of this study." [12].

The *PBCF* system was evaluated using a Choose-Your-Own-Adventure (CYOA) story, in which the system can predict player's choices 82% of the time [37, 38]. Analogously to PaSSAGE, it did not use procedural generation.

To the best of my knowledge no experience manager or even IS system has provided player agency integrally, that is, increasing player's sense of agency while using procedural generation for story trajectories and player modelling, all formally evaluated in user studies. However, the integration of several platforms in order to further improve an experience management framework is possible, and in some cases, this integration occurs in a complementary manner. Such is the case of ASD and PaSSAGE, as explained in the upcoming chapter.

Chapter 4

Proposed Approach

In the previous chapters, I formally defined the problem of agency-based experience management and reviewed relevant existing work. I argued that these previously proposed approaches are not suitable to solve the agency problem while providing player-specific stories and procedural generation of narrative trajectories, all while being empirically evaluated. In this Chapter, I present a new experience manager that attempts to solve the problem at hand.

I start by presenting a high-level overview of the system, *Player-specific Automated Storytelling (PAST)*, followed by sections that address the different elements described in Chapter 2: section 4.2 elaborates on how the system represents narrative as an MDP and on how the player traverses a series of states, as well as how the set of allowed transition functions **B** is created by defining a library of action templates; section 4.3 describes the procedural generation mechanism in PAST, which conforms to the MDP limitations specified in the problem formulation; section 4.4 explains how the transition function $\mathcal{P}$ is updated using player modelling (section 4.5) as a means to provide the estimators $\tilde{R}$, $\tilde{r}$ to solve the Equation 2.6 and thus produce player-specific stories toward an increased agency perception.

4.1 Introduction to PAST

In an interactive story setting, the player may want to deviate from the original plot, which is in line with increased player agency. To illustrate this, consider the *Little Red Riding Hood* story: the tale of a little girl who must go through a perilous forest to take a basket with food to her sick grandmother. Assume this story to be a hypothetical video game, with the player directing the experience.

The game starts when Red enters the forest, heading to Granny's place. Shortly
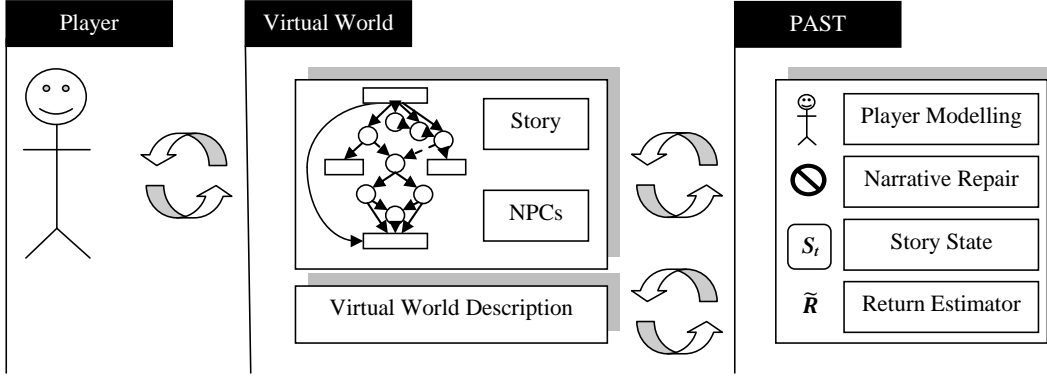
Figure 4.1: A high-level model of PAST, depicting the player, the virtual world, and the experience manager.

after, an evil wolf appears with the intention of deceiving and eating her. Some players may want to prevent the wolf from eating Little Red by killing him, which is not supported in the original story. Assuming that the experience manager decides to accommodate such an action, two issues must be tackled: (i) preserving the original authorial goals and (ii) accommodating the player's action, in a way that improves the player experience (i.e., increases agency).

In this case, the experience manager can change the transition function to re-enable the states that were disabled due to this player's action (i.e., causally re-enable story states by ensuring that the necessary preconditions are met). For example, if the player kills the wolf, a resurrecting fairy could be summoned to bring the wolf back to life; or perhaps a bigger and more aggressive wolf (for illustration purposes, named Grendel) could take the place of the previous antagonist [21]. To decide between the two accommodations, PAST uses a player model; if the player has demonstrated a fighting inclination, then the latter would be chosen; otherwise, the resurrecting fairy appears bringing the wolf back to life. In either case, the authorial goal states (a wolf eating Red and Granny) will be re-enabled.

4.1.1 PAST High-level Model

The PAST approach aims to solve the problem presented in Chapter 2 by using two key concepts: player modelling and planning-based experience management. Automated planning computes candidate accommodations, while player modelling is used to select the most fitting one.

The high-level components are depicted in Figure 4.1. The *player* interacts with

Algorithm 1 PAST high-level pseudocode.

$t \leftarrow 0$ ▷ Initial time step.
$\vec{p}_t \leftarrow (0.5, 0.5, 0.5, 0.5, 0.5)$ ▷ Initialize the player model.
while $s_t \notin S_{FG}$ **do**
$\quad a_t \leftarrow \pi(s_t)$ ▷ Player agent chooses an action based on policy.
$\quad$ **if** a_t is a rupture **then**
$\quad\quad$ expandedStates $\leftarrow$ **planning**(s_t, a_t)
$\quad\quad \mathcal{P} \leftarrow$ **updateTransitionFunction**$(\mathcal{P}, \vec{p}_t, s_t, \text{expandedStates})$
$\quad$ **end if**
$\quad s_{t+1} = \mathcal{P}(s_t, a_t)$ ▷ Player observes next state.
$\quad \text{reward}_{t+1} = r(s_t, a_t, s_{t+1})$ ▷ Player obtains a reward.
$\quad \vec{p}_{t+1} = \textbf{updateModel}(p_t, a_t)$
$\quad t \leftarrow t + 1$
end while

---

the *virtual world*, which is a series of game states represented in the computer, by performing *actions* (some of which, called *ruptures*, break causal links thereby disabling authorial goal states). Concurrently, the *experience manager* directs the interactive story by adjusting the game dynamics of the virtual world.

Revisiting the MDP example (Figure 2.1), the role of PAST as an experience manager is as follows (Algorithm 1). First, it monitors the virtual world's state and the player's actions. Each action is analyzed to assess whether it is a rupture. In case the action is a rupture, then planning (Section 4.3) is used to compute candidate states in the MDP. Then, the transition function is updated based on the player model, selecting only one state from the set of candidate states (Section 4.4). Finally, the player model is updated based on the player's action (Section 4.5). The process continues until a final goal state is reached ($s_t \in S_{FG}$) .

4.2 The MDP in PAST

In PAST, the states and actions are declared in a structured manner. The author needs to specify S, A, $S_G = S_{FG} \cup S_{IG}$ with $S_G \subseteq S$, and the initial state ($s_0 \in S$). These states and actions are coded in a Lisp-like notation.[1] Additionally, the author can provide an initial set of story trajectories. Henceforth, I refer to the set of these trajectories as the *exemplar narrative*.

Note that the exemplar narrative in PAST is the only portion of the story MDP

---

[1]PAST is built on top of an existing ASD/Longbow implementation, which had been done entirely using Allegro Common Lisp. I preserved most of the Common-Lisp code and substituted proprietary libraries with Steel Bank Common Lisp (SBCL) open-source equivalents.
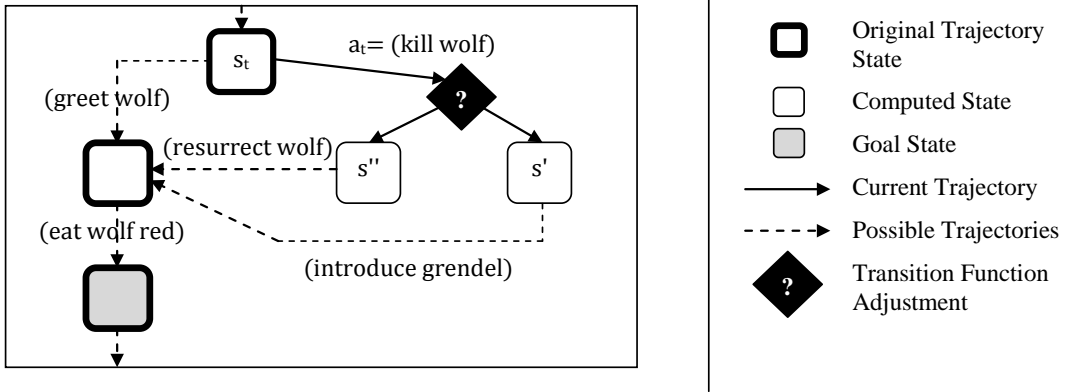
Figure 4.2: Virtual game world after the player performs `(kill wolf)`, which leads to the computation of two candidate accommodation states: s' and s''.

that is not procedurally generated, as procedural generation in PAST takes place when the player creates a rupture: a rupture disables intermediate or final goals by disabling the preconditions of one or more actions that lead to such goals, thus requiring a new trajectory that reaches those goal states (Figure 4.2).

4.2.1 Defining States

In PAST, a state is described by a series of instantiated predicates (i.e., world facts). Each state is a conjunction of several `(attribute character)`, `(action subject direct-object)`, or `(action subject direct-object indirect-object)` facts. For instance, at the start of the Little Red game, an initial state could be described with this series of facts: `(person red)` `(alive red)` `(wolf wolf)` `(alive wolf)` `(hungry wolf)` `(knows wolf red)` `(knows red wolf)`.

In the Little Red story example, the states in which the facts `(eaten red)` `(in red wolf)` or `(eaten granny)` `(in granny wolf)` are present are marked as intermediate goal states; on the other hand, `(has granny basket)` is marked as a final goal state, at which a valid story Little Red story trajectory must arrive.

Except for the initial state, the rest of the virtual world states are not explicitly defined by the author *per se*; instead, actions transition from one state to another via their postconditions.

4.2.2 Defining Actions

Each action connects two states and is, in itself, an instantiation of action template. An example of an action template and action instantiation are shown in Figures 4.3

```
Action template:   eat
```

```
(define (action eat)
:parameters (?eater ?eatee)
:constraints ((wolf ?eater) (person ?eatee))
:preconditions ((knows ?eater ?eatee) (hungry ?eater) (alive ?eater) (alive ?eatee)
(:not (eaten ?eatee)) (:not (asleep ?eater)) (:neq ?eater ?eatee))
:postconditions ((eaten ?eatee) (in ?eatee ?eater) (full ?eater)))
```

Figure 4.3: Sample action template.

```
Action instantiation:   eat
```

```
(make-template
:form '(eat ?eater ?eatee)
:short '(?eater eats ?eatee)
:long '(The fiery ?eater was so hungry that he ate ?eatee whole without hesitation.)
:annotation #(1 0 0.8 0.6 0))
```

Figure 4.4: Sample text-based instantiation of an action template, with its text form and annotation.

and 4.4 respectively, for the action *eat*.

For each action template, a series of elements need to be specified: (i) which characters and elements participate in the action (i.e, *parameters*), (ii) conditions that need to be met in the current virtual world state (i.e., *preconditions*), (iii) time-invariant attributes required for the parameters (i.e., *constraints*) and (iv) changes in the state after the execution of such an action (i.e., *postconditions*). Note that actions also need to be annotated using the player model, as seen in the last line of Figure 4.4 and is further explained in Section 4.5.

In each action template and instantiation, `(?tokens)` are variables that can be assigned at runtime by PAST. For instance, `(eat ?eater ?eatee)` can be instantiated to `(eat wolf red)`, mapping `?eatee` to `red` and `?eater` to `wolf`, but only if all the preconditions and constraints are met in the current state (e.g., `(person red)`, `(hungry wolf)`, `(knows wolf red)`). After execution, the effects are applied to the previous game state s_t, resulting in a new state s_{t+1} (Figure 4.5).

State s_t	Action	State s_{t+1}
(person red) (alive red) (wolf wolf) (alive wolf) (hungry wolf) (knows wolf red) (knows red wolf)	(eat wolf red) $\Longrightarrow$	(person red) (alive red) (wolf wolf) (alive wolf) (knows wolf red) (knows red wolf) (in wolf red) (eaten red)

Figure 4.5: Sample transition caused by an action between two states.

Note how rupture actions add postconditions which are causally incompatible with authorial goals: if the player kills the wolf, `(alive wolf)` would be removed from the current state, therefore disabling preconditions of the action `(eat wolf red)`–included in the exemplar narrative–and which transitions to the goal state that contains the facts `(eaten red) (in red wolf)`.

For these Lisp skeletons, actual game content needs to be prepared. The current PAST implementation is a text-based console video game. Thus, text content is provided when the actions are instantiated (the short and long forms in Figure 4.4). For example, `(eat ?eater ?eatee)` uses the text stubs "?eater eats ?eatee" and "The fiery ?eater was so hungry that he ate ?eatee whole without hesitation."; during the interactive experience, the latter is shown on the screen as "The fiery wolf was so hungry that he ate Red whole without hesitation."

With the purpose of computing accommodations, a library of action templates (i.e., not related to the exemplar narrative) has to be provided; these are used by the planner to compute states and trajectories in response to player ruptures.

4.3   Planning and Narrative Generation in PAST

4.3.1   Narrative Representation

The narrative in PAST is a complete trajectory through the MDP, $T = (s_0, s_1, ..., s_n)$. As discussed before, the manager allows deviation from the original exemplar narrative trajectories. To preserve part of the authorial intent, PAST attempts to include all intermediate goal states and one final goal state in the story trajectory. To ac-
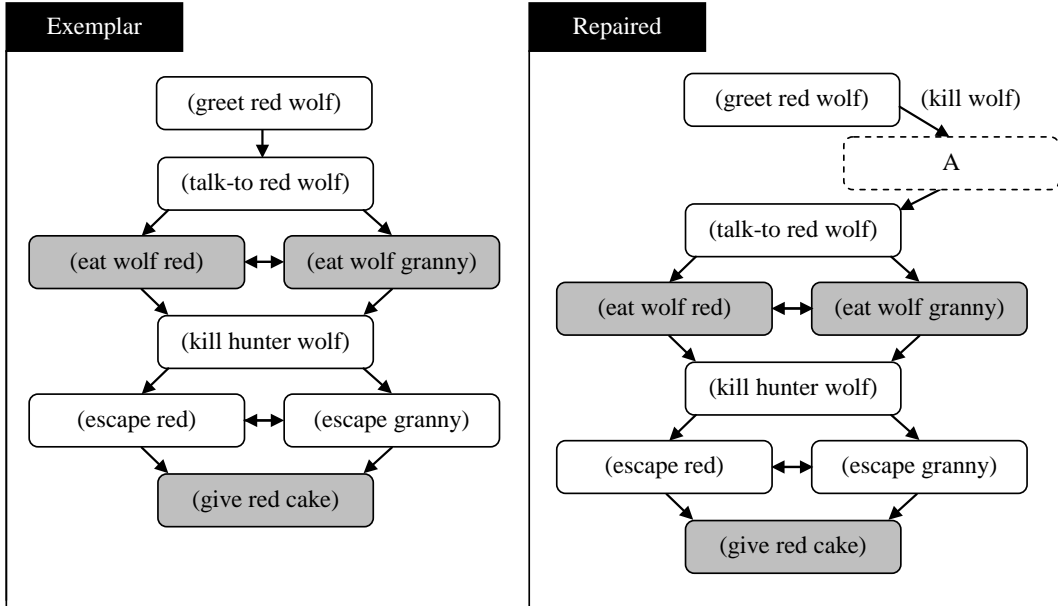
Figure 4.6: The exemplar *Little Red Riding Hood* narrative trajectories on the left and a accommodation using tier 1 planning (assuming an exemplar narrative rupture after (greet red wolf)). The extra state (*A*) and its corresponding trajectory re-enable causally downward goal states; the actual accommodation state varies depending on the player model. For simplicity, no other states are shown.

complish this, a series of planning stages are performed to ensure that necessary preconditions are met.

4.3.2 Planning

The planner used in PAST is *Longbow*: a domain-independant hierarchical discourse AI planner that uses decompositional reasoning (i.e., that performs larger abstract actions by small steps) [35]. It also uses causal reasoning, which means the planner ensures that preconditions are met before executing an action, in this case). This planner is built around the idea of narrative discourse, and it is enhanced to prevent redundancies (series of events that could be seen as repetitive) and to create a smooth narrative flow [35].

The generative module is taken from the ASD experience manager, which sits atop Longbow to repair state inconsistencies (i.e., postconditions that disable authorial goals) [26]. The first step is to identify ruptures, followed by a three-tiered planning system to produce a goal-compatible state and trajectory by instantiating one or more actions that ensures goal preconditions are met (Algorithm 2).

The planning starts with tier 1, which takes an invalidated state and searches

Algorithm 2 planning (s_t, a_t)

$s_t \leftarrow$ current state.
$a_t \leftarrow$ action taken by player.
expandedStates $\leftarrow$ **tier1**(s_t, a_t)
if expandedStates is empty **then**
    expandedStates $\leftarrow$ **tier2**(s_t, a_t)
end if
if expandedStates is empty **then**
    expandedStates $\leftarrow$ **tier3**(s_t, a_t)
end ifreturn expandedStates

---

for one or more action templates that, once instantiated, will produce states that re-enable goal states.

For example, if the player kills the wolf, then the precondition `(alive wolf)` is negated, making the goal states with `(eaten red) (in red wolf)` unreachable (i.e., Red cannot be eaten because the wolf is not alive). If an action template, `(resurrect ?fairy ?wolf)` can be instantiated to enable `(alive wolf)` again, then the planner would prompt the player to take that action.

Note that, at this point, many other action templates may have the same effect and thus be equally valid (e.g., the big mean wolf Grendel who comes in place of the original). Conceptually, the planner returns a list of all possible states that can be added to the MDP trajectories.

If tier 1 fails, tier 2 acts by only removing actions and states from the exemplar narrative whose preconditions can not be causally re-enabled, given that there are no sequences of actions available that will re-enable such events or that the planner has timed out. Analogously, tier 3 proceeds to remove the causally invalidated goal states, since they may not be re-enabled by performing any changes in the MDP, thus reducing the story substantially but with at least a final goal state.

To illustrate, suppose the player kills the wolf who is then resurrected by a fairy. If the player persuades the resurrected wolf to go away without eating Little Red, tier 2 planning will be invoked to remove invalidated states from the narrative graph. For example, the action `(talk-to red wolf)` and posterior states would be disabled and removed from the trajectory.

In this case, however, all intermediate goal states are also invalidated. Tier 3 planning then tries to remove invalidated intermediate goal states while preserving the final goal state (e.g., Red and Granny are not eaten and Red goes directly to

Granny's cottage).

4.4 Transition Function Adjustment

After a valid plan to accommodate player's action is returned by the planner, PAST modifies the transition function to enable the new plan and its respective trajectories. This means that the previous state s_t and the player rupture action a_t transition to a state s' toward re-enabling authorial goals. Whereas ASD selects from possible accommodations (i.e., candidate plans) in an *ad hoc* fashion, PAST selects the accommodation according to a player type. To do so, PAST estimates the return in Equation 2.6 ($\tilde{\mathcal{P}}_{max} = \arg\max_{\mathcal{P} \in \mathbf{B}} \tilde{R}$) to guide the planner toward accommodations that are estimated to be more suitable for the current player. In our case, the return function $\tilde{R}$ estimates perceived agency.

The system also ensures that the maximum expected return is taken by selecting a transition function $\mathcal{P} \in \mathbf{B}$, given that this set is defined by the library of action templates previously provided by the author, which is also used by the planner to accommodate player ruptures.

Additionally, PAST never considers a transition function $\mathcal{P}$ that allows for a state revisit under any player policy. This is shown in Theorem 1.

Theorem 1 *No state revisits are possible under PAST experience management. In other words, all transition functions generated by PAST are in $\boldsymbol{P}$.*

Proof. All possible trajectories in PAST are represented by a partial order plan. The initial partial order plan is manually created by the author to preclude the possibility of state revisits. Suppose that the player causes a rupture, thereby invalidating the plan. PAST will then invoke its planner to revise the partial order plan. The planning process guarantees that a new plan does not allow for trajectories longer than an *a priori* limit. Any trajectory with a state revisit could be made arbitrarily long via repeatedly revisiting that state. The planner will attempt to do so, thereby hitting the limit and invalidating the plan. Thus, any valid plan will not allow any trajectory with state revisits. The new transition function will then be updated to enable the new valid plan, therefore not allowing any loops under any player policy. ∎
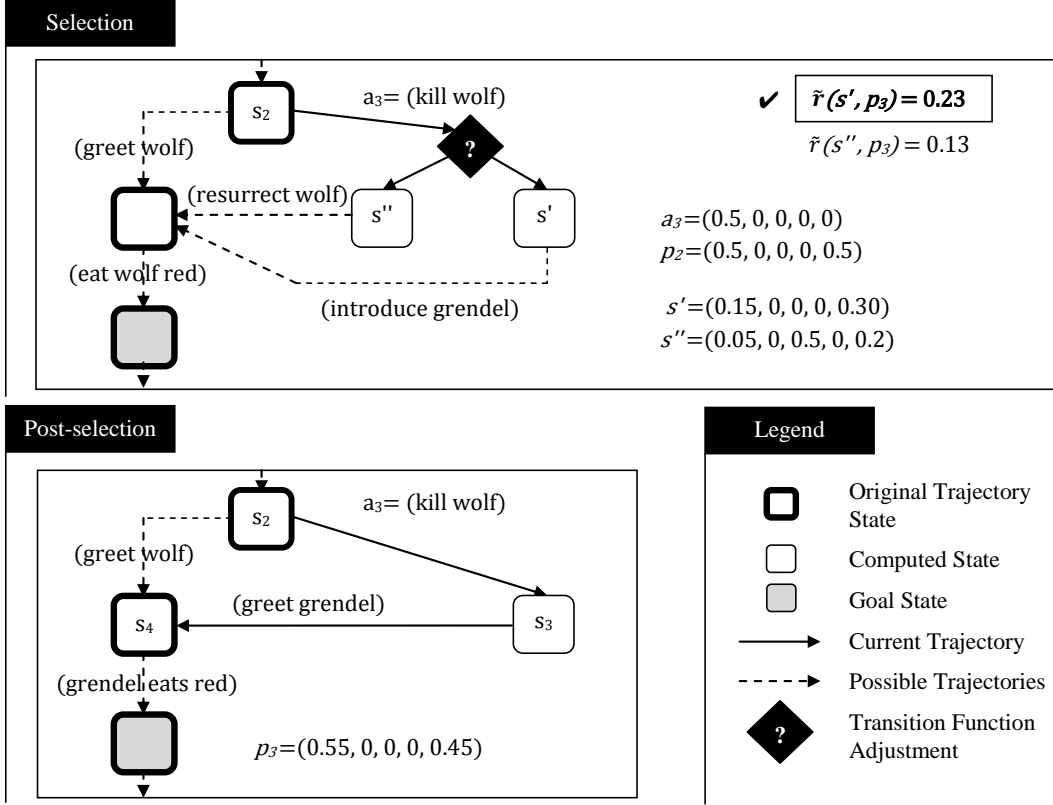
Figure 4.7: The transition function adjustment in PAST. In the top frame, after a player performs rupture action a_3, the system selects between two candidate accommodation states and action instantiations; in the bottom frame, the selected state and updated player model is shown.

