Developing the Relic Series

Exploring the Effects of Remediating Naively Generated Narrative

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ABSTRACT

This paper describes the ongoing development of the *Relic* series – a series of games aimed at exploring the integration of procedurally generated content in games. The series currently consists of two games, both dungeon crawlers. The first game is text-based and focuses on a minimal experience, whereas the second game is a 2D Zelda-like game aimed at providing slightly more context while still maintaining a minimalist aesthetic. These games are currently under development and will transition to testing over the next year. In this paper, we will describe the design of this series, provide the research motivations for why they are designed the way they are, and describe our future testing plans as well as our planned future prototypes.

CCS CONCEPTS

• **Applied computing** → **Computer games**; • **Human-centered computing** → **User models**.

KEYWORDS

Naive generation, procedural content generation, narrative, game design, game development

1 INTRODUCTION

Over the last decade, research into Artificial Intelligence (AI) technologies has experienced a meteoric rise in popularity and we have seen a large amount of papers published regarding how to apply AI within games. Among many branches of games AI, the generation of game content has come to be one of the more fertile fields of inquiry – including the sub-field of narrative generation. We have seen many approaches, for example the narrative experience *Bad News* produced by Samuel et al [10]. We have also seen approaches

based on novel technologies, such as generation using the GPT-3 framework [2].

However, there has so far been a dearth of discussion on how we design and evaluate these AI artifacts from a human-centered perspective, and how that interpretation changes with user situation. Essentially, we as a community focus a lot on *how* we build something, but rarely take the time to clearly articulate *why* we build something – at least beyond the necessities of making our projects fundable and palatable to reviewers. Simply put, although we evaluate AI artifacts within singular contexts, we do not currently evaluate them as part of a larger whole of game design.

To this end, we have initiated a research project aimed at exploring a blank spot in the map of technologically aligned games research: the minimum viable generative experience and how it is interpreted by players. In this case, we are focused on generative narrative and our working hypothesis is that even minimal narratives can be engaging. This assumption is based on a previous paper by Warpefelt [12], and inspired by games such as *RimWorld* [5], *Caves of Qud* [3], *Dwarf Fortress* [1], and the *Crusader Kings* series [7–9]. The research questions we wish to explore within this context is to what extent players interpret minimalist generative narratives as engaging, and how the remediation of such narratives influence that interpretation.

In this paper, we will describe the ongoing development of a series of prototypes created to study how context and mediation influences the interpretation of narrative in games. These prototypes are intended to help us explore the nature of generative narrative and why (and why not) their game design contributes to a novel game experience. The series of prototypes is currently made up of two games: a text-based adventure, and a 2D dungeon crawl – both aimed at exploring how players interpret the same procedurally generated narrative through different forms of game media. Together, they form the initial dyad of what we call *The Relic Series*. I will also describe future directions for the *Relic Series*, including player testing and future games.

2 THE *RELIC* SERIES

In this section we will explain the design fundamentals underlying *The Relic Series* games, what design decisions they share, and how they differ. We will also discuss the underlying scientific concept of why this is something that needs to be tested using prototyping.

The fundamental assumption behind developing the *Relic* series of games is that the same content, presented using different mediation, will be interpreted differently by players. Based on research by Warpefelt [12] there seems to exist a connection between how

things are presented in games, and how they are intepreted by the player. This notion is further supported by research into fields outside of games, for example Hassenzahl's concept of intended versus apparent design [4] as applied to games by Strååt [11], as well as McLuhan's notion that *the medium is the message* [6]. The *Relic* series is intended to test these theories in practice and to provide insight into how this interpretation happens. We will be testing this by providing the player with small narrative snippets and examining to what extent the player "fills in the blanks" between these snippets to complete the narrative. As mentioned in the introduction, previous research by Warpefelt [12] and an existing corpus of games such as *RimWorld* [5], *Caves of Qud* [3], *Dwarf Fortress* [1], and the *Crusader Kings* series [7–9] leads us to believe that this effect can be harnessed to create believable generative narratives from fairly sparse narrative detail by employing the player's own creative process to make them extrapolate from small narrative snippets.

