Purposeful Authoring for Emergent Narrative

Sandy Louchart[1], Ivo Swartjes[2], Michael Kriegel[1], and Ruth Aylett[1]

[1] MACS group, Heriot Watt University, Edinburgh, United Kingdom
[sandy,michael,ruth]@macs.hw.ac.uk
[2] Human Media Interaction group, University of Twente, Enschede, the Netherlands
swartjes@ewi.utwente.nl

Abstract. Emergent narrative (EN) is a narrative concept in virtual reality that relies on emergence for a flexible shaping of stories as opposed to fixed pre-determined plots. This has consequences for the creative role of the author in an EN system. In this paper, we aim to clarify the actual function of the author by investigating what is exactly mediated in ENs and how this can be filled in by an author at design time.

1 Introduction

In 1999, Aylett introduced the concept of Emergent Narrative (EN) as a credible solution to the "narrative paradox" in virtual environments [1]. The narrative paradox, as a term, illustrates the contradictions between an autonomous user, free to move in a virtual world, and the desire to convey a satisfying coherent plot structure. The original concept has benefited from work carried out within the Interactive Storytelling (IS) community (e.g., [2–4]) and has reached a general consensus on its components, articulation and design. The development and implementation of the FearNot! application [2] has also contributed to disseminate the concept to a wider audience and highlighted practical authoring issues associated with its specific character-based design. While previous research focused on identifying the interactions between dramatic elements (i.e., characters, plot, events), users and authors [3], the experience of authoring for FearNot! combined with the IS community's shift towards authoring, raises a number of fundamental questions about not only the form of EN but also about the *process* by which an EN system is created. In this paper, we are concerned with the actual shaping of an emergent narrative and we aim to identify the process by which an author can create and organize narrative content.

The nature of EN is such that the author can enjoy a certain freedom from general concerns on interaction, contextualization or continuity. However, the lack of apparent narrative structure raises issues about authoring responsibilities. While character interactions move an unfolding plot forward, these interactions have to be authored in the first place, leading to doubts as to the relationship between what the author intends, which interactions to author, and which narratives emerge as a result. This line between authoring, emergence and fore-sought plot lines is rather unclear and is dependent on one's semantic interpretation of emergence. The view – as rightly pointed out by Crawford [5] – that original

stories would emerge from a system given that the system is complex enough is an unrealistic take on the issue. Our opinion is that emergence should not be associated with a lack of purpose in the authoring process. In this paper we argue for the consideration of purposeful authoring, by considering first of all the notions of authoring and emergence with respect to the process within which an EN is assembled and presented to an interactor (Sect. 2), and secondly by considering the creative ideas that an author is able to mediate using the concept of EN (Sect. 3). From these two considerations, in Sect. 4 we describe authoring implications from the side of both the EN process (through the metaphor of story landscape) and the EN as medium (by considering EN as simulation).

2 How an Emergent Narrative Takes Shape

In principle, an EN system is designed to offer a certain dramatic experience to an interactor. The interactor, by assuming a given role, takes on part of the responsibilities for the qualitative and interactive aspects of the experience. Such a dramatic experience can only take place if the interactor is actively participating and has been given the means to participate relatively freely with both the narrative environment and the characters that populate it. The EN concept approaches storytelling from a process-based perspective. In this particular context, rather than focusing on the structure of a given story, we propose to develop an understanding of how one should envision an emergent narrative to take shape as a process. We aim to carefully identify the roles that the interactor and system play in accomplishing a satisfying interactive narrative experience.

2.1 The Interactor: Narrative Development through Interaction

An important aspect of an EN system is that interactors influence how the narrative unfolds. In order to do so, interaction and narrative development must show a certain level of flexibility so as to accommodate each other. The shaping process between a story and an interactor's choices reflects the decisions made by a user on the spectrum of actions or events proposed by an EN scenario. In this model, a given narrative system offers a definite range of options to an interactor. The narrative development is not pre-defined however; the decisions that the interactor makes gradually shape and re-shape the spectrum of actions available for a meaningful and purposeful experience.

