

Concepts for Interactive Digital Storytelling: From Table-top to Game-AI

Martin van Velsen, Josh Williams, Gustav Verhulsdonck

Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213
Institute for Creative Technologies, 13274 Fiji Way, Marina del Rey, CA 90292
New Mexico State University, MSC 3E, PO Box 3000, Las Cruces, NM 88003
vvelsen@cs.cmu.edu, williamsj@ict.usc.edu, gustav@nmsu.edu

Abstract

In the current environment of digital games and immersive role playing systems, we often overlook previous methods of conveying and experiencing narrative based entertainment. We present a fresh perspective on interactive digital storytelling systems based on table-top role playing games. Table-top games offer players the ability to negotiate and determine outcomes of a game with a referee. This cooperative strategy provides opportunities for studying new approaches to AI in Interactive Narrative. Using table-top role playing games as a model, we propose terminology and concepts that are different from the normally applied traditional literary or dramaturgical perspectives.

Introduction

Prose, poetry and other types of fiction are all mechanisms for creating a believable temporal environment, be it only in the mind of a single individual at a time. Film and television are similar save that a fully developed and fixed rendition of the world is presented to an audience. But attempts at creating interactive worlds via these traditional media have been far less popular than their passive counterparts. Exploring the interactive aspects of telling and experiencing an unfolding drama to a wide audience has rested square on the video game community's shoulders for the last couple of decades (Aarseth, 2001; Juul, 2001; Laurel, 1993; Murray, 1998). Most agree that we are only at the beginning of exploring the narrative possibilities computer technology can provide, but perhaps a method of storytelling within game play (or vice versa) already exists that has the missing elements we currently lack in virtual worlds.

In this paper, we present a collaborative storytelling model developed through table-top-gaming. Table-top systems offer more player agency and system awareness than modern video game systems, at the cost of occurring in less-than-real-time with fewer potential participants and diminished symbolic feedback. The basis for this trade-off,

and what constitutes the majority of table-top games' appeal, is allowing players to co-author the experienced story. After a brief introduction into the history of interactive narrative and table-top game play, we will discuss the major elements that make up the real time construction of a table-top game and suggest potential directions for AI based on table-top gaming. Finally, we explore these ideas in the context of future work towards creating a novel model of interactive storytelling.

Digital Narrative and Interactive Narrative

A traditional approach to narrative is based on applying social, cultural and critical perspectives to various texts (prose, poetry, film, and theatre) in order to study how an author creates and conveys a particular experience to an audience (Ball, 1997). Literary studies have complicated notions of authorship, reading processes and authorial intent as separate acts by announcing the death of the author through the birth of the reader where reading is seen as an interactive, rather than passive, experience (e.g. Barthes, 1977). For instance, reader-response theory, which focuses on reader-text interactions, questions the idea of authorial intent and stable meaning by highlighting reading processes where readers are participants in constructing their own readings of a text. By interacting with a text and bringing their own unique responses, readers thus create multiple narrative readings of the same text. In modern times, entertainment technologies have further complicated the relationship between author, reader, and text. Multiple forms of interaction are now encouraged by digital media such as video games. In MMORPGs, players may interact with other players in symbolic actions and so construct individual and collective narrative experiences or be persuaded to engage in various social interactions and role-playing. As a result, for various theorists, the increasing use of digital media poses unique questions regarding the experiencing of narrative constructs, and many new approaches for developing a model of these interactions have been based on dramaturgy (Laurel, 1993), interactive storytelling (Murray, 1998), cybertexts (e.g. Aarseth, 2001), and procedural rhetoric (Bogost, 2007).

