Writing Interactive Fiction Scenarii with DraMachina

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Abstract. This paper presents DraMachina, an authoring tool dedicated to authors of interactive fictions. An interactive fiction is an extension of classical narrative media as it supposes a direct implication of spectators during the story evolution. Writing such a story is much more complex than a classical one, and tools at the disposal of writers remain very limited compared to the evolution of technology. With DraMachina, we propose an authoring tool dedicated to the description of narrative elements composing an interactive fiction. It also automatize the exchange of information between writers and production teams.

1 Introduction

As opposed to classical literary, cinema, theatre or choreographic works, spectators of an interactive fiction are not passive as they can directly influence the story evolution. The central idea of Interactive Drama is to abolish the difference between author, spectator, actor, and character[12]. It requires to use the potential of different technologies to allow the spectator to become co-author, actor and character. Interactive Fiction can be regarded as a new genre, deriving both from video games and from cinema. When *Immersion* is the basic quality players request from the former field, *identification* stands as the cornerstone of the later. Identification is only made possible when the interactor is able to witness human-like characters, endowed with a personality, and facing conflicts which he/she can potentially share and acknowledge as familiar [8]. Therefore, when writing for interactive fiction, the author does not only have to describe settings, a plot, and potential ways to solve it, but he must also account for motivation, tastes, personality and consistency of the characters. Whatever degree of interactivity, freedom, and non linearity might be provided, the role that

the interactor is assigned to play always has to remain inside the boundaries thus defined by the author, and which convey the essence of the work itself. This brings an extra level of complexity for writers, when tools at their disposal - word processors and graphical representations of a story decomposed into a tree diagram of scenes - remain limited compared to technological evolutions. DraMachina contributes to amend this situation. The goal is to design a tool that authors can use to create narrative environments by directly handling the tale's key elements - places, characters, roles, relationships and actions. A writing methodology analysis performed by Dæsign was studied to propose a more ambitious representation model, capable of specifying various types of interactive fictions or dramatic frameworks defined by literary theorists[11, 3, 6, 15].

The DraMachina program is a partnership between IRISA[3] and the Dæsign company[4]. DraMachina was supported by the RNTL (French National Network for Research and Innovation in Software Technology) during two years until march 2003. This program develops an authoring tool dedicated to the description of narrative elements composing an interactive fiction. This tool is connected to an "interactive fiction engine" developed by Dæsign. This engine is intended for the fiction production team. By using the DraMachina tool and the database it generates, the engine considerably shorten the analysis and synthesis of documents supplied by the writer.

2 Related Works

2.1 Narrative Structure

The narrative is a statement of real and imaginary facts. Each fact can cover two kinds of reality, event and action, which are both referring to the modification of the natural course of things. An action is characterized by the presence of an anthropomorphic agent who will cause the change, while an event will arise under the effect of causes which are not outcoming from the intentional intervention of an agent. It is important to distinguish the two notions of cause and motive. In the case of a relationship between cause and effect, the antecedent is logically distinct from the consequent. On the other hand, the motive does not have any proper existence and is only thinkable from the action, as it concerns the reasons who will determine or permit to explain an act or a behaviour. The Hero of a story is driven by a motive to realize his quest.

To situate temporally and geographically a narrative, some descriptions should be given: character description (moral, physical, psychological portrayals), places and their topography, living and inert objects and last but not least the time(s) of the story. Each narrative is characterized by two bounds: the initial and final situations, and by a transformation relation between them. If each narrative possesses a transformational structure, each transformation between two states could not be assimilated to a narrative. It is necessary to take into account the

[3] Mixed Research Unit between INRIA, CNRS, University of Rennes 1 and INSA
[4] formerly known as Dramæra

notion of plot. In [1], Aristotle defined the structure of a tragic plot in two parts: the complication and the denouement. The complication extends from the beginning of the action to the part which marks the turning-point to good or bad fortune, while the denouement extends from that point to the end. The Aristotelian curve of tension underlies millions of narratives from Greek tragedy to modern soap opera.