This is illustrated in Laurel's "flying wedge" (Fig. 1) [6]. An interactor within an EN determines the direction of the narrative development by engaging in certain interactions (the aim of the point of the wedge), and in turn the narrative development constrains the probable future interactions (the gradual narrowing of the wedge). In the case of EN, interactions are constrained by the narrative development through the interactor's own storification process (i.e., the ongoing cognitive process of constructing a narrative understanding of the experience [7]). By storifying the unfolding sequence of events, the space within which future interactions make sense is reduced. At the beginning of an EN, anything is

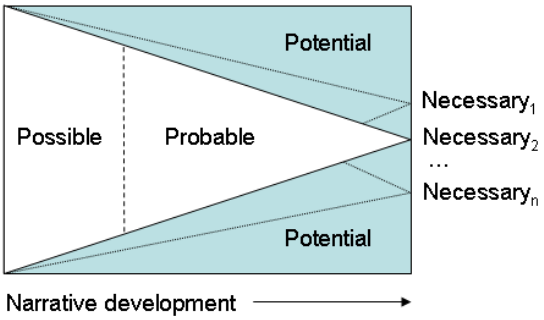

Fig. 1. Laurel's "flying wedge" (interactive version). In EN, interactors' choices determine the direction of the narrative development and in turn, narrative development constrains the range of probable future interactions.

possible but by the time the first few interactions have taken place, this space is already considerably narrowed. The characters take their context along in deciding their future behaviour, and this context only keeps growing as it also contains their history up until that point. For instance, at the point where the wolf, in the Little Red Riding Hood folk tale, starts pretending to be the granny, interactions that would have been purposeful *before* the scene takes place, such as the wolf inviting granny for dinner at his house, make no sense from a dramatic perspective any more. The interactions that make sense from then on are the ones pertaining to the deception scene.

By making decisions as the story unfolds, the interactor determines the range of possible interactions that could logically or dramatically follow the course of action undertaken (illustrated by the direction the wedge points at). Therefore, as a result, certain actions would fall outside the scope of the interactor's probable action range and would not be used.

Laurel's Flying Wedge transposed to multiple characters means in EN that all characters have their own wedge. This illustrates how a particular range of actions can be utilized within an EN scenario. In this case, actions that would have been deemed unnecessary for a particular character might still be part of a potential range of actions for another character. While this hints at a definite story space for interactions to shape an EN, it does however not provide answers as to how this definite space should be created and elements within it authored. We will therefore elaborate on this discussion from an authoring perspective in Sect. 4.1.

2.2 The System: Virtual Characters and Drama Management

The prime concern in designing an EN is to assess the different natures of interactions and how they affect each of the characters' stories. An EN approach facilitates such design issues by offering a virtual reality in which these interactions can take place. One can rely on virtual characters to mediate the purpose

of interactions. Since an EN story is conveyed through its characters, the interactions they engage in with each other and with the interactors should help the story to move forward. This should also be further supported by the dramatic modelling of characters as these are designed for *change* (in the sense that the interactions change the attitudes, emotions and goals of the characters).

An often mentioned issue with a character-centric approach is that interactions of autonomous characters do not necessarily lead to interesting stories. Although this might be particularly true when stories are considered from a spectator viewpoint (stories in the OZ experiment were not particularly exciting to watch [8]), this might be less so for stories experienced from a participative view. Still, as previously mentioned, emergence does not mean losing all concern with story development. It just means that the managing forces for drama in EN are necessarily operating in a way that is very opportune. Drama management in EN is not based on desired plots and an attempt to 'push' autonomous characters or interactors to do what is necessary, but rather uses a very local view on plot development where it should seize opportunities as they come along. For instance, drama management in FearNot! and the Virtual Storyteller [9] happens by system components that facilitate the story development by setting up episodes and scenes for the purpose of increasing the chances of story progression. Under certain conditions, lapses in time, space and situation can be made that will facilitate story progression by bringing parts of the simulation to the fore. More subtle forms of drama management are currently under development, where the agents acquire some responsibility to make decisions that aid on story development, such as choosing those actions that have the biggest emotional impact on other characters (the Double Appraisal mechanism [10]), or introduce events or new setting information to enable useful goals or actions (late commitment [11]). An implication of this opportune stance toward drama management is that the quality of the emergent stories might vary depending on the particular opportunities and the particular ways in which drama management decisions have played out.

