

What Comes Next? An Experiment in Interactive Narrative

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Abstract

Most interactive narratives fail to live up to their names. Static interactive narratives (e.g., fixed story graphs) tend to lack a large enough possibility space to allow for a sense of creation and ownership on the part of the player. Dynamic narratives can employ techniques that undercut, or remove entirely, the significance of player interaction. This paper introduces a proposal for a new system that lets the user continuously select from system generated sets of story events to include in an evolving narrative. Though this work is still in its preliminary stages, it could be an advance in interactive storytelling, allowing for a large possibility space of quality stories that truly depend on user input and interaction for their creation.

The Problem

Most interactive narratives fail to live up to their names. Rather than being true collaborations between game author and end user, interactive narratives tend to consist of a number of pre-authored paths that the player merely experiences; there is no authorship on the part of the player, only discovery. Admittedly, sometimes the number of pre-authored paths can be very large, large enough to the point that it might provide an illusion of player impact on the narrative. Other times there is only a single possible trace through the game. Both ends of this spectrum are united in a single truth: the player is merely uncovering existing plot, not generating it themselves. A true interactive narrative must be dynamic enough to allow for player impact that is unforeseen at the time of authoring.

Although moving beyond selecting between existing options is an important first step, it is by no means all that is required for true interactive narrative. Another important feature is that the game needs to be able to understand the implications of the player's choices. This is something games get for free in most current interactive narratives, as the consequences for a choice are baked into the choice

itself. An oft used but apt analogy is the Choose Your Own Adventure novel: readers are presented with choice points throughout the text whose selection will influence the resulting narrative. The novel does not need to have an underlying model of good storytelling, nor does it need to have a model of the reader and the choices that they've made up to this point of the text. This is the same tactic leveraged by many existing story games today; all of the possible narrative sequences available were originally conceived in the mind of the author before the reader even entered the picture.

Now, perhaps it is not fair to expect anything more from a Choose Your Own Adventure story; novels after all are a static medium. Computational media, however, have no such excuse. Computational media are more than just the presentation of a story, as behind the scenes they have the power of real time calculation on their side. This power of computation can manifest itself in story manipulation in a variety of ways. One such way is the notion of drama management (Bates, 1992). A drama managed experience typically has a model and heuristics for an ideal game experience, and a daemon running in the background that tracks how much the current gameplay trace deviates from this preferred ideal. If the trace strays too far from optimality, the drama manager generally has an array of operators which can (usually subtly) manipulate the game world to get the player back on track.

Drama managers' operators and model of story quality are defined and set before they reach the hands of the user, much like the content in a Choose Your Own Adventure novel. However, the system dynamically identifies which operators to use to lead the player towards its vision of an ideal experience. This identification process allows for much more sophistication than what is present in a CYOA story; any given operation isn't just a choice between handfuls of options. Rather, it makes operation decisions by taking into account everything the player has done to reach this particular state.

Drama management is a powerful device, but it is sadly not a cure-all. One issue with drama management is that it

forces the player to subscribe to its own model of what it means for something to be a good story. Although in traditional narrative mediums it is, or at least should be, the responsibility of the author to craft a strong narrative structure, in an interactive medium authors must be willing to relinquish some of this power to the players. It's also somewhat restrictive. Though some drama managers attempt to incorporate the actions of the player into the encoded ideal narrative arc (Mateas & Stern, 2005), others (Riedl, Stern, Dini, & Alderman, 2008) are primarily engaged in course correction: secretly fixing the identified mistakes or bumbblings of the player to steer them down the predetermined-by-author best path.

Another use of computation in the creation of narrative is in story generation. By story generation, I refer to works such as Meehan's *Tale-Spin* and Lebowitz' *Universe* (Lebowitz, 1984; Meehan, 1977). These story generators, given a relatively small amount of base material, have the power to generate a very large number of stories. These stories often take the form of plans. An issue with these plans, however, is almost the exact opposite of what we see in drama managers—there is often very little in place to ensure that the generated stories pass a threshold for quality, or have an understanding of what a good drama is. In *Universe's* famous examples, soap opera inspired characters are puppets meant only to satisfy the goals of a simulated author's desires. *Universe's* hallmark operation, Churn, takes two characters identified as being happy as input and as output returns a plan that will ruin their day, if not their lives. For example, lovers may be separated by a surprise arranged marriage from their parents. These calamities strike quickly, frequently, and are not experiences that characters, or flesh and blood human beings for that matter, would seek out for themselves. These are not the plans of intelligent agents, nor are they particularly the plans of an author attempting to build up to a climax; they are the plans of a system desperately trying to prolong a story by endlessly re-introducing turmoil upon its hapless characters. As such the methodology of *Universe* loses its believability outside of the context of melodrama. Moreover, many of these story generators are not terribly interactive; though some allow for select customization (a version of *Tale-Spin*, for example, allowed players to select the protagonist and their objective), they are primarily passive experiences on the part of the user.

