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The architectural topographic grain of contingent events

An exploratory 'toponemic' analysis of an interactive narrative

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ABSTRACT

The philosopher Mikhail Bakhtin referred to the prevailing imaginaries of fictional time-space associated with distinctive phases in the development of the novel as their 'chronotope'. In this paper I argue that the *form* of the chronotope can be regarded in relational terms as the arrangement of architectural topographic descriptions that *prefigure* the time-space of narrative possibility. These denotative descriptions are intrinsic to the temporalizing quality of contingency that distinguish particular sequences of action and occurrence as signifying *events*. An exploratory analysis of the dungeon-cave complex described in the Fantasy Fighting Gamebook (FFG) *The Warlock of Firetop Mountain*, published in 1982, offers an example of a ludic chronotope in which the player's navigation of the text defines the gamespace. The interactive format of FFGs facilitates the quantitative examination of the relationship between architectural topographic descriptions and narrative possibilities that are non-linear because what happens in the game depends on players' route choices. Space syntax methods are applied to show how the 'mapping' of literary time-space has less to do with establishing degrees of real-world correspondence so much as with recognizing the architectural topographic form of the chronotope as expressing the integrity of the fictional world's own system of reality. *Firetop Mountain* is then examined using 'toponemic analysis' to identify how the characteristic figures of actual narrative events are contingently generated through gameplay, rather than pre-determined by the global properties of its chronotopical form. Yet such contingency is not complete randomness. If it were the gaming world would be unplayable.

KEYWORDS

Interactive narratives, contingency, space syntax, Mikhail Bakhtin, chronotope

1   INTRODUCTION

The philosopher Mikhail Bakhtin refers to the prevailing imaginaries of fictional time-space associated with distinctive phases in the development of the novel' as their particular 'chronotope', with strong implications for narrative expression (Bakhtin 1981). In this paper I argue that the *form* of the chronotope can be regarded in relational terms as an arrangement of architectural topographic descriptions that *prefigure* the time-space of narrative possibility. These denotative descriptions are said to be intrinsic to the temporalizing quality of contingency that distinguish or *figure* particular sequences of action and occurrence as signifying *events* that embody a text. An exploratory analysis of the dungeon-cave complex described in the Fantasy Fighting Gamebook (FFG) *The Warlock of Firetop Mountain* (*WFtM*) is offered as an example of a ludic chronotope that is reliant on contingency for the gameplay (Jackson and Livingston 2017 {1982}) [1]. Although FFGs are neither novels nor literary texts in the conventional sense, their interactive format facilitates the quantitative exploration of how the arrangement of architectural topographic descriptions prefigure narrative possibilities that are non-linear because how events in the game unfold depends largely on the path choices and other decisions made by the player. This quality makes FFGs an analogue example of what Aarseth (1997, 1) calls "ergodic" texts which a "nontrivial effort is required to allow the reader to traverse". Wilkie notes how FFGs anticipated the "controlled interactivity" later associated with electronic media formats (Wilkie 2004, 31). Lünen (2019) gives a chronotopical interpretation of a pioneering online gameworld *Darkland*s, noting how its ergodic qualities as a cybertext and the verisimilitude of its medieval historical setting create "immersiveness" in gameplay. In this paper I emphasize the particular role of architectural topographic description in *WFtM* in the chrontopical sense of expressing the integrity of the Firetop Mountain gameworld (FMG) as its own system of reality. The analysis reveals the chronotope less as a source of 'realistic' constraints on FMG so much as the condition of its fictions.

Network analysis software was used to represent FMG as a topology of architectural topographic descriptions constituting the gamespace of all possible narratives. The theories and techniques of space syntax were applied to give conceptual clarity to the argument that the issues at stake in the mapping of fictional time-space have less to do with establishing degrees of real-world correspondence (as is sometimes assumed) so much as with expressing the form of the chronotope as a fictional reality. Finally, exploratory 'toponemic analysis' reflects on the prefiguration of architectural topographic descriptions in the FMG text as a basis for identifying the characteristic figures of actual narrative events contingently produced through the gameplay. In conclusion I propose that the sequencing (or 'grain') of architectural topographic descriptions in FMG is integral to the chronotopical imaginary through which authors and players, in a sense, *embody or inhabit* the narrative.

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[1] An earlier iteration of this research was presented as: Griffiths Sam and Alexander von Lünen. 2018. 'Dungeons and Salons: using Bakhtin's chronotope of encounter and Fighting Fantasy Gamebooks to examine how locative descriptions shape narratives of the French Revolution', INTH Place and Displacement: The Spacing of History, Stockholm, Sweden, 20-22/08/2018, https://iris.ucl.ac.uk/iris/publication/1541941/1 3.2.22.

2   LITERATURE REVIEW: THE ARCHITECTURAL TOPOGRAPHIC GRAIN OF THE CHRONOTOPE

In narratives the events of a story are constructed by relating occurrences and actions in ways that are not predictably sequential but cannot be completely random or they would not make any sense, an event trajectory which implies some kind of minimal temporal arc: beginning-middle-end'. Narratives then, do not have to be 'realistic' in the sense of corresponding to a particular historical reality. This is implicit in what the narratologist Anne Marie Ryan (1991, 24-25) calls the "fictional recentring" involved in accessing the "textual actual world" (TAW) from the historical AW ("actual world"). It refers to the essential imaginative shift that means a given chronotope can be *realistic* in the sense of constructing 'tellable' narratives that are intelligible in terms of the system of reality represented, while being no less fictional in the sense of not corresponding absolutely to a real-world cartography, or in making claims on 'realism' as a literary genre.

For Bakhtin the chronotope is a purely literary (i.e. textual) representation of time-space but one which is historical in its development, and which since the sixteenth-century has increasingly deployed narrative as way of expressing the lives of ordinary people. This is interesting because it suggests how the chronotope expresses a literary practice in which the materialities of historical time-space and the fictional time-space of narrative intersect. Offering a fuller account of the chronotopical imagination in this sense though is not straightforward. This is because it can become epistemologically snagged on negotiating the awkward (because fundamentally incommensurate) approach of mapping literary texts onto cartographic (or otherwise 'realistic') spatial representations, while literary criticism defines fictional time-space by its ability to escape such reductions. Yet if the chronotope does not express the degree of *correspondence* of historical and fictional time-space we might instead consider the extent to which architectural topographic description is implicated in how texts *prefigure* the time-space of narrative possibility such that fictional worlds can express *a* reality; whether or not this is an historical one.