To this end, we have decided to design a series of games that have gameplay features and narrative that are easily translated between modalities, as well as easily remediated into other form. At the core, the *Relic* games is a series of roguelike-likes, meaning that they are similar to roguelikes but with some deviations from the commonly accepted formula as to make it easier for us to vary the modality and mediation of the game. As such, they are about exploring a dungeon and collecting items to unlock a final puzzle. This approach was chosen because it provides simple and intuitive gameplay while still maintaining the ability to integrate generative content – something that is a common component in roguelike games. However, we have deviated from the basic roguelike formula in some aspects. Our current prototypes are single player games that do not have any combat system, which is intended to let us (and players) focus on the exploration aspects of the roguelike genre. As will be discussed later, future prototypes will have combat systems of varying complexity and will add multi player functionality.

2.1 Game concept

The *Relic* series are centered around exploring dungeons, where the dungeon itself is made up of a series of 30 rooms laid out in a two-dimensional grid. The player starts in a lobby room, which contains a puzzle they need to complete in order to exit the dungeon. The clues needed to complete the puzzle can be found in the rooms of the dungeon. The rooms can be small, medium, or large. The medium and large rooms make up the bulk of the dungeon, and provide spaces for the player to traverse. They are intended to act as vehicles for world building and environmental storytelling, and are populated by items and things that provide clues about the nature of the dungeon. There is a total of 20 of these rooms. The game also has 5 large rooms at the edges of the dungeons, each containing a puzzle that will unlock a door leading to a small room (of which there are an additional 5). In each of these small rooms there is an artifact which provides a piece of the fictional alterhistory of a main character, which makes up the core narrative of the game. This alterhistory is presented as narrative snippets, portraying events that happened in the character's life. The player has to collect all of these artifacts and their corresponding narrative snippets to finish a puzzle in the starting room and thus be able to exit the dungeon and finish the game. The puzzle is centered around activating switches in the correct order, as indicated by the chronological ordering of the life events in the alterhistory provided by the narrative snippets found on the artifacts. There are also other items, aimed at adding flavor and thickening the narrative of the world, that do not provide any alterhistory related to the main character. The player will have to interact with each of these items to find which ones provides alterhistorical information and which ones provide world narrative.

The game series uses a generic fantasy aesthetic, and uses English-styled character and place names where a prefix and a suffix is stuck together, forming place names such as *Stainwood* or *Cinder Springs*. Character names are naively generated by randomizing a gender (male or female for simplicity) and then randomizing a male or female parent name. The parent's name is then suffixed with either -son (if the character is male) or -daughter (if the character is female) in the Norse tradition, creating names such as *Viola Gabellasdaughter* or *Bertram Hickson*[1]. A similar approach is used for most content in the *Relic* series, with the exception of room generation (which is still being developed, as described below).

2.2 Procedural content generation

The content in the *Relic* series is created using naive procedural content generation, which essentially means that we use simple generative methods to create in-game content. As mentioned, the game contains three main types of generated artifacts: rooms, characters, and items. The generated content, both narrative (i.e. items and characters) and rooms, is generated offline using a separate generator and then exported as a JSON file. Each game loads and presents the context according to the game's modality. The exact nature of the presentation again varies per prototype, and will be presented in the sections below. Using offline generation lets us maintain consistency in content between different prototypes and lets us hone in on how the mediation of content affects how it is interpreted.

At generation time, we start by creating an empty world, and then simulating the alterhistorical life of the main character as a series of steps. For each step, time is advanced by an number of years and a random event is created. Should an event need another entity, such as another character or a geographical place, these are either generated or stochastically chosen from the existing corpus in the world. Furthermore, we also create a series of world building items which help situate the narrative of the game and give the appearance of a larger world. These draw from the same corpus of people and places as the world historical events, which helps create a connection between the main character and the world. All of this content is naively generated using simple substitution, where names of people or places are inserted into pre-defined strings. This naive approach was intentionally chosen to study the limitations of the simplest possible and most accessible generation techniques. The items (collectible and otherwise) exist to provide alterhistorical narrative information to the player through snippets of narrative. The narrative snippets describing the alterhistory as well as the world building are all generated using simple substitution methods, as described above.

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[1]The corpus for name generation currently contains 70 male names and 65 female names

Once we have established the game world and its alterhistory, represented as a number of items, we generate the dungeon in which these items will be located. The rooms are generated using simple substitution, where each room is given a size (small, medium, or large) and some descriptors to provide flavor (dank, items added, colors)[2]. Room generation is currently recursive, starting with our lobby room which contains the exit puzzle. Rooms are then created and expanded until we have reached the desired number of rooms, essentially forming a graph but in an array. We then add 5 relic rooms as leaf nodes in the graph, positioned at random. Once we have the complete dungeons, we place artifacts in the artifact rooms and other items at random in the dungeon. This completes the data set present in the JSON file. Some things, for example the display of the room, is relegated to the different prototypes.