A global action is generally decomposed in a sequence of smaller action units. Such series should follow a chronological order but also a causal chain: there is a necessary link of logical causality between facts. Vladimir Propp[11] had broken down a large number of Russian folk tale into their smallest narrative units to arrive at a typology of narrative structures. His conclusion was that there were only thirty-one generic units in the Russian folk tale. Even if they are not all present in each narrative, he found that all the tales he analyzed displayed the functions in unvarying sequence. Propp proposed also a repartition of functions between the seven main kinds of characters. There is not a unique distribution of functions: one character can accomplish more than one group of functions and a group of functions can be accomplished by more than one character inside the category. Campbell[4] observed that the same stories has been told continually along the history of humanity, whatever is the culture but of course with different details and character names. He traces the story of the hero's journey and transformation through virtually all the mythologies of the world. Influenced by Propp, A.J. Greimas [6] proposes the Actant Model which describes the dynamic forces and their position inside the narrative. Actants are not the same as actors, they function at the level of the text not of character. Several characters in a narrative may consolidate a single actant. Actant is a name of a fundamental Role at the level of deep structures. The Actant Model is based on six categories of agents (subject, object, sender, receiver, helper, opponent) organized on three axes: project, conflict and communication. The project-axis depicts the subject and its project, its endeavours to appropriate the coveted object. The conflict-axis depicts a helper who promotes and an opponent who opposes the subject's project. Finally the communication-axis depicts the action which is decisive for the accomplishment of the project, the sender and its doing which transfers the object to the receiver. The Actant Model permits a formalization of the partial propositions of the narrative development.

From the analysis of a hundred short stories contained in *The Decameron*, written by G. Boccaccio, T. Todorov [15] proposes to describe narrative laws, to encode their expression and to build the basis of a new science: the narratology. He describes three levels: semantic, syntaxic and verbal. In his work he mainly focuses on the syntaxic level which corresponds to the combination of basic narrative units depending on their relationships, each narrative unit corresponding to an action performed by a human or anthropomorphic character. He defines a set of logic connectors to express different kinds of relations between those units. For Bremond [3], Propp Narrative structure is too simplistic: a narrative may have more than one point of view. In the Propp model, there is only one hero and everything is defined from its point of view. For Bremond, functions

are grouped in sequence, whose structure is fixed, but that can be organized in various ways (superpose, interlace, knot, ...). He criticizes also Todorov, saying that his model did not take into account means of actions. His own narrative structure is based on rôle distribution and on implication and exclusion relations: an event B presupposes a past event A and makes possible a future event C while it makes impossible another potential event D. He also introduces a logical model of a sequence: a situation opens the possibility of an action which can either become an action or not, and this action can either succeed or fail.

2.2 Interactive Dramas

Interactive Drama is a new media based on several other ones: the narrative branch (Literature, Theatre, Cinema) and the interactive branch (Video Games, Virtual Reality). The main problem concerns the merging of narration and interactivity, without decreasing the force of narration and the strength of interactivity. The script limits the freedom of the user, but it also maximizes the chances of a pleasurable performance. As illustrated on figure 1 there is a bidirectional link between the theatre world and the story world. The story should react to the actions of the audience (the action feedback) while also the audience should react to the narration (the emotional feedback).

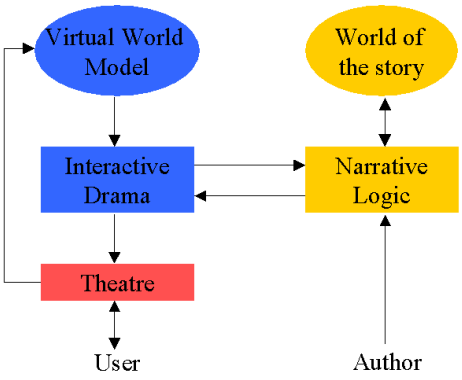

Fig. 1. Architecture of an Interactive Fiction.