Interestingly, Bakhtin himself characterizes chronotopes in highly architectural terms, for example, as roads, market squares, thresholds, castles, rooms and salons and so on; as sites that situate and thereby bring forth narrative (Bakhtin 1981). His broad chronotopical category of 'encounter' (extending equally to non-encounter) characterizes narrative developments that implicate (to a greater or lesser extent) the play of chance. The encounter chronotope is closely associated by Bakhtin with the chronotope of the road where "the spatial and temporal paths of the most varied people – representatives of all social classes, estates, religions, nationalities, ages– intersect at one spatial and temporal point. People who are normally kept separate by social and spatial distance can accidentally meet" (243).

For those familiar with space syntax theory there is an intriguing resonance here with Hillier *et al*'s conceptualization of urban streets as "the means by which the pattern of social differences is

forgotten, and the inhomogeneous is assembled [...] the profane mixing of categories which in the social structure are separate and insulated from each other" (1976, 180). Of course roads and streets are not exactly the same thing and Bakhtin is referring to novelistic representation whereas Hillier is talking about actual streets. Even so, I suspect Bakhtin with his interest in 'fleshy' and 'carnivalesque' narratives would appreciate Hillier's description of the 'profanity' of the encounter field as an agency generative of disorderly social mixing. In space syntax theory the encounter field as a spatial configuration refers to the anticipated patterning of bodily co-presence rather than actual social interactions –in that sense it is a virtual or imagined spatial practice (Hillier 1996, 186-89). From a literary perspective one can think of the textual arrangement of architectural topographic descriptions as the chronotopically prefigured time-space of *all* narrative possibilities, as distinct from specific figures associated with actual narrative events; in this sense, it is the time-space imagined by authors as a literary practice and embodied by the readers of their texts.

In space syntax spatial-configurational descriptions are typically syncretic in analytical mode though they can also reveal how buildings and cities may come to be narrativized in different ways by the people who design, build and inhabit them (see Psarra 2009; 2018). It is a particular quality of spatial configurations that a system looks different depending on one's local positioning; occupying a shallow space (for example, a central street) makes other streets relatively accessible while occupying a deep space puts other spaces at a relative distance. In architectural terms such descriptions can acquire cultural significance such that shallow-spaces might be sites of 'profane' mixing, while deep spaces might be considered sacred or liminal in their cultural associations. The text of a story too represents heterogenous situational viewpoints, perhaps associated with different characters, which must, at least in some minimal sense, coincide or otherwise 'touch' at certain points to express the characteristic time-space form of the chronotope.

3   DATASETS AND METHODS

The methodology consists of four phases: (1) network analysis of FMG's narrative topology; (2) cartographic visualization of FMG's narrative topology; (3) configurational analysis of the visualized narrative topology of FMG using space syntax and (4) toponemic analysis of FMG's narrative figures. 'Narrative topology' as I refer to it should be understood in the sense of an 'all-possible-narratives' topology since it encompasses the whole gamespace of FMG, as opposed to the singular narrative trajectory of the hero-player engaged on their individual quest. Similarly, 'mapping' as I deploy this term, does not hypothesize a possible correspondence of FMG with real-word terrain. Rather, I am mapping the text to explore the reality of a *fictional* world. Specifically, I am concerned with the intrinsic coherence of the dungeon chronotope as a basis for gameplay, hypothesizing that the time-space reality of FMG is written into the text itself in the grain of its architectural topographic description.

3.1   The format of Fighting Fantasy Gamebooks: the *Warlock of Firetop Mountain*

Steve Jackson and Ian Livingstone created the best-selling *Fantasy Fighting Gamebook* series that ran to a total of 59 titles published between 1982 – 1995 and was primarily intended for readers in a 9-14 age range. The first FFG, originally published in 1982, *The Warlock of Firetop Mountain* has been chosen as a representative case study here (Jackson and Livingstone 2017 {1982}). In FFGs *you* (i.e. 'you' the player) 'are the hero'. The hero-player's quest in *WFtM* is to defeat the evil Warlock and claim his treasure. To do this it is necessary to navigate the gamespace that comprises 400 numbered paragraphs (or 'sections') of text. At the end of each section the hero-player is either directed to another (non-consecutive) section or makes a selection from 2-5 options that directs them to the appropriate section, revealing the consequence of their choice. Each section is typically a few sentences in length, sometimes much shorter and rarely more than a page of text. The most common choices are route choices of some kind but these are not the only decisions the hero-player has to make; indeed they are the most recessive of events in the unfolding narrative. Many other choices must be made such as whether to fight, evade or otherwise engage with the denizens of FMG, explore mysterious rooms or stop to eat provisions. It is not possible to win the game without collecting certain objects and essential information *en route*. Nor does the format of FFGs present a purely logical puzzle: overcoming the hazards of FMG also requires luck in the throw of dice.

The 'you are the hero' format means that the narrative trajectory in FFGs unfolds from the single point of view of the player-as-hero. With some trivial exceptions the player is the only character whose narrative sequence extends beyond the single location where they are first encountered. This is useful for the purposes of this research because it simplifies the analytical task of moving from a global chronotopical account (i.e. the prefiguration of FMG as a narrative topology) to the description of narrative figures (i.e. the movements of the hero-player through particular event spaces in a given iteration of the game) without having to deal with the narrative trajectories of multiple characters. The format of FFGs is also well suited to this research because for the ludic chronotope of the dungeon to work it needs to be sufficiently navigable for the hero-player to feel the progression of their quest as they move through the sequence 'beginning-middle-end' while being neither so predictable that the game bores, nor so unpredictable as to render it unplayable. The denotative grain of architectural topographic description and its implications for narrative contingency would be much harder to represent empirically in literary fictions –whose interlocking layers of character, situation and temporalities present considerable difficulties of topological representation (though see Bushell *et al* 2021). Even so, Bakhtin is clear that the form of chronotope is fundamentally expressive of the time-space imaginaries that sustain narrative and connect writer and reader (and player). There is every reason to think that architectural topographic description is a critical dimension of this expression in many different kinds of texts (Griffiths 2021; Griffiths 2015).

A final characteristic of FFGs useful for this exploratory analysis is that the principal elements of architectural topographic description in each section describe event spaces at a similar resolution

(mainly passageways, doors and rooms) and that these are represented as a contiguous pattern of space. This reduces the analytical complexity required compared to narratives that unfold through multiple settings that may be discontinuous in time and space. In FFGs the general rule is that one section contains one principal architectural topographic description, and presents the hero-player with one gaming event to which they need to respond.