To illustrate how the transition function $\mathcal{P}$ is adjusted for a given player, I will use this example: assume that the player breaks the narrative before going through the second state (`greet red wolf`) by killing the wolf (`kill wolf`). Also, assume several accommodations can be used (A in Figure 4.6). To select amongst the candidate action templates and states, the action annotation, the player model (i.e., information about previous player actions), and the return estimator $\tilde{R}$ are used.

PAST estimates the reward function as the dot product of the player model at time step t and the annotation of candidate accommodation actions and states ($\vec{s}$): $\tilde{r}(\vec{s}, \vec{p}_t) = \vec{s} \cdot \vec{p}_t$. Notice that selecting $\tilde{\mathcal{P}}$ to maximize $\tilde{R}$ is equivalent to maximizing the future portion of the return. PAST estimates the future portion of the return $\tilde{R}$ as the reward $\tilde{r}$. Technically, the planner computes $\vec{s}_{max} = \arg\max_{\vec{s} \in X} \tilde{r}(\vec{s}, \vec{p}_t)$, where X is the set of possible next states, each corresponding to a candidate transition function. The $\vec{s}_{max}$ implicitly defines $\tilde{P}_{max}$ in Equation 2.6.

This mechanism is illustrated in the selection frame in Figure 4.7, where $\vec{p}_t =$

Type	Description
Fighter	The fighter likes violent encounters and uses brute force to achieve her goals.
Storyteller	The storyteller prefers complex plots, stories and characters; attention to details is a must.
Method Actor	The method actor is concerned with bringing to life the psychology and personality traits of her character.
Tactician	The tactician ponders her choices carefully to make well-thought decisions; goal-oriented.
Power Gamers	The power gamer likes to increase statistics: more money, more power and more items.

Table 4.1: The RPG player types and description used by PaSSAGE and PAST, based on types proposed by Laws [11].

$(0.5, 0, 0, 0, 0.5)$ at the time step when the player ruptured the story (the player model is discussed in Section 4.5). After calculating the estimated reward $\tilde{r}$ for each candidate accommodation, the transition function is adjusted to lead the state with highest estimated return $\tilde{R}$. Therefore, for the action (`kill wolf`) the manager shows the player only one accommodation based on its similarity to the player model, posteriorly changing $\mathcal{P}$ each time takes a rupture.

In this example, the state that brings Grendel to the story (s') is chosen given its higher similarity to the player model. Eventually, the player might cause another rupture action while in s_4 and then the manager would choose between the subsequent candidate states.

In addition, PAST produces accommodations *on-line*; by contrast, ASD creates a tree of narrative trajectories during an off-line phase. The former is advantageous since it avoids an expensive pre-computation and allows the use of the player model.

4.5   Player Model

In PAST, the concept of *player model* was taken from Thue et al. [30]. The model is based on five RPG player types found in Table 4.1: *fighter*, *power gamer*, *storyteller*, *method actor*, *tactician*. The model is a five dimensional vector $\vec{p}$ where each component, bound in $[0, 1]$, indicates the inclination towards each of the five playing styles. For example, a player with a model $\vec{p} = (1, 0, 0.5, 0, 0.1)$ would be a player highly inclined to fighting, neutrally inclined to complex stories and plots, declined

Figure 4.8: Screenshots from the PAST text-based implementation: main menu and introductory text.

towards to the tactics and strategy, and even more strongly declined towards the method actor and powergaming styles.

The model starts neutral for all players, that is, $\vec{p}_0 = (0.5, 0.5, 0.5, 0.5, 0.5)$. When the player starts taking actions the corresponding annotations are used to update the model as shown in Equation 4.1, where $A_t \subseteq A$ is the set of all choices available to a player at time t; $a_t \in A_t$ is the user action (notationally, $\vec{a}_t$ represents the annotation of action a_t), α is the learning step size, and $\vec{p}_t$ the player model. The conditional formula guarantees that a player model will be updated only if enough

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Figure 4.9: Screenshots from the PAST text-based implementation: text description and player actions.

diversity of choices is present at that time (e.g., the player might not be choosing based on inclination if all available choices are fighter-inclined). The value $\xi \in [0,1]$ is the tolerance.

$$\vec{p}_{t+1} = \begin{cases} \vec{p}_t + \alpha(\vec{a}_t - \vec{p}_t), & \text{if } \exists \vec{a}_i \in A_t \text{ s.t. } \left\| \frac{\vec{a}_t}{\|\vec{a}_t\|} - \frac{\vec{a}_i}{\|\vec{a}_i\|} \right\| > \xi \\ \vec{p}_t, & \text{otherwise} \end{cases} \quad (4.1)$$

Revisiting the *Little Red Riding Hood* example, suppose the player model at time step 3 is $\vec{p}_3 = (0.5, 0, 0, 0, 0.5)$, and the player chooses the rupture action a_3 (kill wolf) annotated with $\vec{a}_3 = (0.5, 0, 0, 0, 0)$. The resulting player model at the next

time step would be $\vec{p}_4 = (0.55, 0, 0, 0, 0.45)$ as shown in Figure 4.7, $\alpha = 0.1$.

4.6   Interface

In the current PAST implementation, the player interacts with the virtual world by using a text-based program (in the top frame of Figure 4.8, the start-up and configuration screen and main menu; in the bottom frame, the introductory text for the user studies is shown).

The player reads text that represents the current state–based on the templates shown in Figure 4.4. In the top frame of Figure 4.8, a text description for `(red greets wolf)` is shown to the player. After reading the text, the player could make a selection between several possible actions, seen in the bottom frame of Figure 4.9, such as `((tell-about red wolf granny))` as well as two rupture actions `((:not (has red cake)), (persuade wolf))`. These actions are available since the current state meets their preconditions.

PAST was implemented with three different story domains for *Little Red Riding Hood*, which are presented in detail in Chapter 5, along with a detailed description of the test bed.

Chapter 5

Evaluation

This chapter summarizes the results of running PAST through three different user studies. The goal of the first user study was to evaluate the planning-based module. The second user study evaluated the effectiveness of adding player modelling to the planning-based paradigm. Lastly, the third user study evaluates PAST on a more restrictive story space.

5.1 Experimental Design

I decided to rely on text-based narratives–inspired in CYOA books [9]–as test beds, in order to use time more efficiently (since no programming is required for visual effects, gameplay, and other platform scripting). Content templates, as the ones shown in Section 4.2, were used to translate states and actions from a Lisp-like notation to prose.

For the user studies, I took the original story skeleton of *Little Red Riding Hood* and the virtual world from Riedl et al. [26] and expanded it with extra action templates, rupture actions and possible accommodations, as well as a complete text description for each possible state, which can be found in Appendix B.

5.1.1 Methodology

In all the user studies, the player would experience the narrative with a certain type of experience management (i.e., the condition). A data log recorded all the player's actions, ruptures, states visited, and player model (if any). Immediately after the interactive story, an online survey was completed by the participant to measure the perception of the experience quality (i.e., the total return R). The statistical analysis was performed after all data was collected.

5.1.2 Participants

All the participants came from the research pool at the Department of Psychology at the University of Alberta. These students participated voluntarily for a partial course credit and were also given the choice of selecting an alternate assignment (included for reference in Appendix A, although not one such case took place).

No personal information was collected other than demographic data such as age and gender, number of reading and gaming hours per week, and favourite game genre. Research ethics approval granted by the Research Ethics Board 1 at the University of Alberta; a complete copy of the approved application can also be found in Appendix A.

5.1.3 Experimental Setup

One-hour sessions were held–with an average completion time of 30 minutes–in a computer laboratory at the Department of Computer Science, University of Alberta. Most sessions had $5 - 15$ participants.

Each person was assigned to a computer and was given a briefing and consent form. A short oral briefing was also administered. Afterwards, the participants would follow on-screen instructions until the interactive experience was complete, at which point they were directed to the online survey.

After the survey completion, participants were given a debriefing form and were allowed to leave. All of the aforementioned forms can also be found in Appendix A.

5.1.4 Post-experience Survey Instrument

The post-experience survey instrument was based on the *IRIS Evaluation Toolkit* by Vermeulen et al. [34] for the *effectance* perception (i.e., agency). Additionally, *enjoyment* (i.e., fun) was also measured, also using questions from Vermeulen et al. [34]. All survey items were based on a five-point Likert scale ranging from *completely disagree* to *completely agree*. Information about player inclination, gaming hours, and reading hours was also collected. The full transcript of the online survey is provided in Appendix A.

5.1.5 Statistical Analysis

To compare across different conditions, I used Analysis of Variance (ANOVA), since, unlike a t-test, ANOVA can analyze several factors at the same time (i.e, indepen-
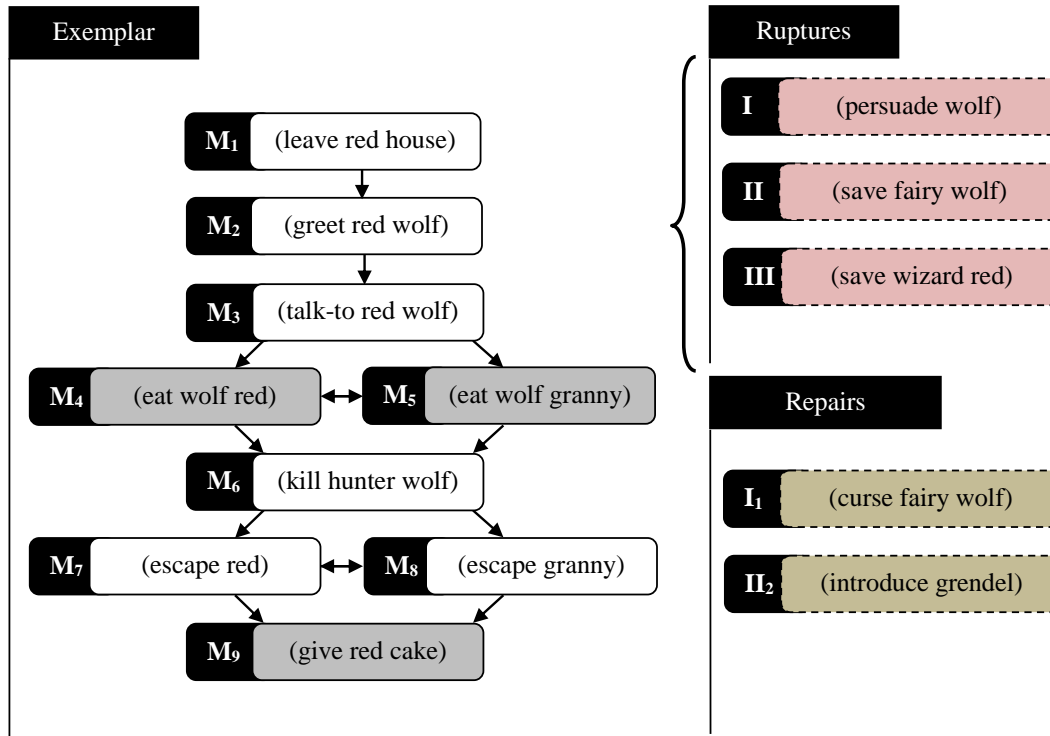
Figure 5.1: Story trajectories for the text-based prototype using story 1. In this virtual world, only three ruptures were available (I, II, III) and repairs for the first two (I_1, II_2).

dent variables) and even different levels per factor (conditions).

In this scenario, aside from the type of experience manager used, it is of interest to assess effects caused by prior gaming skills. Two different groups were assessed: non-gamers (i.e., participants who play video games less than one hour per week) and gamers. A two-way ANOVA with two factors, *experience management* and *gaming skills* was used in all user studies.

In some cases, further testing was required, since ANOVA does not indicate which groups are different when the number is greater than two. *Tukey's Honestly Significant Difference post hoc* test was used to allow for multiple test correction. Both for ANOVA and Tukey's HSD, the standard $\alpha = 0.05$ value was used.

The assumptions of the ANOVA test, namely independence of observations, homogeneity of variances, and normality were all validated before performing the analysis; Levine's and Welch's tests were used to check for unequal variances while the Kolmogorov-Smirnov test was used to test for normality.

5.1.6 Outlier Removal

Two different noise and outlier removal methods were used. The first method targeted potential non-readers, based on the average reading speed for each participant. According to Carver [3], the *skimming* speed at 450 words per minute (wpm) is insufficient to get an acceptable understanding of the story. Furthermore, it was also taken into account that people tend to read a 10% slower on average when doing so from a computer screen [39]. Consequently, all participants reading with average speeds over 405 wpm were excluded from the analysis.

The second method was then applied to the remaining data. *Tukey's Outlier Test*, also known as *Interquartile Outlier Test*, was used: any data point in any dependent variable x such that $x < (Q_1 - 1.5 \times I_{QR})$ or $x > (Q_3 + 1.5 \times I_{QR})$ where Q_1 is the first quartile, Q_2 the third quartile, and I_{QR} is the interquartile range, was completely removed from the analysis.

5.2 User Study 1: Evaluating Planning-Based Experience Management

User study 1 examined evidence whether using an experience manager with a planning-based approach that accommodates narrative ruptures results in increased perceptions of agency and fun. These were the original design goals of ASD but its authors never published user study results [26]. Note that I disabled PAST player modelling for this study and chose repair states based on the ASD heuristic.

5.2.1 Story 1

In Figure 5.1, the story trajectories for the first user study is shown. Each rounded rectangle represents a state and the enabling action; the unabridged prose for each state is available in Appendix B.

The exemplar narrative has a total of nine different states, two of which where intermediate goals (M_4 and M_5) and a final goal (M_9). The player only had some agency over certain temporal elements (e.g. deciding the temporal ordering between M_4 and M_5).

When ruptures were enabled (i.e., the actions to break the narrative were shown in the screen), the participant could select to break the narrative before seeing M_6 using ruptures I, II and III. Repair states were available (planning tier 1) for I and

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	394.91	1	394.906	5.46	0.0221
GS	321.05	1	321.052	4.44	0.0384
EM $\times$ GS	0.46	1	0.455	0.01	0.9370
Error	5495.78	76	72.313		
Total	6276.99	79			

Table 5.1: ANOVA results for fun in user study 1: EM is condition (control, experimental) and GS is gaming skills (gamer, non-gamer).

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	719.48	1	719.48	20.46	0.0001
GS	64.53	1	64.53	1.84	0.1795
EM $\times$ GS	7.43	1	7.428	0.21	0.6471
Error	2707.92	77	35.168		
Total	3563.28	80			

Table 5.2: ANOVA results for agency in user study 1: EM is condition (control, experimental) and GS is gaming skills (gamer, non-gamer).

II; in case the player performed *III*, the story was significantly reduced (planning tiers 2 and 3).

5.2.2 Participants

The total number of participants was $n = 81$ ($n = 98$ before removing outliers), of which 42 (21 gamers, 21 non-gamers) were in the experimental condition (i.e., ruptures allowed) and 39 (23 gamers, 16 non-gamers) in the control condition (i.e., no ruptures allowed).

5.2.3 Results

The null hypothesis H_0 was that the planning-based experience management (experimental condition) has the same effect on fun and agency when compared to a fixed exemplar narrative (control condition) in a text-based narrative story domain.

The results for this experiment showed higher scores for both fun ($F(1, 76) = 5.46, p = 0.02$) as seen in Table 5.1, and agency ($F(1, 77) = 20.46, p = 0.001$), table 5.2 when compared to the control condition. These results are statistically significant ($p < 0.05$).
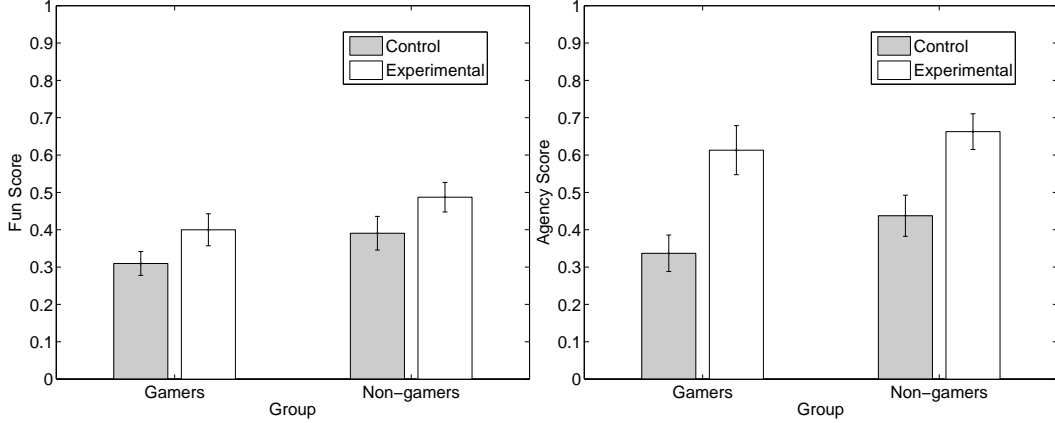
Figure 5.2: Mean normalized scores and error bars in user study 1.

No interaction was found between both factors and means were in the expected direction. Consequently, H_0 was rejected, rendering *post hoc* testing unnecessary. An improvement effect of planning-based experience management appeared in both gamers and non-gamers as seen in Figure 5.2.

5.3 User Study 2-A: Evaluating Planning-Based Experience Management with Player Modelling

The goal of the second user study was to evaluate the use of player modelling along with the planning-based experience manager (i.e., PAST).

5.3.1 Story 2

Besides the exemplar narrative, story 2 (depicted in Figure 5.3) also included a prologue. This provided a playground for the player to explore and for the system to learn a player model.

During the prologue, actions and states are designed to appeal the five player types. Each time the player got to one of these states, the player model was updated.

The second layer of the prologue were *confirmation states* ($1.A, 2.A, 3.A, 4.A$, and $5.A$) used to corroborate whether the player was really inclined toward a playing style: it was either possible to continue down the current story trajectory or to go back to the start and select another.

The player model was only learnt during the prologue phase (given that after the prologue, ruptures could happen and it was necessary to balance content between conditions as explained further below).
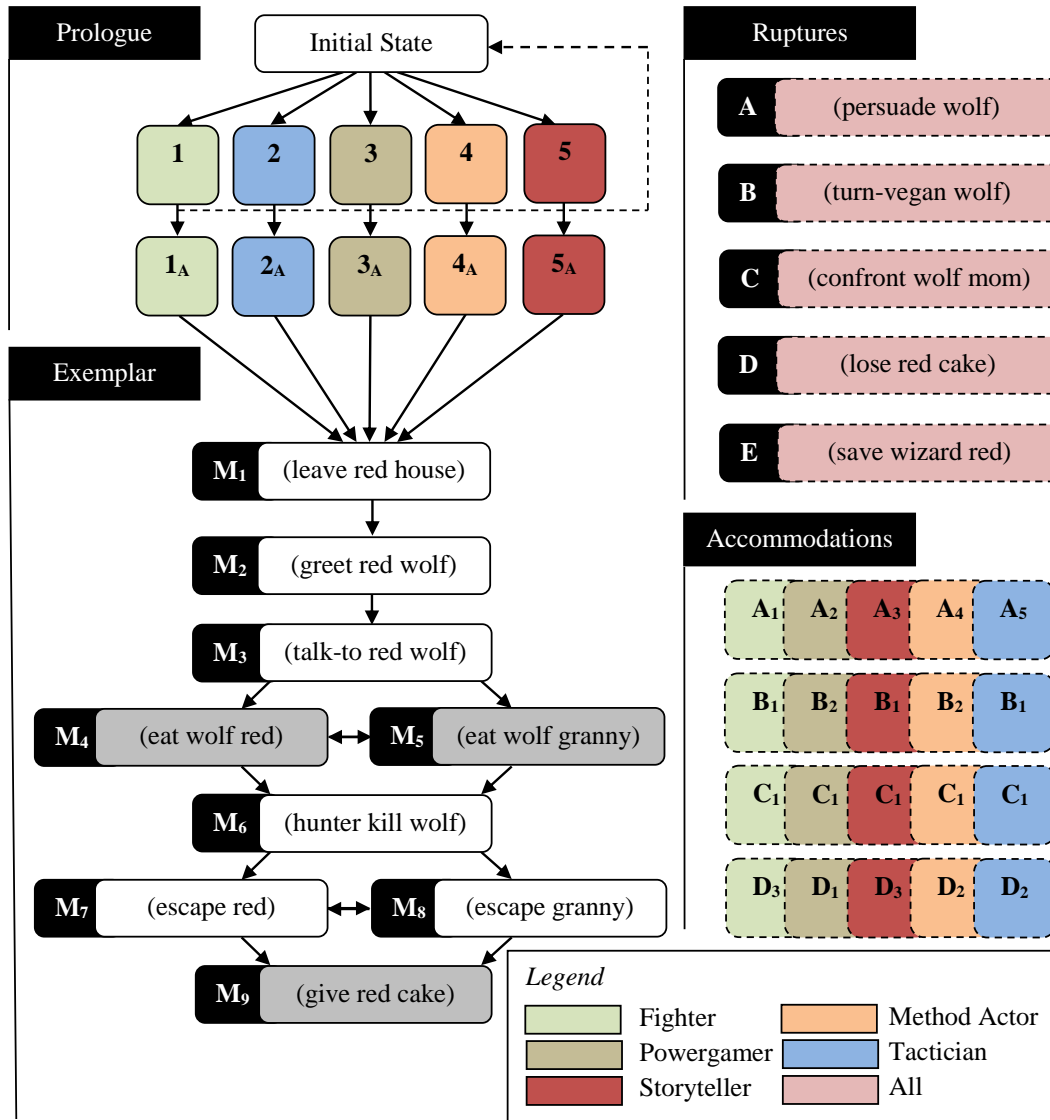
Figure 5.3: Story trajectories for the text-based prototype using story 2. In this virtual world, more ruptures were available and accommodations had more diversity.