2.3 Relic

Our first game, called *Relic* is a text-based dungeon crawler similar to Zork. The game is played in a browser, and all content is displayed as light grey text on a black background. The player navigates the space by giving textual commands on where to go (*n* for north, for example) and each room is presented as the player enters. An example of a room is as follows:

> You enter a medium-sized room. The room contains some bookshelves and an old painting with a plaque. There are exits to the east and south.

At this point, the player can go east or south by pressing the corresponding button, or investigate the painting by pressing the interact key. If they investigate the painting and be given the text seen in Figure 1. The player can the continue exploring the dungeon until they have found all the clues and are able to complete the final puzzle.

Relic is intended to be the minimum viable product of a game full of generative content, and serves as a baseline for us to compare against. Since the game does not have any traditional graphics, it provides the least amount of accessory information for the player to take in, and relies heavily on the player using their imagination to visualize the rooms and items found in the dungeon. Room descriptions are intentionally designed to be formulaic and very similar in format as to provide a simple of a gaming experience as possible.

Early and informal testing of *Relic* when it has been demoed seems to indicate that players will "fill in the blanks" between the narrative snippets presented to them by inferring the missing pieces. However, at the time of writing of this paper we have not performed any formal evaluation of *Relic*. Given the promising informal results, we have decided to proceed with additional prototype development to test the how different mediations will affect player interpretation and comprehension. And formal findings from this process will be published in a future paper.

2.4 Relic 2D

Relic 2D is a 2D roguelike-like dungeon exploration game similar to games like Zelda. It uses medieval fantasy aesthetics, a pixel art style, and chiptune music. The intent is to roughly mimic the adventure games of the late 80's and early 90's, but with some modern conveniences in terms of control. An example scene similar to the scenario from the original *Relic* game can be see in Figure 1.

As with the text-based game, the player explores a dungeon to find clues for the final puzzle. The main difference between the original *Relic* and *Relic 2D* is that the latter game incorporates the aforementioned 2D graphics. The idea is to see if this change in mediation between games influences the player's interpretation and comprehension of the narrative. Since *Relic* uses only text to display content to the user, there is comparatively little "medium" to distract from the message. Conversely, *Relic 2D* provides a full-fledged 2D gaming experience with all the mediation associated with such a presentation. That said, we have intentionally chose an visual and aural design that is fairly simple and evocative of the 16bit console gaming era. Our visual assets are designed for a 16x16 pixel tile set, and the music is of a chiptune style. Furthermore, the control scheme is inherently simple with only 8 directional movement, a button to show inventory, and a contextual interaction button. As such, the gameplay is kept simple as to not distract from the narrative experience.

For version 2.0 of *Relic 2D* we intend to add two forms of combat systems. The first one will be a simple system akin to that found in early Zelda games, with just a melee attack and a ranged attack. We also aim to implement a more complex combat system, where the player can integrate various different attacks as well as magic. The intent behind having this stratified gaming experience is to explore if the added cognitive load of having to manage combat of varying complexity will affect the player's interpretation and comprehension of the narrative of the game. The working hypothesis is that the player will comprehend less of the narrative but also be more willing to accept the narrative as the gameplay becomes more complex.

2.5 Future *Relic* games

In addition to the further development of *Relic 2D*, we also intend to develop a board game based on the assets from *Relic 2D*. The underlying idea is to see if the remediation to a board game context further affects the interpretation and comprehension of the narrative. Furthermore, we aim to make this board game playable in both single player and multi player modes, which will add an additional social layer to the interpretation of the narrative. The exact details of this prototype are still being developed, as is the testing methodology. Provided that the multi player approach for the board game is successful, we may also implement this as a feature of the *Relic 2D* game, but given the relative complexity of that implementation we have so far decided to focus development resources elsewhere.

