Archaeological Game Design

Video Game Archaeology as Interpretive Play and Play Preservation

by

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In all papers in which I was the first author above, I designed and led the research projects, conducted the literature reviews, analysed and wrote up the results.

Abstract

Video game archaeology is a relatively new field. This can involve studying players through the traces they leave in digital game worlds, though only limited work of this kind exists. Furthermore, the potential of these methods to record ephemeral play experiences for preservation purposes has not been widely explored. The first part of the thesis establishes the background literature on games archaeology and play preservation. The second part reports on the development of novel archaeological methodologies for preserving play. This includes three case studies; a go-along study in the massively multiplayer online game *Wurm Online*, an archaeological survey in *Elden Ring*, and a collaborative autoethnography in *Elden Ring Shadow of the Erdtree*.

The third part of this thesis reports on the results of a player study investigating how participants interpret environmental storytelling. We report on a study in which participants (N=202) played a game about exploring a procedurally generated ruined village and were then surveyed on their interpretations. We draw on methods and theory from archaeology, a field that specialises in the interpretation of material remains, to support a grounded theory analysis of the survey responses, from which we form the theory of an archaeological gameworld mental model.

Finally, the fourth part of the thesis synthesises these case studies to argue that archaeological game design brings together both the archaeological recording of player traces, as well as player interpretations of a fictional gameworld that should also be preserved. This work contributes both novel methodologies for play preservation and a new theory for how players interpret gameworlds. This work has narrative design applications, and interdisciplinary contributions to game AI, games studies and HCI.

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During my PhD I also worked as a Story Tech for the indie studio Die Gute Fabrik, and I would like to thank Charlene Putney for her mentorship as Story Lead. I also did a placement on collecting complex digital objects at the British Library under the supervision of the Digital Curator, Giulia Carla Rossi, who I would like to thank for our fun adventures recording gameplay footage for the *Digital Storytelling* exhibition.

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And finally, there are two people this thesis is dedicated to: my past and future selves. I have a message for them both:

"I NEED YOU. YOU CAN KEEP ME ON THIS EARTH. BE VIGILANT. I LOVE YOU." [632]

1

Introduction

”Boy-man whose breath is prayer
ready to breath life
into video game cartridge”
-*Tall Grass*, Marlin M. Jenkins [286]

1.1. Overview

This thesis as a whole presents the case for what I call archaeological game design that applies to both research design of archaeological methodologies for studying and recording gameplay, but also designing for interpretive play experiences that produce paratexts that can be preserved. Thus, there are two major strands to this research; novel archaeological methodologies for play preservation, and an investigation into video game archaeology as a form of interpretive play.

1.2. A case for interdisciplinary research on video games

1.2.1. Video game ontologies

In order to adequately preserve video games and their attendant gameplay experiences, we need to understand what video games are. The ontological question of “what is a video game?” is vast and has been debated for decades; Stenros [543] has analysed over 60 definitions of what a game is dating from the 1930s and onwards. With that in mind, we will trace some broad themes with regards to the ontology of *video games* here in order to demonstrate the diversity of perspectives on the matter, before reflecting on why this complexity requires interdisciplinary study.

Declos [142] traces four main strands of video game ontology; rule-based ontologies [344], algorithmic ontologies [397], code ontologies [141] and contextualist ontologies [485]. He questions what are the ”persistent conditions of video games,” for example, what makes *Elden Ring* [196] the same game even when its playthroughs can be so variable. Declos, like Rough [492], is left unsatisfied with these existing ontologies, finding them either too reductive or vague. That being said, we can identify common themes of needing to accommodate for changing social contexts of play across these ontologies, and play as performance.

Lopes [344] does suggest a rule-based ontology based on the idea of token-types that has been more widely applied to other forms of art such as music and theatre [504], in which the type is the original work, and tokens are the performances. He does recognise that games have history and traditions, and that “strongly interactive computer art invites and indeed prescribes repeat encounters, and interactors expect and are attuned to differences between interaction-instance” [344].

In the case of a contextualist ideology, Ridge [485] understands games in terms of “Games TC” that are individuated according to rules and goals, whereas there can be associated “Games SP” that are defined by social practices, and can evolve over time. In discussing his ontological framework, Ridge uses the example of the historical development and changing rules of the boardgame *Monopoly*. Without

an understanding of the contexts in which this game was played over time, Ridge would not have been able to make his point. Thus, regardless of which ontologies we might agree with or not, preserving video games and the context of their play is of vital importance to better understanding them.

1.2.2. Interdisciplinarity

In his 2003 article *Playing Research: Methodological Approaches to Game Analysis* Espen Aarseth delineates three different types of game research perspectives that roughly correspond with different existing academic epistemologies:

> "• Gameplay: sociological, ethnological,psychological etc.
> • Game-rules: Game Design, business, law, computer science/AI
> • Game-world: Art, aesthetics, history, cultural/media studies, economics" [2].