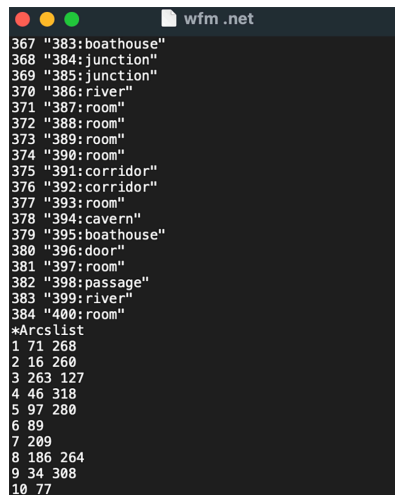### 3.1.1   Note on the presentation of the research

The Warlock of Firetop Mountain is under copyright. For this reason all visual figures included have been restricted to schematic illustrations and abstract diagrams. At all points great care has been taken not to reveal any information that could spoil the enjoyment of the game-play for the uninitiated.

3.2   Methods

3.2.1   Mapping the topology of the FMG gamespace

A notable quality of FMG is that most (60%) of its 400 sections specifies an element of architectural topographic description (e.g. 'room' or 'passage') that situates the action in which the hero-player is a participant. In those other sections (40%) where no architectural topographic description is specified the reason is because it has been 'carried over' from previous sections that the hero-player will already have read, in these cases the site-specificity of the action has already been established. When a given architectural topographic description is strongly implied but not specified in this way it is referred to as a 'silent' toponeme (36% of the total). There are 16 exceptions (4% of the total) which have no architectural topographic descriptions as event spaces because they are deployed as artifices of the gameplay. These are: a range of possible solutions to a numeric puzzle (15) and a wandering monster battle that can occur in different event spaces (1). These have been removed leaving 384 sections with architectural topographic descriptions as site-specific event spaces.

The main element of architectural topographic description in each of the 384 sections was then identified as its 'principal toponeme'. Toponemes are defined by their position in the sequence of architectural topographic descriptions specified in the text itself, rather than, for example, linking to a system of classification with its origins external to the text. Where individual sections contained toponemic sequences (e.g. passageway > doorway) both were recorded but the principal toponeme was identified as that which most clearly situates the hero-player in a given event space where the gaming action takes place. In total 20 principal toponemes were identified. These were subsequently categorized as movement spaces (e.g. corridors), occupation spaces (e.g. rooms) and threshold spaces (e.g. doors) for the purpose of analysis.

Figure 1: representing the narrative topology of the Firetop Mountain gamespace in Pajek

The numbering of individual sections in *WFtM* was recalibrated to take into account of the reduced number. The relationships between the 384 remaining sections was then transcribed into a .net file for analysis using Pajek, a standard network analysis tool where the sections in FMG represent vertices (n=384) and relationship between them arcs (n=679).[2] The results of the analysis are presented in Section 4.1.

3.2.2   Visualizing the gamespace and space syntax analysis

In the second research phase FMG was visualized cartographically and then analyzed using space syntax techniques, first to compare the topology of the mapped gamespace with its narrative topology, and secondly, to compare its topology with the spatial morphology of a sample of real-world buildings and settlements. The value of the configurational analysis lies in exploring how space syntax representations can be used to describe a spatial arrangement as a pattern of inhabited space. Conroy Dalton describes these as 'embodied diagrams' that: "are not merely representations of real-world space, but contain multiple implicit meanings pertinent to the experience of being situated in the equivalent real-world space" (Conroy Dalton 2005, 107). This is the point of view of Michel de Certeau's spatial storyteller (de Certeau 1984). It promises to lend greater conceptual clarity to the central proposition of this paper that the chronotopical form of the FMG text expresses an architectural topographic (toponemic) grain that prefigures the text as a whole and anticipates the contingent figuration of particular narrative trajectories.

The space syntax analysis is not intended to imply a putative correspondence of a fictional world to a real-world historical space, nor does it conflate fictional time-space with the formal demands of a mode of spatial representation. Indeed the nature of the FFG format means that map-making *is part of the game*. Before the quest proper gets underway the locals in the nearby village inform the hero-

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[2] https://pajek.software.informer.com/ accessed 01.02.2022

player that they should "keep a good map" to avoid becoming "hopelessly lost" in Firetop Mountain (Jackson and Livingstone 2017, 10). Of course, whether such a map resembles an actual visual representation of FMG or a web of number-sequences representing the choices taken, or (most likely) includes elements of both, is a matter for the hero-player. In any case it invites enquiry into the relationship between the chronotopical form of the text (as the undrawn 'map' of all possible event sequences) and the hero-player whose individual quest embodies its particular narratives.

The cartographic map of FMG was drawn onto a grid template using drawing software. Using a grid schema made sense because in mapping the narrative topology it is the relationship between architectural descriptions in the gamespace rather than their geometric form that matters. Each numbered event space in the text was usually equivalent to one grid square space for the purpose of cartographic representation but in a small number of cases a single event space needed to be represented as two grid or more squares (e.g. the river and some passages) or subdivided (e.g. the werewolf's larder) to make the map as accurate a representation of FMG as possible. Pajek analysis was used to identify the shortest topological route through the 384 site-specific event spaces and a trial-and-error approach deployed to ensure that final map functioned effectively in actual gameplay. To avoid spoilers only a small, unlabelled, section of the map is presented in Figure 2.
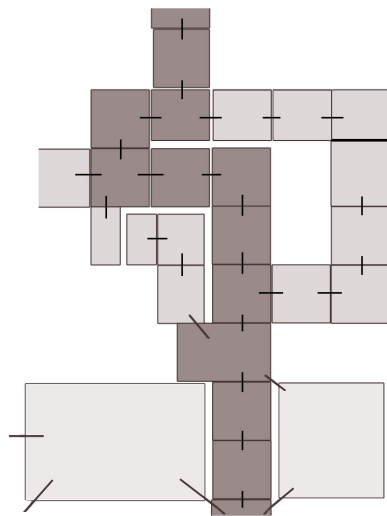

Figure 2: section of the author's schematic cartographic visualization of the Firetop Mountain gamespace (indicating sequence of shortest-path route in dark grey).

The cartographic visualization of FMG was exported into *DepthmapX*[3] and redrawn: first as a convex break-up map (the fewest and fattest set of convex-space polygons in which all internal points can be connected by a straight line without cutting across the perimeter of the polygon, and which cover the whole system), and then as an axial map (the least and longest set of lines that traverse all convex spaces). These representations were made as if all the event spaces formed a contiguous system of

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open space (Hillier and Hanson 1984, 97-99). In fact while FMG does form a contiguous system it is not one of open space as many doors and thresholds are locked or concealed. A small number of gaming events also create discontinuities in movement space by magically relocating the hero-player to non-adjacent event spaces. Unlike the narrative topology, axial and convex analysis are undirected networks that have nothing to intrinsic to say about the directionality of the hero-player's questing. In these respects the cartographically visualized map and its topological representation should be regarded as simplifications of FMG that abbreviate aspects of the localized complexity of the gameplay while being largely consistent with its global configuration.