Compared to story 1, story 2 also had two additional ruptures and a wider variety of accommodations (in some cases, 5 per rupture). Analogously to story 1, ruptures could happen at any time before the state M_6 took place.

5.3.2 Participants

In total, data from $n = 72$ participants ($n = 98$ before outlier removal) were used. Three conditions for the factor of experience management were present: *control* (planning-based without player modelling), *experimental* (planning-based with player modelling) and *exemplar* (participants who chose not to take any rupture

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	27.7	2	13.848	0.22	0.8059
GS	3.01	1	3.014	0.05	0.8289
EM $\times$ GS	605.67	2	302.837	4.73	0.012
Error	4222.67	66	63.98		
Total	5053.94	71			

Table 5.3: ANOVA results for fun in user study 2 part A: EM is condition (control, experimental, exemplar) and GS is gaming skills (gamer, non-gamer).

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	60.47	2	30.2335	1.13	0.3289
GS	2.3	1	2.3002	0.09	0.7702
EM $\times$ GS	102.98	2	51.4878	1.93	0.1538
Error	1791.59	67	26.7401		
Total	1949.92	72			

Table 5.4: ANOVA results for agency in user study 2 part A: EM is condition (control, experimental, exemplar) and GS is gaming skills (gamer, non-gamer).

actions). Unlike study 1, all participants had the same narrative choices.

In the control condition, ruptures were repaired using a player model randomly sampled from another participant from the experimental condition; if by chance the observed model was the same as imposed, the data was moved to the experimental condition. This procedure was done to procure the same story content distribution across conditions, in order to prevent content bias; this is common in empirical user studies of this nature [33].

The experimental condition had 23 subjects (8 gamers, 15 non-gamers), control condition had 22 (6 gamers, 16 non-gamers) and the exemplar condition 27 (8 gamers, 19 non-gamers).

5.3.3 Results

The null hypothesis H_0 was that planning-based experience management with player modelling (experimental condition) has the same effect on fun and agency when compared to both a fixed exemplar narrative (exemplar condition) and planning-based management without player modelling (control condition) in a text-based narrative story domain.
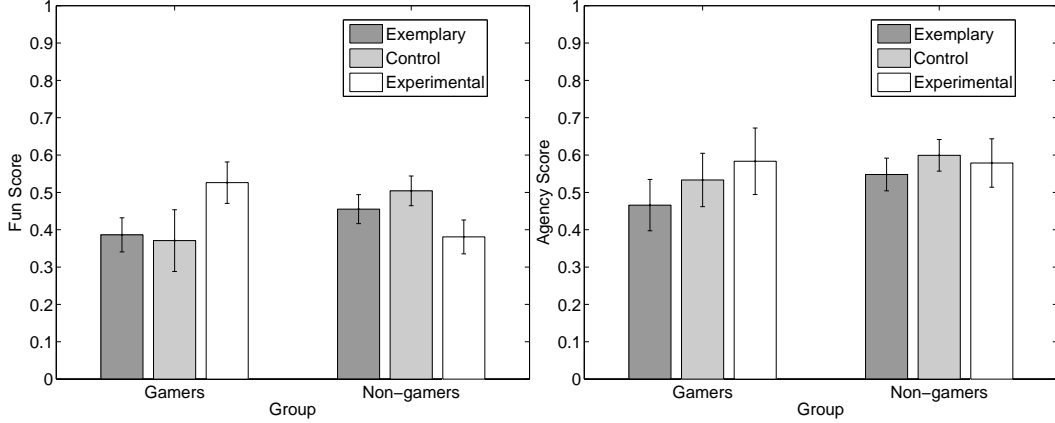
Figure 5.4: Mean normalized scores and error bars in user study 2 part A.

No statistically significant results were observed in either of the main factors (experience management or gaming skills) for fun and agency. However, an interaction was found when evaluating fun with statistical significance ($F(2, 66) = 4.73, p = 0.012$), whereas agency showed a similar pattern but without significance ($F(2, 67) = 1.93, p = 0.1538$). This interaction manifested as different perceptions between gamers and non-gamers, the former behaving as originally hypothesized. The information is summarized in Tables 5.3 and 5.4 for fun and agency respectively.

Means and standard error bars are shown in Figure 5.4. An interaction appeared between the six means in $EM \times GS$; therefore, Tukey's HSD *post hoc* test was run, showing that non-gamers in the control condition experienced more fun than non-gamers in the experimental condition ($p < 0.05$). Therefore, H_0 can be rejected only when considering gamers and non-gamers separately.

5.4 User Study 2-B: Evaluating Planning-Based Experience Management with Player Modelling

Since user study 2 part A did not provide statistically significant results on factors alone, the experiment was repeated using the same methodology, along the same goal and null hypothesis. The story from user study 2 part A was also used.

5.4.1 Participants

In this user study 2 part B, $n = 63$ participants ($n = 83$ before outlier removal) were used, with the following distribution over the tree conditions for experience management: experimental 19 (2 gamers, 17 non-gamers); control 19 (5 gamers, 14

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	101.26	2	50.6299	0.76	0.4722
GS	29.88	1	29.88	0.44	0.5057
EM × GS	19.46	2	9.7318	0.15	0.8645
Error	4335.85	65	66.7054		
Total	4557.49	70			

Table 5.5: ANOVA results for fun in user study 2 part B: EM is condition (control, experimental, exemplar) and GS is gaming skills (gamer, non-gamer).

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	180.48	2	90.239	2.8	0.068
GS	0.13	1	0.1327	0	0.9490
EM × GS	62.02	2	31.0094	0.96	0.3875
Error	2193.28	68	32.2542		
Total	2385.09	73			

Table 5.6: ANOVA results for agency in user study 2 part B: EM is condition (control, experimental, exemplar) and GS is gaming skills (gamer, non-gamer).

non-gamers); and exemplar 25 (10 gamers, 15 non-gamers).

5.4.2 Results

Patterns observed in user study 2 part A were not replicated; furthermore, no statistically significant results were found either in fun or agency. Interactions between experience management and gaming skills were not observed (Tables 5.5 and 5.6).

The means and error bars in Figure 5.5 show that no clear trends were found on user study 2 part B. Thus, H_0 cannot be rejected.

Narrative Coverage

The difference in the results in parts A and B of user study 2 can be attributed to a number of factors, one of them potentially related to unbalanced story content across conditions. The diversity of story 2 made it unlikely to obtain the same narrative coverage across the three conditions. Figure 5.6 demonstrates this by showing a histogram for the story trajectories (i.e., each trajectory id is a different sequence of states). The imbalance took place in both parts of user study 2.
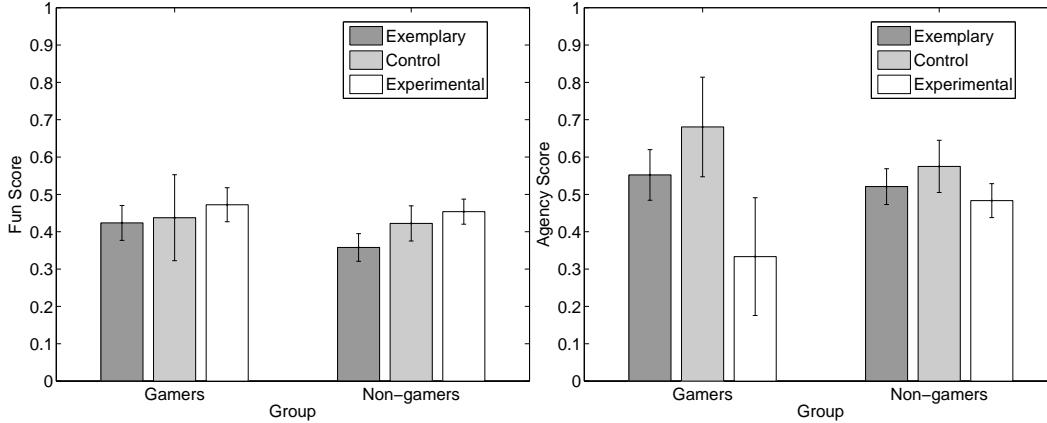
Figure 5.5: Mean normalized scores and error bars in user study 2 part B.
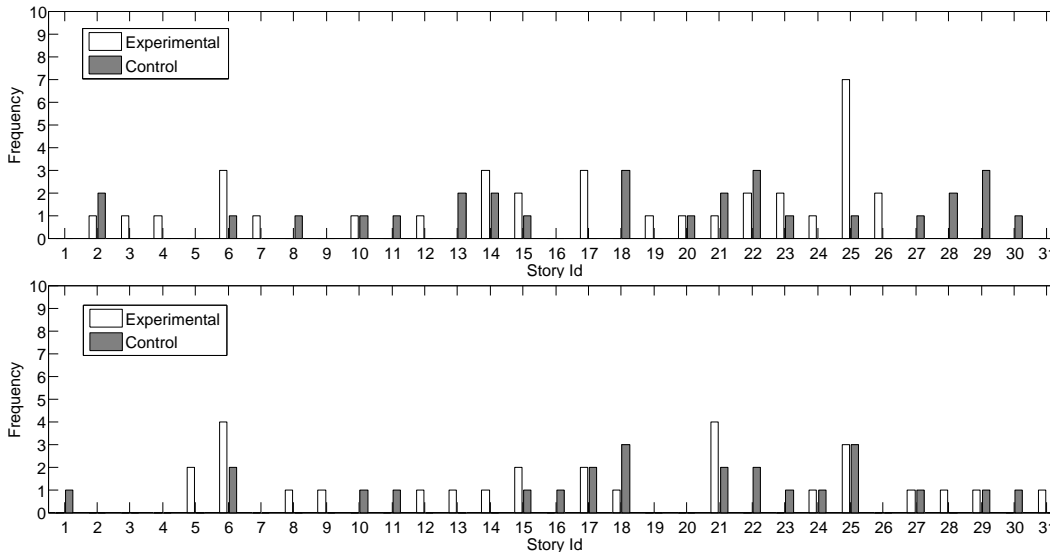
Figure 5.6: Story content distribution by *trajectory id* in both part A (top) and part B (bottom) of user study 2.

5.5 User Study 3: Evaluating PAST in a Constrained Domain

To better balance narrative coverage between conditions, another user study was run based on the same goals of user study 2 (i.e., evaluate PAST) but only using two different conditions of experience management.

In this scenario, the null hypothesis H_0 was that planning-based experience management with player modelling (experimental condition) has the same effect on fun and agency when compared to planning-based management without player modelling (control condition) in a text-based narrative story domain.

5.5.1 Story 3
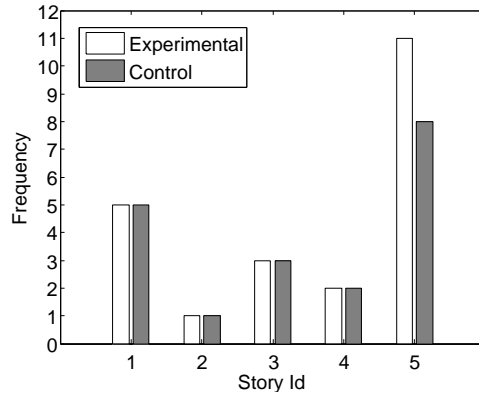
Figure 5.7: Story content distribution by *trajectory id* for user study 3

The story 2 was drastically constrained by permitting only one rupture (rupture *A* in Figure 5.3). Furthermore, all participants were forced to go through the rupture at the same point in time, resulting in only 5 different story trajectories (compared to 31 in user study 2).

The content distribution in both conditions was considerably closer to uniform in this user study (Figure 5.7).

5.5.2 Participants

The number of participants was $n = 34$ ($n = 41$ before outlier removal). There were no statistically significant results ($p < 0.05$) for fun, but there was a marginally significant result ($p < 0.1$) for agency ($F(1, 67) = 5.46, p = 0.097$). No statistically significant interactions were found, as seen in Tables 5.7 and 5.7.

5.5.3 Results

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	4.76	1	4.75726	0.07	0.7967
GS	23.61	1	23.6143	0.34	0.5669
EM × GS	34.73	1	34.73	0.49	0.4880
Error	2113.24	30	70.4414		
Total	2204.26	33			

Table 5.7: ANOVA results for fun in user study 3: EM is condition (control, experimental) and GS is gaming skills (gamer, non-gamer).

Factor	Sum of Squares	d.F.	Mean Square	F	p-value
EM	55.588	1	55.5884	5.46	0.0968
GS	59.168	1	59.1682	1.84	0.0871
EM × GS	0.025	1	0.0253	0.21	0.9710
Error	567.386	30	18.9129		
Total	692.029	33			

Table 5.8: ANOVA results for agency in user study 3: EM is condition (control, experimental) and GS is gaming skills (gamer, non-gamer).
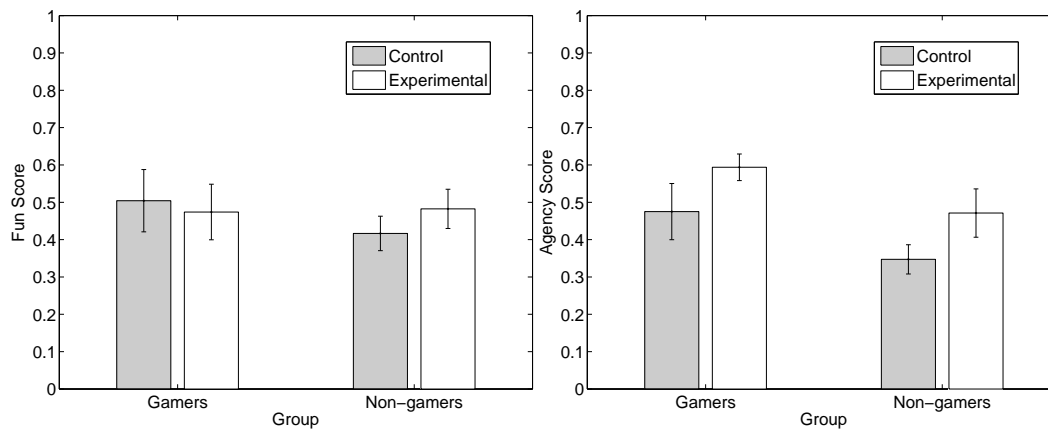
Figure 5.8: Mean scores and error bars in user study 3.

This user study showed positive trends (as shown in Figure 5.8, the means are the expected direction, both for gamers and non-gamers). Therefore, H_0 can be rejected for agency with marginal statistical significance ($p < 0.1$).

Chapter 6

Discussion

In this Chapter, I discuss the results obtained in the empirical evaluations presented in Chapter 5, considering each of the three user studies separately. I conclude by presenting the problems encountered, discussing applicability, and pointing possible future work directions.

6.1 User Study 1: Evaluating Planning-Based Experience Management

User study 1 found that participants of the experimental condition reported more fun and agency with 98% and 99.9% confidence respectively.

The increase in the sample means for fun was about 28.99%, whereas the improvement on agency was 68.67%. The gamers group had a more conservative approach on the evaluation (lower means on both conditions) but also had a higher increase (81.93% increase on agency versus 51.97% in non-gamers), which could be due to a different different appraisal of the gaming experience due to more gaming hours and exposure to multiple video game stories. This evidence indicates that participants preferred the ASD experience manager over a single branching story, for their feeling of fun and agency.

6.2 User Study 2: Evaluating Planning-Based Experience Management with Player Modelling

In user study 2 part A, a significant interaction was found between *gaming skills* and *experience management* in fun. By analyzing the charts in Figure 5.4, an opposite trend is observed in gamers when compared to non-gamers; whereas the former group behaves as originally hypothesized (i.e., the experimental group having more

fun and agency) the non-gamers group–which happens to be a greater portion of the sample–had more fun in the exemplar and control conditions. This difference may be again due to a perception caused by prior gaming experience.

In part B, there were no clear trends at all; furthermore, the results obtained in part A were not replicated. There are several possible reasons. First, different trajectories could well produce different perceptions by themselves. For example, some accommodations can simply be funnier or provide a greater agency perception due to their writing style, characters or narrative context. The story space allowed 31 different trajectories (i.e., 31 different sequences of states), and presented unbalanced distributions across conditions. Second, user study 2 part B was run during the last week of the academic term, which is associated to anedoctical evidence of less motivated students. Third, smaller sizes of the condition groups may have resulted in a loss of statistical power, atop of the unequal distribution of gamers and non-gamers under each condition.

6.3 User Study 3: Evaluating Planning-Based Experience Management with Player Modelling in a Constrained Domain

To improve the trajectory distribution across conditions, user study 3 was run with a (i) fewer story trajectories (only five versus thirty-one different stories), (ii) with fewer conditions (no exemplar condition). In this scenario, the results for agency were marginally significant ($p = 0.097$), with a 29.60% overall increase (35.71 in gamers, 25.01 in non-gamers) when comparing experimental (i.e., PAST) to control (i.e., ASD). No statistical significant results were found for fun ($p = 0.797$), although the overall mean reported a 8% increase from control to experimental (-5.98% gamers, and 15.48% non-gamers). A possible explanation for the lack of statistical significance is the use of a single rupture that may not have allowed for a true customization of the story. Additionally, a short prologue may have been ineffective at learning an accurate player model, which could have also affected user study 2.

6.4 The Pull-Back Effect

A frequent observation from some participants in the open comments section was what they described as the *pull-back effect*. This effect was characterized as a desire

of escaping from the authorial goals, but failing to do so (due to the planning-based accommodation). These were found across all three user studies; some examples are quoted below (all from the experimental condition in each study).

User Study 1

"It seems as though most people already know the little red riding hood story and some people may choose paths that lets little red avoid getting eaten by the wolf but in the end it doesn't matter what options you pick you would still end up going through the story like it would anyways"

User Study 2

"The plot of events seems pre-determined, anything the user chooses may eventually loop back to the static plot."

User Study 3

"(...) It was disappointing when I would try to go away from the typical Red Riding Hood story and then it would just inevitably go back to that (it made me feel like my input in what happened next didn't matter)"

Despite this effect, deemed as negative by the participants, the feeling of agency and fun increased when ruptures were accommodated versus no options at all (user study 1). Also, agency increases when player modelling is added to the experience management (user study 3). This could be an indication that the additional perceived agency provided by rupturing the narrative does increase such perception even if it implies merging back into the exemplar narrative.

6.5   Problems Encountered

During the planning, execution and analysis of the user studies, I encountered some problems which are worth discussing.

Large story domains created much diversity, which was hard to balance across different conditions. As evidenced in user story 2 parts A and B, balancing the story content (known as *yoking* in psychology) may be crucial to reduce content bias.

Another problem was that a few people found instructions hard to follow, which lead to unusable data. Furthermore, it is not clear how motivated junior undergraduate students are in playing text-based adventures, especially since they did not volunteer for this particular set of studies. Indeed, the text-based experience was unstimulating for some participants, which described it as "dull" and "boring". While a text-based virtual domain saves development time, this may have negative effects on the attention span that some people have, as some seem to prefer graphics and more visually stimulating interfaces.

The uncertainty of a good player model learning during the prologue was another potential problem; additionally, labelling states and actions while conveying a player type by relying solely on text-based narrative proved challenging, especially given that RPG player type were used. Another potential problem is that some players might have identified themselves with Little Red's persona, when their role was that of an omniscient director of the story. Assuming the player model was accurate, the way it was used to accommodate some ruptures that were not related to Red could have had an undesirable effect.

6.6 Applicability and Future Work

PAST, in its current implementation, generates narrative trajectories while expanding states that were not pre-authored by a human but which are possible under the virtual world domain definition. These trajectories are described as a set of states, actions, causal links, and temporal links in a Lisp-like notation. This can be used as a tool in designing video game story trajectories during design phases when aiming for player-specific stories and agency; should this be used in an actual game, the narrative skeletons need to be provided with actual video game content (i.e., voiceovers, graphics, dialogue).

Given that all of the above elements cannot be completely generated in an automated fashion, I propose to use the narrative skeletons as a guide for player-specific story while using the on-line mechanism during the game. For example, a video game developer could specify goals, a game domain, and exemplar narrative and then foresee potential content that needs to be created, thus accounting for ruptures and accommodations for certain player types.

Future work will investigate a more efficient planning algorithm for more complex and larger narratives. While this experience manager was presented as a tool for

video game developers and players, its applications to interactive learning should be studied: interactive tutors could benefit from a modelling approach that adapts around a set of goals that could well be pedagogical. In words of Squire [27]:

> Historically, video games have been on the technological cutting edge of technically of what is possible, whether it is building online communities on the Internet, creating rich worlds using 3D graphics cards, or allowing dynamic synchronous interaction play by streaming information over the Internet. (...) In fact, the greatest benefit of studying games may not be as much in generating theoretical understandings of human experience in technology or guidelines for instructional design, but rather, in inspiring us to create new designs.