In summary, many story based games suffer from a limited possibility space, and the possibility spaces they do have are pre-authored limiting player agency. Plan and goal based story generators help address the issue of pre-defined possibility spaces, but often lack interactivity and the model of a dramatic arc. Drama managed experiences have these models, but can sacrifice the player's ability to take the narrative in their own direction to adhere to them. Although all of these systems are circling a truly

interactive story, it seems as if none of them have quite reached it yet. My proposal is an attempt to unify the qualities found in the above systems to bring us one step closer to the Holy Grail of interactive narrative outlined in *Hamlet on the Holodeck*, a simulated world which seamlessly weaves all actions of the player into a quality story. (Murray, 1997).

The Proposal

The proposed system could almost be considered a mixed initiative approach to interactive narrative; a human user and a system driven by artificial intelligence collaborating to create something that neither entity could produce on their own. Though mixed initiative methodology has already been applied to the creation of interactive narrative plan structure (Thomas & Young, 2006) and sentence by sentence story authoring (Swanson & Gordon, 2008), this proposal outlines a system in which the user and system are cooperating to tell a story one story event at a time. This methodology is inspired in part by the author's background with improvisational theatre, and research that has been done on the subject (Magerko & Riedl, 2008). It poses the research question: Can a mixed initiative story generation system create a deeper experience of interactive story agency than current, pre-authored approaches?

The key interaction loop from a high level is very simple, especially if we approach it in a hypothetical *medias in res*, a few rounds into the interaction with some amount of base story already established. The system will present a variety of story events that it has determined would be a good next addition to the story, ranked in order of appropriateness. The user selects the story event from the available options that they would like to become part of the story. Although the story event will default to revolving around the characters already introduced in the story, the user may also choose between a set of characters who will participate in the event. The selected event becomes canon, and a visual representation of it, akin to a comic frame, is appended to an ever growing storyboard. The system then determines a new set of events that could reasonably follow the previously established event, and presents their frames to the user for selection. Thus, the heart of the experience is a rapid back and forth between the user asking the system "what could come next?" and the system asking the user "what does comes next?"

Although simple in theory, there are several difficult issues that will have to be addressed to make this system a reality. One of the major ones is the ranking of the story events; a second is their authoring. A third is the very definition of what a 'story event' can be. Let us tackle the last one first, and work backwards from there.

A story event in this system is referring to any unit of action that moves the story forward. Unlike plot fragments in *Universe*, which were a means of realizing author plans such as Churn, a story event is not meant to fill in ‘holes’ in a pre-established plan. The granularity of the story event unit is malleable, and is expected to change from story to story, or even within a story. Story events might be descriptors of entire scenes, such as “A Secret Deal” in which two characters broker an agreement unbeknownst to the world at large, or “Getting Fired” in which an employer terminates their relationship with an employee. Alternatively, story events might refer to individual actions like the panes in a comic, including discrete movements such as “Furtive Glance” or “Squeezing a Trigger.” They might have coarser granularity as well, in which the story might read like a table of contents. Regardless of the granularity, each story event progresses the narrative, lending more likelihood to certain story events to occur in the future while diminishing the probability of the appearance of others. These are the kinds of things story events can be; but how do story events come to be?

Story events, as currently envisioned, will be authored by a human pre-runtime. This rings a little of being a concession; one of the chief aforementioned problems was pre-authored possibility spaces, and relying on a human author to produce the bag of potential story events seems to be falling into that same trap. Although not freed completely from the limitations of pre-authored content, the story events should be authored generically enough so that any given event could be retargeted and applied in a large variety of situations. Plus, leveraging human authors often produces a level of quality not guaranteed with computer generated narrative. There are several aspects of a story event that an author will have to specify.

A story event will have preconditions that must be satisfied for the system to present it as a possible option; the “Getting Fired” event, for example, might have the preconditions that the two characters are in the same physical location, and that one is the employee of the other. A story event will have post conditions that impact the internal model of the story. These post conditions can adjust the qualities of the narrative’s characters, possibly changing their relationships or character traits; the above characters no longer have the *employer/employee* relationship, one of them no longer has the trait *employed*. Other postconditions might speak towards the story event’s positioning within a greater dramatic arc; “Getting Fired” might be labeled as a moment of “loss” for the newly unemployed character, and as a “twist” if this character had previously been subject to events establishing him as competent in his job. Different characters in the same story event might carry out the story event differently. While a boss taking after Donald Trump might be content to simply say “you’re fired,” a mob boss might fire an underling in a

much more permanent manner. These character-specific ways of story events playing out call upon story events with finer granularity. If multiple story events are applicable, the user is given the choice of which one to use. Story events also have influence rules, which label under which conditions a story event is more or less appropriate to be presented to the user as an option for inclusion.

