

A STORYTELLING MODEL FOR EDUCATIONAL GAMES

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Abstract. This paper deals with an interactive storytelling of game, based on Campbells heroes journey. It begins by introducing Campbell analysis and then presents how this model has been transformed in order to support for interactive storytelling. Then, it shows how this model can be used for educational games. It finishes by an experimentation of an implementation of this interactive storytelling in the field of a robot based game.

1 Introduction

Adventure games and virtual learning environments share the same context: the user interacts with a simulation of a process. From these interactions the user learns some technique or information by an experimental way (for virtual learning environment). Whereas, in the field of game, the user makes some experiment in order to solve a problem. However, the difference stands in user motivation: the main motivation of game is fun.

In order to improve the feeling of fun in a game, the game industry develops methodologies to manage the game execution (the storytelling of the game). Two families of storytelling arise in game: emergent narrative (where the player is free to do what he wants, and the quality of the game depend on the player ability) and story based game where the player cannot influence the course of the game.

Game management requires a new kind of storytelling. A storytelling that let the player free but that manage the execution of the game (the unfolding of the story): the Interactive Storytelling. In this management, the player decisions impact the global story of the game. This strengthen the interest for education, [14] states that video games were a more effective tool for education than traditional ways of teaching.

Actually the management of the story in game his support for many works. [16] in the Game Ontology Project aims to define a general framework to describe and analyse a game. Their proposed ontology is based on the notions of interface, rules, objectives and entities. The interface describes the set of methods that a player can use to interact with the game. And, as a consequence, to modify the

story. Rules explain interaction between the player and the game. They allow controlling the story execution. Objectives are conditions the player must reach to end a game. And entities correspond to all the elements of the game.

Within this context, the improvement of the framework of game is of primary importance, because it encourages the student to pursue the experiment. One of the important improvements is the construction of rich and detailed stories, synchronized on cycles of training. Immersing the player in a story makes sure that he will play it until the end, and thus will provide an additional effort in the training process.

However, the restrictive aspect of stories is difficult to conciliate with the freedom of interactive applications. This duality generally carries out to a clash between story and interaction [8]. This divergence leads to different ways of managing the problem: works about scenario design and validation of players actions, as presented in [15] or [10], and others based on the concept of emergent narrative, introduced by [1] and completed by [13]. To deal with this opposition, our team proposed in [5] a system of plot monitoring for interactive games. It generates a story in the course of execution, according to games setting, players actions, and plot patterns proposed by game designer. This system includes for now only one basic scenario pattern, which requires evolutions.

2 An Interactive Storytelling

[5] proposed an Interactive Storytelling pattern for adventure games. This pattern derives from Campbell Heros Journey model. We will present this model in the sequel.

2.1 Whats this Heros Journey?

Joseph Campbell proposes a common pattern, including strong reference symbols: a journey from the "common" world towards another most supernatural, and the way back. The structure describes the story in 3 parts:

Departure: The Hero begins the story in the ordinary world. The Hero feels the Call to adventure, an event (or series of events) which pushes him to leave the comfort of his world for the more marvelous world of adventure. Once the Hero engaged in the adventure, he receives a Supernatural Aid, in the shape of an ally or a mentor which delivers indices or objects which will be useful to him thereafter. He then can go Crossing the First Threshold, stage marking his entry in the supernatural world. Thus, he disappears from the common world and is found In the Belly of the Whale (in reference to symbolic disappearance of Pinocchio).

Initiation: Our Hero from now on completely entered in the adventure. He will have to pass a Road of Trials which will aim at testing his courage, his determination, and the virtues relative to his quest. He is then subjected to a Meeting with the Goddess, who stands for a protective and maternal figure and to Woman

as the Temptress as test of his virtue. He must then pass the Atonement with the Father, who makes of him an adult and opens the doors of the Apotheosis: last test of the initiation which will require him to use all its understanding of the quest and will offer him the Ultimate Boon: knowledge and experience in reward of his efforts.