In space syntax theory convex space is said to represent the localized 'occupation' space of small-scale movement while axial lines represent globalizing 'movement' space (Hillier 1996, 316). 'Interfaces' are the thresholds or transition spaces between different scales of movement and occupation. This conceptualization has clear implications for thinking about how toponemes such as 'passageway', 'room' and 'doorway' sequence or *figure* narrative events in texts. Importantly occupation, movement and interface spaces are not fixed categories but relative to the scale of analysis. (A local high street, for example, typically serves as an interface between 'to movement' at the neighbourhood scale and 'through movement' at the urban scale but can also be considered as a complex site of localized occupation and movement in its own right). In a similar fashion, the same element of architectural description (i.e. a given toponeme) may be implicated in different toponemic sequences, for example denoting qualities of synchrony (i.e. localizing events of occupation), diachrony (i.e. globalizing events of movement) and transition (i.e. interface or threshold events). Different toponemes will possess different connotative potentials depending on their particular deployment in constructing narrative figures. The results of the FMG visualization and space syntax phases of analysis are presented in Sections 4.2 and 4.3.

3.2.3   Toponemic analysis

The toponeme is defined as a denotative element of architectural topographic description (a class of noun) that forms part of a non-consecutive textual sequence of such descriptions distributed throughout a text that serve to prefigure its range of narrative possibilities. I refer to this as the architectural topographic 'grain' of the text. In linguistic theory one might say that the toponeme's *syntagmatic* (sequential) role takes precedence over the *associative* (metaphorical or connotative) role as a source of contingent (because undetermined) meaning (Barthes 2010, 58-59). In this it prioritizes the diachronic figuration of a narrative (its patterning in time) over its syncretic identity as a spatialized system (its patterning in space). This distinction is only notional, however, as time and space are intrinsically linked in the form of the chronotope, as Bakhtin clearly asserts (1981, 84). Narratives express the temporal trajectories of spatial stories but spatial stories must also be imaginable that align with those of other agents, otherwise no fictional worlds involving movement, situation or encounter would be possible. One might say (with some license) that Hillier's notion of the 'virtual community' (the intangible socialities we imagine through being situated in real-world

time-space) intersects with the textual form of the chronotope as a prefigured imaginary of inhabited or embodied time-space (Hillier 1996, 212-14). The toponemic phase of analysis for this paper focusses on how, in *WFtM*, the hero-gamer generates sequences of toponemes as particular narrative figures through which the ludic possibilities of FMG are embodied and made manifest. It shows how the integrity of Firetop Mountain as a fictional world depends upon the contingencies intrinsic to these figures, such that the gamespace is neither too simple to navigate or too difficult and therefore *uninhabitable* in a narrative sense, with little sense of progression from one event to the next.

4   RESULTS AND DISCUSSION

4.1   First phase: analysis of the narrative topology

The network representation of the FMG narrative topology (NT) produced in Pajek is given in Figure 3. It is immediately apparent that this topology is not recognizable even approximately as a plan or map of a dungeon complex, nor of any other intuitively familiar built environment. This is not surprising because the network represents a textual narrative not a spatial configuration. A global topological structure is, however, 'just about' detectable that indicates the directionality of the overall narrative trajectory with an identifiable beginning and end (indicated) but this progression is complicated by a series of dense localized knots and intricate strings of vertices. It suggests that NT structures FMG as a global system of event space but one in which complex localized narrative possibilities must be navigated as the hero-player's quest progresses.
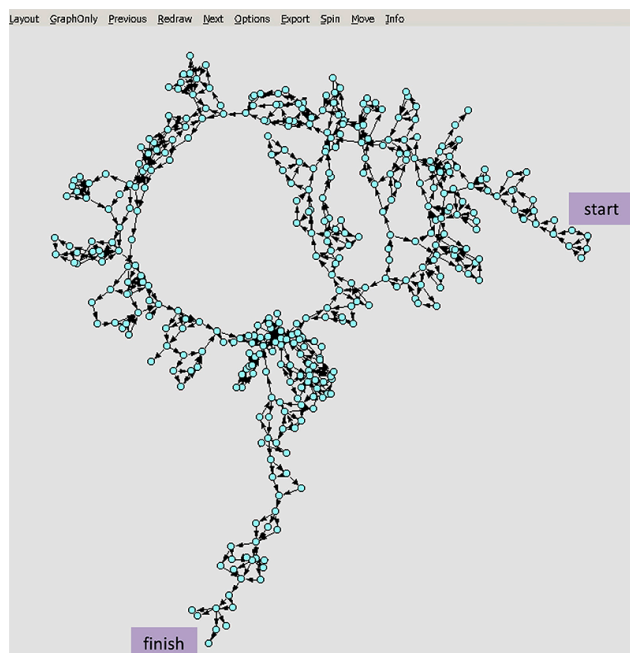

Figure 3: Unlabelled narrative topology of the Firetop Mountain gamespace

Each of the 384 sections in NT describes a specific event space in the game: *something* that happens *somewhere* meaning the hero-player will have to *do* something, even if this is only turning the page to another section. In the majority of event spaces (57%) the hero-player will have to take a decision between two or more options. As there are 384 vertices to 679 arcs the mean choices per gaming event (arcs connecting out to other vertices) is 1.76 and the modal average is 2 (Table 1).