3 GAME TESTING APPROACH

Testing is currently planned for the two initial games in the *Relic* series, i.e. *Relic* and the non-combat version of *Relic 2D*. We aim to set up a comparative and between-subjects study where users play either game. This study will be done with the aim of eliciting the interpretation and comprehension of the in-game narrative as it is presented and mediated by the two prototypes. The study will
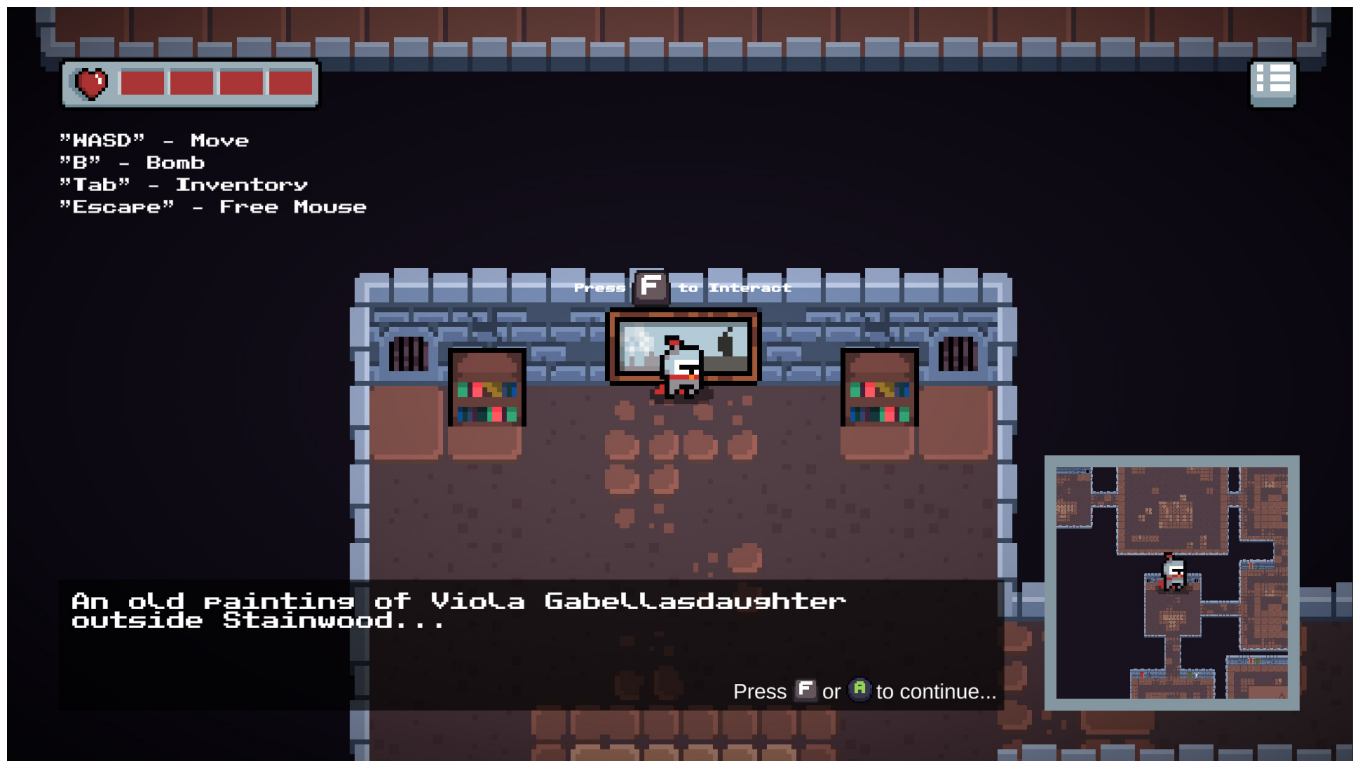
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[2]It should, however, be noted that room generation currently has not been implemented for Relic 2D due to time constraints, and that the map used in that game is static. We aim to implement room generation in the near future.

Figure 1: An example scene from the 2D prototype, where the player examines a painting found in the dungeon

consist of three phases, where all three will use different methodologies. All three phases will also feature instrumented prototypes, which lets us collect data on how long players take to complete tasks, how many times they have to try to solve the final puzzle, and similar data. These quantitative data will be used to identify the impact of user performance on interpretation, should any such differences exist.

Phase one will be a qualitative study where we run respondents through play tests on-site in our lab and perform semi-structured interviews. The data from the interviews will be analyzed using inductive thematic analysis to elicit their interpretation of the narrative, as well as their level of comprehension of the narrative. This approach will let us identify the categories by which we can evaluate this understanding, and how player express themselves regarding the prototypes. Combined with the qualitative data from the instrumentation of the playtests, this will provide us with a holistic view of how player interpretation correlates with performance. We expect this phase to have 10-20 respondents per game, for a total of 20-40 respondents for the phase.