Further evaluations are needed: while the last user study indicated that perceived agency was increased, it was marginally significant and had no clear trends on the perception of fun. Richer stories settings and test beds are needed. Finally, automatic content generation research should be pursued to rely less on pre-authored content templates. For instance, in a text-based narrative, methodologies that could translate the actions such as `(eat red wolf)` to a prose description taking into account the system state are compelling; furthermore, if the event `eat` needs to be re-utilized, then the text for that given event should rephrased from the one previously used to avoid repetition. Another research directions that should be investigated are (i) using dynamically introduced story goal states (currently, all goals are static), thus potentially providing even more agency to the player, (ii) modelling stochastic player policies and (iii) supporting stochastic transition functions.

Chapter 7

Conclusion

Interactive Storytelling (IS) can be applied nowadays to interactive entertainment on digital devices. Even though the ultimate goal of this cognitively rich field is to create a creative human-like storyteller, some contributions are already applicable to video games to imprive the player's experience. For instance, the player's perception of experience quality can be increased using an experience management framework.

Agency is an important goal in IS research. The main problem with increasing player agency is to provide more actions and states while striking a tractable balance: the competing needs of a coherent, creative story and player agency need to be understood from the designer's perspective (i.e., need for automation while retaining authorial intent) and the player's perspective (i.e., more actions). The system presented in this paper, Player-specific Automated Storytelling (PAST), uses player modelling while also automatically accommodating player actions with automated planning. In doing so, I combined complementary ideas from two existing systems, Player-Specific Stories via Automatically Generated Events (PaSSAGE) and the Automated Story Director (ASD), building on their strengths.

In this work, I made several contributions. First, a planning-based experience manager focused on agency was evaluated for the first time with a validated instrument. The results suggest that accommodating ruptures increases agency and fun in text-based narratives. Second, I found an indication that player modelling and planning can be even more effective together. Third, I created a tool that can be used by video game developers to design story trajectories in player-specific stories.

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Appendix A

User Study Materials

In this appendix, I include the different support materials used during the empirical evaluation (user studies).

A.1 Briefing and Consent Form

Computing Science Study: Introduction and Briefing

<u>Introduction</u>

Welcome! You are invited to participate in a research study being conducted by Alejandro Ramirez and Dr. Vadim Bulitko of the Department of Computing Science and Dr. Marcia Spetch of the Department of Psychology, from the University of Alberta. The purpose of this study (which is part of a graduate M.Sc. project) is to evaluate the quality and entertainment value of several interactive stories (narrative in which the user takes the role of "director" and chooses the events in the main plot, thereby adjusting the course of the story). Each session of this study will last less than an one hour.

<u>Your participation</u>

Your participation in this study involves experiencing a short interactive story by playing with an interactive console for approximately 30 minutes. The events that form the story may include violence in a written text form. Before beginning the story, you will be presented with a short set of instructions for interacting with the environment. Following your completion of the story, you will be asked to fill out a survey ranking the game across several measures. Your participation in this study is worth 2% toward your course mark.

<u>Your rights</u>

Your decision to participate in this study is entirely voluntary and you may decide at any time to withdraw. If you choose not to participate or withdraw after you have begun, but would like your 2% credit for participation, you may complete an alternative educational activity. In this case, you will be given a short article to read on the decisions that storytellers make while telling a story. You will be asked to answer on paper a few questions about the article. The time it takes to complete this assignment will be no longer than the time it takes to participate in this study. Your decision not to participate will not affect access to services from the University of Alberta. Your survey responses will remain confidential and anonymous, and our data file will NOT contain any personal identifiers (i.e., names or student ID numbers). Survey forms will be identified only by a researcher assigned code number, for the purpose of associating them with the particular story that the participant experienced. Only researchers associated with the project will have access to the questionnaires. The results of this study may be presented at scholarly conferences, published in professional journals or books, or presented in class lectures. All data presented will be anonymous. The data will be securely stored by the Department of Computing Science (Alejandro Ramirez) for a minimum of two years.

<u>Benefits and risks</u>

There are no major risks in this study; in general, the risks associated with this project are expected to be similar to those that are associated with reading a book or watching a movie. There is a minimal risk of fatigue and tension, as in any situation that involves immersion in a story. If any risks should arise, the researcher will inform the participants immediately. If you should experience any adverse effects, please contact Alejandro Ramirez and/or Dr. Vadim Bulitko.

<u>Contact information</u>

The plan for this study has been reviewed for its adherence to ethical guidelines and approved by Research Ethics Board 1 at the University of Alberta. For questions regarding participant rights and ethical conduct of research, contact the Research Ethics Office at (780) 492-2615. If you have any questions or comments on the study, or if you wish a clarification of rights as a research participant, please contact Alejandro Ramirez.

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Chair
Research Ethics Office
University of Alberta
(780) 492-2615

<u>Signatures</u>

Please sign below to indicate that you have read and understood the nature and purpose of the study. Your signature acknowledges the receipt of a copy of the consent form, as well as indicates your willingness to participate in this study.

_____   _____

Participants's Signature   Date

_____   _____

Researcher's Signature   Date

A.2 Debriefing Form (User Study 1)

Evaluating Personal Agency in Automatically Generated Stories

Thank you for participating in this study! Your time and effort have been very valuable to us. Video games are an increasingly popular form of entertainment, but little is known about why people play video games and what gratifications they receive from them. Our research in this study investigates personal agency and enjoyment in the context of a dynamically managed interactive story, with content that has been in part generated by a computer.

Specifically, we study whether allowing the player to break an original narrative as designed by the author increases feelings of agency and enjoyment that they derive from playing. Previous studies have indicated there is a link between agency and providing the player with more narrative choices but the content creation bottleneck (i.e., the increased and often intractable amount of authorial efforts needed to develop alternative stories in responses to various play styles) remains.

In this study we investigate whether the content creation bottleneck can be mitigated by automatically pre-computing alternate narratives. Then, at play time, the software monitors the player's actions and, whenever such actions break the current narrative being shown, an appropriate alternative narrative is loaded and being presented to the player. Our hypothesis is that this approach gives players a sense of agency at the level of narrative while allowing game developers to save time by partly automating the content creation phase. We presented a simplified version of the story in which the player took the role of a director of a plot, instead of a character in the story.

To test our hypothesis, our independent variable is the presence or absence of options to break the narrative. If you were in the control condition, the adaptive storytelling system was turned off, and story events were fixed. If you were in the experimental condition, the game automatically observed the actions that you took, and allowed you extra options and actions that would conflict with author goals. Our primary dependent variables were your ratings on the questionnaire of how enjoyable the game was, as well as how much agency you felt.

It was necessary to withhold the information that the game may adapt its story based on your actions to avoid a possible player bias.

The results of this research will further increase the understanding of the importance and causes of personal agency, and will provide knowledge about the factors that influence gratification and enjoyment of storytelling games. This will also help understand the extent to which Artificial Intelligence methods can be used to assist creating additional authorial content. This information will be of theoretical interest to researchers in both psychology and computer science, and will have an applied value for researchers in computer science as well.

Thanks very much for participating. Do you have any questions that I can answer right now? If you have any questions, later on, about the study, please contact Alejandro Ramirez via either phone (780-616-7661) or email (ramirezs@cs.ualberta.ca) or if you have general questions, contact Kelly Arbeau (Research Participation Coordinator) at rescred@ualberta.ca or 780-492-5689. Please do not tell others about what we had you do here to avoid biasing them in case they participate in this study as well.

A.3 Debriefing Form (User Study 2 and 3)

PaST: Evaluating Personal Agency in Automatically Generated Stories

Thank you for participating in this study! Your time and effort have been very valuable to us. Video games are an increasingly popular form of entertainment, but little is known about why people play them and what gratifications they receive from them. Our research in this study investigates personal agency and enjoyment in the context of a dynamically managed interactive story, with content that has been partly generated by a computer.

Specifically, we study whether customizing the outcomes of players' decisions on an individual basis can increase the feelings of agency and enjoyment that they derive from playing. Previous studies have indicated there is a link between them but the content creation bottleneck (i.e., the increased and often intractable amount of authorial efforts needed to develop alternative stories in responses to various play styles) remains. We want to create tools that help authors cope with this complexity.

In this study we investigate whether this bottleneck can be partly addressed by using planning and player modelling to create stories on-the-fly. The software monitors the player's actions and, whenever such actions break the current narrative being told (according to the author's original story), an appropriate alternative narrative is loaded and presented to the player. Our hypothesis is that this approach increases the players sense of agency and fun, and could potentially save game developers time by automating a part of the content creation phase. We presented a simplified version of the story in which the player took the role of a director of a plot, instead of a character in the story.

To test our hypothesis, our independent variable is the presence or absence of player modeling and the resulting story modifications in the game. If you were in the control condition, the events shown did not necessarily match your player model. If you were in the experimental condition, the game observed the actions that you took, and showed content matching that specific player type. Our primary dependent variables were your ratings on the questionnaire of how enjoyable the game was, as well as how much agency you felt.

It was necessary to withhold the information that the game may adapt its story based on your actions to avoid a possible player bias.

The results of this research will further understanding of the importance and causes of personal agency, and will provide knowledge about the factors that influence gratification and enjoyment of storytelling games. This will also answer if Artificial Intelligence methods can be used to assist creating additional authorial content. This information will be of theoretical interest to researchers in both psychology and computer science, and will have an applied value for researchers in computer science as well.

Thanks very much for participating. Do you have any questions that I can answer right now? If you have any questions, later on, about the study, please contact Alejandro Ramirez via either phone (780-616-7661) or email (ramirezs@cs.ualberta.ca) or if you have general questions, contact Kelly Arbeau (Research Participation Coordinator) at rescred@ualberta.ca or 780-492-5689. Please do not tell others about what we had you do here to avoid biasing them in case they participate in this study as well.

A.4   Survey

Storytelling User Study

Thanks for your participation. After completing the interaction, and being prompted by
the system, please fill out this form to the best of your knowledge and perceptions.
Your time and careful answering is quite appreciated.
* Required

Gender ***
○ Male

○ Female

Age ***
[18 ▼]

**How many hours a week, on average, do you normally spend playing video
games? *****
○ Less than 1 hour.

○ Between 1 and 3 hours.

○ Between 3 and 7 hours.

○ More than 7 hours.

○ None at all.

**How many hours a week, in average, do you normally spend reading novels
or short stories? *****
○ Less than 1 hour.

○ Between 1 and 3 hours.

○ Between 3 and 7 hours.

○ More than 7 hours.

○ None at all.

How would you define yourself in terms of video gaming? ***
○ Don't play video games at all.

○ Casual gamer.

○ Average gamer.

○ Hardcore gamer.

Storytelling User Study

Assessing the Story
For each of the following statements, use the scale below it to show how much you agree or disagree with what it says. All these items are related to the interaction you just had the system. When finished, click the "Continue" button below.

The story experience was interesting. *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

The story experience was believable (in its own context) *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

The story experience is consistent with itself (no contradictions in the plot). *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

The story experience experience kept me immersed. *

	1	2	3	4	5	
Strongly Disagree	◯	◯	◯	◯	◯	Strongly Agree

Storytelling User Study

Assessing the Story

For each of the following statements, use the scale below it to show how much you agree or disagree with what it says. All of these questions are related to the interaction you just had the system. When finished, click the "Continue" button below.

The story experience was pleasant. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was gratifying. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was rewarding. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was amusing. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was exhilarating. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was thrilling. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Storytelling User Study

Assessing the Story

For each of the following statements, use the scale below it to show how much you agree or disagree with what it says. All of these questions are related to the interaction you just had the system. When finished, click the "Continue" button below.

The story experience was exciting. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was melancholic. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was moving. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was appealing. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience was pleasing. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience made me feel proud. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The story experience made me feel competent. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Storytelling User Study

Assessing the Story

For each of the following statements, use the scale below it to show how much you agree or disagree with what it says. All of these questions are related to the interaction you just had the system. When finished, click the "Continue" button below.

My inputs had considerable impact on the events in the story. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I had the feeling that I could affect directly something on the screen. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

The consequences of my inputs were clearly visible. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I could recognize which events in the story I have caused with my inputs. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

My decisions clearly influenced how the story went on. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

I discovered how my earlier actions influenced what happened later in the story. *

	1	2	3	4	5	
Strongly Disagree	○	○	○	○	○	Strongly Agree

Storytelling User Study

Roles and Preferences

For each of the following statements, use the scale below it to show how much you identify with each role on a gaming situation or in any story in general. When finished, click the "Continue" button below.

With which video game genre do you identify the most? *

○ Adventure.

○ Action.

○ Strategy.

○ Role-playing Games (RPGs).

○ None of the above.

With which role do you identify yourself the most when playing? *

○ Fighter - you enjoy the game and achieving goals by means of brute force and weaponry.

○ Story-teller - you appreciate long, intricate plots with unexpected turns.

○ Method Actor - you get into the character easily and do everything to fit into the expected background.

○ Power Gamer - you focus on obtaining high-scores, lots of items, and achievements.

○ Tactician - you plan your every move carefully considering all the information you have at your disposal.

○ Other: [   ]

Storytelling User Study

Final Comments

Please answer the following questions to the best of your knowledge. Then click on "Submit" to end the questionnaire.

Feel free to make general comments you deem valuable on the whole experience.

Did you notice any errors or other system related problems that you consider important for us to know? *

◯ Yes

◯ No

If you answered "yes" above, please comment:

A.5 Ethics Approval

1.1 Study Identification

All questions marked by a red asterisk * are required fields. However, because the mandatory fields have been kept to a minimum, answering only the required fields may not be sufficient for the REB to review your application.

Please answer <u>all relevant questions</u> that will reasonably help to describe your study or proposed research.

1.0 *** Short Study Title** *(restricted to 250 characters)***:**
PAST: Measuring Player Agency in Automatically Generated Stories

2.0 *** Complete Study Title** *(can be exactly the same as short title)***:**

PAST: Measuring Player Agency in Automatically Generated Stories

3.0 *** Select the appropriate Research Ethics Board (***Detailed descriptions are available by clicking the HELP link in the upper right hand corner of your screen***):**
REB 1

4.0 *** Is the proposed research:**
Funded (Grant, subgrant, contract, internal funds, donation or some other source of funding)

5.0 *** Name of Principal Investigator** *(at the University of Alberta, Covenant Health, or Alberta Health Services)***:**
Alejandro Ramirez Sanabria

6.0 **Investigator's Supervisor** *(required for applications from undergraduate students, graduate students, post-doctoral fellows and medical residents to Boards 1, 2, 3. HREB does not accept applications from student PIs)*

Vadim Bulitko

7.0 *** Type of research/study:**
Graduate Student - Thesis, Dissertation, Capping Project

8.0 **Study Coordinators or Research Assistants:** People listed here can edit this application and will receive all HERO notifications for the study:
Name   Employer
There are no items to display

9.0 **Co-Investigators:** People listed here can edit this application but do not receive HERO notifications unless they are added to the study email list:

Name	Employer
Marcia Spetch	SC Psychology Science
Vadim Bulitko	SC Computing Science

10.0 **Study Team** *(Co-investigators, supervising team, other study team members)*: People listed here cannot edit this application and do not receive HERO notifications:
Last Name First Name Organization Role/Area of Responsibility Phone Email
There are no items to display

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1.3 Study Funding Information

1.0 *** Type of Funding:**
Grant (external)

If OTHER, provide details:

2.0 *** Indicate which office administers your award.** *(It is the PI's responsibility to provide ethics approval notification to any office other than the ones listed below)*
Other

If OTHER, provide details:

3.0 *** Funding Source**

3.1 Select all sources of funding from the list below:
NSERC - Natural Sciences And Engineering Research Council   NSERC

3.2 If not available in the list above, write the Sponsor/Agency name(s) in full (you may add multiple funding sources):
 There are no items to display

4.0 *** Indicate if this research sponsored or monitored by any of the following:**
Not applicable

If applicable, indicate whether or not the FDA Investigational New Drug number or FDA Investigational Device Exception is required:

The researcher is responsible for ensuring that the study complies with the applicable US regulations. The REB must also meet particular review criteria and this application will likely receive full board review, regardless of level risk.

1.5 Conflict of Interest

1.0 *** Are any of the investigators or their immediate family receiving any personal remuneration (including investigator payments and recruitment incentives but excluding trainee remuneration or graduate student stipends) from the funding of this study that is not accounted for in the study budget?**
　○ Yes ● **No**

If YES, explain:

2.0 *** Do any of investigators or their immediate family have any proprietary interests in the product under study or the outcome of the research**

including patents, trademarks, copyrights, and licensing agreements?
○ Yes ◉ **No**

3.0   **Is there any compensation for this study that is affected by the study outcome?**
○ Yes ◉ **No**

4.0   **Do any of the investigators or their immediate family have equity interest in the sponsoring company? (This does not include Mutual Funds)**
○ Yes ◉ **No**

5.0   **Do any of the investigators or their immediate family receive payments of other sorts, from this sponsor (i.e. grants, compensation in the form of equipment or supplies, retainers for ongoing consultation and honoraria)?**
○ Yes ◉ **No**

6.0   **Are any of the investigators or their immediate family, members of the sponsor's Board of Directors, Scientific Advisory Panel or comparable body?**
○ Yes ◉ **No**

7.0   **Do you have any other relationship, financial or non-financial, that, if not disclosed, could be construed as a conflict of interest?**
○ Yes ◉ **No**

If YES, explain:

Important
If you answered YES to any of the questions above, you may be contacted by the REB for more information or asked to submit a Conflict of Interest Declaration.

1.6 Research Locations and Other Approval

1.0   *** List the locations of the proposed research, including recruitment activities. Provide name of institution or organization, town, or province as applicable**
BSP 454, Department of Psychology Lab, University of Alberta
Undergrad Laboratories, Department of Computing Science, University of Alberta

2.0   *** Indicate if the study will use or access facilities, programmes, resources, staff, students, specimens, patients or their records, at any of the sites affiliated with the following** *(select all that apply):*
Not applicable

List all facilities or institutions as applicable:

3.0   *** Indicate if the proposed research has received or will require ethics approval from other Research Ethics Board or institution. Choose all**

that apply:
Not Applicable

If OTHER, list the REB or Institution:
Name
There are no items to display

4.0 **Does this study involve pandemic or similar emergency health research?**
   ○ Yes ◉ **No**

If YES, are you the lead investigator for this pandemic study?
   ○ Yes ◉ **No**

5.0 **If this application is closely linked to research previously approved by one of the University of Alberta REBs or has already received ethics approval from an external ethics review board**(s)**, provide the HERO study number, REB name or other identifying information. Attach any external REB application and approval letter in Section 7.1.11 – Other Documents.**
This project builds upon our previous work.

Application number (ASL REB member) 1844 (CLG08-08-05)
Approval Expiry Date: 2010-September-04
Title: Evaluating entertainment of recurring characters in adaptive interactive stories

Amendment/Renewal ID: Pro00017135_REN1
Study ID: MS1_Pro00017135
Study Title: Player Agency in Interactive Stories
Study Investigator: David Thue

2.1 Study Objectives and Design

1.0 **Date that you expect to start working with human participants:**
16/10/2012

2.0 **Date that you expect to finish working with human participants, in other words, you will no longer be in contact with the research participants, including data verification and reporting back to the group or community:**
30/11/2012

3.0 * **Provide a lay summary of your proposed research suitable for the general public** *(restricted to 300 words)*. **If the PI is not affiliated with the University of Alberta, Alberta Health Services or Covenant Health, please include institutional affiliation.**

Interactive storytelling takes audience's reaction to the story told so far to customize the parts of the story yet to be told. In this work we continue our research on applying Artificial Intelligence techniques to this problem. Using a "chose-your-own-adventure" story generator, our automated storyteller observes the audience (i.e., the player), profiles them and modifies the story being told on the fly to make it more appealing to the individual. In this instalment of the on-going research, we will test whether adding player

archetypes allows us to pre-compute more diverse contingent narratives and thus increase player's enjoyment and the feeling of agency.

4.0   * **Provide a description of your research proposal including study objectives, background, scope, methods, procedures, etc)** *(restricted to 1000 words)*. **Footnotes and references are not required and best not included here. Research methods questions in Section 5 will prompt additional questions and information.**

We wish to test several hypotheses concerning how various configurations of our interactive storytelling approach (called PaST) can influence the agency that users perceive while experiencing an interactive story that has been partly created by a computer planner. We intend to explore other metrics as well, such as player enjoyment ("fun"), engagement and coherence of the story.

More specifically, we will test whether PaST can improve user's perception of fun and agency, while providing consistent and believable narrative. The improvement is with respect to a fixed story (i.e., allowing story breaks but repairing without player modelling nor offline computation).

We have three hypotheses:

a. PaST increases player's perception of fun;
b. PaST increases player's perception of agency;

- Background -

Agency, as the ability to change the course of one's experience, has been found to promote well-being in daily life [Thompson 1998], and is a central aspect of video games. Current commercial video games provide agency from gameplay (e.g., whether to be friendly or antagonistic to an in-game character or whether to explore an area of the map or not). However, many commercial games maintain a single high-level narrative and, despite player's choices, he or she will eventually be "funnelled" into a pre-scripted event.

In the field of Interactive Storytelling, one of the central concerns since its inception has been to provide a higher level agency by allowing the player to manipulate the narrative [Wardrip-Fruin et al. 2009]. This is difficult to do with the current commercially deployed technology for two reasons. First, allowing the player to break the narrative requires designing a large number of contingency narratives. This is impossible to do manually due to the sheer size. Second, simply giving the player a large number of choices is likely to reduce their fun as the players will be plodding through much content they do not like until they find something they do like.