3 Mediation in Emergent Narrative

It may be clear by now that EN is not meant to mediate stories as artefacts thought up in advance, because, as we have argued, the interactor has a fundamental role in 'what the story is', or rather, what *their* story is. This poses the question of what exactly EN conveys. If stories emerge at interaction time, one might wonder who "tells" these stories, and to whom they are told. Furthermore, what is the story being told? These questions pertain to a deeper underlying question about the EN concept: what can an author mediate using the concept of EN? We take a closer look at what mediation means in terms of EN, by investigating the roles of sender, receiver and mediated message.

3.1 The Sender: Who Tells?

In traditional narrative, authors take on full responsibility for how a story is received by the way they write it. When wanting to mediate a particular story to the receiver, they write a story in advance, skilfully raising questions the receiver might have, and answering them at just the right time to reach desired effects. This unidirectional relationship disappears in EN. Although an EN system is authored in advance, the responsibilities of narratorship become shared between system and interactor. It is the interactor who raises questions and sets out to answer them in the emergent narrative. As such, an EN is the story of the interactor, not in the sense that they have been the sole creative force behind it, but in the sense that it is in part driven by their attempt to organize their experiences into a unified whole. As such, an EN is established as a dialogue between system and interactor.

3.2 The Message: What is Told?

Because an EN gives the interactor responsibilities that the narrator would otherwise have, the message or moral of an EN takes on a shape that is different from that of traditional stories. Where traditional stories bring across a unidirectional message, an EN gives the interactor the chance to construct their own message, by developing an understanding of the story world through making choices and exploring their consequences. For instance, FearNot! does not tell children how they should deal with bullying behaviour. Rather, it lets them try out for themselves what works and what does not. By authoring the various causes and consequences of a moral dilemma, the responsibility for the conclusion is placed in the shoes of the interactor storifying them, and as such becomes very personal. After many replays the conclusion might gain more nuance and sound something like: "often when I push the bully, he falls and stops bullying, but sometimes he doesn't and the situation gets worse."

3.3 The Receiver: Implications for Participation

Shared narratorship has far reaching implications on the interactor's role within an EN and on the formulation of requirements for an author at design time. Without considering these, one might be tempted to think that an EN system should cater to a vast array of actions the user might want to do, and make sure they all have consequences in the story world. Therefore, we consider here the notion of agency (or meaningful action) [12] from the perspective of EN in order to relax this heavy responsibility of an EN system.

There are three points we would like to make about how we approach agency in EN. First, interactors do not have to be able to predict the consequences of their actions in terms of story outcome in order to be able to experience agency; understanding how particular actions effect the story line can even come much later. In an EN where the interactor plays Little Red Riding Hood, they might be persuaded by the wolf to take a detour, and unveil the wolf in granny's

house. This might suggest to the interactor the reason *why* the wolf sent them on a detour. If this trickery was not predicted by the interactor, its realization contributes to their storification process, making sense of their own actions and those of the wolf only later, whilst still being satisfying. This implies that "purposeful action" does not necessarily mean that this purpose plays a central role in the story. This property sets it apart from most computer games.

A second point is that if the interactor *can* predict the consequences of a certain course of action, it should not be expected that they make the choices that they would if it were real life. For example, when the wolf addresses the interactor, they might remember the wise words of their mother telling them not to speak to strangers, but still decide to talk to the wolf so as to find out what happens (from a dramatic perspective). This implies that the interactions do not need to be tailored such that the interactor can "be themselves"; for a good story to emerge they might not only have to, but also *want* to make the dramatically bolder choices, just like the other characters should be doing.