Return: the Return makes echo at the Departure and closes the narrative. The Hero, from now on master of the quest, must then return to make it profitable in his original world. By comparing this pattern to a diagram of acquisition of knowledge and skills, we can observe the following: the student, coming from the profane world, is being put in front of a problem that he cannot solve. He is then attracted towards a world of unknown knowledge, which he must cross by stages, having to prove his assimilation of determined notions in order to progress. After having triumphed over the last trial, which resume the whole of gained knowledge, he can then go back to his original framework, and, transforming his knowledge (theoretical) into skills (put into practice), he can solve its initial problem, thus enriching his living environment by mixing skills from both mundane and extraordinary worlds.

One can underline that this model begins with a motivation of the hero to increase his power or knowledge in order to perform a test. It introduces a second world where the hero can try some strategies. And finally he can go to the test.

2.2 Limits of interactivity:

In a linear history, the author does not have to worry about the choices and actions undertaken by the characters, since he controls at the same time those ones and the resolution of their actions. In the same way, he can constantly choose to put in scene characters other than the hero, in order to exploit the methods of narration (even if in the case of the Heros Journey, the Hero remains central). However, within the framework of interactive narrative, and more in that of educational games, the author loses these freedoms. The learner is generally identified as the Hero, and makes the experiment of the game through this misadventure. The Hero must be permanently present at the time of the play, avoiding learner to lose his marks. Moreover, this one must remain in the scope of the action, and not leave the learner in passive position.

In addition, in a game, the player must be free of his choices and actions. Its choices can then come directly against the initial scenario (of which certain stages rely on precise choices from player). Finally, the player can fail: fail some trials, be mistaken, and refuse some possibilities. These failures, if they are not taken into account during the game design, can put the narrative in danger: either while compelling game to repeat some steps, leading to boredom of the player, or by causing a brutal termination of the game, ending the experiment before term.

2.3 Two worlds:

The Heros Journey is a way forth and back between two worlds: a common one for the player and a mysterious one that will be the object of the adventure. Both worlds must be represented carefully, and answer a whole of design criteria.

The Ordinary World represents a familiar environment for the player. It is within this framework that the player will discover the game, as a consequence it has to be ergonomic (*e.g.* by including a tutorial). This environment makes it possible to discover games theme, its possibilities, and gives occasion to the player to identify with his character. It also includes the problems that the player will have to solve at the time of his return. Although those cannot be solved at the beginning of the game (because their resolution relies on knowledge that the player does not have for now), they will have to be present so that the player, failing at the beginning of game, and succeeding at his return, will have a true feeling of achievement. To enable the starter of the scenario, it will be necessary that this world include events able to draw the player in the adventure. These events will have to be multiple, in order to adapt them to the preferences expressed by the player. The supports offered (mentor, supernatural aid, and rescue from without) would also have to be prepared in this phase, in accordance with the trials/dangers that the player will meet in the world of adventure.

The World of the Adventure is less common to the player, but based on the knowledge to learn. It is designed according to a serie of notions to teach, and validation tests. It also contains a final exam (overall test of knowledge) and non-player characters taking part in the quest (assistances like opponent).

Although the two worlds are distinct, it is important during game design to take into account the mutual references which must arise during the narrative: the serious problems to solve in the ordinary world must match to the skills the player will gain in the world of the adventure. In the same way, the assistances brought to the player (ordinary world) must answer the tests which await him during Initiation.

2.4 Key figures and symbolic:

The Heros Journey also relies on some key figures which intervene during the story, being used to assist the player or to test him. Although these figures have a rather fixed representation in the myths, their symbolism can be adapted to the type of narrative we want to obtain.

Supernatural Aid: a character that comes to bring tools, councils, protections for the player in his future quest. It matches to the idea of a mentor who would assist the player by giving him precious councils on the process.

The figure of the Goddess: maternal figure (in mythology the majority of the Heroes were male, which brought a certain bias in the characters who surrounded them). She is a protective figure, symbol of partial success of the quest. She takes care of the player; bring him psychological comfort, and give him advantages for the following of his quest.

The figure of the Father: paternal figure, resolution of a personal conflict. With through the image of his father, the hero reconciles with himself. This figure is the base of a personal completion of the player: the reach of adulthood.

The Rescue from Without: Reciprocal of the supernatural Aid. It has a similar function but appears within a different framework.