PaST addresses both problems. We use an Automated Story Director (ASD) [Riedl et al 2008] to automatically identify all ways in which a player can break the original (exemplar) narrative. For each of such possible breaks ASD automatically pre-computes a set of contingency narratives, given a domain theory of the world in which the narrative is situated. We address the second problem by using a University of Alberta-developed approach for player-modeling (PaSSAGE) [Thue et al, 2007]. PaSSAGE monitors the player's in-game actions and filters the available content in an attempt to match player's style and, subsequently, increase player's enjoyment.

- Scope -

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We expect this research to have impact in all applications of interactive storytelling, including personal entertainment and realistic training simulations.

- Methods & Procedures -

We intend to conduct a user study to test the aforementioned hypotheses, wherein participants experience and evaluate the interactive stories that various conditions of our software system create (e.g., {configuration 1: selecting contingency narratives arbitrarily} versus {configuration 2: selecting contingency narratives based on the player model}). Experiencing a story that our system creates will involve playing a computer video game using a text-based interface for up to one hour. The user will read text the screen and will respond with a keystroke to select a next possible action. The most violent type of phrases in our system will be of the like of "The player has killed the wolf" or "The wolf has eaten granny"; with no gore or detailed description of violence presented.

5.0   **Describe procedures, treatment, or activities that are above or in addition to standard practices in this study area** *(eg. extra medical or health-related procedures, curriculum enhancements, extra follow-up, etc)***:**
None.

6.0   **If the proposed research is above minimal risk and is not funded via a competitive peer review grant or industry-sponsored clinical trial, the REB will require evidence of scientific review. Provide information about the review process and its results if appropriate.**
None.

7.0   **For clinical research only, describe any sub-studies associated with this application.**

3.1 Risk Assessment

1.0   *** Provide your assessment of the risks that may be associated with this research:**
Minimal Risk - research in which the probability and magnitude of possible harms implied by participation is no greater than those encountered by participants in those aspects of their everyday life that relate to the research (TCPS2)

2.0   *** Select all that might apply:**
Description of Potential Physical Risks and Discomforts

Possibly   Participants might feel physical fatigue, e.g. sleep deprivation

No   Participants might feel physical stress, e.g. cardiovascular stress tests

No   Participants might sustain injury, infection, and intervention side-effects or complications

No   The physical risks will be greater than those encountered by the participants in everyday life

Potential Psychological, Emotional, Social and Other Risks and Discomforts

Possibly	Participants might feel psychologically or emotionally stressed, demeaned, embarrassed, worried, anxious, scared or distressed, e.g. description of painful or traumatic events
Possibly	Participants might feel psychological or mental fatigue, e.g intense concentration required
No	Participants might experience cultural or social risk, e.g. loss of privacy or status or damage to reputation
No	Participants might be exposed to economic or legal risk, for instance non-anonymized workplace surveys
No	The risks will be greater than those encountered by the participants in everyday life

3.0   *** Provide details of the risks and discomforts associated with the research, for instance, health cognitive or emotional factors, socio-economic status or physiological or health conditions:**
Many stories create tension in their audience, and the stories that our software system adapts could have the same effect, causing a mild degree of worry for our participants out of empathy for characters in the story. Playing a video game can be somewhat fatiguing or stressful, in a similar way that watching television can strain one's eyes or elicit excitement and concern.
In general, the risks associated with this project are expected to be similar to those that are associated with reading literature or viewing a movie.
Experiencing a story that our system creates will involve playing a computer video game in the role of an event "director" (with
text violence, but no blood or gore) for at most 1 hour. The most violent types of phrases include but are not limited to expressions of the sort "Hunter kills wolf" and "Wolf eats granny". Most of the story narrative is based on the traditional Little Red Riding Hood children story.

4.0   *** Describe how you will manage and minimize risks and discomforts, as well as mitigate harm:**
Participants will be informed that they may stop participating at any point during their study session, and be allowed to take breaks if they feel the need to do so.

5.0   *** If your study has the potential to identify individuals that are upset, distressed, or disturbed, or individuals warranting medical attention, describe the arrangements made to try to assist these individuals. Explain if no arrangements have been made:**
No arrangements have been made as the study will not identify these individuals.

3.2 Benefits Analysis

1.0   *** Describe any potential benefits of the proposed research to the participants. If there are no benefits, state this explicitly:**
Participants may enjoy a stronger sense of control over their experience than they do in typical commercial video games.

2.0   *** Describe the scientific and/or scholarly benefits of the proposed research:**
Having a sense of control has been found to be beneficial to personal well-being, and one benefit of this study will be an improved understanding of which factors of a person's experience lead them to feel such a sense of

control.
If our hypotheses are confirmed, then we will have empirically demonstrated the effectiveness of a new method for selecting content in interactive experiences that has been generated offline by an artificial intelligence method.This will have implications in video games, computer tutoring, and narrative generation.

The technological improvements that our techniques offer may potentially be of use in all aspects of interactive entertainment and training simulation design.

3.0   **Benefits/Risks Analysis: Describe the relationship of benefits to risk of participation in the research:**
The risk involved with this study is expected to be minimal, isolated, and short-term, while the benefits have the potential to improve a wide range of entertainment and training applications.

4.1 Participant Information

1.0   *** Who are you studying? Describe the population that will be included in this study.**
Undergraduate students obtained through the Psychology 104/105 Research Participation Pool.

2.0   *** Describe the inclusion criteria for participants (e.g. age range, health status, gender, etc.). Justify the inclusion criteria (e.g. safety, uniformity, research methodology, statistical requirement, etc)**

Participants must have normal or corrected vision (eyeglasses or contacts o.k.), and be able to use a mouse and keyboard.
These restrictions are necessary to ensure that participants will be able to play through the experiences that our software system creates.

Participants must be 18 years of age or older.
This restriction is in place to due the (minimal) violence that players may see as part of their in-game experience.

3.0   **Describe and justify the exclusion criteria for participants:**

Only participants who do not meet the criteria above will be excluded, for the reasons given above

4.0   *** Will you be interacting with human subjects, will there be direct contact with human participants, for this study?**
    ◉ **Yes** ○ No
Note: No means no direct contact with participants, chart reviews, secondary data, interaction, etc.

If NO, is this project a chart review or is a chart review part of this research project?
    ○ Yes ○ No

5.0   **Participants**

How many participants do you hope to recruit *(including controls, if applicable)*
100
Of these how many are controls, if applicable *(Possible answer: Half, Random, Unknown, or an estimate in numbers, etc).*
50
If this is a multi-site study, for instance a clinical trial, how many participants *(including controls, if applicable)* **are expected to be enrolled by all investigators at all sites in the entire study?**

6.0 **Justification for sample size:**
Similar previous studies achieved statistical significance with this amount .
[Thue, 2007]

7.0 **Does the research specifically target aboriginal groups or communities?**
○ Yes ◉ **No**

4.3 Recruit Potential Participants

1.0 **Recruitment**

1.1 How will potential participants be identified? Outline how you will identify the people who will be approached for participation or screened for eligibility.
Undergraduate students obtained through the Psychology 104/105 Research Participation Pool

1.2 How will people obtain details about the research in order to make a decision about participating? Select all that apply:
There are no items to display

1.3 If appropriate, provide the locations where recruitment will occur *(e.g schools, shopping malls, clinics, etc.)*

2.0 **Pre-Existing Relationships**

2.1 Will potential participants be recruited through pre-existing relationships with researchers *(e.g. Will an instructor recruit students from his classes, or a physician recruit patients from her practice? Other examples may be employees, acquaintances, own children or family members, etc)***?**
○ Yes ◉ **No**

2.2 If YES, identify the relationship between the researchers and participants that could compromise the freedom to decline *(e.g. professor-student)***. How will you ensure that there is no undue pressure on the potential participants to agree to the study?**

3.0 **Outline any other means by which participants could be identified, should additional participants be needed** *(e.g. response to advertising such as flyers, posters, ads in newspapers, websites, email, listservs; pre-existing records or existing registries; physician or community organization referrals; longitudinal study, etc)*

4.0 **Will your study involve any of the following** *(select all that apply)***?**

None of the above

4.5 Informed Consent Determination

1.0	*** Describe who will provide informed consent for this study (select all that apply). Additional information on the informed consent process is available at: http://www.pre.ethics.gc.ca/eng/policy-politique/initiatives/tcps2-eptc2/chapter3-chapitre3/#toc03-intro** All participants have capacity to give free and informed consent

Provide justification for requesting a Waiver of Consent (Minimal risk only, additional guidance available at: http://www.pre.ethics.gc.ca/eng/policy-politique/initiatives/tcps2-eptc2/chapter3-chapitre3/#toc03-1b

2.0	**How is participant consent to be indicated and documented? Select all that apply:** Signed consent form

Except for "Signed consent form" use only, explain how the study information will be communicated and participant consent will be documented. Provide details for EACH of the option selected above:

3.0	**Authorized Representative, Third Party Consent, Assent**

3.1 Explain why participants lack capacity to give informed consent *(e.g. age, mental or physical condition, etc.).*

3.2 Will participants who lack capacity to give full informed consent be asked to give assent?
◯ Yes ◯ No

Provide details. IF applicable, attach a copy of assent form(s) in the Documentation section.

3.3 In cases where participants (re)gain capacity to give informed consent during the study, how will they be asked to provide consent on their own behalf?

4.0	**What assistance will be provided to participants, or those consenting on their behalf, who have special needs?** *(E.g. non-English speakers, visually impaired, etc)***:**

5.0	*** If at any time a <u>participant wishes to withdraw, end, or modify their participation in the research</u> or certain aspects of the research, describe how their participation would be ended or changed.** They will be asked to complete a different activity, such as reading a related article and answering some questions, or withdrawn completely if they do not wish to participate at all.

6.0	**Describe the circumstances and limitations of <u>data withdrawal</u> from the study, including the last point at which it can be done:**

7.0	**Will this study involve any group(s) where non-participants are present? For example, classroom research might involve groups which include participants and non-participants.** ◯ Yes ◯ No

5.1 Research Methods and Procedures

Some research methods prompt specific ethic issues. The methods listed below have additional questions associated with them in this application. If your research does not involve any of the methods listed below, ensure that your proposed research is adequately described in Section 2.0: Study Objectives and Design or attach documents in Section 7.0 if necessary.

1.0   *** This study will involve the following** *(select all that apply)*
The list only includes categories that trigger additional page(s) for an online application. For any other methods or procedures, please indicate and describe in your research proposal in the Study Summary, or provide in an attachment:
Surveys and Questionnaires (including internet surveys)
Use of Deception or Partial Disclosure (not including double-blind)
Use of Psychology Subject Pool (Psychology Research Participation Program, specific to the Faculty of Arts. Requires separate registration with RPP)

2.0   *** Is this study a Clinical trial? (Any investigation involving participants that evaluates the effects of one or more health-related interventions on health outcomes?**
◯ Yes   ⦿ **No**

3.0   **If you are using any tests in this study diagnostically, indicate the member(s) of the study team who will administer the measures/instruments:**
Test Name   Test Administrator   Organization   Administrator's Qualification
There are no items to display

4.0   **If any test results could be interpreted diagnostically, how will these be reported back to the participants?**

5.5 Use of Deception or Partial Disclosure

1.0   *** Describe the information that will be withheld from, or the misinformation that will be provided to, the participants:**
Instead of telling participants that our software system will be crafting the stories that they experience, we will say that a group of university students created the stories.

2.0   **Provide a rationale for withholding information:**
We wish to avoid any bias due to the novelty of software systems that can dynamically adapt stories to their players.

3.0   **Indicate how and when participants will be informed of the concealment and/or deception. Describe the plans for debriefing the participants. Indicate when the participants will be debriefed, and describe the nature and extent of debriefing:**
Participants will receive a textual debriefing upon completing their participation, and this debriefing will make clear that a software system was creating the stories that they experienced, as well as explain our rationale for

doing so.

4.0   **Describe the procedure for giving the participants a second opportunity to consent to participate after debriefing. Explain if debriefing and re-consent are not viable:**
It will not be possible for participants to consent to participate after debriefing, as the knowledge they gain during their debriefing will make them unsuitable as test subjects.

5.0   **Indicate how participants may follow-up with researchers to ask questions or obtain information about the study:**
Full contact information (name, phone number, e-mail address) for the principal researcher will be provided to participants during their study session.

5.7 Interviews, Focus Groups, Surveys and Questionnaires

1.0   **Are any of the questions potentially of a sensitive nature?**
○ Yes ◉ **No**

If YES, provide details:

2.0   **If any data were released, could it reasonably place participants at risk of criminal or civil law suits?**
○ Yes ◉ **No**

If YES, provide the justification for including such information in the study:

3.0   **Will you be using audio/video recording equipment and/or other capture of sound or images for the study?**
○ Yes ◉ **No**

If YES, provide details:

6.1 Data Collection

1.0   *** Will the researcher or study team be able to identify any of the participants at any stage of the study?**
◉ **Yes** ○ No

2.0   **Will participants be recruited or their data be collected from Alberta Health Services or Covenant Health or data custodian as defined in the Alberta Health Information Act?**
○ Yes ◉ **No**

Important: Research involving health information must be reviewed by the Health Research Ethics Board.

3.0   **Primary/raw data collected will be** *(check all that apply)***:**
Anonymous - the information **NEVER** had identifiers associated with it (eg anonymous surveys) and risk of identification of individuals is low or very low

4.0   **If this study involves secondary use of data, list all original sources:**
N/A

5.0   **In research where total anonymity and confidentiality is sought but cannot be guaranteed** *(eg. where participants talk in a group)* **how will confidentiality be achieved?**
After participation, each participant's data will be stored securely in a locked lab for a minimum of 5 years.

6.2 Data Identifiers

1.0   *** Personal Identifiers:** will you be collecting - at any time during the study, including recruitment - any of the following *(check all that apply)***:**
Age at time of data collection
Other

If OTHER, please describe:
Gender, Prior experience playing video games (e.g. None at all, 1 hour per week, 5 hours per week, etc.).

2.0   **Will you be collecting - at any time of the study, including recruitment of participants - any of the following** *(check all that apply)***:**
There are no items to display

If OTHER, please describe:

3.0   *** If you are collecting any of the above, provide a comprehensive rationale to explain why it is necessary to collect this information:**
Age, gender, and prior gaming experience are all factors that may bias a player's perception of agency in an interactive story. Collecting this information is necessary to control for any potential biases that may be introduced as a result.

4.0   **If identifying information will be removed at some point, when and how will this be done?**
The only (potentially) identifying information that will be recorded during our study is the age, gender, and prior experience playing video games of each participant. No names or other identifying information will be recorded.

5.0   *** Specify what <u>identifiable</u> information will be RETAINED once data collection is complete, and explain why retention is necessary. Include the retention of master lists that link participant identifiers with de-identified data:**
The age, gender, and prior gaming experience of each player will be retained along with their answers to our survey's questions. Doing so is necessary to perform a (minimally-biased) analysis on the data that we acquire.

6.0   **If applicable, describe your plans to link the data in this study with data associated with other studies (e.g within a data repository) or with data belongong to another organization:**

6.3 Data Confidentiality and Privacy

1.0   *** How will confidentiality of the data be maintained? Describe how the identity of participants will be protected both during and after research.**
All physical data will be stored in a locked computer lab, and all digital data will be stored on a secure file server. Both the lab and the server are managed by the Department of Computing Science. Initially, data will be collected and saved in a Google Docs secure server, and then moved to the department.

2.0   **How will the principal investigator ensure that all study personnel are aware of their responsibilities concerning participants' privacy and the confidentiality of their information?**
As no personally identifiable data concerning our participants is retained, no special privacy training is necessary to have access to the study's data.

3.0   **External Data Access**

* 3.1 Will identifiable data be transferred or made available to persons or agencies outside the research team?
○ Yes ◉ **No**

3.2 If YES, describe in detail what identifiable information will be released, to whom, why they need access, and under what conditions? What safeguards will be used to protect the identity of subjects and the privacy of their data.

3.3 Provide details if identifiable data will be leaving the institution, province, or country *(eg. member of research team is located in another institution or country, etc.)*

6.4 Data Storage, Retention, and Disposal

1.0   *** Describe how research data will be stored, e.g. digital files, hard copies, audio recordings, other. Specify the physical location and how it will be secured to protect confidentiality and privacy.** (For example, study documents must be kept in a locked filing cabinet and computer files are encrypted, etc.)
All physical data will be stored in a locked computer lab, and all digital data will be stored on a secure file server. Both the lab and the server are managed by the Department of Computing Science in Athabasca Hall and the Computing Science Centre.

2.0   *** University policy requires that you keep your data for a minimum of 5 years following completion of the study but there is no limit on data retention. Specify any plans for future use of the data. If the data will become part of a data repository or if this study involves the creation of a research database or registry for future research use, please provide details.**
The data will be retained for the purposes of replicating and verifying our results.

3.0   **If you plan to destroy your data, describe when and how this will be done? Indicate your plans for the destruction of the identifiers at the earliest opportunity consistent with the conduct of the research and/or clinical needs:**

No identifying information will be recorded, and all survey data will be stored securely for five years.

7.1 Documentation

Add documents in this section according to the headers. Use Item 11.0 "Other Documents" for any material not specifically mentioned below.

Sample templates are available in the HERO Home Page in the **Forms and Templates**, or by clicking HERE.

1.0 Recruitment Materials:

Document Name	Version	Date	Description
There are no items to display			

2.0 Letter of Initial Contact:

Document Name	Version	Date	Description
There are no items to display			

3.0 Informed Consent / Information Document(s):

3.1 What is the reading level of the Informed Consent Form(s):
Low

3.2 Informed Consent Form(s)/Information Document(s):

Document Name	Version	Date	Description
Briefing and Consent	History	0.02	25/09/2012 00:31	

4.0 Assent Forms:

Document Name	Version	Date	Description
There are no items to display			

5.0 Questionnaires, Cover Letters, Surveys, Tests, Interview Scripts, etc.:

Document Name	Version	Date	Description
Debriefing	History	0.01	13/09/2012 14:49	
Past Online Survey	History	0.01	13/09/2012 14:48	

6.0 Protocol:

Document Name	Version	Date	Description
There are no items to display			

7.0 Investigator Brochures/Product Monographs (Clinical Applications only)**:**

Document Name	Version	Date	Description
There are no items to display			

8.0 Health Canada No Objection Letter (NOL)**:**

Document Name	Version	Date	Description
There are no items to display			

9.0 Confidentiality Agreement:

Document Name	Version	Date	Description

There are no items to display

10.0   Conflict of Interest:
Document Name   Version   Date   Description
There are no items to display

11.0   Other Documents:
For example, Study Budget, Course Outline, or other documents not mentioned above
Document Name   Version   Date   Description
There are no items to display

Final Page

You have completed your ethics application! Please select "Exit" to go to your study workspace.

This action will NOT SUBMIT the application for review.

Only the Study Investigator can submit an application to the REB by selecting the "SUBMIT STUDY" button in My Activities for this Study ID:Pro00033529.

You may track the ongoing status of this application via the study workspace.

Please contact the REB Administrator with any questions or concerns.

A.6 Alternate Assignment

Alternate Assignment: Judgements of Control

Instructions

Read the research paper "*How Do We Judge Personal Control? Unconfounding Contingency and Reinforcement in Contr[...] Judgments*" by S.C. Thompson et al., and answer the questions below.

Definitions

1) Heuristic:

2) Contingent Situation:

3) Reinforcement:

Short Answer Questions

1) What are two factors that can influence an individual's perception of control?

2) In Alloy and Abramson's llight-onset studies, is reinforcement treated as a dependent variable, or an independent variab[...]

3) The authors describe two ways in which people seem to be prone to judging contingency inaccurately. What are they?

4) According to Arkes & Harkness's findings in1983, what often forms the basis of an individual's judgement of contingency between antecedent and consequent variables?

5) The participants in the authors' experiment ranged from 17 to 26 years of age, with the average age being 18.8 years, a[...] the standard deviation being 1.2 years. What does this information suggest about how many 26-year-olds participated?

6) List six steps of the procedure that the authors used to administer their experiment.

Long Answer Questions

1) In your own words, explain the flaw that the authors identify in Alloy and Abramson's Experiment 1 from 1979. How doe[s] the authors' presented work address the flaw?

2) Considering experimental design described by Table 1, explain why pressing the space bar makes the target appear 2[5%] more often in the High Control (50%), High Reinforcement (70%) condition than it does in the No Control (0%), H[igh] Reinforcement (70%) condition. Why not 27% more often, or 23%?

3) Describe the authors' hypotheses in your own words.

4) The authors state that "[it] appears that under certain conditions of contingency, illusions of control are found." Whi[ch] "certain conditions" are they referring to?

Essay Questions

1) Are Thompson et al.'s findings extensible to the context of video games? Why, or why not?

Essay Questions (continued)

2) Imagine that you're a designer of a commercial video game whose primary focus is to give its players a sense of havi influence over a story. You've already done some development, and you've created enough content to tell a nice, lir story. As nice as it is, however, it doesn't actually provide the player with any opportunity to control how it turns out; ev player gets the same story, no matter what they do. Providing opportunities for players to control stories is expensi because each different thing that can happen in the game requires extra effort to create. Given that people seem overestimate their control even in no-control situations (see Figure 1), would you expect your game to be any better if y did the extra work, and gave players actual opportunities to control the course of the story? Why, or why not?

Appendix B

Story Transcript

The Little Red Riding Hood: An Interactive Version
by
Wayne DeFehr[1] and **Alejandro Ramírez**[2] and **Vadim Bulitko**[2]

B.1   Prologue

B.1.1   Introduction

Cottages dot the woods and meadows around the village. There was the one that Little Red Riding Hood lived in with her mother, and her grandmother's cottage a few miles away. But here and there were other cottages with kids and their families who would make the daily trek to the country school on the hill, following well–worn pathways through woods and open areas, jumping the stones over brooks. In fact, there was an uncle who'd taken Red Riding Hood and her mother under his wing, ever since Red's father died in a hunting accident. He would drop by from time to time to see how they were doing. Red had heard that he was a wise man with special powers, a bard they called him, but she did not believe that. His shoes were worn like anyone's, and his fingernails were dirty most of the time. The tranquility of life in the forest was broken from time to time by the presence of wild life, like bears and wolves, but overall it was a great place to enjoy one's childhood. They would gather sometimes spontaneously at each other's houses for games like hop scotch, hide and seek, and tag.