While video games offer narrative experiences, they are not strictly passive since they engage a player by demanding they perform certain actions to achieve narrative goals. For this reason, scholars make a distinction between *narrative* (narratological) - which advances the narrative experience - and *interactive* (ludological) elements - which ask the player to meet a certain goal (e.g. Mateas & Stern, 2005; Mateas & Stern, 2006). Some scholars have criticized the separation of interactive and narrative elements by questioning the narrative experience offered by a game such as Tetris (e.g. Juul, 2001). Complicating this situation, a common distinction is made in narrative theory between *plot* (sjuzet) - the way a narrative is presented to a reader by an author - and *story* (Fabula) - the elements of a narrative as experienced by a person (e.g. LeBlanc, 2005). For this reason, an important issue revolves around to what extent video games can be seen as encompassing both interactive and narrative experiences. Many different approaches explore the dynamics of narrative in AI, in which some have argued that AI agents are understood in a narrative and “socially situated” manner where their meaning is negotiated rather than solely predefined through AI modeling (Sengers, 2002). In order to further explore this dynamic of negotiation, our paper aims to explore these issues by presenting a brief history of table-top role playing games as a way to explore these concepts for AI in developing new terminology and concepts for negotiating interactive narratives.

A Brief History of Table-top Role Play Gaming

Table-top role-playing games began when conflict simulations called “war-games” were used to learn tactics and strategies for actual battlefield gain. An example of this is the game *Kriegspiel*, a variant of chess used by officers in the Franco-Prussian war, and the grandfather of modern table-top games. In these games, role-playing was required of players to represent unit actions on each side, but the introduction of negotiations between specific individuals required a referee. Over the decades that have followed, many table-top games have provided numerous rule-sets to enhance the experience of these interactions, as well as have provided game mechanics to lessen the need for a referee to weigh-in on related outcomes.

Broadly speaking, table-top games can be placed on a spectrum ranging from combat or simulation based gaming to pure narrative and story based play. We will focus on the story oriented variety, where players engage in dialog based interaction with a referee, often referred to as a Game Master (GM), or Dungeon Master (DM), or simply, and for our purposes, a Narrator.

An important aspect of table-top games is that they allow for the use of narrative role-playing to be introduced into the game by letting people inhabit a character role (Fine, 2002). Often, in table-top role-playing games, character points are given to indicate strengths and

weaknesses, but character role-playing also helps to determine game outcomes by allowing players to negotiate their actions with the Narrator of the game. But what happens when the player’s representation of his character is more compelling than his character’s rule-based point determination? One example is presenting a sound combat strategy even though the character in question is weak in this area. In such cases the referee could decide to weight the character’s point determination with an arbitrary bonus, or decide the outcome before ever committing the point process. It is precisely these circumstances that enhance table-top rule-sets and which we will use in our generalized negotiated framework for clarity of AI comparisons.

Introducing Interactive Storytelling Terminology

A concept strongly associated with table-top is the skill-check game mechanic, which can be likened to the interactive element thus far identified as intrinsic to video games as narratives. This mechanic forms the means of evaluating the validity of an action taken by a player against the set of rules that embody the nature of a game. For example, checking to see if a player’s character has enough dexterity to jump across a small stream is a game mechanic check. Skill-check game mechanics are therefore an artifact of simulating actions within world model. In the case of table-top gaming, these checks can only occur in less-than-real-time due to having multiple humans in the loop. If we can capitalize on this decreased speed to observe the transactions between players and Narrator, we may discover how they shape the experienced story, and perhaps how each can be influenced to steer the story.

Narrative Views

We consider the narrative view or views, the vantage point(s) from which a participant, both players and Narrator, observes an ongoing game. It creates and defines the personal context of a player via his character, and contributes to the unique perspective each participant has. The social experience in table-top gaming can be perceived and described from three distinct vantage points. Each point of view adds knowledge about the entire experience, which otherwise could not be observed. Within table-top gaming, the three observation points are: the player’s perspective, the Narrator’s perspective and the universal observer’s perspective. Especially the last view is important for our discussion here since it gives us both an understanding of the over encompassing game mechanics and it provides us with a better understanding of the game from any player’s perspective when they are not actively engaged with performing in the game itself.

The Narrator

One major difference between current digital narrative-based games and table-top role playing varieties is the use of a Narrator (different in the sense that questions cannot be about the narrative). Narrators have a different role than the other participants in that they not only represent various non-playing characters, but also have ultimate definitive say in the outcomes of players. It is tempting to label a Narrator the ultimate authoritative role in a game; in fact it is more apropos to describe this role as a holistic reference, which players consult for verification of the current state of the imagined world.