Models proposed by structuralists has been used to structure interactive drama models: Propp[7, 13], Greimas [9], Bremond [14]. Another approach consists in restricting a narrative to a sequence of actions and to use AI planning techniques for interactive storytelling[5]. Facade, developed by Mateas and Stern[10] integrates both the story and the character levels, including drama management, autonomous character behaviour and natural language processing for the interaction with the user playing the rôle of one character in the story. Our objective with DraMachina is not to produce a drama manager and to make choice between the different models proposed in the narrative theories, but to help an

author to write an interactive fiction. The main input remains the natural language directly connected, thanks to hyperlinks, to the key elements of the drama, including its narrative structure, rôle distribution and character description.

3 The Authoring tool

3.1 Introduction

DraMachina is an interactive application mainly based on text edition. An author of a classical linear story would have the ability to write the story, including characters description and linear dialogs edition. A scenarist of an interactive fiction will also be able to describe the skeleton of a story at different levels (period, act, scene, action) and to specify relations between these elements. He will as well be free to specify a more complete dialog structure including user choices and branching depending on specific parameters. As summarized by Marie-Laure Ryan[12], different architectures are possible for an interactive fiction. We have decided not to make a choice between these possible architectures, but to let authors writing stories with a low-constrained approach.

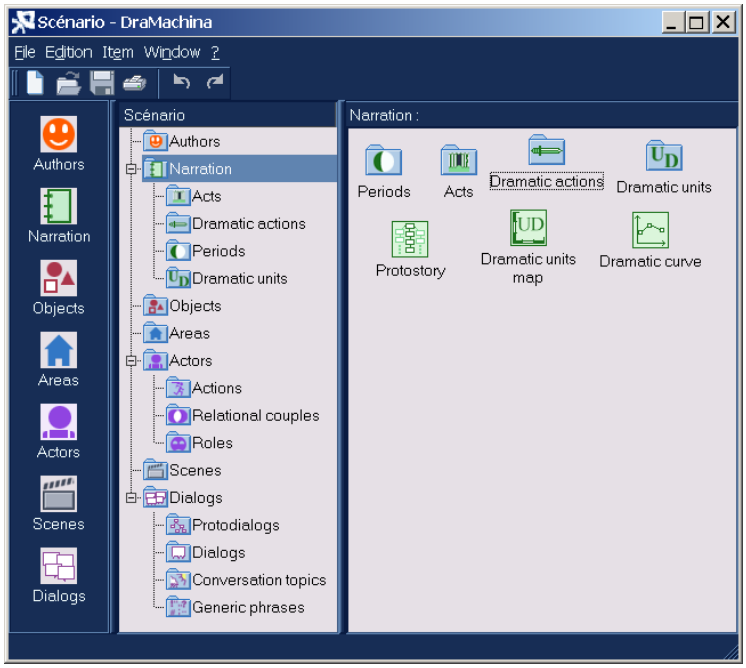

Fig. 2. Hierarchical structure of objects manipulated inside DraMachina.

The main window (cf figure 2) allows authors to access to the story elements, and is structured by using the file/directory metaphor. The main elements are:

Authors directory : each author can enter his own reference.
Narration directory : this directory includes acts, periods, dramatic actions and units description.
Objects directory : description of objects important in the course of the story.
Areas directory : description of locations of the story.
Actors directory : this directory includes elements related to the description of characters, which is composed of their characteristics, psychology, actions they can perform, roles they can play and relationships between actors.
Scenes directory : detailed description of scenes.
Dialogs directory : dialog edition based on protodialog patterns.

This logical description is based on a structural analysis, not only of drama, but also of film *morphology*. It allows the author to set up a series of criteria which will determine a *virtual director's cut* each time the interactive fiction is performed. For example, a Scene object is logically described as the combination of current setting / actors on stage / Dramatic Action currently going on / and present state of the Dramatic Units map. Entrance of a character, change of Dramatic Action... will automatically change the Scene Object and thus its parameters such as Mood / Ambience, Level of Formality, Rhythm of Action, Actions Allowed, etc. For example, we can imagine two generals, character A and character B (the Actors), walking along a palace's corridor (Setting), leading to the throne hall. They are toughly arguing about waging war on another country (Dramatic Action). A tries to argue B out of this project. In all cases, their dispute will automatically end as soon as they enter the throne hall, if this setting is bound to a high level of formality and imposes silence and respect. This simple mechanism can be used by authors to determine directing patterns, without having to write any scripts at this stage.

