Value-Driven Characters for Storytelling and Drama

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Abstract. Agent architectures have proven to be effective in the realization of believable characters, but they stay at odds with the notion of story direction, that is difficultly reconciled with the characters' autonomy.

In this paper we introduce the notion of character's values to mediate between agent architecture and story direction in storytelling systems. Modern theories of drama view story advancement as the result of the characters' attempt to maintain or restore their values, put at stake by unexpected events or antagonists. We relate characters' values with their goals; the activation and suspension of goals depend on the values that are put at stake by the progression of story incidents. Values and goals are integrated in a computational framework for the design of storytelling systems in which the direction is defined in terms of characters' values.

1 Introduction

In the last decade, storytelling has emerged as a powerful instrument to convey meaning, in a range of applications that span from education to entertainment [1,2,3]. The effectiveness of stories depends on their dramatic quality, that creates an emotional bond between the audience and the characters. This quality can be ascribed to two main properties: on the one side, the story must proceed from some initial conflict to its final solution according to a clear direction (the 'unity of action' dating back to Aristotle's poetics and clearly stated by [4,5]); on the other side, story characters must act according to recognizable aims and react to story events with appropriate feelings, in order to gain the naturalness that leads to Coleridge's 'suspension of disbelief'.

The twofold nature of dramatic quality corresponds to two parallel lines of research in computational storytelling. The attempt to formalize the structure of stories has lead to the development of story models, mainly inspired by the semiotic tradition in the analysis of narratives [6,7,8]; the research in character design has investigated the applicability of intelligent agent theories and technologies in storytelling systems [1,9]. However, these two dimensions are difficulty reconciled, since the autonomy that characterizes intelligent agents contrasts with the imposition of constraints on the story development [10]. This problem is exacerbated by the interactive storytelling paradigm, in which the user's actions interfere with the establishment of the story direction and must be addressed by the storytelling system in order to constrain their consequences to the admissible outcomes [11,12].

The notion of character's value has emerged in scriptwriting theory as a major propulsive force in story advancement. First stated in Egri's definition of drama premise

[22], the notion of value underpins most of the subsequent work conducted in scriptwriting [23], until the recent formulation by McKee [24] about cinematographic stories. The progression of the story follows a cyclic pattern: a character follows a line of action suitable to preserve its balance of values, when some event (typically, a twist of fate or an antagonist's action) occurs that invalidates its line of action and puts other (more important) values at stake, requiring the character to abandon or suspend its current line of action and to devise yet another line of action to restore them.

For example, in Bond movies, the hero must defeat an arch-vilain who threatens the human kind. As he devises a clever plan to neutralize his antagonist, the value at stake, initially limited to the 'security of the country', becomes increasingly higher as an effect of the counter attacks of the antagonist, with a climax that invariably ends with the removal of the threaten. In courtroom dramas, a solitary lawyer fights against injustice; the climax puts at stake the lawyer's self-achievement, then the fate of the victim of the injustice, until the lawyer becomes involved in some kind of direct opposition against the law institution. Abstracting from the actions actually carried out by the characters, the story can be conceptualized in terms of the values it puts at stake, which form the 'direction' of the story [5]. The direction conveys a type of universal meaning, independent from the actual the actions carried out by the characters in the story. For example, Bond movies tell the audience – through infinite variations – that evilness can be defeated by the courage of a solitary hero, courtroom dramas say that justice will infallibly triumph.

In this paper, we propose the notion of character values to reconcile story direction and characters. We define the story direction in terms of a set of values that are subject to change, and we propose a model of how characters react when their values are put at stake. The link between the characters' intentions and their values forms the meaning of the story. This framework can be employed to drive the generation of stories, by constraining the autonomy of the characters to the value dynamics prescribed by the author's direction. We believe that agent theories and architectures are effective to embed values in storytelling systems and that story direction results from the actions charaters undertake to reestablish their values put at stake. In particular, we address the following research questions:

- How can characters' values be formulated?
- How do values affect the behavior of characters, modeled as intelligent agents?

In the following, we first briefly examine the use of intelligent agents in the context of storytelling, and then introduce the notion of value as a propulsive force for the advancement of story direction.