The Players

Around the table, or gathered together in a virtual environment are the players or participants. It is these individuals who ask questions about the world and respond to the Narrator's replies. A group of players combined is often referred to as a party or a team and it is this team nature combined with the individual choices and natures of the players that add story depth and narrative momentum. It is not the case that players simply follow the guidelines of the Narrator and hope to end up at a satisfying climax or conclusion. It is through the individual decisions and statements about the world that the Narrator is forced to adapt the story and the virtual world. As such players have much more control that would be assumed and a Narrator has a much more accommodating role than might be expected.

Non Player Characters

Non Player Characters (NPCs) form a living backdrop in the game and a way for players to interact with other living entities. Much information is obtained through these NPCs and they are one of the primary means for a Narrator to convey important aspects of the game. Media types such as theatre, film and television afford a granularity of characters that can be roughly divided into the following categories: **Background characters**, **Medium level characters** and **Foreground characters**. Each of these character types has a specific role in the world and therefore in the narrative. Background characters are frequently used in film to contribute to the setting and atmosphere of the events. Medium level characters may have few speaking lines and contribute to the vibrancy and human detail of a performance. Foreground characters directly interact with the protagonists and are the entities who determine the direction of the plot. In table-top games NPCs are foreground characters and often function as medium and background characters. In fact good Narrators use the ambiguity of the role types to have the players guess as to the importance of encountered NPCs. Computer simulations have embraced both background characters and foreground characters but hardly blend the

types to allow a medium characters. More recent games such as Half Life 2 provide some extra acting ability of background characters and therefore push them slightly into the medium level type.

The Universal Observer

Besides being actively engaged in their respective roles, all participants have their opinions and evaluations of the ongoing game. Observations on how the game progresses are sometimes communicated as if each member is a universal observer or a participant who is not a part of the game. One could liken this to an active "in-game" backchannel, where items are discussed such as the fairness of decisions made or the validity of events in the world.

From a traditional media perspective, this universal observer breaks the 4th wall or the suspension of disbelief (Murray, 1999). It would be analogous to watching a film for the first time with the entire production crew in the theatre who discuss the decisions made during the shooting of the film. Within table-top gaming this practice is quite common and even desired. It is yet another means of checks and balances that keeps the world consistent and is furthermore a means for players to interact with the Narrator on an equal level.

The Structure and Role of Time

Perhaps the single most important concept to discuss is the usage of time in interactive narrative based games, simply because time can be stopped to negotiate an outcome. Time is important because it is the desire of both players and storytellers to mimic the dramatic ebb and flow of linear narrative, while not being subject to it, nor having to openly agree upon its station with one another. At a meta-level two forms of space-time can be distinguished in table-top games: the Setting and Campaign.

The Setting, or the context of the game, sets the tone of play. It serves as an important indicator to players and Narrator of what types of events and characters are to be expected. For instance, one would be surprised to encounter an actual vampire in a traditional Victorian murder mystery game. It's common for table-top rule sets to be specifically for a single type of setting, though general systems exist.

The Campaign, is composed of all games played in specific Setting, and can be considered the stretch of time that forms an entire story from start to reveal. If a closing reveal is to be expected then it would be at the end of a campaign.

Within the above, a single sitting of the required number of players and Narrator to adequately move the story forward constitutes a **Game**. Tychsen et al have provided an empirically-derived model of how time flows in numerous multi-player game formats (Tychsen et al, 2007). In regards to table-top gaming they illustrate *passive* and *active* states, and describe common

interactions for the latter. One limitation of this model is that it only includes activity moderated by the Narrator, when in fact the discourse between players during the passive state contains information vital to the story experienced during the game. The following four forms of timekeeping further encapsulate the table-top experience across the passive and active states between players and Narrator, and describe the negotiations common to each:

In-context (active), which comprises the time spent in role-play by players with each others' characters and the Narrator's non-player characters, and the description of actions and reactions. If it were possible to present only this instrument's contents, they would be indistinguishable from a linear story.