3.2 The Narrative Structure

In classical narration, spectators are passive, they receive informations without acting. In interactive fictions, interaction between spectators and narration implies to offer choices to users. The narration complexity explosion then force to structure strongly the story skeleton. Considering that stories have a beginning and one or more endings, we then face to a graph representation of main times of this story, where nodes are dramatic units and edges the narration directions offered to the audience. Dramatic units have a role of markers of the narration evolution. They can be validated by different events as dramatic actions, dialogs or relationship evolutions. These elements are then associated to dramatic units by declaring logical formulas which are preconditions or implications of the dramatic units, such as the Bremond logical model [3]. Links between nodes of the drama unit map are then extracted from these logical formulas and a drama map can be constructed. Analyzing this drama map by detecting cycles or non-linked nodes is then possible and helps authors to identify problems in the logical structure of their scenario.

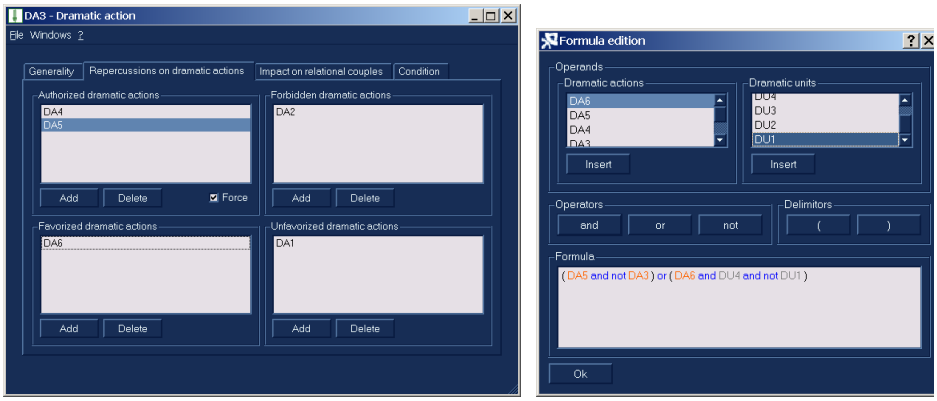

Fig. 3. Dramatic action repercussions and condition edition.

3.3 Actor Description

Psychological description of characters is a delicate and important point. Classical psychoanalytical theories do not offer an approach suitable for computer abilities. Transactional theory is a social psychology developed by E. Berne[2] which is devoted to the global understanding of interpersonal transactions. In this theory, the human being is globally categorized in three ego states : parent, adult and child. A human being can address to another one from any of his ego states to a specific state of the receiver, who can reply in turn: this exchange is a transaction. If the response is not given from the same state than the targeted one, there is an imbalance in the transaction. During a transaction, each one signals recognition of the other and returns that recognition; any act of recognition is a stroke. Berne observed also that people need strokes, the units of interpersonal recognition, to survive and thrive. By reproducing this mechanism while writing dialogs, an author could tag each retort by indicating the source and target ego states. In DraMachina we decide to focus on strokes. Each stroke has an impact, which could be either positive (caress) or negative (blow), and a duration on the receiver (cf figure 4). Declaring strokes that characters received before the start of a story helps to represent the characters' initial psychological state. We decomposed it in a description, a duration value from seconds to whole life and an impact value from traumatism to happiness.