2.5 Imply the player at every time:

On the opposite of a traditional spectator, the player must remain in the center of the action, and not be limited to a passive role. Any important action of the scenario must occur by and with him. Only one exception is possible: when the events are used to make pressure on the player. In this case we can compel the player to attend scenes which relates to him but on which he does not have a catch. However it is always better that these events are related to players choices (refusal of implication, failure with a test, *etc*).

As a result, any phase of the account must put the player at the center of the action, and its resolution must rely on players actions. Although consequences of these actions can give place to phases where player loses control over the narrative, those should be only the result of his actions, and not direct the course of the game.

2.6 Enact every act or choice from the player

The scenario should rely neither on the acceptance of the player, nor on his refusal. Each time that a choice is presented to the player (to begin its journey, accept/refuse some help, reaction to a proposal or a meeting, *etc.*) each solution must be valid (it draws to a correct outcome of the game) and allow the progression of the narrative. This one must give a suitable answer to each choice. It is possible to condition certain rewards with "good" choices (choices which show a will of progression, the resolution of an important dilemma, *etc*), but this solution is to be used with parsimony: by obviously supporting specific choices, the game denies players right to determine his acts.

The game must also take into account players failures as much as his successes. Most of games (with notable exception of Wing Commander IV) only make possible to succeed of the several trials suggested to the player. In the event of failure, the player must either reiterate the stage, or take again the game since its beginning. These repetitions break the games dynamics and bore the player, causing an interruption of the game before reaching its end. The game must be permissive to failure: to sanction the player (worse results, handicaps at the time of the following tests, less points) but not to stop him from playing.

2.7 Adapt to players abilities:

Some phases (mainly Supernatural Aid and the Rescue from Without) are intended to give the hero a support in his trials. However they are not inevitably

present in all stories, and mainly rely on players ability to pass the difficulties. Within our framework, it is the players ability to succeed the tests which will determine if he needs a help or not. Thus, concerned stages become optional and subjected to a conditional release.

2.8 Heros Interactive Journey:

We propose an "interactive" version of the Heros Journey. This new model is based on the application of the preceding rules, but also requires to carry out some design choices. There can be several valid alternatives, according to authors needs'. A version with accompanying notes is given here as an example.

The scenario pattern we propose must offer sufficient flexibility to cover the various possible behaviors of the player, and to accept his failures as much as its successes. We thus supplemented it by adding new stages and by detailing the advance.

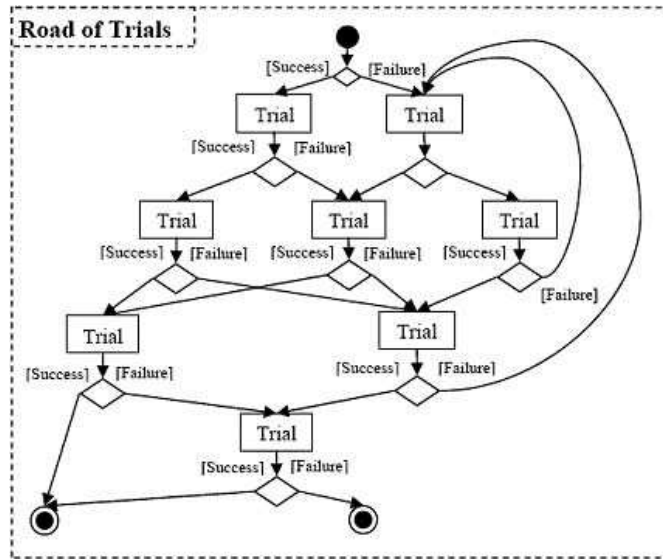


Fig. 1. Example of the Road of Trials

2.9 New stages added:

In order to cover any possibility, it is necessary to add complementary stages. Mainly optionals, they allow us to open the possibilities of the narrative and to answer the unforeseen ones. They so will create alternative ways which will enable us to adapt to the choices of the player while preserve him in the story.

We added in this example three new stages: Stubborn Refusal, Compelled to Adventure and Interference from Without. Stubborn Refusal and Compelled to Adventure are present at the beginning of the story. They are used to manage the case of players marking a stronger refusal than that allowed by the model. If inside the Refusal of the Call stage, the player does not want to follow the adventure, more important incitation events will be set up in Stubborn Refusal to try to push him. If finally he still refuses to be implied, then the stage Compelled to Adventure will draw his character in the story.