In-game (active), wherein rule-required skill and chance systems are queried, and resource information necessary to determine action outcomes shared.

Out-of-game (passive), which is a mode of game play where information about the game is discussed while all participants are still actively engaged in the game but where the players are not acting from within their role, character, or necessarily discussing the current moment of the game at hand. These situations are used to conjecture about story elements, discuss issues about the game mechanics or to debate the applicability of a certain rule or convention.

Out-of-context (passive), which is composed of similar exchanges to Out-of-game, but that occur specifically between games, versus while one is in play. One could imagine an email discussion about events in the game a few days after the participants played together.

Table-top needs both passive and active phases since the Narrator and players can't perform all the story maintenance exclusively in one phase. In the active phases the story is squarely in front of the players; they are either acting upon it because the rules are not stopping them In-context, or gathering data from it via the rules In-game for further action. This makes the elements of the story difficult for the Narrator to change. However in passive phases, the story is restricted to only what the players have already experienced, and as the rules are not involved, the Narrator does not have to respond through them to player actions. During Out-of-game and Out-of-context phases the Narrator can make both subtle and sweeping changes given what story data he believes the players have absorbed, and are focused on.

Changing Time Phase and Narrative Control

Whatever story a table-top game provides, it requires a constant give and take to be realized. This give and take occurs during each transition from one time phase to another, which both players and Narrator have access to creating. The following are descriptions of each transition, and how they might be triggered:

Out-of-context to Out-of-game – this is the only transition that requires cooperation as it signals the

beginning of a game. While it is true that a Narrator must be present, the act of every player refusing invitation is just as powerful. This first transition establishes the equality of both sides of the table.

Out-of-game to In-game – the first time this is brought about in a game is up to the Narrator. Prior to the transition, he is establishing or re-establishing story elements with the players, and based on their focus can make adjustments to possible encounters in the game's near future. When ready, he initiates the In-game phase.

In-game to In-context, and vice versa – switching between these two phases happens often and rapidly, but it is necessary to distinguish them as both the players and Narrator can cause the switch. In moving from In-game to In-context, a player or Narrator is moving the story forward. In the opposite direction, the story is made referential to the rule-set as the In-game phase requires. These two phases validate each other; their interplay is the proof that a story is being collaboratively told and experienced.

In-game to Out-of-game – this transition is most often initiated by a sub-group of players, and rarely brought about by the Narrator. Once a game is in motion, the Narrator is better served by a “poker-face,” while allowing players to break away from the action (especially if their characters are not at its focus) and shares their thoughts about what just happened and what to do next before rejoining. When a Narrator pulls the whole game into this phase, it is to make a ruling clear so that the players can better trust in future outcomes, and perhaps to indirectly emphasize a story element related to such a ruling. The only other case for a Narrator to initiate this transition is to end a game.

Out-of-game to Out-of-context – this transition is most often brought about by the players in the desire to continue conversation about the game and campaign before meeting again. It also can be an opportunity for the Narrator to put into the gaming experience a story that the players' characters were not involved in, so as to give them access to a sub-plot or aside that may re-focus their interest in a particular part of the story.

Narrative Meta-Concepts

We can now attempt to tie together all the means and models previously discussed into a lexicon of narrative concepts. These concepts are designed to create a workable vocabulary in which to discuss interactive storytelling.

Faith Based Gaming encompasses interactive narrative systems wherein the stories played out are done so upon the unvoiced promise of a meaningful ending. In table-top games, even the Narrator must have “faith” that available negotiation structures will provide this meaning at a Campaign's end, sometimes called “the reveal.” We hesitate to use the term *reveal* since it sets up the Aristotelian assumption that stories play towards the resolution of a puzzle of sorts in an innovative and surprising fashion. A reveal can also be the satisfactory

conclusion of major arcs and storylines in a game that can have spanned years of play. For table-top games, faith based gaming also contains the promise of narrative wholeness, which brings us to the next concept: the promise of consistency.