Other characteristics could be given to complete the description of an actor, such as the speaking and listening focus, the accepted distance to other people in a discussion, the normal walking speed. We can also describe lists of actions and roles that the actor will be able to perform. Of course the author has also the ability to give a natural language description of the actor and to write its biography. Again however, logical description of the actors is critical, as it is meant to have a direct impact on the course of drama. Each character is endowed with a role, which itself contains a goal and potential actions. The goal is the concrete purpose of the actor, the realization of which would mark the positive

end of the story from the actor's point of view. Several characters can be given identical or conflicting goals, thus mechanically facing external obstacles to their quest. These concrete goals are the only ones made obvious to the interactor but, from the author's point of view, a key dramatic objective still underlies them: reaching the peak of each character's transformation arc. Transforming himself is usually not a direct purpose for a character in a story; it simply appears as a necessary condition, or even a side effect, of his success. Conversely, it is probably the most important lever of the identification process. DraMachina allows the description of both paths.

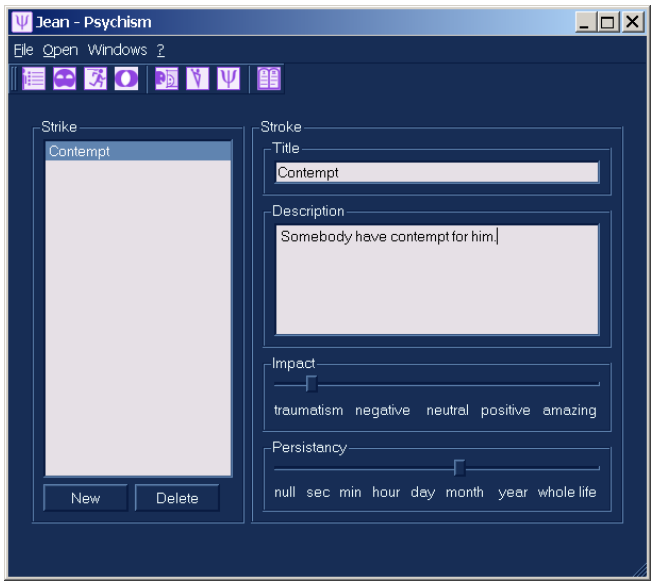

Fig. 4. The Inner Mind Edition Window.

The goal can only be reached by performing *dramatic actions*, which themselves result in sequences of more simple actions. Some of these actions may contradict the character's system of values, (this being highly recommended for the sake of dramatic tension!). Finding ways to achieve the goal without generating unbearable internal conflict for the character, or building up enough pressure to bring the character to a point where self-transgression becomes possible (and witnessing the consequences...), are the two main ways offered for interaction in DraMachina based gameplays.

3.4 Dialogs Writing Method

The protodialog edition window (cf figure 5) is a graph based structure including nodes, arcs and three kinds of branching - binary, ternary and unbounded. Protodialogs are used to characterize different dialog structures. Branching nodes

can either correspond to a conditional expression on variables of the story or a question/answer interaction phase with spectators. All classical style characteristics can be specified for each element of the graph. Cyclic subgraphs can be detected and overviewed.

