Stories in Space: The Concept of the Story Map

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Abstract. While 3D space has become almost ubiquitous in computer games that apply narrative techniques, theoretical frameworks and practical experiments about the use of virtual space are underdeveloped compared to the number of works that deal with literary textual pieces such as MUDs. Offering one element to fill this gap, the notion of a *Story Map* is introduced in this paper. The interactor's experience of space and of the events in a Real-Time 3-Dimensional Virtual Environment (RT 3D VE) form a constant discourse and *Story Maps* are seen as a form of the interactor's comprehension of this discourse. The *Common Tales* research project exemplifies the development of this theory and its narrative qualities.

1. Introduction

1.1 Approach

This paper operates from two premises:

1) Events take place. Whether in novels, film, or RT 3D VE most (but not all) narratives unfold in space. These media create fictional spaces, in which stories are understood and situated by the reader/ audience/ user.

2) Space needs to be understood. Visitors to a building/ movie audiences to a film projection/ readers of literary texts/ users of RT 3D VE's have to make sense of the spatial data provided. The results are individual cognitive maps of the understood space and its ingredients.

This paper argues that both effects intertwine in RT 3D VEs and that this combination can be used to generate effective narrative in virtual worlds. The user's cognitive map of the virtual space combined and filled with meaning by the events unfolding during the interactive experience of the RT 3D VE is what this paper defines as *Story Map*. The model gives designers a point of reference how users comprehend virtual worlds and offers a tool to improve the content structure of RT 3D VEs.

1.2 Discussion of Approach

Narrative Spaces in Literature and Film

Various researchers have discussed connections between space and narrative in literary and hypertextual structures. Murray discusses space in the form of a literary presented labyrinth structure in a textual Multi User Dungeon (MUD) where 'the story is tied to the navigation of space' [21]. Based mainly on literary texts, Ryan points towards the 'text-as-world' metaphor in a model of the textual space as a 'three-dimensional environment to be lived in, an area for travel, a landscape and a geography to be discovered in time. It is mapped by the bodily movements of characters from location to location' [23]. But the closest literary concept to *Story Map*s is Herman's 'storyworld' theory. He defines 'storyworlds' as 'mental models of who did what to and with whom, when, where, why, and in what fashion in the world to which recipients relocate – or make a deictic shift – as they work to comprehend a narrative' [14]. Herman describes the connection between narrative and his 'storyworlds': 'narrative can also be thought of as systems of verbal or visual cues prompting their readers to spatialize storyworlds into evolving configurations of participants, objects, and places'. The 'storyworlds' are seen as the cognitive results of the process of comprehending the story cued by the author and completed by readers. Structural elements of architectural cognitive maps can be traced in them in a way parallel to the concept of *Story Map*s for virtual story spaces proposed here.

The difference between Herman's 'storyworlds' and the *Story Map*s lies within their creation. Herman focuses on the creation of space through a linear literary-based system that evokes a spatial 'storyworld', while *Story Map*s evolve during a non-linear interactive exploration of a virtual spatial environment. Space and spatial understanding in 'storyworlds' is the achievement of the literary discourse – space in *Story Map*s is part of the discourse itself, as virtual space is not purely imagined, but is itself an expressive element. Herman concentrates on the creation of space through a narrative, but he does not investigate spatial systems and how they in fact generate narrative.

Film generates a screen space as a consistent 'visible space within the frame' [4] made up of edited shots/ frames. Although the projection of each frame creates a 2D picture, it is read as the presentation of a 3D space [5]. Within this space the story unfolds. While watching the film, the audience assembles the screen spaces from many shots and interprets the information to create a fictional world. They combine the visible, and cinematically interpreted space with an anticipation of how the surrounding space – 'off-screen' and therefore invisible – might look. Only small parts of the story-world space are visible at any one time on the screen, and the audience adds/ imagines the missing parts that are 'out of frame'. A film's diegetic world consists of more that just the presented screen space, is encourages the audience to form some idea of the overall space of the story and strives to evoke certain readings [1] of the fictional space. Finally, the cinematic mediation and the implied perspective position the audience in relation to what is depicted [13].