Consistency Creation, Cognitive overload can be high for players and in order for the Narrator to ensure an enjoyable experience an unspoken contract exists, which promises that clearly distinguishable patterns will emerge as a guide to the players. The promise of consistency is an important aspect of faith based gaming. It allows uncertainty to be pervasive throughout the game and at the same time be a consistent understandable experience. Once could liken the promise to the pattern seen in television shows, where a cliffhanger at the end of an episode is promised to be resolved, but with the understanding that another cliffhanger will be constructed as well.

Narrative Baggage is the collective behaviors, emotional responses and personal resources a player has built up as a response to prolonged exposure to a Narrator's incentives. Narrative baggage is an important concept because it lowers the cognitive load of both players and Narrator. Complex events can play out because there now is an understanding how each participant will respond to the provided stimuli.

Narrative Structure is a specific pattern of interaction between Narrator and players, similar to narrative structure in written works (Turchi, 2004). In Table-top players can also adopt a specific scheme of interaction that closely resembles a plot device for example. Perhaps the most important distinction between traditional media such as literature, theatre, film, etc, is the way narrative structure is used. Even though there is dramaturgy where an audience participates in the performance, the narrative structure is still mostly one sided and makes a clear distinction between observer and generator of events. As is evident, the narrative structure in table-top games is interactive because of the negotiation between player/character and Narrator.

An AI Perspective on Table-top Gaming

In most current AI driven interactive narrative games the focus is either on generative narrative construction or authoritative narrative extrapolation. In our review of modes of play in table-top gaming we have shown that generative and authoritative narratives are interweaved and interlocked. As such the above table-top concepts and paradigms may be used as possible solution tracks for novel approaches in AI development for interactive narrative based games. We will discuss a number of advantages table-top models have over current AI approaches in the below section.

Narratology vs. Ludology in Digital Table-top

Since in table-top gaming the Narrator validates a player's proposed action, a broad range of responses can apply that are richer than action/reaction. For example, a Narrator can divert a player's request for an action by responding with a completely new sub plot and self contained narrative molecule, as opposed to a single allow/disallow action model (e.g. Riedl et al, 2003). As such in table-top, a narratological response is possible to a ludological dilemma (e.g. table-top game mechanics).

An extension of this paradigm can also provide insight into how authoritative content can be incorporated into an otherwise generative based storytelling approach. An AI system could respond with a semi-authored vignette, allowing authors to contribute seeds and themes.

Likewise if a Narrator is stuck in a plotted construction, a narrative mechanic can be played out, which is in fact the normal operation of a table-top game where players roll one or more dice to figure out what will happen next.

The Narrative View in AI Based Games

A distinct gap between table-top narration and AI driven interactive narrative is the way in which a player interacts with Narratorial authority of the ongoing story. AI systems do not reflect on past events and can therefore not explain why a player could or could not take a certain action. A method of retrograde analysis would be valuable to explore how past actions may shape character behavior and which may be of benefit to current approaches in AI. One could liken the approach to explainable AI (Core, 2006) but with the difference that the AI explains what has happened instead of why it has made a specific decision.

Since table-top games require that participants are aware of what has happened to their character in earlier times, it is important to see if we may utilize this awareness for developing new models in AI. In table-top, story validation is an important mechanism by which all players can maintain both an individual as well as a collective understanding of the game world and story state. Most of the time this authorial role is put on the Narrator but in table-top every other player contributes.

AI Use of Narrative Baggage

Currently digital interactive narrative games are explicit action evaluation machines. What we mean by this is that players clearly indicate to the machine what their intent is. E.g.: A mouse click linked to a gun object immediately fires a virtual weapon. In story based games actions are not as clear cut. A real world example might be that we tend to look at the objects we will interact with. When walking down the street we might look at the possible places to go for lunch and read the menu displayed at the entrance of one particular restaurant. This indicates likelihood, but more importantly excludes a large range of other activities that will not play out. As such Narrators often closely observe a player's behavior and we believe we can apply

lessons learned from automated tutoring research where machine learning techniques automatically obtain cognitive behavioral models by observing experts (Matsuda, 2008). In our case experts are the players as well as the Narrators.