Interference from Without is the reciprocal one at the end of the story, when the player has the choice to return in the common world. If the player, after having refused first once to return, continuous in this direction, the figure of Rescue from Without can then intervene, not to help the player, but to push it to return and ensure that it will accede at the last stages of the narrative. Here the player is not compelled to accept the intervention, and can then leave the narrative without completing his quest.

3 Example of therapeutic game

In the field of game with therapeutic purpose we were asked to design an adaptive game for autism. We, first, made a prototype that is based on a robot (Abo) that is candidate for interaction. The scenario is made up of activities. An expert that authors the game defines the activities and scenario. A teacher monitors the execution and uses a PDA as a remote control in order to validate an activity or to force to remake an activity.

The supervisory control software is divided into two parts. The first aims to authoring the scenario of the game. The second is to monitor the game execution. The authoring tool allows giving a sequence of activities to be performed (actually a state machine). The final authoring tool should include in the tool the Campbells heroes journey pattern.

The supervisory control consists in giving the robot the next activity to perform according to player interactions. It is based on a multi-agent system that monitors and controls the game unfolding. Four agents (analysis agent, profile agent, scenario management agent and realisation agent) analyse and compute the action to be performed. Each agent has a specific task.

The analysis agent receives information from the game and sends them back to the system. It performs a first selection between useful and non-pertinent information. It sends to the scenario management agent all information about the state game evolution and to the profile agent all information coming from player actions.

The profile agent contains the knowledge database on the player. This agent merges all information on the player actions and derives statistics on its behaviour and its preferences (type of the most used action, game element which is generally used by the player, player performances). The profile agent can be questioned by the scenario management about some specific statistics.