The effects and implementations of visualizations of cinematic space are manifold, and their narrative role can be enhanced to the extent that the graphically depicted space functions only as a vehicle for narrative [3]; space becomes subordinated to the narrative. Such a space does not have to be coherent in itself anymore – it might be incomprehensible outside the specific narrative for which it was created, and cannot be explored in any other way than from within the fictional narrative world

RT 3D VEs can generate spaces accordingly, as each view of a designed virtual space has to be generated by a virtual camera – leading to a mediated form of spatial experience. This signifies camera-work and editing techniques as basic elements of spatial experiences in RT 3D VEs.

Coherent Space in Architecture and RT 3D VEs
Real-time rendered virtual spaces offer a flexibility comparable to that of cinematic space. But there is an important difference between a film set and a virtual world: Film sets – in contrast to RT 3D VEs – do not have to be coherent and closed spaces, whereas RT 3D VEs provide the interactor with the impression of such a spatial closure. If the audience were to step into the architectural space of the film set and take control over the camera, they would see a modern film studio at the point where the set ends. The space would have no coherence and the illusion created by the fictional world would be broken. In contrast, it is a defining part of RT 3D VEs that they allow this step into the precisely defined represented space – this positions RT 3D VEs nearer to architectural spaces.

Solid architectural space is read by the visitor as being coherent as opposed to the fragmented fictional spaces of literature and film. But architecture also operates through a form of fragmentation as it relies on the reception of parts of the whole that can be experienced by a visitor only over a period of time and in the form of movement. Architectural space is time-dependent, as it relies on the fragmented reception of parts of the whole spatial structure that cannot be perceived in its totality by the observer (see e.g. Corbusier's principle of the 'architectural promenade'). Although immersed in the space, the visitors cannot perceive the space's totality in one glance and have to explore it gradually. Numerous approaches have been made to analyze architectural space: from basic geometric shapes and their arrangement [7], interconnected patterns of use [2] [15], to cognitive maps as ways to comprehend spatial context [20]. This paper refers to Lynch's analysis of structural elements of cognitive maps to develop the model of *Story Maps* further.

As elaborated above, cinematic mediation is crucial to RT 3D VEs. However, the feature of interactive access to the virtual space separates virtual story worlds from a pure cinematic comprehension and refers to architectural space. Navigating in a RT 3D VE depends on the creation of a cognitive map of the space just as it does in the physical world [22], which is why Lynch's theories about the creation of these cognitive maps have repeatedly been applied to virtual worlds [25] [9] [26] [8] [24]. The research focused on optimized navigation in virtual world that was applied, for example, in data visualization or military training – not on narrative.

1.3 Related Work

The importance of cognitive maps in the exploration of RT 3D VEs is an accepted phenomenon but their narrative potential still largely unexplored by academics. Friedman combines narrative and the concept of mapping [11]. Unfortunately, it is not always clear whether Friedman refers to cognitive maps or environmental maps [10].

Champion combines vistas and encounters in virtual space to 'memento maps', which are themselves combined with the spatial cognitive maps. The functionality of 'memento maps' covers the user's memory of past events and Champion argues for a 'virtual heritage' [6] based on these past events. Past events, indeed, form an important part of the *Story Map*, but *Story Map* include expectations and intentions by the user reaching into possible future events, and deliver their elements in a clearly mediated (and thereby interpreting) form. Story Maps are not aimed to improve spatial navigation (as Champion points out as main feature of his model) but at the development of a narrative in the comprehension of the content through the interactor.

Among the researchers who explicitly step away from literary texts and towards RT 3D VEs, Fuller and Jenkins outline parallels between travel-journals that mainly deal with the description of the travels between two locations, and Nintendo games that offer comparable navigation between virtual locations [12]. Although simplifying all Nintendo games into one genre weakens their approach, they point out the importance of a spatial structuring of content within a spatially explorable immersive RT 3D VE, as opposed to a textually described world. Their comparison also suggests that cognitive mapping of the virtual space is necessary, as only an understood space can be translated into a travel log. Further exploration of space as a narrative element is undertaken in Jenkins' later work, where he approaches computer games as 'spatial art' [17] inspired by various aesthetic principles. Narrative finds its way into these worlds through the spatial design. 'Game designers don't simply tell stories; they design worlds and sculpt spaces' [16].