Influence rules are inspired by, and will take a form similar to, the influence rules of a previous research project of the author: the social AI system *Comme il Faut* (McCoy et al., 2010) initially employed in *Prom Week* (McCoy et al., 2013). In *Prom Week*, influence rules were used to determine which social exchanges characters wanted to engage in with each other. For example, if two characters had a social history of shared positive experiences, the two might be more inclined to become friends. This new system can take advantage of similar character based influence rules to achieve similar effects; if there are several story events in which two characters have been friendly or assisted each other, they will be more likely to become and remain friends for future story events. An event such as “sharing a secret” with a precondition that two characters trust each other might become available, assuming one of the characters had a secret to share.

Influence rules can also take aspects of the dramatic structure of the narrative thus far into account. The importance of proposed story events being sensitive to the selected story events so far, not through hard preconditions but on a fuzzier level represented through the dynamic weights of influence rules, is one of the major hypotheses of the system. This will be evaluated by making it possible to turn weighting on and off. Having encodings of rules can serve as this system’s version of a drama manager; in addition to local coherence (such as proposing an emotional response following a dramatic reveal) the system will favor story events that offer a rising dramatic tension, followed by a climax and a denouement, assuming the user is subscribing to a traditional Aristotelian story arc.

This assumption need not be the case, though. When creating a new story, the system could theoretically ask the user what type of genre they want their story to be. Choosing a genre impacts the appearance of certain story events: story events can have influence rules which impacts likelihood of appearance in any given genre, or preconditions that remove them from certain genres entirely. Moreover, choosing a genre will impact the timbre of the dramatic arc the system subscribes to. Horror stories may be more inclined to set up series of dangerous situations followed by narrow escapes, while a children’s story may favor lower stakes and focus on themes such as friendship. The inclusion of many genres could quickly escalate the project beyond reasonable scope; it will therefore be important that genre addition is modular, reducing the risk of overreach bringing down the entire system.

Though the system will use genres as a means of helping to determine which story events are likely potential candidates, nothing will ever be forced upon the part of the user; as long as the preconditions hold (and, perhaps, that the appropriateness of a story event exceeds a certain minimal threshold) the player can select it to be the next event in the narrative. This should give players the ability to experiment by pushing on the boundaries of the system, without the system conveniently ignoring the players actions or attempting to transform them to its own desired story state. It is true, genre-crossing might result in stories being somewhat more muddled—or flat out bizarre—than if they were solely being ferried along a completely drama managed experience, but muddled though they may be, they will be stories that users should feel a genuine sense of ownership over. Ideally the system could acknowledge patterns of unexpected choices, and assist in the effort. Perhaps the player has generally been weaving a hard-boiled detective novel, but every third event centers around an eldritch horror. Then the system should suggest both detective and Lovecraftian story events, with a slight preference of detective over horror. This could lead to interesting cross genres, which might have exciting and unexpected effects on the influence rules of the story events for the user to discover. Experimenting with genres is one of the features that differentiates this work from other story games, such as *Versu* (Linden Lab, 2013), which also has the player selecting story events, but from the perspective of a character in a Restoration narrative.

For motivation and challenge, there should be goals for the player beyond simply crafting a story. Perhaps the narrative framing is the player is a young Hollywood screenwriter, feverishly creating these stories to appease critics and audiences. If audiences enjoy the stories, the player's notoriety increases, giving them access to new characters or set pieces. Producers might give the player specific story events that must happen (midway through, there *needs* to be a puppy that rescues the hero), but the player can set up story events up to that point that ensure that the preconditions of the puppy rescue are satisfied.

In summary, the possibility space of stories this system can generate relies on combining existing authoring elements that have preconditions, postconditions, and influence rules, but no hard-set sequencing constraints. This recombining allows for a larger possibility space than narratives whose sequences are statically implemented. The system will have models of genre conventions, but won't force users down particular paths. And indeed, based on their actions, the system might discover that the story is crossing into a different genre entirely and account for that when proposing possibilities for what happens next. Finally, the system is highly interactive, giving players ownership over the course the narratives take.

The Progress

The work outlined in this paper is preliminary, and has yet to be subject to the rigors of even an initial prototype. Though the author's previous research experience offers some insight for how best to move forward—the similarities between *Prom Week's* social exchanges and story events affords a fruitful starting point—the amount of infrastructure design and development required for this project is large and only the beginning stages. An initial prototype is slated to be completed in time to share with the doctoral consortium at AIIDE for feedback in October.

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