Number of choices facing hero-player	number of event spaces (n=384)	% of total event spaces
0 (hero-player dies)	6	2
1 (simple redirection)	157	41
2	162	42
3	42	11
4	13	3
5	4	1

Table 1: distribution of event choice range across event spaces

One might hypothesize that these gaming decisions are not equally distributed across all event spaces, however. If they were one would expect the localized knotting effect in Figure 3 to be less pronounced than it appears. Table 2 explores this hypothesis by comparing the number of gaming decisions in event spaces with different principal toponemes. While most architectural topographic descriptions are highly generic (e.g. 'room' and 'passageways') in the sense of appearing at multiple points in FMG some, for example 'crypt' and 'boathouse', denote sites associated with clearly defined phases in the hero-player's quest. It seems reasonable that these unique *site-specific* toponemes might be also associated with the phases of increased narrative complexity suggested by the 'knots' of event spaces in Figure 3.

principal toponeme of NT event space (n=>10)	instances of principal toponeme in NT event space	sum gaming decisions associated with principal toponeme	ratio of principal toponeme: gaming decisions (mean 1.8)
crypt	10	22	2.2
boathouse	12	25	2.1
junction/ crossroads	39	81	2.1
dead end	8	16	2.0
door/ secret door/ cave entrance	29	53	1.8
riverbank	16	29	1.8
room/ chamber	154	260	1.7
passageway/ corridor/ stairs	80	134	1.7
river	11	18	1.6
cavern	19	31	1.6

Table 2: ratio of gaming decisions to principal toponemes describing event spaces

Table 2 shows how the ratio of principal toponemes to gaming decisions is marginally less than the mean for the most generic descriptions (1.7) and greatest for event spaces associated with unique site-specific localized narrative sequences in FMG. For example, the ratio for toponemes such 'crypt' (2.2) and 'boathouse' (2.1) is as high or higher than for the more generic route-choice toponemes 'junctions'/ 'crossroads' (2.1) and 'doors' (1.8) despite, or indeed *because*, of their status as unique site-specific *topoi* in FMG. Other unique site-specific event spaces such as 'river' and 'cavern' (the

latter not actually unique but describing only a limited number of event spaces) feature marginally below the mean ratio of gaming decisions. While unique and uncommon site-specific descriptions are no less denotative in a toponemic sense than more generic descriptions, their relative exclusivity in the narrative lends them a special connotative status.

The complex NT in Figure 3 can be greatly simplified by using Pajek to identify the shortest topological route through FMG from the entrance to the dungeon to the Warlock himself. This process reduces the 384 vertices of NT to just 73 vertices in the shortest-path topology (SPT) meaning that just 19% of NT vertices are on SPT (for a summary see Table 3, below). If split routes of equivalent topological distance are excluded the number of SPT vertices is further reduced to 66. Interestingly, while the ratio of choices to event spaces on the shortest path is 2.0 – higher than the mean – this is largely because of the high proportion of crossroads and junctions, and doors. In SPT the proportion of event-spaces described as rooms (or using unique and uncommon toponemes) is relatively small (see Section 4.2, Figure 5).
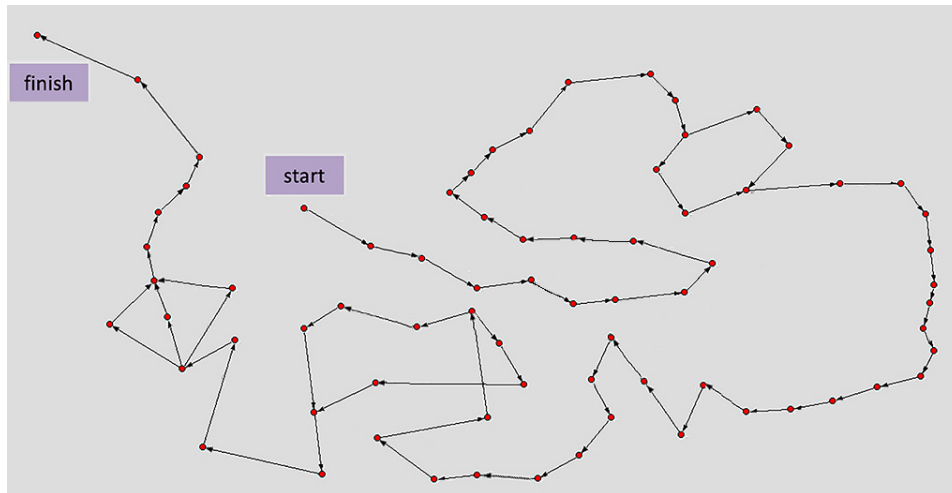

Figure 4: reduced narrative topology showing unlabelled shortest path nodes in FMG

It is important to be clear that SPT is an artifice of the network analysis, it has little relevance to the actual gameplay because it would be impossible to find and defeat the Warlock, take his treasure and return alive without deviating from the SPT to go into the depths of FMG at many points. It is however, consistent with the proposition that NT describes a global narrative trajectory (beginning-middle-end), that links to localized knots of narrative complexity with multiple gaming choices that are concentrated on particular events spaces en route. By stripping out almost all the narrative complexity SPT suggests how the successive phases of gameplay are organized around a somewhat less complex *prefiguration* of the FMG representing the global form of the chronotope.

4.2   Second phase: cartographic visualization of the gamespace

The second phase of the research was to produce a visualization that functions as a schematic map of FMG for the hero-player. In Section 3.22 it was explained how 'NT-mapped' (NTM) was constructed around the spine of its SPT and how the grid schema served to minimize the geometric differentiation of the event spaces (attributes of form and area only sporadically specified in the text). Although this phase of work was initially viewed as preparatory for the space syntax configurational analysis it was found to produce an interesting result of its own. Namely, that the production of NTM involved a dramatic reduction of the number of vertices in the NT from 384 to 137 and in SPT from 73 (66 excluding split paths) to 54 (51) – reductions of 64% and 26% respectively. These reductions reflect that fact that the majority of narrative vertices are re-using a smaller number of site-specific event-spaces in order to express different narrative outcomes that respond to the decisions made by the hero-player confronted *in situ* when faced with an encounter or puzzle situation on their quest. The three reductions, as 'translations' of the original FMG NT, are summarized in Table 3.

trans-lation	method	vertices NT	change (count)	NT as % previous NT	vertices SPT (splits excluded)	SPT as % prev. SPT	SPT as % NT (splits excluded)	reason for NT reduction
I	identification of principal toponemes	400	-	-	-	-	-	identification of sections with no possible or stable architectural description in FMG
II	representation of NT in Pajek	384	-16	96%	73 (66)	-	19% (17%)	removal of non-event space vertices from the network
III	preparation of the cartographic visualization	137	- 247	36%	54 (51)	74%	39% (37%)	localized NT consolidated into site-specific event spaces to make functional map

Table 3: phases in reducing the FMG narrative topology to produce a cartographic visualization

Table 3 shows the stages in translation of the FMG text to a narrative topology that conforms to the schematic cartographic visualization NTM. It is clear how in translation III the mapping exercise radically reduced the number of vertices necessary to represent the gamespace overall. In translation II the amount of NT invested in SPT is a small proportion of the whole (19%) but it rises to 39% in translation III.