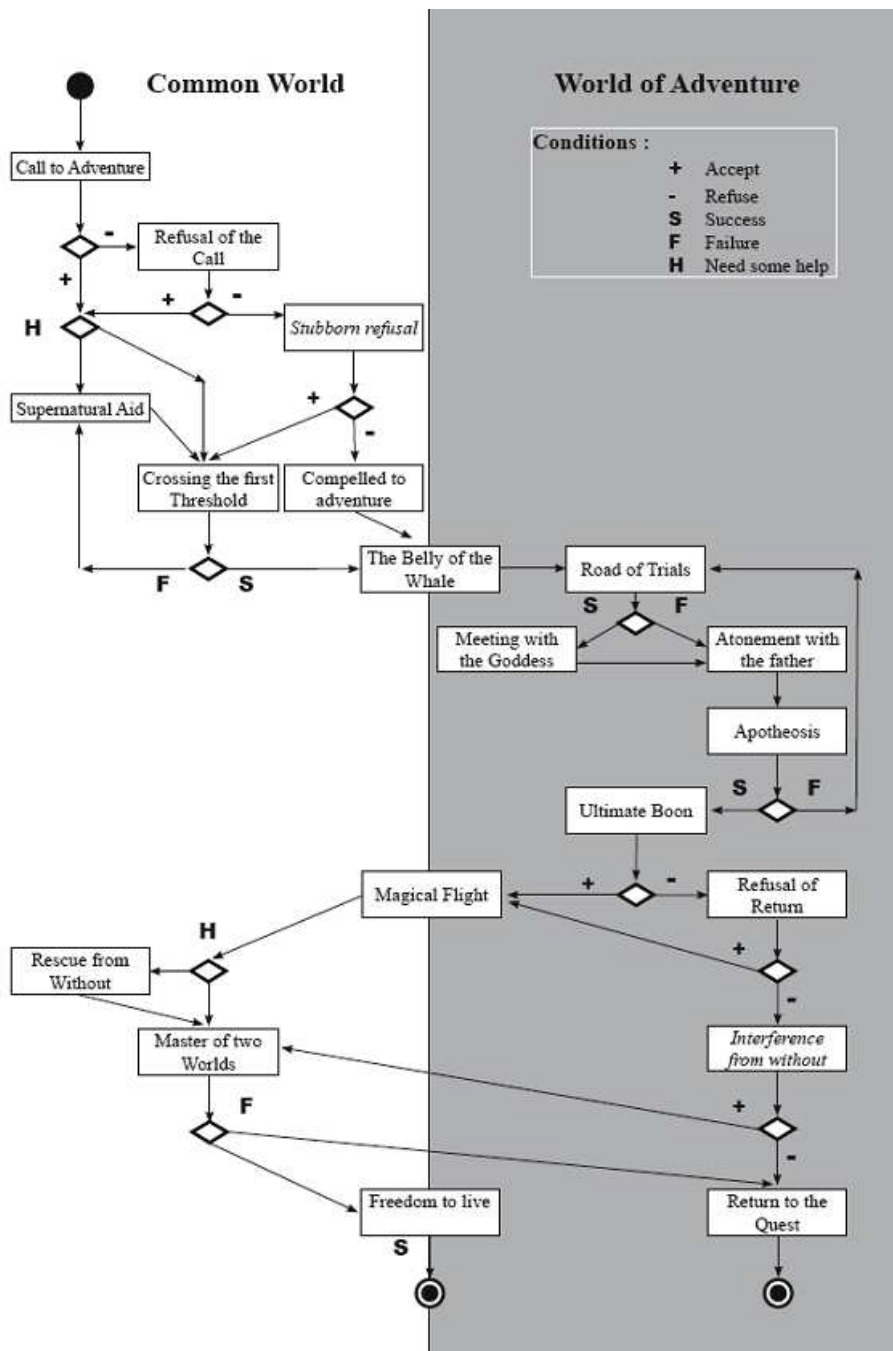


Fig. 2. The Hero's Interactive Journey

The scenario management agent is the one that takes the decisions. This agent monitors the game execution, updating the game state, detect progression phase of the history. When a situation change occurs, one can decide to give an input on the game. It determines the conclusion the most feasible and the best path to reach it. It requires the information coming from the profile agent. When the decisions are made, it sends them to the realisation agent in order to be applied.

The producer agent aims at making a retransmission of scenario management decision to the game. It transforms the scenario management decision into comprehensible directive by the game.

Finally the supervisory control allows to store the execution trace. Future work would be on an automatic analysis of trace according to drama constraints and consistency of storytelling.

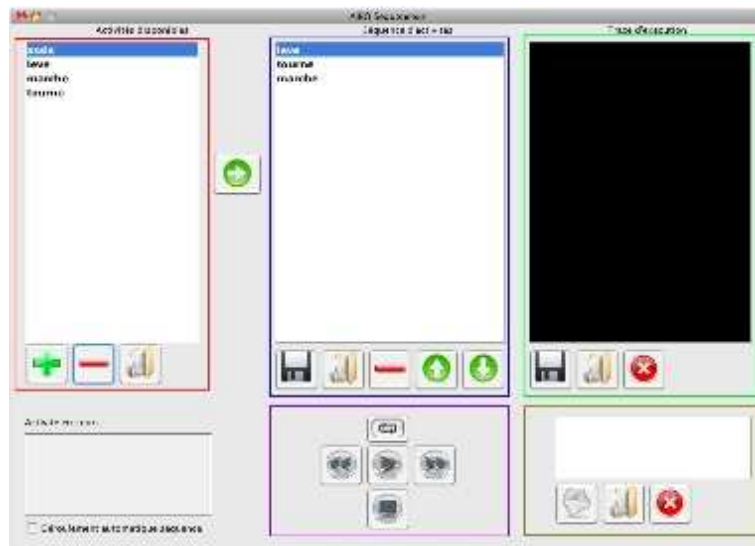


Fig. 3. Supervisory control of a game execution

4 Conclusion

This paper presents an extension of the storytelling model from Campbells hero journey in order to deal with interactive storytelling. This interactive storytelling is well suited for educational games. The key concept comes from to give player the possibility to impact the storytelling. In a game the storytelling is crucial for player immersive feeling. But in a game the player is motivated and is candidate to follow the game, whereas in an serious game not.

An experimentation of a game based on a robot (Aibo) has been introduced. This experimentation validates the general software architecture of control of an interactive storytelling. This architecture is built on a pattern of scenario, and it derives a story which corresponds to the game execution. However, as the player is free to interact with the game the consistency of the generated story is a crucial issue.

Finally, a future work would be to include such a mechanism of controlling narrative in an e-learning system.

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