

# Real Characters in Virtual Stories

## Promoting Interactive Story-Creation Activities

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**Abstract.** Interactive experience in a virtual world. We take the line that children need to be both engaged in the action through role play and given the opportunity to reflect on the significance of their actions to understand something of their significance in terms of both the narrative and its ethical significance. This requires a system that incorporates the children's actions into the unfolding plot. We introduce the Support And Guidance Architecture (SAGA), a plug-in architecture for guiding and supporting children's interactive story creation activities. This is illustrated with reference to Teatrix, a collaborative virtual environment for story creation, which provides the children with the means for collaboratively creating their story on a virtual stage.

## 1 Introduction

In the past years, several researchers from distinct and different areas such as interactive drama [4], computer-games (*e.g.*: SIMS, Shadow of Memories, etc.) have tried to develop a system that would provide its users with an interactive experience, and simultaneously would allow the users to act out a role within that experience. However, none of these researchers point to a clear solution that establishes a compromise between plot, characters and users. By placing the user (or player) inside the plot, it is necessary to accommodate the actions he/she takes into the unfolding plot, and, at the same time, to guarantee the achievement of a true interactive experience. The role of the user has changed from being just a spectator of the story to a first person character — for example, in the *Shadow of Memories* game, the player can be the detective of his own murder, discover the assassin and avoid being killed. Nevertheless, stories are not only presented to users in the format of interactive computer systems, they add color to our lives since our early childhood. Cognitive development theorists and psychologists ([10], [14]) suggested that through make-believe activities children

start to understand the mysterious world they live in, and that in a fantasy scenario they engage in new experiences. By doing this, they acquire proficiency in acting in the real world. In middle-childhood, fantasy takes the form of board, video and computer games, and in creative drama and theatrical performances on the school premises as well. Also, at this developmental stage, children prefer rule-based games, in which they tend to create their own rules or even use them to provide an arena in which to compete [12].

These two streams of research have led us to the problem of developing a system that would be able to convey a fulfilling interactive story to its users (children) and, at the same time, to allow such users to play inside the story as characters. Our approach to this problem, it is the development of a general architecture — *Support And Guidance Architecture (SAGA)* that can be used in different collaborative story creation applications. The aim of *SAGA* is to provide such applications with a mechanism to give support and guidance to children during the story creation process. Additionally, the research goal is to provide the children with an interactive story, where they have a character to control in the story, and at the same time they have the opportunity to reflect upon their characters’ actions. With this reflection activity we aim at providing the children with a psychological portrait of the story characters, which may contribute to a “better” story achievement.

## 2 *SAGA: Support and Guidance Architecture*

The development of *SAGA* was based on the assumption that the story creation process is composed of two distinct phases: story definition/preparation and story construction (*de facto*). In the first phase the children define the basic elements for their story: the cast and setting, and in the second they collaborate between themselves to build their story. Therefore, both phases are dependent on the story creation application that is using the services of *SAGA* (for example, we could have applications that provide the children with the means to create their story in the format of a play, a cartoon, etc.).

### 2.1 Concepts

As other researchers have done before us ([13]), we decided to adopt Vladimir Propp’s morphology [11] as the underlying theory of narrative for our model. However, due to the lack of interactivity associated with this theory, we decided to enrich it with some AI concepts and also some educational practices. The major concepts, derived from the work of Propp, present in the architecture are:

- story — is a sequence constituted by the 31 functions. A story must be started by a villainy or a lack, and proceeds through intermediary functions to a reward, a gain or in general a liquidation of misfortune;
- function — which can be understood as both the actions of the characters and the consequences of these actions for the story;

- role — a set of behaviours (specified by a set of functions) that are known to both the characters and audience [3].

Additionally, we defined the concept of an actor, which emerged from the study of theatrical performances. An actor is the physical representation or appearance of a character (example: a young girl, a wolf, a witch, etc.). And finally, a character is the conjunction of two different concepts: an actor and a role. The character is the one that acts in the story, accordingly to its role and in the skin of the actor<sup>1</sup>

## 2.2 Integration

To integrate *SAGA* into a story creation application, it is necessary that the latter complies with two important properties: (1) to be observable — *SAGA* must be able to inspect the state of the application and also, (2) to allow changes — *SAGA* must be able to introduce new elements into the story creation application or even to take some actions in the story creation application.

## 2.3 Components

The components of *SAGA* are: the *Facilitator*, the *Scriptwriter*, the *Director Agent*, the *Narrative Guidance Engine* and the *Reflection Engine* (see Figure 1).