Conclusion

A concise and accurate set of terms describing both human and machine driven interactive narrative can assist the AI field to investigate the advantages of each driver. Since traditional terms from literature and dramaturgy do not adequately describe the interactive narrative model identified in digital role-playing games, we propose the terminology and concepts above, which are applicable to table-top role-playing games, as appropriate for inclusion in the development of AI and interactive digital storytelling mechanisms.

Future Work

Using the concepts and terminology presented in this paper we will look in more detail at various modes of interactive storytelling and automated interactive narrative. From a comparison and evaluation of the findings of captured table-top sessions we hope to create a model and meta-mechanics that describe and predict the behavior of participants in interactive storytelling and which can drive automated Narrators. Ultimately we hope to refine our vocabulary to the level of specific domain knowledge including high level plan operators (Riedl, 2006), such that these can inform planning algorithms.

References

Aarseth, E. 1997, *Cybertext: Perspectives on Ergodic Literature*. Baltimore, MD: The John Hopkins University Press.

Bal, M. 1997. *Narratology*. Toronto: University of Toronto Press.

Barthes, R. 1977. Death of the author. *Image-Music-Text*. Hill and Wang: New York.

Bogost, I. 2008. *Persuasive games: The expressive power of videogames*. Cambridge, MA: MIT press.

Core, M.G., Lane, C.H., van Lent, M., Gomboc, D, Solomon, S., & Rosenberg, M. 2006. *Building Explainable Artificial Intelligence Systems*, Proceedings of the Eighteenth Conference on Innovative Applications of Artificial Intelligence (IAAI-06)

Fine, G.A. 2002. *Shared Fantasy: Role Playing Games As Social Worlds*. Chicago, IL: University of Chicago Press.

Juul, J. 2001. Games telling stories. *Game studies 1* (1) retrieved, April 11, 2008 from : <http://gamestudies.org/0101/juul-gts/>

Laurel, B. 1993. *Computers as theatre*. New York: Addison-Wesley.

LeBlanc, M. 2006. *Tools for Creating Dramatic Game Dynamics*. In Katie Slaen & Eric Zimmerman (Eds.), *The Game Design Reader: A Rules of Play Anthology*, 438-459. Cambridge, MA: MIT Press

Riedl, M.O., Saretto, C.J. & Young, R.M. 2003. *Managing Interaction Between Users and Agents in a Multi-Agent Storytelling Environment*. Proceedings of the 2nd International Joint Conference on Autonomous Agents and Multi Agent Systems, Melbourne, Australia.

Riedl, Mark, and Young, R. Michael. 2006. *Story Planning as Exploratory Creativity: Techniques for Expanding the Narrative Search Space*, In: *New Generation Computing*, Vol. 24, Nr. 3

Mateas, M. and Stern, A. 2005. *Structuring Content in the Façade Interactive Drama Architecture*. In Proceedings of AIIDE 2005, 93-98. Marina del Rey, CA.

Mateas, M. and Stern, A. 2006. *Interaction and Narrative*. In *The Game Design Reader: A Rules of Play Anthology*, eds. Katie Salen & Eric Zimmerman, 642-669

Matsuda, N., Cohen, W. W., Sewall, J., Lacerda, G., & Koedinger, K. R. 2008. *Why tutored problem solving may be better than example study: Theoretical implications from a simulated-student study*. In proceedings of the International Conference on Intelligent Tutoring Systems.

Murray, J. 1998. *Hamlet on the Holodeck*. Cambridge: MIT Press.

Sengers, P. 2002. *Schizophrenia and Narrative in Artificial Agents*. *Leonardo* 35 (4), 427-431

Turchi, P. 2004. *Maps of the Imagination: The Writer as Cartographer*. Berkeley, CA: Trinity University Press.

Tychsen, A., McIlwain, D., Brolund, T. & Hitchens, M. 2007. *Player-Character Dynamics in Multi-Player Role Playing Games*. In DIGRA Conference Proceedings.