But how do the toponeme profiles of the reduced NT and SPT compare? To explore this question the principal toponemes of FMG event spaces were clustered into four groups of similar and usually interchangeable toponemes. Figure 5 shows the proportion of each principal toponeme cluster in six different representations of NT. Three of these (NT, NT-SPT[4] and SPT) derive from the Pajek network analysis of NT, and three from the cartographic visualization NTM: (NT mapped, NT-SPT mapped and SPT mapped). The four clusters represent the most generic and recurrent toponemes in

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[4] This should be read as: 'NT minus SPT'.

FMG. The lowest proportion of all toponemes they represent is 77% (NT-SPT) and the highest 84% (SPT and SPT mapped), again demonstrating how the shortest-path topologies contain more generic toponemes.
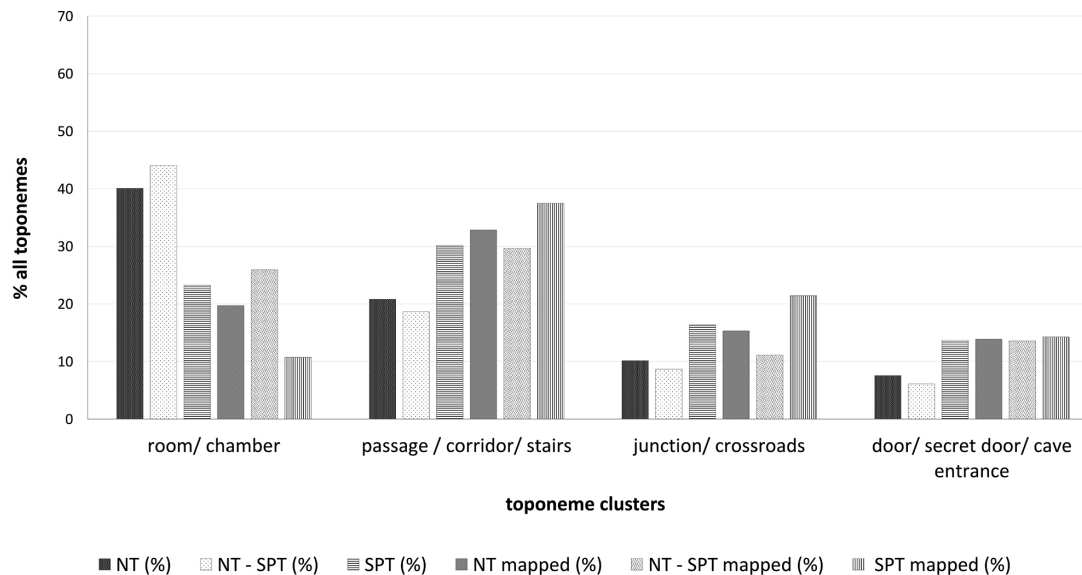

Figure 5: proportion of high frequency principal toponeme clusters in NT/ SPT and NT-/ SPT- mapped

It is notable how the proportion of NT vertices (40%) described as occupation spaces (i.e. rooms and chambers) is significantly higher than those described as movement spaces (i.e. passageways, corridors, stairs, junctions and crossroads – a total of 31% combined), whereas the opposite is true of NT-mapped which is dominated by movement space descriptions. In both topologies passages and corridors are the most frequent toponemes on the shortest path route (30% SPT, 38% SPT mapped); this is amplified in SPT-mapped where 73% of all toponemes are either movement spaces or thresholds. SPT vertices were also subtracted from NT to represent the area of the gaming space that is not topologically necessary to traverse the network but is essential to completing the quest in gaming terms. Figure 4 shows how the proportion of occupation space vertices are highest in this area of the narrative topology (44% NT-SPT) but interestingly not so in NTM-SPT mapped which shows a much lower proportion of occupation spaces (26%) to movement spaces and thresholds (55%).

Three observations can be made on the basis of this analysis. The first is simply that the network and cartographic visualization stages of mapping the FMG narrative topology emphasizes how all possible gaming events come 'ready-tagged' with an architectural topographic description, whether the toponeme is silent or specified in the text.[5] Secondly, it is apparent that the effect of the cartographic visualization process is to radically reduce the definition of NT to a minimal description of the arrangement of site-specific event spaces in NTM. This suggests: (a) how narrative contingencies are

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[5] For a discussion of the 16 sections of *WFtM* that were not considered to be event spaces see Section 3.21

expressed by localized iterations through the same event spaces – most typically in the occupation spaces away from the SPT, and (b) that at least some site-specific event spaces are likely to recur more than once within the same hero-player quest. Most typically this would be in a fairly trivial way such that the hero-player finds themselves back at a crossroads or junction that feels familiar, but it can also be explicitly stated when returning to the scene of a previous encounter, for example: "if you have already been in this room, you find it empty" (Jackson and Livingstone 2017, {#227}). Finally, the successive phases of the analysis reinforce the description of FMG's NT as characterized by localized knots of narrative complexity in and around site-specific occupation spaces and *topoi*, whereas the cartographic gamespace NTM reveals the global system of movement spaces by consolidating complex localized narrative contingencies into a reduced number of mappable occupation spaces - which may or may not feature in any given iteration of the game play. To put this another way, the analysis indicates how the role of architectural topographic description in FMG works at different scales to embody the global narrative of the hero-player's quest while generating the possibility of multiple alternative narratives as they progress through a succession of localized event spaces.

4.3   Third phase: space syntax analysis of the gamespace

The preparation of the cartographic visualization FMG was a preliminary to the third research phase using space syntax techniques to analyze the cartographic visualization of the gamespace. For this, the map of FMG was represented as a system of convex and axial (linear) spaces in *DepthmapX* software (see Section 3.22). This phase of analysis involved a subtle but important act of conceptual translation of FMG as *vertice*s in NT to *nodes* in a spatial configuration of event spaces. The process of creating the convex break-up led to a fourth translation of NT (following the series described in Table 3), this time leading to a slight increment of 16 rather than a reduction of nodes. This is because, while adding grid squares to create differentials of distance between event spaces is necessary to make NTM a workable map for gameplay (translation III), it does not increase the number of NT vertices. This process does, however, have implications when using NTM as the basemap for space syntax analysis (NTMSc). Each time multiple grid squares representing a single NT vertex in NTM also include a change in direction, the directional change generates an additional convex space in the spatial configuration. The overall impact of translation IV, however, is minimal: SPT as a proportion of NT remained similar to translation III at 37%. More significant than the exact numbers is how the analysis reveals the lack of topological 'fit' in the relationship between NT and NTMSc. The addition of nodes in NTMSc does not necessitate more NT vertices in FMG and more NT vertices does not necessarily require more NTMSc nodes. On the contrary, it appears to be a characteristic property of both NTM and NTMSc to represent *fewer* space or nodes than NT has vertices. It is interesting though to consider in stylistic terms the scope for the expression and repression of information regarding distance and direction in the text of the narrative (NT).