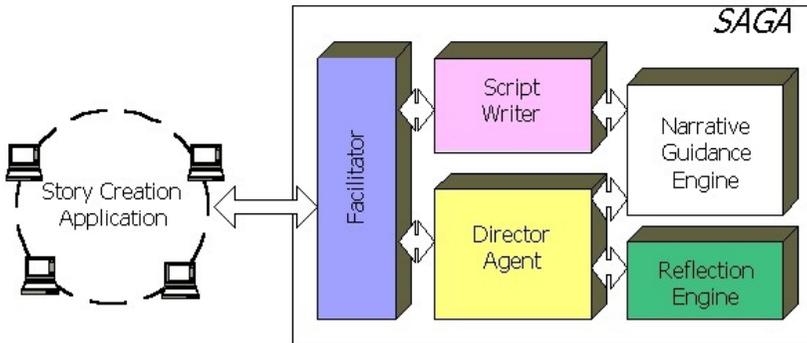


Fig. 1. *SAGA*

The *Facilitator* is the component of *SAGA*, which establishes the bridge between the architecture and the story creation application.

<sup>1</sup> In fact, Propp indicates that an actant can have more than one associated function. Actants however are not exactly the same as actors.

The *Scriptwriter* has the main goal of building an initial story situation in accordance with the story elements previously chosen by the children. The definition of the story's initial situation was based on the work of Propp, and can be specified as the situation in which the characters are introduced, the relations between such characters are established, and the story is situated in terms of temporal and spatial location. To do this, a set of templates is available each of which is defined by a set of minimum requisites that must be satisfied to have an initial story situation. To better illustrate these ideas, a template fragment is presented:

```
<violationFunction> <text> However, now that she is alone in the
world and becoming older, she is thinking more and more to
explore the </text><sceneName>forest</sceneName> <text>and find
the enchanted lake. If she could find such lake she would have
money to try finding her parents.</text> </violationFunction>
```

```
<firstVillainAppearanceFunction> <text> Also, in the </text>
<sceneName> forest </sceneName><text>lived a terrible and
feared</text> <villainType>wolf </villainType><text>named,
</text><villainName>Herman</villainName><text>, who was the
guardian of the magic lake. </text>
</firstVillainAppearanceFunction>
```

```
<reconnaissanceFunction> <text> In her deeper thoughts
</text><heroName> Mary </heroName><text> wanted to know more about
this lake guardian. How was it? Was it so bad as his mother
said?</text> </reconnaissanceFunction>
```

In the above template, we can distinguish the parameters (<villainName>, <heroName>, etc.), that can be instantiated with distinct values, which provides the possibility of generating different initial story situations. From the template excerpt we can see that any stories that are created using it will evolve around the search for the *guardian of the magic lake* and its treasures, but everything else is left open to children's creativity.

Although, the motive can be established at a large-grain size, by the type of story template, there is also the need to establish a set of challenges to be discovered throughout the story progression. These challenges are intended to enhance the story with an extra degree of suspense, which would be translated into a more interesting experience for the children, in a game like way [15].

The main goal of the *Narrative Guidance Engine* is to generate the space of all plot points for a particular story. A plot point is an important story situation, which should be played by the children in order to achieve the goal of the story (similar to the approach taken in the OZ project [7]). These plot points are defined from the initial story situation and from the functional roles performed by the characters. The space of all plot points is the result of all paths between plot points that make possible the achievement of the end of the story, implicitly

reaching also the goal of the story. An evaluation function was therefore defined to determine, at each point in time, which is the best path to follow.

The *Director Agent* is the component that has the responsibility for deciding how and when some particular kind of support should be provided. To do this, we are developing the concept of a narrative agent which is equipped with a decision process that is used to consider what to do. This decision process is performed with the help of the agent's narrative memory. Its narrative memory is organised in the form of episodes and contains information about story progression from each story character's point of view. Each episode is constituted by three important events: crisis, climax and resolution [2]. In the end of the story creation activity the narrative agent can use the various character-centred stories, stored in its memory, to generate a unique story that reflects the overall experience of the story creation activity. The *Director Agent* also has the important role of asking a child to reflect upon the actions performed by her character. This can happen, for example, when it detects a conflict between the actions performed by the child and her character's role.

The *Reflection Engine* is the component that on demand (by the Director Agent) generates a reflection moment. The idea is that a child is asked to put herself in someone else's shoes and explain the meaning of her character's current behaviour [1]. Additionally, all the other children collaborating in the story creation process should be informed about such reflection, since it can influence the flow and development of the story.

With this component we aim at providing the children with the opportunity to inspect the characters' minds, and understand their behaviours and motivations. By doing this they have the opportunity to act (by means of their characters) in accordance with such behaviours and even explore more deeply the plot of the story (for example: if a child see the character wolf running after her girl character, and she knows that the wolf is hungry so maybe it is only starving and not bad).

### 3 Application of SAGA

Teatrix is an application developed under the NIMIS (Networked Interactive Media In Schools) project, which was an EU-funded project under the Experimental School Environments (ESE) program. It is a collaborative virtual environment for story creation, which provides the children with the means for collaboratively creating their story on a virtual stage. The children are able to create the stories using a set of pre-defined scenes and characters. These characters may act on behalf of the children or autonomously (for further details see [6]). To act and create the story the children have a set of actions and props available (see Figure 2).