2 Intelligent Agents and Values in Storytelling

The paradigm of intelligent agents offers an operational way to design and implement characters. Most agent architectures rely on the Belief-Desire-Intention (BDI) characterization of agents [13]. According to the BDI paradigm, agents are driven by their goals (or desires), and form plans to achieve them. Once an agent commits to a plan (i.e., the plan becomes the agent's current intention), it actively pursues the execution of

World War II. 1944, Italy. *Two partisans, Tenebra and Echo, are on a mission in the North of Italy (0). On the way to the meeting with an Allied officer, they decide to stop at a farm to get food and water, only to discover that the farmer, Agnese, is being tortured by a brigade of nazifascists (1). While Tenebra decides to stick with the mission, Echo decides to rescue Agnese. With a strategem, he kills most of the brigade, except the officer, who asks him to surrender in exchange for Agnese's life. While Echo hesitates, Tenebra, who's gone back as he cannot find his way to the meeting (2), gets close to the officer, unnoticed, and shoots him.*

Fig. 1. The synopsis of the example story, the short film "1944", directed by A. Scippa, Italy, 2007. The number in brackets mark the relevant time points for the value-based analysis illustrated in Table 1 (first column).

the actions that are prescribed by that plan. From time to time (typically, after the execution of an action), the agent monitors the world by performing sensing actions; sensing actions enable the agent to recognize other agents' plans and goals from the observation of their actions, so that the agent is likely to anticipate their consequences. BDI-based architectures have proven to provide a solid and effective basis for the implementation of character-based storytelling systems [14,15,1,9], thanks also to the availability of programmable agent frameworks [16,17]. Moreover, [9] argue that the BDI characterization of agency [13] provides the necessary basis to model emotions in characters.

From a cognitive perspective, it has been argued that characters are expected to be rational agents by the audience [18]: according to this claim, characters must manifest an intentional behavior to acquire believability. For example, the generation of interactive stories by the system described in [11] relies on the assumption that a rational model of the characters' behavior is a precondition for equipping characters with an 'expressive behavior' [19], i.e. descriptive elements that help the audience making sense of the motivations underlying their behavior.

Following the line of research summarized above, we assume that a character is modeled as a BDI agent, with beliefs, high-level goals (or desires) and intentions (or plans). For example, in the story summarized in Figure 1, the protagonists recognizably display an intentional behavior: they have the goal to accomplish the mission they have been assigned, and have a plan to accomplish it. There are obvious antagonists in the story, the Nazifascists, who threaten the protagonists' goal. However, some relevant aspects of the story cannot be grasped by pure rationality. In the example story, the protagonists exhibit two different 'scales of values' [20]: when they realize that Agnese's life is threatened by the Nazifascists, they make different choices, as a result of the different importance they attribute to the life of the individual, traded off against the interest of the mankind. The notion of value belongs to the realm of ethics and economics [21]; a value is an assignment of importance to some type of abstract or physical object. Recognizably subjective, values are related with the regulation of behavior, but they retain a more abstract, symbolic meaning and do not exhibit a direct correspondence within the theory of rational action; at the same time, they are very relevant for the establishment of the story direction.

In order to link the definition of characters, encoded by the BDI model, with the direction of the story, we propose to augment the character definition with the notion of

values, and we describe how characters modify their goals (and plans) in response to values at stake. Incorporating explicit values in characters' deliberation is the precondition to designing a storytelling system that manipulates values (for example, by putting them at stake) according to a pattern established by the author in order to affect the behavior of characters.

We model the **character** as a 4-tuple $\{B, D, I, V\}$, where, beside beliefs B, Desires D and Intentions I, V represents the character's values. Note that, here, we consider only the subjective dimension of values, and do not consider their relation with an external social system. Each value is polarized, with a negative or positive polarity p, and is associated with a condition c. The negative polarity of a value means that, when the value condition holds in a certain state of the world, the value is *violated*; the positive polarity corresponds to the value being *in force*. In order to let characters arbitrate among their values, values are associated to a priority r that ranks them according to their importance.

So, a **value** v is defined by a set of constructs of the form (p, c, r) where p is a negative or positive polarity, c is a ground formula and r is a ranking (a real number). We pose the restriction that, for some value v, the conditions c cannot be inconsistent and the priority r must be the same for all constructs. If the condition c of a value holds in a state of the world, represented in the character's beliefs, that value is *at stake*.

A character's **record of the values at stake**, VaS, is a set of triples (c, p, r) for which c holds in the current state of the world or is expected to hold in the future, according to the character's beliefs. The character's record of the values at stake (VaS) is a dynamic structure: along the progression of the story, the character updates its VaS by matching the conditions of its values V with its current belief state B. From the point of view of agent architectures, the monitoring of values can be expensive. However, we assume that the set of character's values V has a limited size, since they are intended as general instruments for the regulation of behavior.