The third point is related to the previous one, in the sense that EN presupposes a willingness to play within the formal constraints of a role. These formal constraints might be partially defined at the start of an EN but also establish themselves further during play in the form of *offers*. Through such offers, an EN establishes a certain cooperative contract with the interactor [13]. For instance, if the Little Red Riding Hood EN starts at home and mother calls the interactor into the kitchen, the offer intends for the interactor to go over and speak to her. They would not be going along with the offer if they ignored the call and went on their own little exploration. Our viewpoint is that the system is not responsible for keeping the interactor cooperative; we do not require it to cater for all ways in which they might not be going along (*blocking*). If the interactor blocks, the resulting EN experience might not be a very satisfying one, as user involvement is part of the fundamental basis of the concept.

4 Authoring an Emergent Narrative System

In the previous two sections we have described how an emergent narrative can be shaped at run time and what exactly this particular storytelling medium could mediate. However, how an author is supposed to think and work within an EN system is still an open question. We now refer back to those points from an authoring perspective. We first investigate through the metaphor of a story landscape how an author can create an interactive experience that unfolds as described in Sect. 2, in an attempt to get a grip of the space of possible stories the author is crafting out. Consequently, by discussing how EN is essentially a simulation approach to storytelling, we address the implications and pitfalls of authoring if the purpose is to mediate a story world.

4.1 The Story Landscape: Authoring for Narrative Development

In EN we try to remove the need to think in terms of plot, because the notion of plot – as discussed – has a problematic tension with the role of the interactor. To

this end, an EN system models how characters come to make certain dramatic decisions, so that the author is then left to determine the content of the emergent narrative, which is raised to a more declarative level (which goals, actions and emotions there are, and under which conditions they occur). This way, the author can think directly in terms of these interactions and what happens locally, rather than in terms of the plots that should occur. This means that all the emotions, goals, thoughts and actions of the story domain are contextualized in terms of the character's autonomy, i.e., the author describes in which context they envisage that a character will feel a certain emotion, adopt a certain goal or perform a certain action. The advantage is that if this is done well, the behaviour of the characters is always in the right context.

To understand the emergence of plot based on authored material, we use the metaphor of a landscape of possible stories (see Fig. 2). Points on the landscape represent possible states of the EN, and climbing hills represents moving towards more and more dramatic necessity (cf. the Flying Wedge of Fig. 1). In a "valley", there are many potential mountains to climb and many paths to do so. Character interactions move the dramatic situation more and more uphill since they yield emotions and intentions for the characters that form a reason for more specific behaviour. It is the author's task at design time to write behaviour that yields a story landscape for the interactor to travel upon, and it is therefore important to understand better the exact processes that constitute such a landscape.

The story landscape is a result of how local interactions of the characters play out and can therefore not be authored directly. EN being a character-centric approach to IS, the concrete content that the author provides is written from the perspective of a single character. The system has content knowledge of the different actions the characters can perform, the goals they can have, the emotions they might experience, and (either explicitly or implicitly) the context for the occurrence of these elements. The system uses this content knowledge together with procedural knowledge in the form of the cognitive processes of the characters (for instance, action planning, goal selection, cognitive appraisal and coping), to map out this landscape of possible stories.

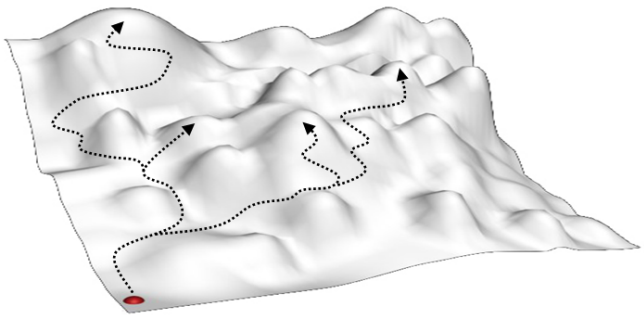

Fig. 2. The story landscape with some of its many possible paths sketched.

Each character has its own landscape of possible stories. An EN system is aimed at meaningful interaction, which happens for instance when the actions of one character establish the context for emotions or goals of other characters, whose performed actions again might lead to emotions and goals for a third. There is no steering force on how this plays out exactly, nor can the author envision this exactly, and it is this property – the real-time translation of autonomous action at character level to interaction at story level – that is emergent in an EN system. The landscape and its peaks are implied by the authored content through the way it is processed by the EN system. For instance, if Little Red Riding Hood takes on the goal to bring cookies to her grandma, this constrains her behaviour and – in terms of the metaphor – sets her on the way to a peak, which is a different peak from that in which her mother had asked her to wash the dishes.