The ludic chronotope of the dungeon combines elements of cities and complex buildings (e.g. long passageways and multiple junctions), building interiors (e.g. rooms and doors – but no windows) and natural landscapes (e.g. rivers and caverns). In order to interpret the results of the space syntax analysis I have drawn on a range of similar analyses for comparative purposes, including one of the small Northumbrian market town of Alnwick produced by the author, and of several complex building types made by Hillier and Hanson and colleagues in the Bartlett Unit of Architectural Studies (UAS 1978). While these systems are not directly comparable to FMG (not least because they represent real-world configurations!) there is a sufficient range of examples to be confident of the comparison for the present purpose. The results of the space syntax analysis are presented in Table 4.

As a spatial configuration FMG does not look entirely unfamiliar to anyone used to such representations (i.e. it looks like a plan of some description) but nor does it resemble the generic form of a town or building. There is an integration core of a kind that focuses on the river, river banks and proximate rooms and passages, but is peripheral to much of the system and does not extend to form the local-global 'spokes' that one expects to see connecting the interior of settlements and buildings to their exterior, making the system relatively shallow and accessible. This explains why FMG has trivial local-global synergy ($r^2=0.07$) compared to Alnwick's, which is typical of a real-world urban form ($r^2=0.42$). FMG is 'strange' kind of city as Hillier (1996) might put it because it is constructed around a ludic idea: the Warlock's treasure must be kept at the greatest possible depth from the point where the hero-player enters because finding it is the purpose of the hero-player's quest. Indeed the most segregated nodes are located right at the extremities of the graph representing its beginning and its end.

The demands of the quest narrative requires that the choices that globalize the hero-player's movement should be made as difficult as possible to identify from their local architectural topographic description. The axial integration of convex space in FMG (.053) indicates a relatively high convex break-up. This emphasizes the localized fragmentation of occupation spaces when compared with Alnwick (0.35) and Hillier and Hanson's example of 'G' (0.33) – values that point to a higher degree of axiality, emphasizing globalized movement (H&H 1984, 99). It follows that the passages and corridors of FMG do not construct a shallow-core system (maximizing accessibility to internal spaces) as they might be expected to do in a real-world building. First, because the contiguity of the movement-event spaces is interrupted by rooms, caverns and shut doors etc. that draw the hero-player into localized narrative complexity (for example, participation in a battle), and secondly, because in many cases the passages and corridors are themselves the sites of gaming events other than the selection of routes – for example, the decision to search for secret passages.

configurational model	node count	least number of steps through system	ratio of shortest-path (SPT) nodes: node count	mean depth	mean integration-HH	mean integration HH radius-2	synergy (r^2 HHn: HHr2)	mean choice
Axial: FM	81	27	1: 3	9.6	0.47	1.6	0.07	682.05
Axial: Alnwick	383	10a	1: 38	9.6	0.75	1.6	0.42	3198.3
Axial: FM SPT	31	31	-	9.7	0.47	1.76	-	1234.84
Axial: Alnwick SPT	10	10a	-	7.0	1.02	2.85	-	19799
Convex: FM	153§	56	1: 2.7	18.6	0.28	1.16	0.06	2679.42
Convex: Alnwick	1100	62a	1: 18	35.2	0.23	1.19	0.09	37628
Convex: Newgate Gaol†	124	13b	1: 10	6.4	n/a	n/a	n/a	n/a
Convex: Factory†	115	6b	1: 19	3.4	n/a	n/a	n/a	n/a
Convex: FM SPT	55	51c	-	18.4	0.28	1.46	-	5332.56
Convex: Alnwick SPT	62	62a	1: 27	28.6	0.23	0.28	-	101469

Table 4: space syntax analysis of real-world sites compared with Firetop Mountain gamespace

† - Data source UAS (1978, 12); § the notional carrier space is not included in the node count; n/a – data not available; a the shortest path (SP) measure for Alnwick represents the 'simplest topological route through' but I have made a common-sense judgement as to what 'simplest route through' means; bdefined as the number of steps to the deepest space in the system rather than 'route through'.

The comparative analysis in Table 4 differentiates NTMSc as a fictional space from real-world settlements and buildings, and serves as a basis for thinking more about the role of architectural description in defining the chronotopical form of narratives in FMG. To begin with the axial graph: it is clear that the spatial configuration of FMG does not conform to the generic urban settlement pattern of the deformed wheel nor to a shallow-core building type. Indeed, what distinguishes it most as a fictional space from the real-world configurations is just how much of its topology is invested in maximizing depth. This is clearly shown by the ratio of STP nodes to overall nodes which is strikingly lower for NMTSc than it is for the real-world systems (even allowing for some difference in definitions of 'shortest path' see notes accompanying Table 5). For every 2.7 mapped (site specific) event spaces in NMTSc one is an STP event space. If the system is represented as axial lines the ratio is similar (1:3), whereas for the real-world systems the equivalent values vary widely from 1:10 (convex Newgate Gaol) to 1:38 (axial Alnwick).

This investment in the depth of its global system explains why the axial local-global integration structure of FMG is comparatively weak. It also explains why its distinguishing configurational characteristic in the expression of global structure is convex choice. It is the choice values for the STP nodes (axial and convex) that differentiate them topologically from the FMG system overall. On both counts the mean STP choice is about twice has high than the system mean, whereas mean local and global integration are similar in axial mode and not strongly differentiated in convex mode. The exception is the high integration-HH radius-2 convex integration in NMTSc – a consequence of the relatively large number of junctions and crossroads in the system, which also emphasizes the localizing effects of the convex breakup. There is still, of course, less choice overall in NMTSc STP than in Alnwick where the axial mean STP choice is 6 times the mean for the system overall and the

axial mean 2.7 times the mean. The difference is because the high global choice routes in real-world settlements and buildings necessarily exclude most of the nodes in the system, whereas in NMTSc almost 37% of the convex event spaces are on the high choice STP routes and the proportion is even higher without the additional convex spaces needed to use the map in space syntax analysis (39%).

The space syntax analysis identifies a key distinction in the topology of real-world settlements or buildings compared with the chronotopical form of the ludic dungeon. In NT the STP choice (betweenness) expresses the narrative trajectory: 'beginning-middle-end' ('through movement' in space syntax terminology) rather than integration which is comparatively synchronic ('to movement'). In FMG integration identifies a localized area of narrative complexity in the topological centre of the gamespace but without constituting a local-global structure of axial movement space. Instead it is the high-choice convex definition of the shortest path route which the hero-player must keep coming back to if their quest is to be successful and which defines FMG's global structure. As a ludic chronotope FMG prioritizes the expression of localized narrative contingency but without doing so to the point where the game becomes unintelligible. This means the global structure of FMG is highly recessive (denotive) but it must be there so that the hero-player can have a sense of progress on their quest.