As observed by McKee, stories often put at stake a character's value by offering her/him the possibility of bringing about a state in which that value is true (e.g. self-realization for Nora in Ibsen's "A Doll's house), possibly in conflict with some other values (family values in Ibsen's drama). In agent systems, strong limitations are posed to opportunistic behaviors, since they conflict with the requirement of behavior stability, and pose complexity issues for the management of multi-agent systems. On the contrary, in fictional worlds, provided that the behavior of the character is consistently believable along the story, stability is not a desirable feature, since the story tends to prefer changes to stability. In order to make the character proactive with respect to the compliance with its values, the character's beliefs include not only the current state of the world, but also its expectations about how it may evolve. Expectations are computed by verifying if, from the current state of the world, any state can be derived in which any conditions of its values hold, through the character's own actions or other characters' actions.[1]

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[1] Since expectations pose problems for the computational complexity of practical systems, the look–ahead process may be limited in practical applications, for example by constraining it to one or few steps.

Notice that this definition of values is intended as a subjective one, i.e., it concerns the beliefs of the character, not the beliefs established by the story in the audience. In fact, the gap between the character's belief and the beliefs held by the audience must be preserved in drama since it is the primary source of the effect known as dramatic irony, i.e. the audience knowing facts, relevant for a character, that are not known to the character itself.

3   Values at Work

When a character realizes that some value is at stake, it is expected to modify its commitment accordingly, by forming a goal (**value–dependent goal**) that contributes to re-establish the value at stake. The way goals arise and are affected by values can be grasped effectively by the framework by [25], which provides a unifying account of goal types and describes how goal state is transformed as a consequence of the modifications of an agent's beliefs according to the operational architecture in [25], *adopted* goals remain *suspended* until they are ready for execution (i.e., they are in *active state*), than possibly suspended again if a more important goal is adopted. Goals can eventually be *dropped* if certain conditions hold, namely, when the rationality constraints stated by [26] are met.[2] In the following, we assume this framework, and we only specify the role of values at stake in the state transitions of goals, according to simple automaton represented Figure 2.
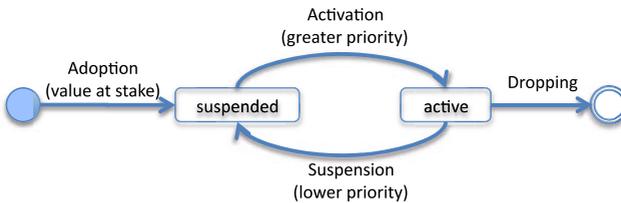
Fig. 2. A graphical representation of goal states and transitions including values (adapted from [25])

- Given a construct $v(p, r, c)$ in VaS (the record of the values at stake), the character formulates and *adopts* a set of goals that have the conditions of its values at stake as an object.
  1. If the condition c holds in the character's *expectations* and the associated polarity p is *positive* (i.e., it corresponds to the value being in force in that state), the character forms the goal to achieve that state of affairs (*achievement goal*). Expectations model the opportunity for the character to achieve the compliance with her/his own values.

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[2] In order to separate commitment to goals from commitment to plans, the model in [25] acknowledges different conditions to manage the status change of a goal in the presence or in the absence of a plan to achieve the goal. Since this difference is irrelevant for our purposes, here we consider only the overall set of goal conditions.

2. If the condition holds in the *present* or in the character's *expectations* and the associated polarity is *negative*, the character forms the *reactive maintenance goal* to achieve any state of the world in which that condition does not hold (any state s such that $c \notin s$). In most cases, this goal involves the need to contrast the behavior of an antagonist who is about to bring about just a state of affairs in which the condition holds.[3]

- Goals become *suspended* immediately after their adoption. In our model, the activation of goals depends on the priority of the associated values, which reflects their importance for the character:

  - If the priority r of the value at stake v is higher than the priority of the current values at stake ($\forall\ (p_i, c_i, r_i),\ (v \neq v_i) \rightarrow (r_i < r)$), the related goal becomes *active*. At this point, the character can *generate a plan* to achieve it and starts to *execute* it. The currently active goal may be have already been active in the past: if so, the character may resume the execution of a previously suspended plan, if still valid.
  - Or, the new goal may not become active immediately, and be activated later when no other goals with higher priority are left (because they have been achieved or abandoned, two conditions that equally result in the dropping of the goal) or never move to the active state. If a new goal is formed in reaction to a value at stake that has a higher priority, the active goal is *suspended*.