While the "story landscape" viewpoint provides no obvious authoring solutions because the author creates this story landscape only indirectly, it does help in identifying certain authoring issues. In the following we focus on three authoring issues (boundaries, critical mass and dead ends), which can be identified by a critical observation of the story landscape, but none of which is inherent in a single item of authored content. We will provide some design suggestions on how content can be structured and shaped to tackle such issues.

Boundaries. A boundary is what separates the story landscape from the rest of the universe (the "sea" around the story landscape, if you will). For example there are no submarines in an EN about cavemen, because they fall outside the envisioned landscape of possible stories. An EN needs boundaries, not only because of the technical infeasibility of simulating an unconfined world but also because the boundaries help define the topic, scenario and message of the EN. This notion of boundary is however quite abstract and can be realized in many different ways. For example, one might construct spatial boundaries (given by the locations where the story takes place), contextual boundaries (e.g. the bullying context in FearNot!) and interaction boundaries (limiting the ways of how the user can interact with the world). Boundaries are not explicitly authored, since they are implied in the authored content. Rather, for the author the key aspect to keep in mind is to find creative ways to justify the existing boundaries to the players. For example, Façade [14] sets up a context (invitation for a dinner) that justifies the spatial boundary (all action takes place in one room) set by the authors.

Critical Mass for Emergence. Within well-defined boundaries, the authoring of content material is meant to "cover" the story landscape. As in any emergent system, a certain critical mass in terms of content is necessary for interesting narratives to emerge. This critical mass is not in absolute terms of quantity, but in relative terms of density, i.e., how well the authored content serves to create different paths through the narrative landscape. It is hard to find out whether the critical mass has been reached other than by playtesting and authoring. It

is however important when designing content that the author keeps the density aspect in mind and does not view achieving the "critical mass" as a purely quantitative aspect. If a particular piece of added content adds new possibilities but also widens the boundaries of the story landscape, the density can go down rather than up; this is detrimental to the achievement of the critical mass.

Dead Ends. We consider dead ends to be states in the story landscape where the emerging narrative ends, not because the story has reached "the end", but because there is a lack of content (e.g., an authored character goal with no actions to attain it, or characters moving in different directions so necessary interactions are no longer possible). We suggest that authoring for EN is a continuing process involving finding dead ends and resolving them by authoring new content for that situation. An open issue for this process is the question how to *detect* such dead ends. A promising approach might lie in automated tools that run the EN many times and try to construct a representation of the story landscape (similar to functionality in the Storytron engine [5]). Assuming the existence of such a tool, an author still needs to be aware that there is no direct relation between density and the amount of dead ends. Having no dead ends does not necessarily imply a high density or having reached the critical mass.

4.2 EN Simulation: Modelling a Dramatic Abstraction

The EN approach to storytelling is essentially one of *simulation*. We use Frasca's somewhat broad definition of simulation being the "act of modelling a system A by a less complex system B, which retains some of A's original behaviour." [15]. Here, we consider system A to be the author's envisioned dramatic world and system B to be the EN system.

A consequence of this notion of simulation is that the development of character models used in an EN architecture must be seen as a process of authoring, rather than as ongoing cognitive modelling research, and although the two might inform each other, research in this direction will not lead to "the" EN character model. In this sense, using simulation for storytelling requires a deep reflection by the author on the story world. One needs to not only think of what the envisioned characters are supposed to do, but also make explicit *why* they do what they do. This may seem like a laborious and excessive endeavour from a design point of view, but it pays off in terms of what is mediated. Interactors can engage with these simulated characters and discover, through playing, the story world and the rules governing it that the author wants to mediate.

The word 'simulation' brings along many connotations from its more prevalent and established use in research. By making these connotations explicit, we can explain certain pitfalls that must be avoided.