This very much mirrors the approach of this paper, but lacks the necessary inclusion of the cinematic means that depict these sculpted spaces to the interactor. To repeat the basic elements of the *Story Map*s are: the connection of event and navigable space, the cinematic mediation of space and event, and the cognitive mapping of these events and the dramatic setting in space. The Story Map is the result of the latter comprehension process that can be influenced through evocative means of event-, space-, and mediation-structure. How these features can be combined towards a shaping of individual *Story Map*s will be described in reference to the practical research project *Common Tales*.

2 The Common Tales project

2.1 What is Common Tales?

The Common Tales project was a collaboration between Sony Computer Entertainment Europe (SCEE), National Film and Television School (NFTS) and the Digital Studios (Cambridge University) conducted 1999-2000 at the Sony Development Studio Cambridge. The overall goal of the project was to combine cinematic storytelling with Playstation console games – not to create a new game, but to try out visual and narrative elements. The project used a basic narrative design that applied serial structures to game consoles and focused on the two main heroes both under the player's control. The heroes' characters were deepened and their relationship towards each other elaborated over the course of the series and in dependency to the player's actions. The design philosophy was that of a character-driven serial. How do the principles of the *Story Map* apply to such a setting?

2.2 Elements of the Story Map Applied

The Maze-Sequence
The first example applies a breaking of spatial and cinematic consistency to create a desired dramatic and narrative effect. *Common Tales* included a sequence set in a small underground maze. In order to make this maze appear larger and less legible, pre-defined camera positions were set inside the labyrinth and the positioning of these cameras was used to complicate the generation of a cognitive map of the space through cinematic means. The rules of cinematography include the law of never crossing the line. The given camera set-up repeatedly broke this rule. By breaking this cinematic law, the visualization creates a disorientating effect, because it uses the established cinematic understanding and reading of visual camera-work of the interactor but does not follow the expected cinematic tradition. The camera set-up in simulates confusion, intensifying the player's experience of the maze. Cinematic mediation made small maze appear more complicated than it actually was.
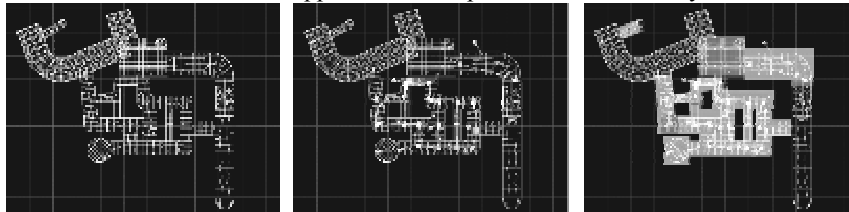

Fig. 1. Camera set-up in the Common Tales maze: basic spatial structure, the concentration of cameras in the central labyrinth part, the interactive triggers for the various cameras

Event-structuring was used to heighten the stakes of the maze-sequence further by including an antagonist in the maze, who chased the user-avatar through the labyrinth.

Breaking the laws of spatial logic, this space was further intensified. While the interactor experiences the maze as a coherent space explorable through linear navigation, the movements of the pursuing antagonist were unpredictably non-linear. Whenever out of view from the interactor, the antagonist's avatar was able to teleport to various locations within the maze, breaking any possible spatial anticipation by the user. Instead of following a linear path, the antagonist could surprise the interactor at any time through spatial inconsistencies. Technically, this was implemented though trigger-zones activated through the user-avatar's movements. In this case, no camera work is needed to explain the spatial teleportation – but instead *not* revealing the antagonist's new spatial position provided for a dramatic effect.

