

The Representational Challenges of Fictional Worlds

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Introduction and Background

Modern computer games often have a strong narrative structure to the progress of their gameplay. In some genres, story is at the forefront of the interaction. As game makers seek to add new capabilities for procedurally generated content to their new releases, work on interactive narrative is growing in significance both as a basic research topic as well as a source for insight into the creation of content for games. As a result, there are now many compelling challenges for researchers working in AI that involve interactive computer games as their area of application.

A significant difference exists between application contexts familiar to most AI researchers and those found in games, however. Games are *fictional worlds*.

Of course, we are all aware that games are fictional worlds. What is not so obvious is what this means to the relationship between a player and his or her game system and what consequences the relationship holds for the use of representations like logic and other formal computational approaches. Games are expected to be fictional in much the same way that other narrative media are. Their worlds share many properties in common with the real world, but their experience is specifically not realistic. Games are not simulations, where system behaviors are required to be identical to real world correlates. When a game player begins to play a game, he or she steps inside a *magic circle* (Huizinga, 1955), effectively entering into a contract with the game's designers where players agree to suspend disbelief and play according to the rules and designers agree to manipulate the game world in ways that facilitate that effective play rather than recreate realistic interaction.

Understanding narrative in these game worlds, as in other media, involves the active construction and experience of an illusion (Gerrig, 1993; Johnston and Thomas, 1995). This construction process is particularly participatory in computer games, where players not only

work to comprehend the story but take action throughout its unfolding to shape it in significant ways.

The distinction that I'm drawing between simulations and game worlds points to interesting challenges for AI researchers in the representation and modeling of players' interactions with games. I describe two examples below, but essentially the larger class of challenges revolves around the requirement not to create a real world experience in a game, but to create a fictional world whose experience will prompt the same narrative comprehension processes that people use to understand other forms of narrative in conventional media (Graesser, Millis and Zwann, 1997).

Levels of Narrative

When considering the structure of narrative, narrative theorists typically break a narrative down into two distinct levels: the *story* and the *discourse* (Chatman, 1980). The story level contains the things within the story world itself – the characters and their mental state, the characters actions, the objects and locations they interact with and within. The discourse contains those medium-specific elements used by the story teller to communicate the story to the reader – a novel's text, a film's camera shots and shot sequences, background music and lighting. This division is useful for approaching the design of narrative generation systems as it provides a direct and reasonable way of factoring the many problems (Young 2007). The discussion below is divided into two parts, providing an example representational challenge from each level.

Two Representative Challenges

At the Story Level: Conflict

Conflict (or rather, the absence of it) is one of the most significant representational challenges to current work on interactive narrative. This is particularly true of plan-based approaches to narrative generation (e.g., Young and Riedel, 2005; Cavazza, Charles and Mead, 2002), which rely on provably sound planning systems to create flaw-free (and thus conflict-free) character plans. In contrast to the plans produced by AI planning systems, stories are delightfully full of conflict. Logical systems hoping to model stories must explicitly deal with the representation of this conflict as a fundamental element of story structure.

Like most real-world notions that are found within stories, narrative conflict is both like and unlike its real world correlate. As in the real world, conflict in narrative typically involves two or more characters each holding goals that are in opposition to one another who form plans both to achieve their own goal and often to prevent their opponents from achieving theirs.

Narrative conflict differs from real-world conflict, however, in a number of ways. For instance, narrative conflict is *paced*, so that conflict is interleaved in the story between periods of calm where other elements of the story can be advanced. Narrative conflict is *balanced*, so that protagonist and antagonist are relatively equally matched in strength. As a result, interaction between the two doesn't result in one side overwhelming the other, thus ending the story prematurely. Narrative conflict is *measured* in order to create a story's rising action, that is, the tension that builds as the lead in to the story's major climax.

At the Discourse Level: The Dynamics of User Beliefs

As in other forms of work focusing on the generation of discourse (Moore and Paris, 1993; Maybury, 1992; Hovy 1991), the generation of narrative discourse has as its goal the creation of a sequence of communication actions that effectively manipulate the beliefs of a reader (or, in our case, a player). In typical existing AI approaches to discourse generation (often focusing on instructional text as a target genre), the content and organization of a discourse is selected in order to provide rhetorical structure that leads a reader to come to hold a certain set of beliefs. These beliefs are the central communicative goals of the discourse and, in some sense, the satisfaction of these goals is all that matters in the process of constructing the discourse.

In contrast, the beliefs that a reader or player holds about the story world at the *end* of a narrative are much less significant than in the case of instructional text generation. Rather, a storyteller (or a storytelling system) must give significant care to the creation of a discourse that manipulates the beliefs of the reader about the story world *throughout* the course of the unfolding story. In narrative discourse, information is *intentionally withheld* in order to create effects like surprise and suspense (Ohler and Neiding, 1996; Cheong and Young, 2008). Information is presented *out of order* (e.g., flashbacks or foreshadowing) in order to drive expectations and build anticipation. Structures in narrative discourse follow specific, genre- and medium-specific conventions or idioms (Jhala and Young, 2006) that license certain types of inferences in much the same way that indirect speech acts license inferences in conversational discourse. A narrative discourse may intentionally prompt inferences at one point in the story that are in direct contradiction with prompted inferences at other points in the story. In many ways, it is the trajectory of the beliefs of a story's reader that matters in narrative rather than his or her beliefs about the story at its end.

Discussion

In the discussion above, I briefly describe two representational challenges for interactive narrative within game worlds. Both these challenges arise from the particular *fictional* nature of game worlds themselves and the important difference between real-world and narrative models. These two areas provide a significant number of open research questions, but they are not the only areas where progress on fictional representation is needed.

Fortunately, there are many familiar logical tools that can be brought to bear on these issues. Epistemic logics, dynamic logics, logics of action and change and other computational models with well-understood semantics address aspects of these problems. Just as planning algorithms provide significant, well-founded models for the generation of casual and temporal structures in stories, so these logical tools come with obvious first steps towards application in narrative contexts. Whatever points are chosen for advance in this area, however, the significantly distinct nature of narrative and fictional worlds must play a central and consistent role.

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