First of all, simulation in many cases means building models of (an aspect of) reality. In EN, we model a *dramatic abstraction* of reality. This means the character models in EN are based on how the author envisions characters to behave, rather than on how people behave in reality. This is not to discredit the

use of established cognitive agent models to model EN characters, but rather to say that trying to make characters adhere to realistic behaviour is an *authorial choice*. Modelling after realism can be a valuable approach for writing the simulation (just like traditional authors will do their research to make their fiction resemble aspects of reality), and there might be good reason for doing so (e.g., to increase the suspension of disbelief, or to simulate realistic consequences for educational purposes), but we found that it can be very tempting to delve into cognitive modelling and lose awareness of the ultimate purpose (which is the envisioned experience).

For instance, FAtiMA (the agent architecture used in FearNot!) models how characters respond emotionally to the prospect of their goals succeeding or failing, how characters select which goals to pursue, and how they decide how to act in a way that seems motivated by their goals. Although FAtiMA and its ideas can be reused, one might make quite different modelling choices for the simulation of virtual Teletubbies [1] or even alien worlds [16].

Second, modelling implies complexity reduction. It is tempting to do this by generalization: modelling general actions and general emotions in an attempt to cover a broad range of possible stories with a small set of content. This happened for instance in the beginning of the Virtual Storyteller project. The resulting stories are stripped of any of the particularities that make stories so engaging. In our view, there are better ways to achieve complexity reduction: by defining clearer and smaller boundaries for the story landscape, and by only making abstractions where they suit the envisioned interactions.

4.3 Issues with Story Space Authoring

In creating content, the author might naturally try to run the imagined simulation mentally, which means that narratives do not emerge as a surprise from the system itself but also materialize within the author's mind using their own understanding of the workings of the system. While this is not necessarily a problem, our experience with FearNot! has shown that this limits the emergent quality of the simulation. Once the author tries imagining the outcome of the narrative as the sole inspiration for modelling, there is a risk of "thinking in terms of plot" and the temptation to take a top-down view on things. The result is that the author starts following a narrow story path and creates just those elements that will produce this path, which has a negative effect on the density of the story landscape. There is no easy solution to this problem. After all, clinging to a plot helps the authors in covering the story landscape more consistently and avoiding dead ends, however with the result of narrowing it down.

In one strand of our work, we are currently exploring a possible approach to this authoring issue by means of massively collaborative authoring [17]. The hypothesis of this approach is that if the content for the simulation is provided by a group of authors, an individual author cannot predict or control the outcome of the simulation any more, creating a collaborative "letting go" attitude towards authoring. Local interactions between the content provided by different authors might create surprising emergent situations that an individual author could not

produce, and author contributions can work mutually inspiring. After all, if we are assuming many different users exploring the dramatic world offered by an emergent narrative in many different creative ways it seems reasonable to assume that the creativity to create this world also needs to come from many authors. And besides the qualitative and creative aspect, having multiple authors also helps with the quantitative aspect (i.e., the aforementioned critical mass).

5 Conclusions

In this paper, we focused our reflection on identifying the actual processes that allow for an emergent narrative to take place. Along with the internal storification process of the interactor, we looked at the how an unfolding story affects the range of choices offered to a character. In doing so we identified that the role played by an interactor is more important than previously thought and that the responsibilities of a compelling and meaningful emergent performance do not only depend on the system but also on the actions of the interactor. In addition to looking at the role of a participant in an EN drama, we also started to formalize the role of the author and reflected on how author and interactor roles actually fit with the notion of narrative agency, by exploring the role an EN can take as a medium for storytelling. We argued that if the interactor is willing to play along with the EN system, an EN can mediate story-like experiences that are more personal and more nuanced than what can be conveyed through traditional storytelling. Finally, we considered EN authoring with respect to both interactor and author and identified the main issues that an author faces when creating an EN.

In this paper we aimed to position our research so as to set the basis for investigating EN further, especially in terms of real-time management, narrative development and authoring. We aim in time to paint a clearer picture of the concept that could be directly translated into applications that are entertaining and/or educational in offering interactors a story-like experience. While there are still many questions unanswered, we aimed with this paper to establish research directions that would lead to the advancement of knowledge in the IS domain and the more specific area of EN.

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