The generation of a *Story Map* of the events in the maze is deliberately complicated through cinematic means, event structure, and spatial design in order to emphasize the dramatic tension of the scene – once the tension is resolved, the complex camera-work is disabled and the view switches to a simple following camera that allows for easy navigation and functional further exploration of the maze.

The Library-Sequence
At other points of the Common Tales prototype a specific reading of the events had to be supported in order to keep the events comprehensible and consistent. Here, various means were applied to direct the interactor's generation of the *Story Map*. For example, pre-defined cut-scenes were used as one way to signify the importance of a special event in space. One key moment in Common Tales sees the user-controlled character in the midst of a burglary stealing a precious sword from a virtual library. In order to signify the moment of the theft as important story event, the control was taken away from the user and a short cut-scene was staged at the moment of the theft itself. The inserted scene keeps the game events continuous but limits interactive access [18]. This specific scene included a structured directed event-structuring through a change in the interactive access. A defining interactive feature of *Common Tales* is that it grants interactive access to two virtual heroes. Interactors' control can switch – or be switched by the system – from one hero to the other. The moment of the theft introduces this feature as the cut-scene ends with the controls not returning to the first hero who conducted the theft, but to the second who witnesses the theft from a distance.
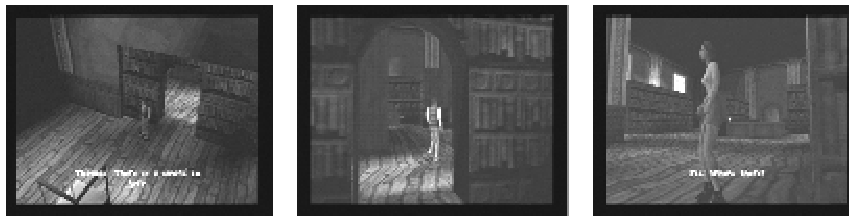

Fig. 2. Screenshots from the *Common Tales* theft scene; at the first frame control is taken at the last frame control it is switched to the second main character (the woman in the foreground)

Change of interactive access and event-structuring, change of the camera's point of view, and the accentuation of the key moment through the cut-scene are combined to

provide a cluster of evocative elements that make the events and the interactor's comprehension of them in the *Story Map* comprehensible and significant in the special location of the library.

The Cube Club-Sequence
Consisting of a set of data, space in a RT 3D VE can be divided into different sub-spaces. These different locations can be stored as separate elements that have to be uploaded by the engine when generating the space of the VE. There is no spatial connection between these data files, only a mathematical one, which allows a designer to interlink them in any way. Visiting users do not experience these spaces as separate from each other, as their user-avatars are 'teleported' between these separate spaces and this teleportation and the fragmentation of space can be hidden with basic camera cuts corresponding to familiar cinematic language. When teleporting an user-avatar to another location, the camera cuts to a new view of this avatar, hiding the spatial teleport effect. In this way, cinematic techniques can enhance the spatial coherence of RT 3D VEs and edit the fragmented space into one perceived entity using continuity editing techniques that reinforces spatial orientation [4].

However, the *de facto* connections between different spaces, hidden by cinematic means, can defy the nature of architectural space. This quotes the specifics of cinematic space, which is assembled from fragments over a period of time into an understandable – or sometimes deliberately confusing – configuration. David Lynch's *Lost Highway* (USA/FRA, 1997), for example, creates architecturally illogical spatial but cinematically valid spaces through editing. Branigan names these '"impossible" spaces', that cannot be logically justified in the diegetic world-space. These spaces lead to perceptual problems 'that force the spectator to reconsider prior hypotheses about time and causality' [5]. They disorientate and destabilize the audience as the spatial connections are broken. Such destabilization is provides a powerful effect for narrative and dramatic impact in film as well as in RT 3D VEs.