The configurational analysis should not be read as a crude exercise in assessing the 'realism' of the FMG as an ergodic text nor simply as the common-sensical observation that the directionality of narrative necessarily involves selection of what is told where, and in what order, such that discrete actions and occurrences in time-space become related as event sequences. A key issue in the translation NT > NTM > NTMSc is to understand the role of architectural topographic descriptions (toponemes) in the prefiguration and figuration of FMG as a fictional space. Bakhtin's notion of the chronotope focuses attention on how of forms of time-space enter into textual 'situations' (as they are written, read or – in this case – played). This what I understand as the form of the chronotope in an architectural topographic sense: the expression of time-space in language opening up the possibility of fictional worlds that are neither necessarily 'realistic' nor reductive of historical reality but are rather engaged in expressing, extending, transforming and decentring such realisms and reductions.

4.4   Fourth phase: toponemic analysis, the identification of narrative figures

The fourth and final toponemic phase of the analysis brings comes full circle to consider how sequences of architectural topographic descriptions, *toponemes* as I have defined them, not only *situate* but in a sense *generate* narrative possibilities in FMG through a ludic process in which the hero-player to embodies the text. In this sense the interpretative dialogue is between the chronotopical imaginary of the *prefigured* text and its *figuration* in narrative that is written-read-played (see also Griffiths 2021, 127-44). The results of the analysis are summarized in Table 5. It represents an attempt to sketch the contingent narrative figures which the hero-player is actively engaged in generating from the prefigured toponemic grain of the *WFtM* text.

narrative figure	description of figure	characteristic toponeme sequence > - direction	characteristic textual expression in FMG {# [section number_i]}	as expression of the hero-player's gaming narrative
Metronomic	one-step-at-a time: 'here-to-there, here-to-there…'	> room >; > passage >; > junction >	Expressions that are the most typical and generic of the event space descriptions: e.g. of route choices at crossroads and junctions	Accumulates to an overall sense of the hero-player's experience of FMG as a complex sequence of contiguous (mainly) passages and rooms
Recursive	circulatory: 'departure and return'	> riverbank >… > riverbank > > crossroads > … > crossroads >	Expressions of familiarity: e.g. {#129} "You return to the riverbank…" ; {#30} "…you can return to the crossroads. Turn to {#_i}"	Event spaces that are revisited by the hero-player who becomes familiar with them. They recur frequently in narrative topology but are less frequent or even unique in a cartographic image.
Concatenative	accelerated: 'seeing and going'	> room > door > passage > junction [route choice] >…	Expressions of fluency in movement: e.g. {#70} "You follow the cobbled corridor east, then north, then east again […] until you wind up at a crossroads. Turn to {#_i}"	Hero-player movement out from occupation spaces through successive movement spaces without engaging with gaming events other than route choice
Decompositional	decelerated: 'coming, staying and looking'	> passage > door > room [encounter or exploration]	Expressions of exploration and encounter: e.g. {#257} "The passageway runs straight for several metres and then ends at a wooden door [choice to go through the door or turn back]	Hero-player movement through thresholds into occupation space and engagement with gaming events other than route choice
Contractive	immersive: 'here and now'	room [description of what can be seen]	Expressions distinguishing event space specificity: e.g. {#82} "The door opens to reveal a small, smelly room. In the centre of the room is..."	Hero-player encounters an unusually elaborated description of an event space, almost always as a preliminary to a significant gaming event
Dislocative	static: 'here now…, here now…'	dead end [abrupt loss of consciousness]	Expressions that draw attention to spatial discontinuity: e.g. {#137} "You feel dizzy and slump to the ground. When you come to, you do not recognize your surroundings. Turn to {#_i}"	Hero-player is disorientated by the experience of disembodied movement between discontinuous spaces
Disjunctive	reflective: 'here and then…there and now'	room [description of temporal contrast]	Expressions that draw attention to the passage of time-through-space: e.g. {#263} "Many years ago he was an adventurer like you" before his incarceration in this "solitary cell".	Hero-player is made aware of the relationship of past and present through description that denotes the possibility of different past or future states

Table 5: narrative figures expressing the architectural topographic grain of Firetop Mountain

The *metronomic* figure is really only a figure in the minimal sense of expressing FMG as a kind of 'boardgame' in which the hero-player charts the progress of their quest through successive page turns that associate site-specific event spaces with the unfolding of the narrative. Whereas the other six figures are contingently produced through decisions made as part of the gameplay, the generic metronomic quality arises by default from the *prefiguration* of the ludic dungeon as a chronotopical form generative of narrative possibilities . Having said that I think it makes sense to specify a metronomic *figure* because it expresses a definite quality of gameplay in FMG when the hero-player's movement is neither accelerated (expressed by *concatenative* figures), nor slowed down (expressed by *decompositional* figures), nor circulated back through familiar territory (expressed by *recursive* figures), nor disembodied by magical intervention (expressed by *dislocative* figures) – and where the relatively static figures of *contraction* and *disjunction* do not apply. At such points in FMG the hero-player becomes aware of progressing 'one-step at a time', perhaps quite laboriously, through successive phases of the narrative, feeling the effort of the gameplay and hoping to complete the quest soon or die trying.

5   CONCLUSION

The research presented in this paper has explored the proposition that the form of the chronotope possesses an architectural topographic grain that prefigures the time-space imaginaries of narratives and sustains the contingency of events. Such an assertion should not be confused with attempts to map the correspondence of fictional texts with real-world places. In this respect the form of the chronotope describes the map-as-text, not the map *of* the text because while the former expresses narrative contingency (vertices NT > nodes NTMSc) the latter illustrates a simple linear progression through successive spaces (vertices NT = nodes NTMSc), effectively flattening the text to its synchronic image (NTM). In this sense the form of the chronotope identifies the architectural topographic imagination at work inside language, constructing the time-spaces between the words, giving figurational expression to situatedness and temporalizing the contingency of events. The expression of contingency has implications not only for interactive narratives but for narrative treatments of fictional and historical space more broadly. This is because the architectural topographic form of the chronotope seems essential to sustaining the imaginative dialogue of writer, reader (player) and subject: consistently posing and re-posing the same questions: 'so what did happen, might have happened, could happen, will happen, must happen *next*?

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