Just that morning Red Riding Hood's mother had let her go to her friend Justine's family's cottage until lunch, to play with some friends there. Altogether about four or five little kids had showed up. They sometimes had a hard time deciding what to play, although they were all eager to do so, jumping up and down, clapping hands, and excitedly chattering amongst themselves. To an observer, these children seemed like any happy, carefree gang of kids, but the truth was that underneath the happy smiles some strong personalities were beginning to develop. Red had learned over time, that in order to have the most fun, she would have to:

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[1]Department of English and Film Studies, University of Alberta
[2]Department of Computing Science, University of Alberta

B.1.2 Event 1: Fight and confront her friends if necessary to do things her way.

Player type(s): *Fighter*

Generally Red Riding Hood enjoyed playing with her childhood friends, but over time some of them had begun to rub her the wrong way, particularly because a couple of the boys would make fun of her tendency to wear the red hood everywhere she went, in almost any weather. She now wanted to play hide and seek, especially since the woods offered many hiding places in the shadows of the trees, bushes and underbrush, and so when it looked like the group was going to follow Billy's idea of playing hop scotch using a stone he'd found along the pathway, she decided to take matter into her own hands. On impulse she walked quickly up to Billy, and before he quite knew what had happened, she pulled his nose and snatched the stone from his hands and ran off laughing. Billy was one of the bigger kids, and having Little Red Riding Hood pull his nose, grab the stone, and run off laughing did not hurt him physically as much as it hurt his pride, and he set off after her, as fast as his stocky legs could move.

B.1.3 Event 1.A: Little Red decides to attack Billy.

Player type(s): *Fighter*

As Red ran down the pathway into the woods, with Billy in hot pursuit, her mind started racing along as well, quickly trying to figure out what to do next. Unfortunately, before she could decide what to do, the decision was made for her. As luck would have it, her shoe hooked on an outlying tree root. She went flying through the air, at first with the greatest of ease, cape billowing and everything, but then with a lot of pain as she crashed to the ground on her hands and knees. When she noticed that Billy was standing there laughing behind his hands, and that she had torn her red riding hood, that did it. She turned around, and made a terrible scowling face. Her anger helped her ignore the pain shooting up from her scratches and scrapes. Yelling at the top of her lungs, she ran as fast as she could straight at Billy. By the time it registered that he should probably step out of the way it was too late. She head butted him right in his stomach and cleanly knocked the wind out of him.

Who knows what might have happened next, except that their friends came running up the path in short order to find out what was going on, and stood there shocked and amazed at what they saw. Not only was Billy wheezing and trying to catch his breath; not only was Red crying from the scrapes and bruises she'd just received. But even more shocking to the friends, was the tattered condition of Red's riding hood, which they knew was like a second skin to her, and was her most prized possession.

Shocked at what had just happened, and worried about what her mother would say, Red turned without even saying goodbye to her friends, and ran down the path to her home to get her cuts tended to, and then have some lunch with her mother.

B.1.4 Event 2: Renounce to brute force and use only her cunning.

Player type(s): *Tactician*

Red Riding Hood was quite a hale and healthy girl from spending so much time in the woods exploring with her friends outside of her cottage, but she still hadn't grown to be as big as most of the boys, particularly Billy, who was insisting on playing tag, even though she herself preferred to play hide and seek. She enjoyed that game, especially when they could venture part way into the woods, and off the beaten path, to hide under bushes and climb up trees, while her friends looked for her without any chance of finding her. She had to be quick on her feet. Challenging Billy directly would not work, she realized, since she and her friends mostly did whatever he suggested. So instead, she decided to run around, behind her friend's house, to see if any of the gang would decide to follow her. And sure enough, just as she crouched down under a wheel barrow leaning against the cottage, two of the girls with whom she was close friends came running past, with the other two, including Billy, following along shortly after. They first ran part way down the path into the woods before she playfully called out from behind her hiding place, causing them to stop in their tracks, turn around and run back, with still no idea where she was hiding.

After a few minutes, no one succeeded in finding her, reason why Little Red eventually got exasperated and started yelling at her friends passing by. After the first round of the game, however, Little Red was still in the mood for more playing; her friends were having second thoughts and gathered to think about it, but Red decided to go hide again, even if they would not follow.

B.1.5 Event 2.A: Red continues to keep the game under her command by deceiving everyone.

Player type(s): *Tactician*

When Red saw that her friends had come back up the path toward the house, but still could not find her behind the wheelbarrow, she decided to continue the game by not coming out from her hiding place. She realized that now she controlled the game they were playing, and that she was doing so in the simplest of ways: by doing nothing. They called her name from where they stood, only a few meters from the wheelbarrow. Red smiled to herself, but remained stock still.

One of them suggested they stand still to see if they could hear anything, and that's when Red took a stone from where she was crouching, and threw it, under-handed, as hard as she could, toward one of the bushes not too far from where they were all standing. When they ran to investigate the sound of the rustling bush, where the stone had hit the branches and leaves, she crawled out from her hiding place and ran the opposite direction, so that she was now in the front of the house, sitting on the white chair beside the lawn ornament, enjoying the sunshine, and stretching out her cramped legs. It seemed as though her friends were getting bored with looking for Red, but also worried about what happened to her, judging from how they were talking with each other. She could hear ... Billy even mentioned the awful possibility that she might have been eaten by a big scary wolf that had been

sighted in the area, and that they had all taken to calling "Henry." So when they rounded the corner of the cottage, and saw Red calmly sitting there, they were very amazed at how clever she was. They excitedly asked where she'd been hiding all this time, and she decided not to tell them, so she could use that hiding place again the next time she needed to get them to play hide and seek with her.

At just that moment, she could hear her mother calling out in the distance that it was time for lunch. Red said goodbye to her friends, and quickly hopped and skipped her way back home. She savored the memory of her clever trick and looked forward to the hot soup and fresh baking her mother had prepared for lunch.

B.1.6 Event 3: Daydream about quests in magical worlds with big rewards.

Player type(s): *Power Gamer*

One of the reasons why Red Riding Hood's mother was always warning her against getting side tracked while running errands was because of her tendency to go off day dreaming and forget where she was at the time. That's actually why Red loved the red riding hood. With this cloak around her shoulders and covering her head, she could settle back and enter some other world with little difficulty, quickly populating it with fairies, pixies, gnomes and elves, who were flitting through the air and tumbling in the grass playing games. In fact, it was not that she didn't like the group of children she called her friends; it's just that she sometimes preferred to be alone, having fun with her own imagination.

Her friends were often too loud and rough, while she preferred things to be quiet and gentle. And this explains what happened just now. Since Red didn't like the energetic games like tag and hop scotch, her friends often suggested hide and seek so she would at least play with them. They knew she loved this game the best because she often found impossible hiding places where she could remain still for as long as she wanted, while her mind wandered off along the paths that her imagination created for her. She also enjoyed very much thinking about quests, expeditions and magic items she could collect on those magic worlds her imagination created. For example, she had once heard about some magic beans that would sprout a magic beanstalk, leading to the skies, were castles guarded by giants awaited with treasures to be claimed and innocents to be rescued.

B.1.7 Event 3.A: Little Red agrees to play but she keeps on daydreaming about her quests and treasures.

Player type(s): *Power Gamer*

Billy volunteered to be the Seeker, and so everyone scattered in different directions. Red hesitated for a moment, and then ran to a place she'd noticed while walking to her friend's house this morning. A soft bed of dark green grass grew at the foot of an old tree, which was still standing straight enough despite having a part of the trunk hollowed out. The hollow part of the tree was just big enough for her to fit into, if she folded her legs up into her red riding hood. As she settled in, she felt she could stay here for hours, watching the rabbits and robins, running

and flitting past. She was about to lean her head back and close her eyes, when she noticed a couple of brightly colored flowers growing right against the tree trunk. She couldn't resist plucking one and, bringing it close to her nose, inhaled deeply to take in the sweet scent of the petals. Just one smell was enough.

Red was wafted gently to her favorite world, far away from her loud friends, populated with sprites and elves and shimmering fairies. She was now a warrior princess in a quest for honour and an immense fortune that had been captured by a fire–breathing dragon. With silver armor and now armed with a sword, she was wondering what it would be like to live such an adventure, to become a heroine praised by everyone, while collecting treasures and powerful magical gadgets.

As it happened, none of her friends did find her, and if they worried about her whereabouts she wouldn't know. Because as she was lost in a reverie, she realized that she herself was feeling hunger pangs and that her own stomach was making funny gurgling sounds. So with that she crawled out of her nook in the tree, stretched briefly, and began walking down the path toward home, and some of her mother's freshly made lunch.

B.1.8 Event 4: Assume her identity and inspire her friends to follow her.

Player type(s): *Method Actor*

Although Red Riding Hood was one of the youngest of the group of friends that gathered to play, sometimes they followed what she said, if sometimes grudgingly. This leadership role had gradually been granted her primarily because of the one bright item of clothing she nearly always wore, and which many of them envied even if they were not prepared to admit as much consciously. Was it because of the swoosh logo placed discreetly on the back? Or was it because of the deep red colour, or the quality of the fabric? Whatever it was, they all realized that the red riding hood she wore was really cool. She'd gotten it one birthday from her uncle, the wise man who lived in the nearby village, and ever since she'd felt a sense of confidence that set her apart from her mates. She carried herself more erectly, walked with a firm gait, and spoke with a clear authoritative voice when talking about the wolves in the forest or the quickest pathway to the village.

So now, this morning, when Red declared that they would play hide and seek, and that Billy would take the first turn at being the Seeker, they really didn't waste any time disagreeing. She usually got her way in any case, and in a few moments they were all scattering across the clearing from her friend's house, with Billy counting to one hundred, without really considering too carefully whether they wanted to do this or not, making some of them starting to discuss upon the matter.

B.1.9 Event 4.A: Little Red continues leading her friends and gives them a reprimand for not following.

Player type(s): *Method Actor*

They were only part way into Billy's turn, when Red noticed that a couple of her friends were not following the new rules that she had made for their game, the last

time they'd played. This would not do. She immediately popped out from her own hiding place, walked briskly to the grass in front of her friend's house, and called everyone to her. Some might call her bossy, but friends were happy with someone in their group taking charge. They all stopped and came over right away. There was some playful pushing as they ran up, but Red gave them a stern look and they settled down. The new rule, she reminded them, was that there could actually be more than one home base to which they could run to avoid being caught by the Seeker, and did anyone remember that? Now that she mentioned it, a couple of them did remember her saying this, but of course, trust Billy, he couldn't recall her having made up this rule at all. At this news, Red rolled her eyes, straightened her red riding hood, and standing just a little bit taller, went over the rule in detail for Billy's benefit. But she was only partly peeved at Billy. The truth was that she also loved being in this position. She could make up the rules, and then also enforce them, and that's really what made games like hide and seek fun. Having more than one home base certainly helped compensate for her being younger and smaller than the others, since she could run to the one closest to her to avoid getting caught, instead of having to race against the other kids toward home, which she always lost.

But just as she was in the middle of teaching them how to play hide and seek in the only way that was really fun, she was somewhat annoyed to find herself interrupted by Justine's mother poking her head out the window and telling her daughter that it was time for lunch. Everyone went their separate ways, after saying quick goodbyes. As Red was walking briskly home to devour the food her own mother will have prepared, she thought to herself that she'd likely have to tell them the rules again the next time they played, because they could never remember from one time to the next.

B.1.10   Event 5: Charm and amaze her friends with old folk stories.

Player type(s): *Storyteller*

Red Riding Hood did like to run and play with her friends like most kids do, but she was also beginning to enjoy telling stories for them as well, usually after they were a little tired from playing a game like hide and seek. And her red riding hood seemed to help her. It wasn't so much the hood that she liked, but the one pocket across the front. Somehow once her hands clasped together in this pocket, she was well underway with joining the story together, one sentence at a time.

Her friends would sprawl on the grass in front of a friend's house, with cheeks rosy from running and screaming with laughter, drinking lemonade that someone's mother had made. Some would stare up at the clouds and others would watch ants conquering a clump of dirt. At times like this, one of her friends would ask her to tell a story, and she would willingly oblige, beginning hesitantly at first, and then after someone would ask what happened next, or another would laugh at some little joke, she would talk more quickly as the words and images came to her. It was never good enough to tell a story just as she'd been told it. Better to embellish and add personal touches of her own, and it certainly didn't matter to any of her friends that most of her stories couldn't actually happen.

If they asked her today, she knew just the story she'd tell. It was from her uncle, a wise man from the village. The other day he had been visiting at her and her

mother's cottage, and had told an old folk story. Just as she hoped, two of her friends asked her to tell a story to pass the time, and even Billy who was a little older than the rest said he felt like one of her stories as well.

B.1.11 Event 5.A: Little Red continues telling the story.

Player type(s): *Storyteller*

Finishing her lemonade, and staring into the woods that bordered her friend's cottage, she put both hands together in her red riding hood as was becoming her story–telling habit. And sure enough, a fanciful story came to her. In her story, a wolf, whom she called Henry, was out looking for adventure one day, even though his mother had told him to stay close to home, because hunting season was upon them, and fire breathing hunters were everywhere. It was a lovely summer morning, much like the one they were enjoying, and Henry the Wolf smelled wonderful odors from his very sensitive nose and was starting to feel hungry like a, well, like a wolf. In Red's story a wolf could climb trees and was fluent in English, but what her friends liked the best was that by opening his mouth super wide he could eat creatures, including humans, he didn't care, in one gulp, without even having to bite into them.

But wouldn't you know it, no sooner had Henry's mom turned to go inside, off he flew along the pathway, to track down a very interesting smell, which seemed to involve not only some baking coming from a warm basket but also a little girl carrying it. Red could not help but get Henry to climb a tree at this point, which all the kids thought was wonderful. And from his perch Henry could see someone carrying a basket full of baking, sure enough. He used his opposable thumbs to swing down from the tree, and then ran down the path in the direction of the terrific smell.

All this talk about fresh food and enticing smells was really catching everyone's attention, but it was also making their mouths water, and their empty stomachs begin to grumble as they imagined the wolf following his nose to the girl with the fresh baking. Ironically, it was because they enjoyed the story so much, and were so deeply immersed in what was happening, that they asked her to stop, or at least to pause the story right where it was, because they decided it would be best for them all to run home to get some food of their own, since it was almost lunch time anyway. Red walked happily home, thinking of telling her mother about the story she told her friends, and how she loved telling them stories much like their uncle.

B.2 Main Quest

B.2.1 Event M.1: Red leaves home.

Player type(s): *All*

It was a sunny and breezy day, perfect for running an errand outdoors. Red's mother realized that Red was already old enough to help out with chores. This afternoon, her mother thought, she would send her to visit Red's grandmother and give her some food she had prepared. But because her grandmother's cottage was

some distance far away, Red would have to leave now, without finishing all of her lunch, if she wanted to get there and back in time for supper.

– Come, Little Red, here is a basket full of goodies. Take them to your Grandma. Although she still has some fight in her, she's come down with the flu, and is spending the day in bed. These treats will do her good. Do not run off the path, or you may fall and ruin the basket of goodies, and then your Grandma will get nothing ... and you know we do not want Granny to feel both sick and mad at you!

– Yes mom, I will take great care and will avoid any distraction – and so she rushed to grab the basket and headed out wearing her favourite red riding hood.

– Also, don't eat anything from the basket! – warned her mother while she called her to kiss her goodbye.

As soon as she got out the door, the fresh air and the feeling of freedom immediately tempted her to do other things. Getting to her grandma's place would take a while anyway, since she lived out in the woods, half a league from the village. And since Red had had to rush her lunch, there hadn't been time to eat everything, and from the feeling of her stomach, Red could tell she was still a little hungry.

B.2.2   Event M.2: Wolf sees Red and decides to follow her.

Player type(s): *All*

Little Red ventured in the forest, feeling hungrier as she went. All she could think about was food, and she kept her ears extra sharp to pick out the babbling sound of the spring that ran nearby and any other potential danger: after all, this was the first time she was doing such a thing by herself, and even if she knew the path she was a little overwhelmed. It is a good thing she was listening closely, or she would have never heard the rustling leaves coming from the trees above her. She looked up to see a large shadowy creature frantically jumping from branch to branch and looking at her in a mysterious and sinister way. Unfortunately for Little Red, the effort she exerted looking to the treetops loosed something in her belly, and she let out a tremendous belch that echoed through the whole forest. The creature descended the tree slowly and carefully, approaching her with a phony smile.

– You seem hungry, my dear. May I offer you something to eat? – Inquired the creature in a very friendly tone.

Little Red was suspicious, as she remembered that she had been told not to talk to strangers.

– Only wolves in folk tales can climb trees– she noted– what were you doing up there? – Ah, that would be because I am a very particular fellow. I enjoy the outdoors as much as you do and love to climb up trees to get a nice view and look for fresh meat... I mean, friends!–

Seeing that she still doubted about him, he continued trying to persuade her that he was a good–intentioned animal.

– It is OK, I mean you no harm: my name is Henry the Wolf, and I am a friendly inhabitant of this beautiful forest.

After saying this he gave her a shiny apple, trying to conceal his sinister grin as well as he could. Red then realized just how big this wolf was, but of course, she was unaware of his wickedness, and was not at all afraid of him. In his cunning

head he was already planning on eating Red as he was hungry and evil, and he had no respect for other creatures in the forest.

B.2.3 Event M.3 : Red tells Henry the Wolf about her quest to Grandma's cottage.

Player type(s): *All*

Henry the Wolf wanted to know more about Little Red to continue plotting his evil deeds. Knowing she was only an innocent and gullible child, and that she saw him now as a friend, he tried to have a conversation with her.

– So, please do tell me little one, where are you headed to on such a fine day as today? You know, you ought to be careful; this forest is full of dangerous creatures who do not care for others as much as I do. After all, I am an innocent animal of good intentions and would like to be your friend.

Hesitant, Little Red felt this creature was hiding something from her; however, her kind nature and spirit, as well as her anxiety since she had never wandered into this part of the woods, caused her to set aside her doubts about the wolf's intentions. After all, he had just given her food a few minutes ago and shown compassion, reason why she felt obliged to act politely.

– Oh Mr Henry the Wolf– she replied– I am but a little girl on my way to visit my poor sick Grandma. She has fallen ill and my kind mom has prepared this basket full of goodies. She lives past the river near the lake, in a beautiful cottage. I cannot stay and talk for too long as she needs my company and my mom told me not to get distracted; I beg your pardon, but I must leave now. I will be forever in your debt for this kind gift.

As soon as she curtsied with her dress bidding farewell to her new friend, Henry the Wolf felt anxious; his plan was falling apart.

– Mind if I accompany you my lady? A girl should not be wandering in the forest alone– he said with glowing eyes.

– I would rather go by myself, if you do not mind. And again, I must leave now– Little Red exclaimed in an angry tone and started walking away. Henry the Wolf refused to be deprived of a good banquet, and so he started following Little Red, sneaking behind the trees.

B.2.4 Event M.4: Henry the Wolf sets up a trap for Little Red outside the cottage.

Player type(s): *All*

Little Red was approaching the cottage of her grandmother and she was in a very good mood. After all, she did not have to worry about that mysterious creature any longer. From afar, everything looked as she had always remembered it: the nice house in the middle of the tall brown trees, and the soft whisper of the wind blowing from the forest to the lake. The house was tidy and beautiful, with a splendid garden of roses in the front and smoke rising from the chimney.

Next to the lake and sitting on a bench, Red could see Grandma's silhouette, as she peacefully stared at the leaves gently floating on the water.

She approached her, skipping and calling out her name. Grandma did not move or react in any way; she was wearing a bonnet and her robes, but Little Red noticed something unusual about her and the way that she was coughing. She blamed the illness as the culprit for her odd behaviour, and also for the weird look.

– Grandma, Grandma! It is me, Red. I have come to visit you as my mom told me you were sick and with influenza, and she has prepared a basket full of delicious goodies.

Grandma did not respond. She remained silent and appeared to be lost in thought. Little Red started talking again, but to no avail– Grandma was acting unusually absent–minded.

– Thank you very much my dear, but I am not in the mood for your mom's cooking today. I fancy something more fresh and tender.

– Grandma, you do sound funny today... Is everything alright? – inquired Little Red.

– I am alright my child, it is just the cold I have caught that makes me speak funny, and now I am also tired and hungry.

– But Grandma, what a big pair of ears you have!

– The better to eavesdrop with, my dear. My neighbours do have interesting conversations from time to time and it is a nice form of entertainment.

– But Grandma, what a big nose you have!

– The better to know when something on the stove is on fire, my dear. You know, insurance is so expensive nowadays that I do not want to pay it any longer; besides, it runs in the family.

– But Grandma, what a big mouth have!

– Oh, I have grown tired of this game! The better to eat you with, my dear. And it turned out that Henry the Wolf had been hiding disguised as Grandma; he opened his mouth big and wide, and swallowed her whole so fast that she had no time to react.

B.2.5   Event M.5: Henry the Wolf breaks into the cottage while Grandma sleeps.

Player type(s): *All*

Henry the Wolf then went into Grandma's house as his stomach was still rumbling with hunger. He opened the door quietly and went directly to her chambers, where she was completely asleep and unaware of the heinous act that this foul beast was about to commit. As Henry the Wolf did not want to wake her up, he was tiptoeing and moving as quietly as he could, barely breathing. Just as he was about to grab and eat her, a bird crashed into the window and woke her up immediately.

– What is happening? Who is there? Is it my little granddaughter who comes to bring me some goodies from her mom? – inquired the old lady.

She was confused as she had just woken up. She was looking for her glasses on the nightstand but she was not able to find them, all she could see was a shadowy figure. Henry the Wolf, clever as he was, started imitating Little Red.