For phase 2 we will use the findings elicited in phase one to construct a questionnaire to be used in conjunction with semi-structured interviews. This phase is intended to verify and refine the questionnaire developed based on the findings from phase one. We expect this phase to have a further 10-20 respondents per game, again for a total of 20-40 respondents for the phase. We hope to be able to perform this testing outside of our lab in order to recruit a broader demographic of respondents.

For phase 3 we will develop the final version of the questionnaire, based on findings from phase two. In this phase of the study we will recruit respondents broadly for an on-line study, where we will ask respondents to play either of the prototypes and answer the aforementioned questionnaire, all done remotely. The two previous phases of the study will have provided us with the in-depth theoretical framework needed for the study, and this will be used to interpret player feedback in phase 3, and allow us to compare how well our experimental results from a controlled environment holds up against the uncontrolled environments created by doing on-line testing. The approach for phase 3 also most closely mimics the context in which a released games would be played, and as such will provide critical insight into how the interpretation of generative artifacts can differ between the controlled lab environment and the "real world" where games are actually played. The exact design of the questionnaire and other study materials is for self-evident reasons not yet established, and as such it is difficult to describe the analysis method that will be used.

The testing methodology for the envision board game along with the future developments of *Relic 2D* will be informed by the success rate of the methodology described above. For self-evident reasons, online testing of the board game will be difficult at best. Instead, we hope to be able to utilize in-person gaming spaces such as conventions and gaming clubs to reach respondents. Testing for the future versions of *Relic 2D* is likely to follow phase 3 of the above described methodology, provided that it is successful.

4 CONCLUSION AND LESSONS LEARNED

In this paper, we have described the two current games in the *Relic* series, as well as the current future direction for the series. The paper is written not as a post-mortem, but as a description of a currently ongoing research project. So far, we have spent the vast majority of our time developing the prototype itself, and as such there are fairly few scientific findings for us to describe at this point. That said, preliminary testing of the *Relic* prototype does indicate that respondents do act in a way that is congruent with by previous research (for example Warpefelt [12] and Hassenzahl [4]). If this holds up in actual, scientific, testing is yet to be seen.

The development of this by and large been done by undergraduate researchers working within the Novel Game Design lab. As with any software project, development has taken longer than expected. This is not indicative of poor performance on part of the students working in the lab, but simply a reflection on the inherent difficulty of planning *any* software project – and games are no exception. Having access to project planning tools such as Microsoft Planner and version control systems such as Unity's Plastic SCM has been invaluable, and are strongly recommended for any kind of game development project within academia. Furthermore, having access to a lab space where we are able to set up work stations has been a strong point, since we were not reliant on students working on their own computers. Games students are also very skilled in thinking about game design, and over the past year we have found that although software engineering skills are important, the ability to think about the design and presentation of the game are often much more important skills in producing a nicer product. As such, it is strongly recommended to recruit students from a multitude of disciplines, since a trans-disciplinary team will be able to produce a more elegant and holistic design.

Unfortunately, the realities of working on this project during the coronavirus pandemic has created some difficulty in terms of building team cohesion. The lab formed during the pandemic, and since the students did not previously know each other team building was difficult due to the remote nature of the work, at least initially. Once we were able to access our lab space, we saw a significant increase in student collaboration, and coordination between the different parts of the project became easier. Although there were outstanding factors in this case, we would strongly recommend starting team building early – even when working with students. Building the social network within the lab has created a team spirit, which was somewhat lacking before. There will always be the temptation of running a lab fully remotely, but that will be detrimental to onboarding effects of new members – or as in this case the coalescence of a new team. Being able to hire a part-time lab manager as well as returning to the office was very beneficial to team coherence.

Finally, being able to utilize university resources such as physical space and bulk software licensing was a large boon for us, and we have been able to run a fairly lean organization. Although the initial outlay for computers was expensive, we were still able to start up the lab with a fairly modest budget. As such, these labs may be able to run on even with fairly small seed grants – or even funds provided by the university, should those be available). This is of course very much dependent on the local context and resources, but the main message here is that you do not need several hundred thousand dollars in funding to do prototype-driven game development in an academic context.

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