- A goal is finally *dropped* if the character recognizes that it is impossible to find a plan to achieve it or if it has been achieved, or if it is not relevant anymore, independently of its priority.

In order to illustrate how the model works, we resort to the example story (see Fig. 1). Table 1 reports the advancement of the story.

At time point (0), the value at stake, for both characters, Tenebra and Echo, is the $freedom$ of mankind, put at stake by the occupation of the country by the Nazifascists. In order to remove this state of affairs, Echo and Tenebra have formed the goal to accomplish the mission of connecting the partisan army with the Allied forces (formalized in Table 1 as $accomplished(mission)$). When the story begins, the two characters are committed to a shared plan, that consists in going to a farm to get food and water, then walking to the meeting point with the Allied officer and meeting him.

At time point (1), when they finally arrive at the farm, they discover that Agnese is held by the Nazifascists, ($prisoner\_of(Agnese, Nazis)$ in the table) and they realize that the threat to Agnese's life puts the $human\_life$ value at stake. Since the associated polarity is negative, this state of affairs represents the violation of the value. For Echo, $human\_life$ has a higher priority than any other value; in his scale of values, the 'concrete particular' is more relevant than 'state of affairs', in line with the definition of 'moral ontology' provided by [21]. So, when he *adopts* the value–dependent goal of preserving Agnese's life ($freed(Agnese)$), it becomes the *active* goal, since the value

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[3] The number of states that match the definition above can be effectively limited by considering the specific events or actions that have established or are going to establish the condition c, and focusing the character's deliberation on the possible ways to undo the effects of these actions or events.

Table 1. Overview of the values put at stake in the plot of "1944". Timepoints (first column) represents the temporal ordering according to which values v are put at stake (second column) for a character (third column), with a certain polarity (fourth column). The fifth column represents the the condition c by which the value is put at stake, and the associated polarity p (fifth column). The goal adopted by the character in response to the value at stake is represented in the sixth column.

time point	character	v	r	c	p	value-dependent goal
(0)	Tenebra	freedom	2	$is\_occupied\_by(Italy, Nazis)$	-	accomplished(mission)
	Echo	freedom	1	$is\_occupied\_by(Italy, Nazis)$	-	accomplished(mission)
(1)	Echo	human_life	2	$prisoner\_of(Agnese, Nazis)$	-	freed(Agnese)
	Tenebra	human_life	1	$prisoner\_of(Agnese, Nazis)$	-	accomplished(mission)
(2)	Tenebra	freedom	2	$unfeasible(mission)$	-	accomplished(mission)

at stake to which this goal is related has a priority of 2 (Table 1, row 3), higher than the priority of the previously active goal. Echo *generates a plan* to rescue Agnese and immediately starts to *execute* it: he kills one of the officers who are torturing Agnese, but the other catches Agnese and points the gun at her head.

For Tenebra, the situation is appraised differently: the value of freedom of mankind ($freedom$, priority 2) is more important than the life of the individual ($human\_life$, priority 1); this different ranking of values solves the conflict between the continuation of the mission and the rescue of Agnese in favor of the former. For him, the goal of rescuing Agnese is *adopted* but it does not become *active*. However, as Tenebra realizes, at time point (2), that his plan to accomplish the mission is not valid anymore ($unfeasible(mission)$), he adopts the goal to help Echo only as an instrumental way to regain him to the mission. According to the mechanism described in [25], he *drops* the goal of accomplishing the mission only to *generate plan* a new modified plan to accomplish the mission that includes the cooperation with Echo as a necessary step. So, Tenebra goes back to the farm; unseen, he attacks the officer by surprise and kills him.

Finally, notice that in the story analyzed, the characters' goal are only reactive, i.e., they do not stem from the opportunity of achieving the compliance with a value. The reason lies in the fact that this type of story does not leave much room for the initiative of characters, who tend to be driven by the events. However, most stories contain also instances of opportunistic behavior in respose to values at stake: for a very well known example, consider the excerpt of Shakespeare's Hamlet, the so–called "nunnery scene", analyzed in a BDI perspective in [27]: Hamlet, by a fortuitous encounter, becomes aware of the possibility of saving Ophelia from the corruption of the court, forms the goal to convince her go to a nunnery and (unsuccessfully) tries to achieve it through a well-articulated rhetorical plan.