– Oh, forgive me Grandma. I am such a clumsy girl! I left the food in the kitchen and wanted to give you a surprise while you were sleeping by cleaning up your room.– stated Henry the Wolf with a squeaky voice and very stiff gestures.

– Little Red? Dear, you have grown up quickly since last time I saw you; not to mention you seem to be getting very hairy... and particularly muscular. Oh dear... I need my glasses. Are you sure it is you?

– Yes Grandma, it is just that I have been working out and running too much lately– said Henry the Wolf hesitantly.

– Are you hungry dear?

– Yes! That is why I am going to eat you!– and after saying this, he jumped at her and ate her whole, not even leaving time for Grandma to react. After his meal, Henry the Wolf was feeling tired, so he went outside to bask in the sun.

B.2.6   Event M.6: Garry the Huntsman finds Wolf/Grendel in his sleep.

Player type(s): *All*

Henry the Wolf was very sleepy after eating so much. He decided to lie down under a tree to take a short nap. He quickly fell asleep and started snoring very loudly; after all, having such a feast would have been made anyone drift off to sleep.

Garry the Huntsman, who happened to be in the woods looking for game less than a league away, heard the loud noise of the wolf snoring. Maybe, he thought to himself, whatever is making that noise is a big bear, with sufficient meat to be worthy of my impressive huntsman skills. He was really looking forward to a good day of hunting. He wandered the woods, trying to locate the source of the noise. As he got closer to where the wolf was napping he was horrified to realize that the noise that he was hearing was actually that of some snoring creature. And with the racket the wolf was making, Garry thought that for sure this dreadful noise had to be coming from a monster fallen asleep in the midst of a normally peaceful forest. This thought inspired him onward, giving him yet another reason to find the beast and protect innocent people from it.

After walking for a while, he could finally see Grandma's house in the distance and from afar he could make out a big silhouette snoring and apparently asleep under the shadow of a big oak tree. The belly of the creature was particularly bloated, Garry the Huntsman noticed that the creature was indeed enormous, and the worst came to mind when he noticed somebody had broken into the house. He was determined to kill the creature, and so he planned his attack carefully: he would sneak up from behind the tree and surprise the creature in its sleep.

Garry the Huntsman approached the tree silently, avoiding any branch or dry leaves that could make a sound. He was indeed very nervous, as the creature seemed to be bigger and stronger the closer he got. As he drew closer to the sleeping beast he inadvertently tripped and fell, making a lot of noise. He feared the worst, but luckily for him, Henry the Wolf's snoring rattled over the sound of him tripping, and Henry remained asleep. Finally stepping out from behind the tree, Garry killed Henry the Wolf.

The huntsman was astonished to notice something was still moving and crying for help inside the belly of the dead monster. He decided to cut it open it, to rescue whomever was inside.

B.2.7 Event M.7: The Hunter rescues Red from Grendel/Wolf's belly.

Player type(s): *All*

To Garry the Huntsman's great amazement, a hand came out from the inside of the beast. It was a smaller hand, that of a desperate child struggling to see the light again. The ranger helped her out; she seemed confused and completely disoriented. Garry the Huntsman was awestruck, as he was not expecting something like this to happen–and even more deplorably– to such a fair and innocent creature, devoured by such a soulless monster.

– Thank you very much for rescuing me, kind sir.– said Little Red with a smile of joy on her face– I was fearing I was not going to be able to escape from that terrible monster, and that I was not going to be able to see my mom and grandma again– said Little Red.

– Fear not my child, as this creature will do you no more harm; you are now free to go back home. This once peaceful forest is now home to a wide variety of strange creatures who hunger for victims and treasures; you must exit the woods before the night falls. Be hasty then, and run back from whence you came.

– Thanks again for your advice good sir, but before leaving I must first spend some quality time with my beautiful Grandma and give her the basket of goodies I was sent to give her. Luckily, it seems the beast did not eat any of it.

B.2.8 Event M.8: Grandma goes berserk.

Player type(s): *All*

The stomach of the creature was still moving and a big person seemed to be trapped inside. The ranger helped her with great effort to come out of Henry the Wolf as she could barely move while in his stomach. After she stepped out, Garry the Huntsman was confronted by an elderly person in rage, flailing her arms frantically, and in one of those movements, she hit his head so hard that she knocked him off his feet.

– You should be ashamed of yourself, treating an old lady like this! Wait until I get my hands on you, you little villains. Where is my cane? I will hit you so hard you will not try to tease old people ever again in your life.– she continued shouting frantically.

Without warning, she grabbed a log that was lying down next to the tree, and started chasing the once mighty ranger. He was in shock and running in circles around the tree, trying to escape from the infuriated and now armed lady. He was running as fast as he could, trying at the same time to calm her down.

– Please my lady, if you will just listen for a moment! I was the one who rescued you from the belly of the beast that had eaten you, I had nothing to do with this.– said the ranger, barely being able to catch his breath– Could we please at least have a peaceful conversation?

Alas, Grandma's stamina appeared, if anything, increased with each passing moment, until, luckily for the huntsman, she remembered about her granddaughter and wanted to make sure that she was alright.

B.2.9 Event M.9: Little Red gives Grandma a Basket full of goodies.

Player type(s): *All*

After this amazing set of episodes and all the action that had transpired, Grandma, Little Red, and Garry the Huntsman all went to share the food that Little Red had brought, having lots of laughs and a nice conversation, as Grandma was now feeling a lot better. As a token of gratitude, Grandma gave him a beautiful quilt that she had sewn herself; then he bade her and Little Red farewell.

Little Red and Grandma went inside and finished the rest of basket, as it was still nice and warm. Both sat down at the table and had a good time for hours, until Little Red was ready to go back home to her mother who was impatiently waiting for her; she was not going to believe the adventurous day she had had!

Little Red waved Grandma goodbye and went singing her favourite tunes, as always in the mood for adventure. When she finally got home, her mother received her with open arms and a huge smile.

They both lived happily ever after, far away from harm's way.

B.3 Ruptures

B.3.1 Story type 1

Rupture I: A bard persuades Henry the Wolf to change his ways.

Player type(s): *All*

Sneaking behind the trees, Henry the Wolf was lurking and following Little Red to see where she was heading. His hunger for her only increased with each second, and he was drooling and fantasizing about the feast he would get to have later. Little Red was crossing a small bridge to get to the other side of the river, cheerfully singing songs since she had forgotten her mother's advice to be extra careful in the forest. She was completely unaware of the danger that was following her from within the shadows.

When she began crossing the bridge, Henry the Wolf saw the perfect opportunity to ambush her on the other side and eat her. He could not wait, for his hunger was driving him mad and would not be able to carry on with his plan for much longer. Henry the Wolf then took a huge leap in the air, landing in front of Little Red. Growing in size and with a terrifying gaze, he seemed invincible. He opened his mouth and showed his forked tongue and sharp teeth. Little Red was completely taken by surprise, and she did not know what to do. She flung her arms up to protect herself, and waited for the worst.

All of a sudden, a sweet and hypnotizing melody came from nowhere, rendering Henry the Wolf unable to do any harm. He stood completely still and calm, as if he was being hypnotized. Little Red was surprised and felt instantly relieved, as her life had been spared by some wizardry far beyond her comprehension. Coming from behind some trees, the figure of a tall, handsome man appeared, playing what seemed to be a flute; not any flute however, for it was an elvish flute of ancient times, known to pacify the hearts of even the most evil beings.

Both Little Red and Henry the Wolf–still frozen–stared at him, mesmerizedby the most beautiful song they had ever indulged their senses with. The man stepped out from the shade and introduced himself.

– Henry the Wolf, what you were planning to do was evil; can't you see this little girl has a heart full of goodness and charity? She means no harm to anyone. I am an elf of the woods and I have come to soften your heart and save this little girl from a fate that is not hers. Can't you see, Henry the Wolf, that she is young and innocent? That a better life awaits should you abandon your evil ways?

The monster, surprised to be called by his name by a total stranger, felt in his heart a sense of goodness and compassion for his would–be victim; he started crying and apologized for his plans, and he swore never to do harm to any other creature of the forest. Henry the Wolf hugged Little Red and thanked the elf, vanishing in between the trees. Little Red smiled at the elf, who replied with a smile and disappeared in the same mysterious way he had appeared. She then proceeded.

Rupture II: Henry the Wolf meets a benevolent fairy.

Player type(s): *All*

Henry the Wolf was still walking in the woods, after having that life changing experience. All of a sudden, his attention was drawn by a glowing light that was coming from some bushes nearby. He approached the bushes carefully, as the colours of the light were beautiful and mesmerizing. As he got closer to the light source, he was able to observe a fair creature and hear laughing and singing in a very mellifluous voice; he thought there must be no words that could do justice to the beauty of this being, and he was right. She looked like a little person, hiding behind the bushes and barely moving in a playful stance. Despite having never seen something like this before, Henry the Wolf knew this must be a benevolent Fairy. She turned towards him and with a beautiful voice began speaking to him, just after waving her wand and removing all traces of evil and fear from his heart.

– You must be Henry the Wolf, as I have seen you in the forest preying on the innocent, and have heard your name called by the bard.–said Fairy while laughing and smiling– You have done well, my child, as these woods are no longer what they used to be, and a great danger draws near. Do not allow the evil back into you; it is a good thing that your heart is now pure and gentle, and that you let Little Red go free. It has been said that this forest is inhabited by a big mean creature named Grendel, whose heart is black and compassion is nonexistent. While I have defended many creatures in the past using my magical powers, I have now depleted them and I need to go back home.

Henry the Wolf was still having a hard time trying to understand what was going on. Befuddled by the strange, mystic creature before him, he asked a question.

– Where is home? Home... –replied Fairy again with playful laughter– Home is far away my dearest friend. For us, home is where the heart lives. After parting this world, we magical beings spend eternity in the warmest corner of our memories, repeating it forever in a bliss of the senses and total satisfaction of the soul. All beings, whether magical or not, have that place and moment in their memory, for which they would give everything just to relive once more. And with these words, the kissed him on the forehead and started fading with the light that lured him in

the first place. Henry the Wolf decided to move on with his new life, now with a feeling of happiness and determination that he simply could not explain. Before completely disappearing, Fairy asked Henry the Wolf if he wanted to come with her, to which he agreed and both left together to a better place.

Rupture III: A wizard saves Red from Grendel.

Player type(s): *All*

Little Red was very close to the cottage, being just a few steps away from her Grandma's house. As a matter of fact, she was so close she forgot what she was doing, and decided to take a longer way around through a nearby bamboo tunnel, just for fun. Once her mind was made, she went cheerfully playing in the tunnel, not noticing that it was getting darker and smaller with each passing moment. Little did she know that she was walking directly into a trap set by Grendel and his magic powers; he had being planning this quite for a while.

Without warning, the tunnel closed around her, and although she was running back looking for the exit, it seemed like it had been shut. She was trapped and fell into despair. After a few moments, she heard a deep, powerful voice coming from all directions, being unable to look directly at the source of such evil. A dark shade was approaching and she was shivering.

– Little Red, you might have escaped the others, but now you will suffer me and my powers, for I am Grendel the wizard.

The shadow grew in size and approached from the east; the place was very dark indeed but she was able to distinguish the creature's fiery eyes coming in her direction. When she thought everything was lost, she took cover and closed her eyes. Suddenly, a beam of white light came from the other direction and hit the creature, instantly freezing it and bringing light in the once enclosed and scary setting in which Little Red was trapped. When Little Red opened her eyes, she was now in the open, standing just in front of a bearded man with a pointy hat and a frozen Grendel as well. With a soothing voice, the man, who happened to be another wizard, comforted her.

– Now then, what is a young girl like you doing wandering in such a perilous forest like this? – said the wizard.

– I am on a quest to give my Grandma some goodies as she is now weak and ill. What is your name? – she asked, still trembling, with the hope that getting a name would somehow reassure her that she was now safe.

– My name? I have no name.– quickly answered the wizard– I have been called by your folk a name though: Greyhame at your service– said he, while bowing to the young girl with a friendly smile– I was looking for this evil wizard werewolf and found it just in time to save you my dear. I would insist in accompanying you, but alas I cannot– I must take this prisoner to where he belongs. I have called my friend the huntsman who will protect you from now on.

Both started walking and heading west, where they meet the Garry the Huntsman. The huntsman told her that he was good friends with his Grandma and that he was going to accompany her to her destination, and so they did.

B.3.2   Story type 2

Rupture A: A bard saves Little Red from Henry the Wolf.

Player type(s): *All*

Sneaking behind the trees, Henry the Wolf was lurking and following Little Red from afar: he had decided to hide so that he could surprise her. His hunger for her only increased with each second, and he was drooling and fantasizing about the feast he would get to have later. Little Red was crossing a small bridge to get to the other side of the river.

When she began crossing the bridge, Henry the Wolf saw the perfect opportunity to ambush her on the other side and eat her. He could not wait, for his hunger was driving him mad and would not be able to carry on with his plan for much longer. Henry the Wolf then took a huge leap in the air, landing in front of Little Red. Growing in size and with a terrifying gaze, he seemed invincible. He opened his mouth and showed his forked tongue and sharp teeth. Little Red was completely taken by surprise, and she did not know what to do. She flung her arms up to protect herself, and waited for the worst.

All of a sudden, a sweet and hypnotizing melody came from nowhere, rendering Henry the Wolf unable to do any harm. He stood completely still and calm, as if he were being hypnotized. Little Red was surprised and felt instantly relieved, as her life had been spared by some wizardry far beyond her comprehension. Coming from behind some trees, the figure of a tall, handsome man appeared, playing what seemed to be a flute; not any flute however, for it was an elvish flute of ancient times, known to pacify the hearts of even the most evil beings. Red did not realize it, but this figure was actually her uncle the bard, who was always on the look out for her safety and well–being.

Both Little Red and Henry the Wolf– still frozen– stared at him, mesmerized by the most beautiful song they had ever intoxicated their senses with. The man stepped out from the shade and introduced himself.

– Henry the Wolf, what you were planning to do was evil; can't you see this little girl has a heart full of goodness and charity? She means no harm to anyone. I am an elf of the woods and I have come to soften your heart and save this little girl from a fate that is not hers. Can't you see, Henry the Wolf, that she is young and innocent? That a better life awaits should you abandon your evil ways?

The wolf, surprised to hear his name, felt in his heart a sense of goodness and compassion for his would–be victim; he started crying and apologized for his plans, and he swore never to do harm to any other creature of the forest. Henry the Wolf hugged Little Red and thanked the elf, vanishing in between the trees: now, Red and the wolf were friends. Little Red smiled at the elf, who replied with a smile and disappeared in the same mysterious way he had appeared.

Rupture B: A Benevolent Fairy puts a spell on Wolf to save Red.

Player type(s): *All*

Henry the Wolf was absolutely determined to follow Little Red and eat her no matter what. He had enough distractions for a day and he was also in a very foul

mood, probably because now he was feeling dreadfully hungry, and of course, tired.

He soon spotted a well, which was very convenient given that he was also thirsty. He approached it, and as soon as he looked down the opening, he was startled by a sudden light that made him go blind for a few seconds. The well was the home of a magical fairy, who had the gift of omniscience and thus knew about wolf and Little Red.

– Ah! My eyes. They burn! – complained the wolf frantically – who is there and why am I being attacked?

– Fear not, dear friend. I have come to save you again from your evil plans. I thought you had been persuaded to stay away from that innocent, little girl you want to eat. Tell me – replied the magical fairy, surrounded by a pale blue glow – Why exactly do you want to eat this poor child?

– I am a wolf. A wolf is a carnivore who hunts when hungry. I am hungry. You do the math.

– Ah. But wouldn't you like a nice bowl of veggies instead? I could share a couple of really nice recipes. You see, we fairies take pride in being vegan due to our immense respect for the forest and its inhabitants. If you have ten minutes, I will share a few to die for...

– I don't have time for this! I guess fairies are as good a piece of meat as anything else – interrupted the wolf, and in a burst of rage, he jumped in the air, jaws wide–open, sharp menacing teeth aimed at the fairy.

The fairy, taken by surprise, was barely able to dodge the lunge. Coming back to her senses, while the wolf was still in the air, she took out a magic wand and cursed the wolf with a spell. Henry the Wolf was now a vegan.

Rupture C: Henry the Wolf confronts his mother about being a vegan.

Player type(s): *All*

After Henry had been brought under the spell of the fairy, he could not remember a thing. Other than being victim of an excruciating pain in the head, he had lost most of his memories of the day. He could only remember that he had gone out for food, wandered the forest, and that now he was in the middle of nowhere. He thought he was falling sick, and that it was probably a better idea to go back to his home; however, before going back, he went to the local farmers market and spent good money on vegetables and legumes, provoking laughter and amazement in everyone who witnessed such a thing.

After the pain had disappeared, he was again in a bright mood. From afar, he could see his home, and even his mother sweeping the porch, in what seemed to be an equally good mood. When he finally got home, his mother received him with open arms. After proper salutations, mother wolf asked for the catch of the day to start preparing supper. Perplexed, she could not fathom why on Earth the bag was full of greens and nothing else.

– Henry, my love... is this some sort of sick joke? There is no meat in this bag. – said the mother.

– Mom, I want us to become vegans. We need to kill animals no more. As a matter of fact, I am in the mood for preparing us a delicious mushroom soup.

His mother exploded, weeping endlessly, not only because of what she felt was a distasteful joke, but also because she saw Henry's vegan idea as a disgrace to her family. The lady calmed herself down after a few minutes, and went indoors, prompting Henry to wait for her.

Henry was looking at the trees, mesmerized by the singing of the birds and the smell of the fresh legumes. All of a sudden, he was struck in the face with a purse.

– This hurts me more than it hurts you. If you don't have any reason left under that thick skull of yours, I will have to beat the reason in it – she said, while she continued hitting the defenseless wolf so hard, that she almost managed to bring Henry's mind out from the spell. Henry's determination was stronger.

– No mom, I won't be part of this any more. I am a proud vegan and there is no shame in that. I will make my own decisions from now own, starting by leaving right now and renting a place of my own. I will not eat any more meat; the experience I had today gave me a fresh start.

Henry then packed all his belongings, while another dreadful beast was listening to this conversation and was planning on finishing what Henry did not.

Rupture D: Little Red loses the food basket to Billy.

Player type(s): *All*

Even if the forest seemed a spooky and intimidating place, she was not embracing her mother's advice and was, most of the time, absorbed in her daydreaming and carelessness. She was halfway to her grandmother's cottage, when she suddenly stopped by a creek to drink some water.

She got down to reach for the water when a little pebble hit her on the head, making her fell on her side, and almost render her unconscious. When she had regained her consciousness, she saw a shadow of a small boy approaching her in laughter; it was Billy, who had been following her since she left her mom's place.

– Haha, dork! You didn't see that one coming, did you? – asked Billy – no hard feelings, right? I was not aiming at you, I was aiming at them fairies, you know? I think I can see them hiding behind the trees and mocking me.

– Mocking you? How come? – said Red, getting back on her feet and rubbing her head – You should not be chasing fairies. My uncle has told me that one has to be careful since they can do anything; there are good and bad fairies, you should know, and the evil ones can curse you with a spell. This is not one of your games.

Little Red and Billy started arguing about the existence of fairies, shouting and yelling at each other, in such a high pitch that they were startling all the animals in the forest. At a certain moment, Billy decided to take advantage of his strength and take away her goodie basket; obviously, this was more than she could bear. Red had to think something quick to get her basket back.

Rupture E: A wizard saves Red from Grendel.

Player type(s): *All*

Little Red was very close to the cottage, just a few steps away from her Grandma's house. As a matter of fact, she was so close she thought it couldn't hurt to take a

longer way around and explore a nearby bamboo tunnel, just for fun, before knocking on her Grandma's door. Once her mind was made up, she went cheerfully playing in the tunnel, not noticing that it was getting darker and smaller with each passing moment. Little did she know that she was walking directly into a trap set by Grendel and his magic powers; he had being planning this quite for a while.

Without warning, the tunnel closed around her, and although she was running back looking for the exit, it seemed like it had been shut. She was trapped and fell into despair. After a few moments, she heard a deep, powerful voice coming from all directions, being unable to look directly at the source of such evil. A dark shadow was approaching and she started shivering.

– Little Red, you might have escaped the others, but now you are prisoner of my powers, for I am Grendel the Wizard.

The place was very dark indeed but she was able to distinguish the creature's fiery eyes coming in her direction. When she thought everything was lost, she took cover and closed her eyes. Suddenly, a beam of white light came from the other direction and hit the creature, instantly freezing it and bringing light into the tunnel. When Little Red opened her eyes, she was now in the open, standing just in front of a bearded man with a pointy hat next to the frozen Grendel as well. With a soothing voice, the man, who happened to be a wizard, comforted her.

– Now then, what is a young girl like you doing wandering in such a perilous forest? – said the wizard.

– I am on the way to give my Grandma some goodies as she is now weak and ill. What is your name? – she asked, still trembling, with the hope that getting a name would somehow reassure her that she was finally safe.

– My name? I have no name.– quickly answered the wizard– I have been called by your folk a name though: Greyhame at your service– said he, while bowing to the young girl with a friendly smile– I was looking for this evil werewolf and found it just in time to save you my dear. I would insist in accompanying you, but alas I cannot– I must take this prisoner to where he belongs. I have called my friend the huntsman who will protect you from now on.

Both started walking and heading west, where they met Garry the Huntsman. The huntsman told her that he was good friends with her Grandma and that he was going to accompany her to her destination, and so he did.

B.4   Repairs

B.4.1   Story type 1

Repair I.1: An evil fairy persuades Wolf to go after Red.

Player type(s): *All*

A few minutes after Henry the Wolf had decided to become good, changing his life and dietary habits, a magical being approached him. She was flying gracefully and dropping magic dust all over the place. She looked fair and beautiful, with long wings and beautiful traits that were not easy to overlook; but her heart was rotten with evil and she liked twisting the minds of others for the worse. She was holding a magic wand in one hand and she seemed to be singing in some elvish language that

was not easy to understand for common folk. She noticed Henry the Wolf coming and, having overheard the conversation his conversation with the bard, decided that he had to be turned back to evil.