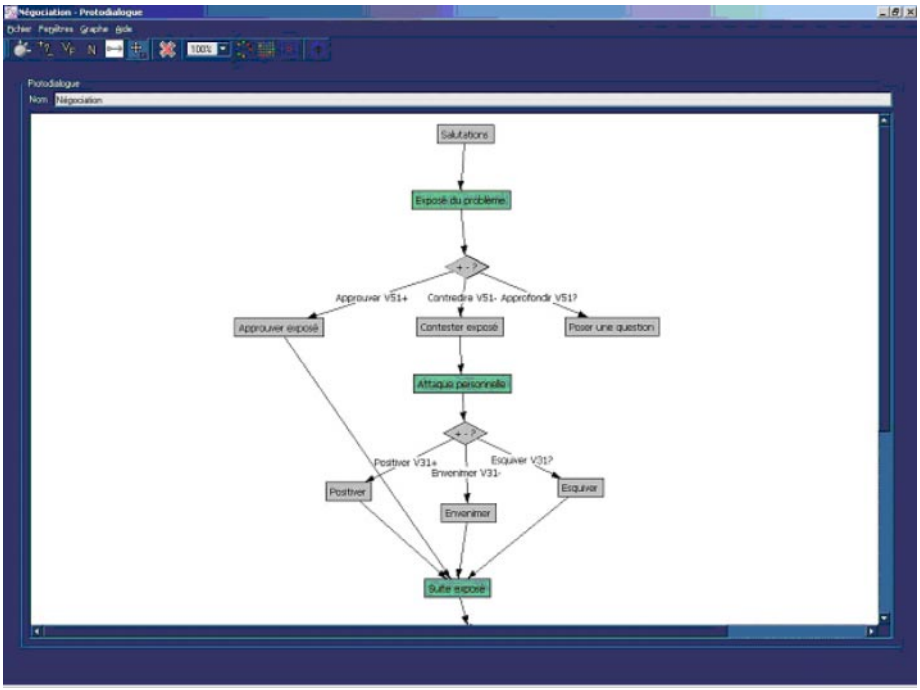

Fig. 5. The Protodialog Edition Window.

As shown on figure 5, specific patterns can be introduced in the text of transitions to give automatically information to the dialog manager. No specific protocol is defined, it is of the responsibility of the development team to define its own writing protocol with the author. A dialog structure is then based on one of the protodialogs available. Protodialogs can be created or modified interactively during a dialog edition. Figure 6 shows a dialog edition window based on the protodialog shown in figure 5. A dialog is also defined by its protagonists and each node of the protodialog can correspond to a sequence of one's lines. For example, in figure 6 the first node of the protodialog is corresponding in the dialog to four one's lines said alternately by two characters. Moreover, DraMachina provides the author with a helpful methodology to further the reuse of sentences, expressions, locutions or set phrases stored in the database, in order to build up a variety of original and dynamic dialogs.

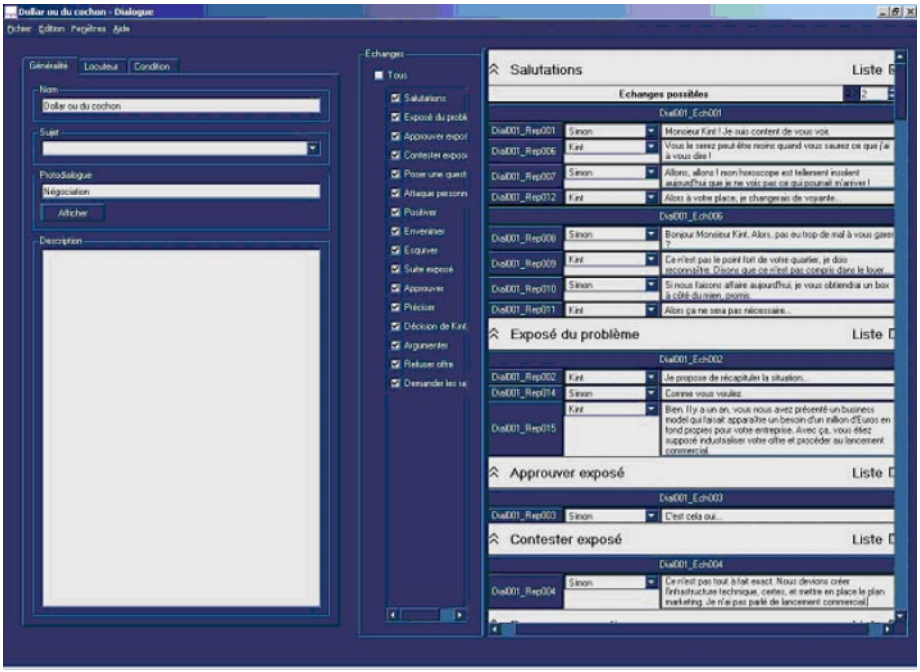

Fig. 6. The Dialog Edition Window.