4   Discussion

The integration of values in the rational model of characters posits a computational system for storytelling in the position to account for the basic patterns of drama. In summary, when a character suspends the current goal (and the related plan) in favor of

a new goal, associated with a value at stake of higher priority, the new goal becomes the active goal, and the patterns is repeated until the story reaches its climax. The possibility, for a character, to merge plans with the goal of maximizing the stability of its commitment is not prescribed by the model we propose. In order to implement such characters, the agent model must be equipped with meta-deliberation capabilities [28].

Since a story encompasses multiple characters[4], the dramatic direction of the story is given by the temporal pattern of all value changes. Although changes of polarity can happen fortuitously, they normally are intentionally caused by the characters: as a result, what the plot communicates with its up- or down-ending is the adequacy of a certain scale of values in a situation that the author assumes to be paradigmatic.

The important consequence of embedding an explicit model of values in characters is that the author (a *procedural author* in the sense of [29]), when establishing the direction of the story in a storytelling system, can deal only with values and manipulate them to obtain communicative effects, relying on the functioning of the characters to connect values with the character's behavior. Value–sensitive characters can be employed to design interactive storytelling systems in which a story engine 'directs' the characters, by putting their values at stake and relying on their individual deliberation to make the story progress. The subjective ranking of values in characters, established by the author, provides the system with the possibility to generate a climax in the values at stake, thus effectively contributing to the user engagement. Every time a character devises alternative ways to achieve a value–dependent goal, the system can use these alternatives to generate user options, letting the user choose among the possible behaviors of one or more characters. Or, else, the user can be asked to choose the value at stake among multiple options, thus playing the role of the author.

The story engine can derive the necessary knowledge to generate events that put values at stake from the characters' definition of values, and rely on interplay of characters' behavior to generate unexpected state of affairs that put values at stake. Differently from [8], in such system, the conflict among values is not planned but obtained by constraining the emergent behavior of a multi–agent system to follow a pattern of values at stake established by the author.

In practical applications, the way values at stake affect the characters' goals may be integrated by more sophisticated models. For example, the utilitarian character may compute the cost of the plans that achieve a value-related goal (with number of steps providing a gross-grained cost evaluation), and activate only the goals that can be achieve by plans whose cost is below a certain threshold. Or, for the conservative character, the goal activation condition may account for the compatibility of the new goals with the goals it is currently committed, so that its behavior acquires stability.

Storytelling theories also provide some useful insight into goal transitions. For example, since personal values change more slowly then extra-personal ones, a different policy, among the ones sketched above, may be associated with different value types, so that the character results more inclined to struggle for certain types of values. The system of genres is also relevant: a coming-of-age drama is likely to show the slow change of a character's inner values; in a sport drama, the protagonist is usually

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[4] In some case, characters may non-human, e.g. the forces of the nature: in this cases, the metaphor of agency becomes relevant as well.

stubbornly obstinate to achieve its self-realization through victory, and more less inclined to consider other options, no matter the importance of the value at stake. Finally, in some media, like television, persistence of intentions is intrinsically lower, while it is higher in other ones, like books. This suggests that the selected policy to manage goal adoption and activation should take the medium into account.

5   Conclusions

In this paper, we have proposed a framework for the definition of characters' values and a specification of how values at stake can be accounted for by characters' deliberation, governing the formation of new goals that eventually affect the state of values. The behavior of the characters is not meaningful by itself, but only as it contributes to the pattern of value at stake that constitutes the expressive language through which the author conveys its message.

Despite the explanatory power of values in storytelling, the framework we propose may suffer from some relevant complexity problems when employed for story generation. In particular, the monitoring of values by characters and the formation of value–dependent goals may pose problems for practical applications. Although we believe that narrative–specific patterns can contribute to alleviate these issues, the ultimate answer can be provided only by the design and testing of prototypes.

In this paper, we have only tackled the problem of interactivity, that constitutes one of the main concerns of computational storytelling. Since values provide a high–level guidance to the story progression, they are likely to be an important tool for designing character–based interactive systems. Future work includes testing the validity of this hypothesis in the context of practical applications and assessing its compliance with authorial practices.

As a final remark, note that modeling the achievement of a story direction through the characters' value-related deliberation is not in conflict with the use of story models, which represent an additional source of knowledge about cultural patterns of storytelling.

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