The application of *SAGA* in Teatrix, starts by providing the children with an interesting initial story situation. The children are given an introduction to the story, similar to what happens in a game, but unlike the games everything else about the plot is left to be determined by the children. The role of *SAGA* is to



Fig. 2. Teatrix

guide and support the progression of the story. To do this, *SAGA* has the power to introduce new props or characters into the virtual world, and also to interact with the children through the reflection moments (implemented in Teatrix, in a reflection tool called *Hot-seating* [5]).

At each point of the story, *SAGA* provides the possibility of confronting the children with what is being done and what will be needed in order to accomplish the goal of the story (mapped in the space of story plot points). For example, take into consideration a story being created from the template presented above:

- *situation*: Mary meets Herman at the forest
- *next plot point*: struggle between hero and villain
- *actions*:
  - Mary: talk with Herman and offer him a mushroom;
  - Herman: accept the offer;
- *Director's perspective*: a conflict occurs between the role and the behaviour of the villain character, which means that the a reflection moment is must be triggered;
- *reflection moment*: the *Hot-seating* interface appears in the monitor of the child controlling the wolf and she has to justify why her character is not performing accordingly to its role. At this point, if the child decides to change her character's behaviour the plot point may be achieved, or in the opposite

situation the *Director Agent* may take a different course of action and introduce a new villain in the story, assuming that Herman is now assuming the role of a helper.

This is just an example, of how the architecture is integrated within *Teatrix*, and the story would evolve until the final goal has been reached.

## 4 Preliminary Results

After a few tests of the architecture itself, we came to the conclusion that the space of all plot points generated were directly proportional to the complexity of the initial story situation, and that the majority of the plot points are useless for the story. From this empirical result, we decided to start doing the generation in a phased way, i.e., by dividing the basic structure of our model into phases and generating the paths not only according to the initial story situation but also by considering the part of the story already achieved.

Also from a preliminary integration results with *Teatrix*, we concluded that the introduction of the reflection engine, in the form of *Hot-seating*, has been accepted well by the children, who demanded a higher degree of control over their characters. Also, we have evidence that some of the reflection moments have been referenced inside the story.

## 5 Conclusions and Future Steps

In this paper we have proposed a plug-in architecture for guiding and supporting children's interactive story creation activities. However, when doing such guiding, *SAGA* also has to ensure the 3 requisites for providing each child with an engaging interactive experience ([9], [8]): (1) immersion — by making it possible for the child to feel herself part of the story and with the power to act in it; (2) agency — by taking into account her actions as a contribution to the flow of the story; (3) and, transformation — by making it possible for the child to put herself in someone else's shoes and in this way to explore a multitude of different situations.

On the one hand, we argue that the usage of *SAGA* enhances the story environments with a support and guidance strategy, but on the other hand it will support the user's need for an interactive and engaging experience.

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## References

1. G. Bolton. *Acting in classroom drama : a critical analysis*. Stoke-on-Trent : Trentham, 1998.

2. L. Egri. *The art of dramatic writing - Its basis in the creative interpretation of human motives*. Touchstone Book - Simon and Schuster, 1960.
3. B. Hayes-Roth. Acting in character. In R. Trappl and P. Petta, editors, *Creating Personalities for Synthetic Actors*. Springer Verlag, 1997.
4. B. Laurel. *Computers as Theatre*. Addison-Wesley, 1993.
5. I. Machado and A. Paiva. The child behind the character. In *Working Notes of the Fall Symposium Series - Socially Intelligent Agents: The Human in The Loop*. AAAI Press, 2000.
6. I. Machado, R. Prada, and A. Paiva. Bringing drama to a virtual stage. In *Proceedings of Collaborative Virtual Environments Conference*. ACM Press, 2000.
7. M. Mateas. An oz-centric review of interactive drama and believable agents. Technical Report CMU-CS-97-156, Carnegie Mellon University, 1997.
8. M. Mateas. A neo-aristotelian theory of interactive drama. In *Working Notes of the Spring Symposium of AAAI 2000 on Artificial Intelligence and Interactive Entertainment*. AAAI Press, 2000.
9. J. H. Murray. *Hamlet on the Holodeck - The future of the narrative cyberspace*. The Mit Press, 1998.
10. J. Piaget. *Play, dreams and imitation in childhood*. London: Heinemann, 1951.
11. V. Propp. *Morphology of the folktale*. Austin: University of Texas Press, 1968.
12. D. Singer and J. Singer. *The House of Make-Believe*. Harvard University Press, 1990.
13. N. Szilas. Interactive drama on computer: Beyond linear narrative. In *Working Notes of the Fall Symposium Series - Narrative Intelligence*. AAAI Press, 1999.
14. D. Winnicott. *Playing and Reality*. Basic Books, 1971.
15. M. Young. Creating interactive narrative structures: The potential for ai approaches. In *Working Notes of the Spring Symposium of AAAI 2000 on Artificial Intelligence and Interactive Entertainment*. AAAI Press, 2000.