3.5 DraMachina Output

The internal file format is expressed in XML. We have chosen XML as it gives easily the possibility to export data to other applications. Figure 7 shows an excerpt of a XML file. During the DOM tree generation process, an optional functionality can be used which consists in syntaxic and semantic analysis of phrases. The result consists in a decomposition of each character's action into several parameters : nature, manner, source and target of the action. Verbs are classified in different categories (action, dialog, motion) by using available corpus. These data can be very interesting to integrate in an action databasis, and permit to extract informations about actions that can be performed by each of the characters. The XML file is read and analysed inside the AVA environment and by now, dialog and protodialog parts of the scenario can be used automatically inside the AVA engine, as illustrated by screenshots of figure 8. In the first picture, labels of the different choices above the frame are corresponding to those given in the protodialog shown on figure 5.

4 Conclusion

What is at stake with DraMachina is to provide simple and efficient ways of writing such a complex works as interactive fictions. The variety of authors, of

```
<?xml version="1.0" encoding="iso-8859-1"?>
<!DOCTYPE DraMachina_scenario>
<Scenario title="Scenario" >
 <Authors/>
 <NarrativeEnvironment>
  <Story title="Story n1" />
  <ProtoStory text="Once upon a time..." />
  <ObjectList/>
  <AreaList/>
  <ActList/>
  <PeriodList/>
  <DramaMap>
   <UDList/>
    <UD name="DU1" description="" />
   </UDList>
  </DramaMap>
  <Dialogs>
   <DialogList/>
   <ProtoDialogList/>
  </Dialogs>
  <SceneList/>
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  <RoleList/>
  <ActionList/>
  <RelationalCouplesList/>
  <ActorList/>
  <DramaActionList>
   <DramaAction name="DA1"
            description="" >
    <DramaUnitList/>
    <AuthorizeList/>
    <ForbidList/>
    <FavorizeList/>
    <UnfavorizeList/>
    <ForceList/>
    <ImpactOnRelationList/>
    <TalnExtraction/>
   </DramaAction>
  </DramaActionList>
 </ActorsEnvironment>
</Scenario>
```

Fig. 7. Excerpt of a DraMachina XML file.

plots, of contexts, of interactive gameplays, etc., imposes the tool to be very generic and adaptable. Therefore, we based it on a low level analysis of the elements of fiction, bridging a gap between computer science and structural theory applied to literature, myth, and storytelling. We took advantage of available results in this lively research field, to make a clear separation between logical items which directly influence the course of the story (roles, motivations, values, preconditions of actions, actions, consequences of actions...), and *cosmetic* items such as settings, physical description of characters, elements of *style*, etc. We also provided general background patterns, like time or dramatic structures (based on different combinations of dramatic nodes), which the author can use as skeletons or guidelines. DraMachina can also be regarded as a linear screenplay laboratory as it allows the author to first describe the atomic components of the story, before experimenting several dramatic developments and conclusions. DraMachina's attempt to achieve an in depth conceptualization of a story and to display it under simple, logical and graphic appearance, is also a step in the description of complex narrative environments and story based virtual worlds.

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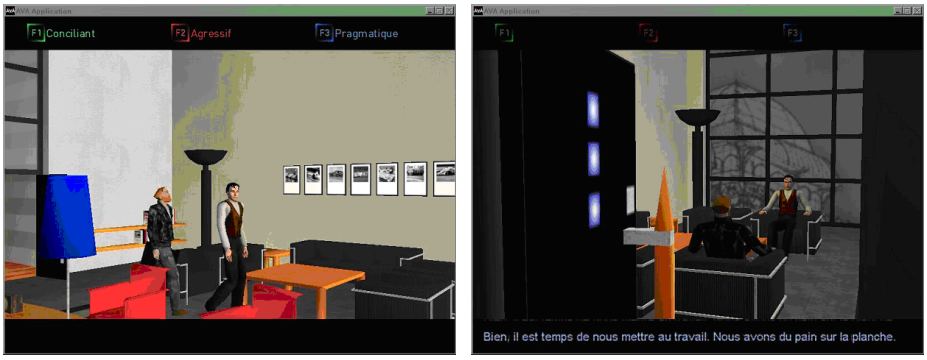

Fig. 8. Some screenshots of the corresponding AVA simulation.

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