– Oh, what do we have here? – she said sarcastically to Henry the Wolf who was startled by the unexpected voice–a beast who doesn't like hunting for fresh meat! What a sad thing! Have you had your will and determination torn apart by an elvish bard who plays the flute? You are not a real monster. Monsters eat and prey on other creatures because that is the way the forest is meant to be...

Saying this, and singing a magical song while she waved her wand in the air and sprinkled more dust, she started changing the heart of the beast to rekindle his evil feelings again. After a few seconds, the body of the beast started moving under the spell of the evil Fairy, and he was no longer acting by his own will. He looked befuddled and nauseous; he stared at the Fairy as he slowly gained a broad, sinister grin.

– What happened? I do not remember anything... just... something about...– said the beast, straining to remember–about a child... and... her grandmother, and that I was planning to eat them both.

– Well, your mind does serve you well, my friend, and your will must be carried out. Go do what must be done, my minion; my duty to maintain the true order of the forest is complete. Beware!, this little girl has powerful friends. Use your wisdom and cunning, and may you yet defeat thy opponents!

And saying this, she vanished in the air with an evil laugh. Henry the Wolf remembered where the cottage was, and carried on with his original evil plans, even if he was acting under a spell and against his own will.

Repair II.1: Grendel sees Little Red and deceives her.

Player type(s): *All*

Same as repair C.1 below.

B.4.2   Story type 2

Repair A.1: An evil fairy persuades Wolf to go after Red.

Player type(s): *Storyteller*

A few minutes after Henry the Wolf had decided to become good, changing his life and dietary habits, a magical being approached him. She was flying gracefully and dropping magic dust all over the place. She looked fair and beautiful, with long wings and beautiful traits that were not easy to overlook; but her heart was rotten with evil and she liked twisting the minds of others for the worse. She was holding a magic wand in one hand and she seemed to be singing in some elvish language that was not easy to understand for the common folk. She noticed Henry the Wolf coming and, having overheard his conversation with the bard, decided that he had to be turned back to his original, natural wolf–like state. A wolf shouldn't suddenly become a herbivore, especially with a delicious feast standing before him.

– Oh, what do we have here? – the evil Fairy said sarcastically to Henry the Wolf who was startled by the unexpected voice– a beast who doesn't like hunting

for fresh meat! What a sad thing! Have you had your will and determination torn apart by an elvish bard who plays the flute? You are not a real wolf worth your name. Wolves prey on other creatures because that is the way the forest is meant to be...

Saying this, and singing a magical song while she waved her wand in the air and sprinkled more dust, she started changing the heart of the beast to rekindle his evil feelings again. After a few seconds, the body of the beast started moving under the spell of the evil Fairy, and he was no longer acting by his own will. He looked befuddled and nauseous; he stared at the Fairy as he slowly gained a broad, sinister grin. – What happened? I do not remember anything... just... something about... – said the beast, straining to remember– about a child... and... her grandmother, and that I was planning to eat them both.

– Well, your mind does serve you well, my friend, and your will must be carried out. Go do what must be done, my minion; my duty to maintain the true order of the forest is complete. But beware: this little girl has powerful friends. Use your wisdom and cunning, and may you yet defeat thy opponents!

And saying this, she vanished in the air with an evil laugh. Henry the Wolf remembered where the cottage was, and carried on with his original plans.

Repair A.2: Henry the Wolf wanders the forest and fights a pack of wolves.

Player type(s): *Fighter*

And it so happened that Henry was in a most cheerful mood. After that life–changing experience with Little Red's uncle, he was heading back to his home with a fresh, brand–new perspective on life, and of course, thinking about the dietary habits he would now have to embrace since he had decided to stop eating meat. Whistling and almost frolicking on a well defined path between tall green trees, he was unexpectedly brought to a halt when he heard a sudden cry from what appeared to be a pack of wolves. He was not alone: all this time he had been observed by other wolves that were also following Little Red's trail in hopes of getting something to eat as well. Henry was quite shocked when all of a sudden, he was surrounded by at least five wolves.

– Oh my, look who's here guys! It's little Henry! And he is now a herbivore because he has decided to let his prey go away. What's the matter? – said one who seemed to be the leader of the pack with a cynical laughter – Are you afraid of them humans now, huh?

– I have now been enlightened by the truth. Laugh as much as you want, but I am confident of my decision. I want to showcase my goodness, my inner–self to the world. I have been reborn – replied Henry, still frozen in place by their circling around him.

– You are nothing but a chicken. A wolf–chicken. Did you hear that boys? Henry's got no guts. – and he started clucking and teasing Henry to everyone else's amusement.

Henry started to feel infuriated: his blood was boiling, and what he could only hear inside his head was the voice of his mom and her teachings about the meaning of bravery and courage. That wouldn't do: those wolves were hurting his family's

pride. Suddenly, an herculean strength filled up his veins and his soul. Without much contemplation, he threw himself at the leader, in a vigorous and what seemed to be non–stop fight. With this unprecedented strength, Henry was victorious after a few minutes, beating the leader and driving the others away because they were afraid.

Repossessed by his animal instincts, he was again mad at the world, especially the bard who had gotten him in this foul mood: he was to blame, in Henry's head, as his words, hollow and meaningless, had brought him to shame before other wolves. On top of this unsettling feeling of anguish, he was now hungry, reason why he decided to go back after Red without further ado.

Repair A.3: The bard plots against Henry to get his fur.

Player type(s): *Tactician*

After the bard, Little Red, and Henry had parted ways, Henry went down the road home in a most joyful mood, upright gait, smile on his face, while whistling happy melodies of childhood times his father had taught him. After all, it was without the hint of a doubt a wonderful day; cloudless blue skies, the incipient smell of newly blossomed spring flowers, and what appeared to be a new purpose in life, away from what he now reckoned as the evil ways of his obscure past.

Unaware he was of the danger that was upon him. The bard, it so seemed, had other plans in mind. Even if he saved his niece with a good–intentioned gesture, he was also planning to further profit from this situation – a skilled fighter as himself could have easily taken down the wolf, but he was not planning on presenting such a hideous spectacle to a little girl; besides, he was quick with his thoughts and wanted to lay hands on that beautiful wolf pelt that Henry had, as they are quite valuable.

Behind the trees, the bard was gliding in complete silence, almost like a shadow, hiding in the gust of the wind and the shade of the trees. He could throw himself at Henry, but that was not his way of doing things: gifted with intelligence and pride, he had decided upon leading the wolf intro a trap. He moved faster and anticipated Henry's way. Soon, he reached a big pit in the ground; to lure Henry, he placed a piece of fresh meatloaf he had in his fanny pack and concealed the hole.

Henry, possessing such a sharp nose as he did, was attracted by the smell. In his mind, he was thinking of this as the last indulgence he would give to his carnivore self before a self–imposed fasting on what he loved the most. However, just when he approached to the meatloaf, he fell into the pit, bruising himself and barely surviving the fall, which made him really mad. The bard approached Henry from above.

– Aha! The catch of the day! Nobody escapes from me, you young, gullible wolf – said triumphantly the bard – Now, I will need you to make this easy for both of us. You see, I need your fur, and I don't really want to spoil it...

– This is not fair – interrupted Henry, with some clever plans in mind – I was not given the chance to fight or to reason with you. A bard, such as yourself, should not take pride in such a pitiful display of cowardice. What are you going to tell your friends? That you made me fall into a pit? You will never hear the end of it.

– Fair enough – said the bard, sheathing his dagger – Since I am not planning on fighting you and ruining the pelt, what would you have me do?

– I will ask you a riddle. If you can't answer it correctly, you will let me go. If you do, I will let you take my pelt.

– Alright. Speak creature. I don't have all day – stated the bard in an arrogant tone.

The wolf hesitated for a moment. He knew that if he managed to hurt the bard's pride, he would go unharmed. He gave it a serious thought, but nothing came to mind. The bard grew impatient, and then, when he was about to change his mind, the perfect idea came to him.

– So – said Henry – what living creature goes on four legs in the morning, two in the afternoon, and on three in the evening?

The bard hesitated. Of all the animals he could think of, magical and non–magical, none fitted the description. After a while, he replied in a very upset tone that there were no such animals, to what Henry replied it was "man: crawls on all four as baby, uses two feet in his adulthood, and when old, has a cane to walk with". The bard's pride was hurt, and as quickly and mysteriously as he had appeared, he vanished. Henry felt deceived and humiliated, with a heart so filled up with anger, that he made the choice to go back and take the road, looking for Little Red.

Repair A.4: Little Red loses her hoodie and approaches the wolf village.

Player type(s): *Method Actor*

After the bard, Little Red, and Henry had parted ways, Henry went down the road home in a most joyful mood, upright gait, smile on his face, while whistling happy melodies of childhood times his father had taught him. After all, it was without a hint of doubt a wonderful day; cloudless blue skies, the incipient smell of newly blossomed spring flowers, and what appeared to be a new purpose in life, away from what he now reckoned as the evil ways of his obscure past.

Red, on the other hand, was in a very grim mood. During the event at the bridge, she hadn't noticed that the wind had blown off her precious red hoodie. She burst into tears, and barely managed to see where she was heading: she could only think about her lost garment, how angry her mother would get, and even worse, how badly everyone was going to mock her when she gets back to the village. Confused and exasperated, she didn't notice she was heading to a dangerous part of the forest: the wolf village.

A pack of wolves had been also following Henry and Little Red for a while, since they were also in the mood for fresh food. When they saw little Red approaching their homes, they thought they had been presented with the perfect opportunity to seize her. Unaware of the danger, the child was still sobbing and gasping, until all of a sudden, she was faced with several nightmarish eyes, tall and menacing shadows that circled her.

– Ah boys, finally we have been blessed with some food. – said who appeared to be the wolf leader. – Let's have some lunch.

Little Red had no idea of what was really going on. The wolves were just about to attack when Henry appeared and stopped them.

– You fine gents don't want to eat that! – interrupted Henry.

– How dare you get between a wolf and his prey? – exclaimed the leader – if you don't to want join her, you better give me a good reason.

– Ah, how scarce are good manners nowadays! – answered Henry, in a calm tone – You see, that child is no good for eating. I was about to eat her myself, when the bard, in a very selfless manner, warned me about the terrible spell that this creature has upon her. It is said that whoever eats her will die in agony, because the fairies have bestowed upon her a protection spell.

The wolves listened carefully with their pointy ears upright. The leader, un-movable as always, stood for a moment and then heeded the warning, with the rest following after him. Little Red was thankful for the heroic act of the wolf, rewarding him with a kiss the forehead. The wolf had found the hoodie, and so, he gave it back to her. They parted ways, but the wolf had fallen victim to hunger; smelling the child awoke his appetite, and his good will was overcome by his deep animal instincts. And so, he set off after Red again.

Repair A.5: Henry's mother finds him slacking off and prompts him to go back after Little Red.

Player type(s): *Power Gamer*

And it so happened that Henry was in a very cheerful mood; after that life–changing experience with Little Red's uncle, he was heading back to his home with a fresh, brand–new perspective on life, and of course, thinking about the dietary habits he would now have to embrace since he had decided to stop eating meat. Whistling and almost frolicking on a well defined path in between tall green trees. He approached an opening, a nice hill next to a peaceful creek, and he decided to lie down and daydream for a bit.

When he was just closing his eyes, he was brought back to reality when a purse smacked him on the face. It was his mother, frantically hitting him and shouting unintelligibly, flailing her arms driven by a feeling of shame and rage for her son.

– Why? Why it had to be my son? – said the mother in agony – You have no right to do this to me. A herbivore! The disgrace has fallen upon our family. What's next? Are you going to tell me you are going to leave me alone and join a circus as a freak?

– Mom, please, if I may explain – said Henry, confused and baffled.

– You will explain nothing! Is there any heart down below that thick fur of yours? You want to make me suffer like your father and brother who abandoned me? You don't think about your poor mother at all!

Henry, still unable to comprehend, felt so bad about his mother that he promised her to go after the child and eat her. The lady, manipulative as she was, dried her forced tears with a tissue and promised him a big reward if he were to hunt something: a magic coat that would give him invisibility powers. Her son headed back on his way to catch up with Little Red.

Repair B.1: Henry's mother convinces him to go back after Red.

Player type(s): *Storyteller, Power Gamer, Tactician*

After Henry had been brought under the spell of the fairy, he could not remember a thing. Other than being victim of an excruciating pain in the head, he had lost

most of his memories of the day. He could only remember that he had gone out for food, wandered the forest, and that now he was in the middle of nowhere. He thought he was falling sick, and that it was probably a better idea to go back to his home; however, before going back, he went to the local farmers market and spent good money on vegetables and legumes, provoking laughter and amazement in everyone who witnessed such a thing.

After the pain had disappeared, he was again in a bright mood. From afar, he could see his home, and even his mother sweeping the porch, in what seemed to be an equally good mood. When he finally got home, his mother received him with open arms. After proper salutations, mother wolf asked for the catch of the day to start preparing supper. Perplexed, she could not fathom why on Earth the bag was full of greens and nothing else.

– Henry, my love... is this some sort of sick joke? There is no meat in this bag. – said the mother.

– Mom, I want us to become vegans. We need to kill animals no more. As a matter of fact, I am in the mood for preparing us a delicious mushroom soup.

His mother exploded, weeping endlessly, not only because of what she felt was a distasteful joke, but also because she saw Henry's vegan idea as a disgrace to her family. The lady calmed herself down after a few minutes, and went indoors, prompting Henry to wait for her.

Henry was looking at the trees, mesmerized by the singing of the birds and the smell of the fresh legumes. All of a sudden, he was struck in the face with a purse.

– This hurts me more than it hurts you. If you don't have any reason left under that thick skull of yours, I will have to beat the reason in it – she said, while she continued hitting the defenseless wolf so hard, that she managed to reset Henry's mind out from the spell.

After this, they both had a brief reconciliatory conversation. Henry once again decided to go after Red.

Repair B.2: Henry fights with Grendel and gets his spell removed.

Player type(s): *Fighter, Method Actor*

After Henry had been brought under the spell of the fairy, he could not remember a thing. Other than being victim of an excruciating pain in the head, he had lost most of his memories of the day. He could only remember that he had gone out for food, wandered the forest, and that now he was in the middle of nowhere. He thought he was falling sick, and that it was probably a better idea to go back to his home; however, before heading straight back home, he went to the local farmers market where he spent good money on vegetables and legumes, of course, not without provoking laughter and amazement in everyone who witnessed such a thing.

After the pain had disappeared, he was again in a bright mood. From afar, he could see his home, and even his mother sweeping the porch, in what seemed to be an equally good mood. When he was a few yards away, he was pulled into the bushes by a mysteriously strong hand. Startked as he was, he dropped all his veggies on the road and had no idea of what had just happened.

– What do you think you are doing? – said the voice of belonging to a big, fury animal. Henry was only able to distinguish a pair of white eyes in the shade.

– Who is this? – replied Henry.

– It seems you don't remember the family any more. – and stepping forward, the silhouette slowly shaped into his evil brother, Grendel, who was a wizard werewolf.

– Grendel ... I was just in the middle of something here... you know... going back to mom's place..

– Hush! I have no time for this. I might be the evil one here, but you know you will break mom's heart with that pile of the so–called food you are carrying with you. Please, go back and get her some real food, now! – commanded Grendel.

Henry, still under the spell, decided he was not going to let his brother have his own way. A vicious fight ensued. With teeth sharp as razors, both of them bit each other in a battle that would have made any weakling run away in fear. It seemed like Henry was going to win the fight, when suddenly, he was not able to move any more: he froze rigid, now victim to a second spell, this time by Grendel.

– Now, go. Seek out the real meat and eat as a proper wolf. Make me proud and I will give you magical powers like mine; a powerful wizard you shall become.

The goodness the fairy had placed in Henry was now gone. Acting more out of this spell than out of conviction, Henry no longer thought of himself as a vegan .

Repair C.1.1: Grendel sees Little Red and deceives her.

Player type(s): *All*

Little Red was still on her journey to Grandma's house, and even if now Henry the Wolf was gone, another creature had taken his place and was now following her. This creature was the magical being named Grendel. His power was so vast that he was rarely seen, and almost never talked about except in hushed whispers. He was, people said, a werewolf wizard with the power to morph into different beings. And here now Grendel was following along the path behind Red. He was clever too. He wanted Little Red to lead him to her destination because there would likely be more to eat there. But at the same time he knew that he would not be able to stay hidden for much longer. He was hungry, and was going to satisfy his hunger with whatever means possible.

Little Red was now on the high road when suddenly something crossed her path; she was completely awestruck, rubbing her eyes as she could not believe what she was seeing. A magnificent white unicorn appeared in front of her, bowing as if to greet her cordially. Not only was the sight of such a creature something she had dreamt about, but what was most amazing was that he was talking to her.

– Little child, today I am Grendel the Unicorn, and I have been watching you. What is your name, if I may ask, and what are you doing on this fine day?

– I... do not know what to say– replied Little Red with difficulty for she was trapped in the charm of the unicorn– my name is Little Red and I am on an errand that my mom sent me to do.

– Please allow me to take you to your destination; it is in my nature to help nice little children like you.

She had always dreamt of a moment like this, and thus she climbed onto the unicorn and rode on his back without any hesitation, heading towards Grandma's

cottage unaware of the evil that Grendel was planning. After a few minutes, they got close to their destination, and Little Red got down of the unicorn and started running cheerfully towards the cottage to tell Grandma about her adventure.

Repair C.1.2: Grendel and Red arrive in the cottage.

Player type(s): *All*

Little Red had told Grendel about her destination, and that the basket of food was destined to her poor and sick grandma. Wanting to take advantage of the opportunity to appease his hunger, he planned to lie to Red to make it easier for him to follow with his evil plans.

– Little Red, can you be a dear and pick some berries from those bushes? I want to prepare a surprise for you and your grandmother. But promise me you will not peek! I really need to be alone to prepare my surprise.

Little Red, still under the spell nodded and went directly to the bushes. The creature approached the cottage and transformed back into his original form, and prepared to eat Little Red and her grandma.

When Little Red finished picking berries, she went towards the cottage but she was not able to see the unicorn anymore. And although she found the unicorn enchanting, she felt relieved that she wouldn't have to talk to him anymore.

Repair D.1: Little Red fights with Billy to get her basket back.

Player type(s): *Fighter*

Little Red was not in the mood for these kinds of games. After all, she remembered that her grandmother was sick and that she had quite a temper – you better not be late with Red's granny! Losing valuable time was not an option, and she didn't want to head back home late in the evening, since the forest was twice as dangerous in the night as during the day.

However, Billy was taking his prank a little further. Now, with one hand he was pushing Little Red away, and with the other he was now opening the basket and looking for something to eat, claiming that he was really hungry and that she could spare some food for him.

It was in that moment, when Billy was about to claim victory, that Red's veins were filled up with an unusual amount of energy and strength; without second thoughts, she grabbed Billy by his arm, and started twisting it slowly but powerfully, making him kneel in pain.

– It's OK, you win, you win! – exclaimed Billy in clear agony, obviously surprised by the unexpected strength of such a little girl – I will give you the basket, and will leave you alone, but please, don't hurt me.

Billy, bursting into tears and sobbing like a baby, placed the basket on the ground gently, still staring at Little Red. Red let him go, and he fled as quickly as he had initially appeared.

Repair D.2: Little Red trades a trinket to get her basket back.

Player type(s): *Method Actor, Power Gamer*

Little Red was not in the mood for these kinds of games. After all, she remembered that her grandmother was sick and that she had quite a temper – you better not be late with Red's granny! Losing valuable time was not an option, and she didn't want to head back home late in the evening, since the forest was twice as dangerous in the night as during the day.

However, Billy was taking his prank a little further. Now, with one hand he was pushing Little Red away, and with the other he was now opening the basket and looking for something to eat, claiming that he was really "hungry" and that she could spare some food for him.

It was in that moment, when Billy was about to claim victory, that Red needed to come up with something quickly to avoid losing her granny's food. It occurred to her that Billy, even though he was an older kid, was quite gullible, and that she could persuade him to leave her and her food in peace.

– Hey Billy, I want to make a deal. If you give me back the basket, I will give you three magic beans that could sprout a magic beanstalk. – proposed Red, remembering that a few minutes before she was collecting colourful pebbles.

– What good would those be to me?

– Well... – continued Red – you could... become rich you know... because this beanstalk would grow as high as the sky and you could fetch all the riches that lie in the clouds.

Billy stared at her with an air of incredibility for a moment. He, however, was fascinated by the thought of such a plant, and, greedy as he was, decided to take the magic "beans" and go away. Red then picked up the basket and got back on her way to Granny's house.

Repair D.3: Little Red persuades Billy to give her her basket back.

Player type(s): *Storyteller, Tactician*

Little Red was not in the mood for these kinds of games. After all, she remembered that her grandmother was sick and that she had quite a temper – you better not be late with Red's granny! Losing valuable time was not an option, and she didn't want to head back home late in the evening, since the forest was twice as dangerous in the night as during the day.

However, Billy was taking his prank a little further. Now, with one hand he was pushing Little Red away, and with the other he was now opening the basket and looking for something to eat, claiming that he was really "hungry" and that she could spare some food for him.

Knowing that Billy was a little upset because her friends ended following her instead of him, Red thought of the perfect offer that would persuade Billy away from eating her granny's food.

– Hey Billy – said Little Red – I know that you are really hungry, but I have a proposition that you'd probably like. You have seen how our friends lately have been following me more than you, right?

– That's not true. They always follow whatever I tell them to do.

– You know that's not true Billy. Remember what happened today...

– Enough! What's your point?

– I would acknowledge you as the true leader of our group if you'd give me back my belongings and let me go now.

Billy hesitated for a moment, but then, without further thought, he placed the basket on the ground and left as quickly as he had originally appeared.