This strategy is experimentally implemented in the *Cube Club*-sequence of *Common Tales*. The virtual *Cube Club* level consists of several separate structures including the library where the above examined theft event is staged. Each individual structure is connected to another via invisible 'teleporter zones' and teleporting effects are camouflaged through camera cuts. Consequently, the interactor experiences the structure as one coherent spatial location. In practice, user-avatars are 'teleported' from one location to another when, for example, stepping through a door or emerging from a tunnel into a new area. The resulting spatial jumps are disguised by camera cuts, which obey the rules of cinematic continuity editing, to the next location entered by the user-avatar.
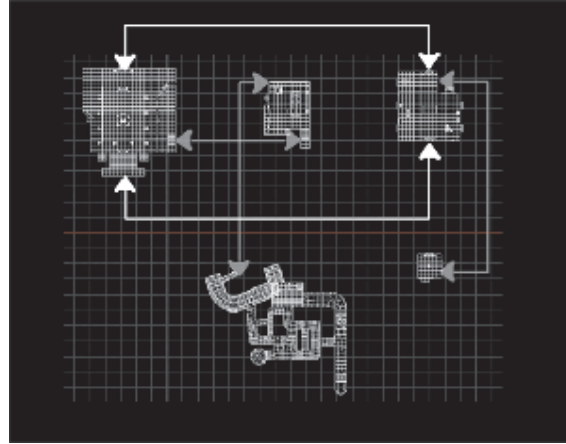
Fig. 3. The *Cube Club* level and the connection of separate spatial units – the bright arrows indicate the illogical spatial assembly

This combination of cinematically created and architecturally understood space allows spatially illogical constructs during the spatial explorations. In the example of the *Cube Club*-sequence, two opposing doors from one virtual room lead to similarly opposing doors in a different room (see the bright light arrows in the graphic). Leaving one room through the northern door sees users entering the seemingly adjacent room also through the northern door in terms of the virtual model. The change of the camera's point-of-view hides this effect and creates a 'spatial impossibility' that cannot be recreated in any physical setting.

The effect, here, is used to enhance the magical character of these rooms, which are symbols for the main conflict of the narrative staged around the basic conflict of fictional characters mingling with real human beings in the world of the RT 3D VE. The basic narrative premise of the *Common Tales* adventure consists of a combination of two inherently incompatible worlds: fiction and fact. The illogically connected rooms embody this theme in their spatial (dis)arrangement and represent a spatially defined narrative element in the expressive vocabulary of the title.

3. Conclusions and Future Work

As the *Common Tales* prototype illustrates: space, the mediation of it, and the events within it are highly interconnected in the shaping of the comprehension of the narrative RT 3D VE into a *Story Map*. Cinematic mediation has the power to complicate the comprehension of virtual space, but can also allow for impossible spaces; staged events and structured interactive access can signify certain moments of a user experience; spatial design can follow non-spatial logic. These features combined provide clearly evocative elements for an evolving *Story Map* based on cinematic mediation, spatial structuring, and event structuring. These three elements

differ from other traditional separating RT 3D VEs from architecture (that cannot create cinematic space), film (that cannot create interactive explorable consistent space), and from literature (as events in RT 3D VEs are told through space, not space through events). *Story Map*s in RT 3D VEs are specific to interactive spatial storytelling.

While the above elaborated features outline a variety of evocative means that can influence *Story Map*s they do not necessarily prove that they exist. As each *Story Map* is highly unique it is difficult to prove their general form. However, their effect – the better understanding and generation of meaning from the experience by combining space and events – can be traced in MMORPGs like *Ultima Online* [Origin, US 1997]. In contrast to single-player titles such as *Common Tales*, MMORPGs provide spatial worlds but no pre-arranged line of events. But within these worlds users share stories that locate past events in special times and spaces. These myths and stories [19] mirror underlying *Story Map*s as they prove the assembly of events and spaces into interpretations towards one whole. It is a paradox that seemingly clearer-structured single-user titles have to learn storytelling techniques from the freedom and spatial assembly of online titles. What is missing in MMORPGs, on the other hand, is the awareness and use of the cinematic mediation. Therefore, two promising fields for further research would include adaptation of spatial organization and event-structuring from MMORPGs to single-player titles and adaptation of cinematic mediation as developed for single-user titles for MMORPGs.

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