This typology indicates that game ontologies influence how they are studied, and the split between what is traditionally considered as humanities versus STEM areas of research. Though Aarseth's article is over 20 years old, this demarcation still persists in terms of how the study of games is commonly split between game studies and Human-Computer Interaction (hereafter HCI). In 2014, Carter made the distinction between HCI as being more concerned with the instrumentalisation of games for health and wellbeing, while game studies "instead pays serious attention to games as cultural artifacts and ludic activities worthy of study in their own right" [98]. Ten years later, Zhao et al's [633] bibliometric analysis of HCI research in games traced health and well-being as a major theme of research, as well as learning and education. However, echoing Tyvik and Mekler [583] Zhao et al called for "innovative HCI designs and with theoretical frameworks and cutting-edge interventions from related fields" [633].

There have been multiple calls for action encouraging a critical approach to a truly interdisciplinary study of games, such as Deterding's highlighting of middle range theories and boundary objects [150], and Gekker's suggestion to focus more broadly on play studies that cut across both disciplinary and digital/analogue boundaries. However, any project that aims to engage in such a "unified meaning-making perspective" [218] will face hurdles, not least in terms of legitimacy and the need to justify completely novel methodological approaches. As Malaby and Burke contrast the work of a games anthropologist with one who does more traditional ethnographic study:

> "Rarely will an anthropologist face a completely open-ended question about whether ethnography of any kind should be used or have to reinvent ethnographic study as a largely novel object" [355].

Furthermore, while Mäyrä [366] highlights the incentive to adapt "interdisciplinary" as an academic buzzword for funding, in practise such work is not necessarily rewarded by traditional academic career pathways. With all this being said, there is wide acknowledgement [218, 150] that digital games cannot be fully understood as either abstract structures or play practises, but the study of video games has to engage with "what happens at the intersection of practise, meaning and community within these persistent, complex and open-ended domains for action?" [355]

1.3. The future of video game archaeology

1.3.1. What is archaeology?

Archaeology, very broadly, is the study of the human past through material remains. To give a literal textbook definition, Gamble states:

> "Archaeology is the study of the past through materials and material remains. It is about three things: objects, landscapes and what we make of them" [205].

While the origins of archaeology as a discipline are often traced back to renaissance collectors of antiquities, we have archaeological evidence of an interest in the past from prehistory. To give just one very specific example, signet rings and stone seals from Bronze Age (prehistoric) Crete have been found in later Mycenaean (mainland Greece) contexts [43]. As Trigger puts it: "All human groups appear to be interested in their own past" [580]. Trigger has argued that archaeological thought and practise is influenced by the historical context in which it occurs:

> "For almost 200 years, into the 1960s, classical archaeologists continued to ask essentially

> the same questions and to collect the same sorts of data. They searched for ancient texts and works of fine art in the contexts of sanctuaries, other public buildings, and elaborate houses, and sought to recover urban plans with a primary focus on civic centers, but they generally ignored evidence relating to subsistence, overall settlement patterns, rural life, technological processes, or trade" [580].

The development of archaeology into a scientific discipline in the 19th century is intertwined with colonialism; the British Empire plundered antiquities from the territories it conquered, and then used these same antiquities to justify institutionalised typologies of evolution and indigenous inferiority [409]. In the present day, the field is still reckoning with these origins, and has an uneasy relationship with the popular culture image of the archaeologist as a rugged adventurer [271]. However, many archaeologists are working to write different narratives, of the past, the profession, and of possible futures:

> "Archaeologists thus have a role to play in interpreting the past according to the kinds of futures we might want for humanity—and nonhumans—rather than defaulting to an endless capitalist and colonial dystopia based on an unimaginative, reductive, and inappropriate interpretation of the past" [271].

Archaeologists do not discover the past, they encounter material remains in the present and produce interpretations, and these interpretations are always influenced by the socio-historical context in which they are made. Furthermore, Shanks argues that what he calls the "archaeological imagination" [519] is shared beyond domain specialists and applies to speculative media that engages with similar questions about an imagined past:

> "the archaeological imagination connects poems about bog bodies by Seamus Heaney with Piranesi's fantastical ruins, National Geographics archaeological tourism with HBO's Game of Thrones or Tolkein's Middle Earth, M.R. James's tales of ghosts and the uncanny" [520]

Shanks wrote this piece in 2020, a follow up to his 2012 book *The Archaeological Imagination*. His arguments in both are compelling, but neither mention a particular medium: video games.

1.3.2. The state of play

The term "archaeogaming" was coined in 2013 [480], however archaeologists have been experimenting with games technology for decades prior to this [79, 619, 183, 394]. The field of archaeogaming gained traction in the 2010s, however the opaqueness of the term and what it meant to be at "the intersection of archaeology and video games" [479] has led to some insecurity about its future. Indeed, as an umbrella term it broadly encapsulates ethics and reception studies [248, 146], developing archaeological games [126, 359], retrogaming and reverse-engineering of code [27, 26] as well as field studies [479, 253]. Thus, even if archaeogaming itself might seem to be a niche field, it has huge potential in engaging specialists in real-world material culture in the design and development of digital games.

This last subcategory has perhaps been the most controversial. Reinhard, who coined the term "archaeogaming," has been one of the proponents for applying archaeological methodologies to video games, for example recording user-generated content in *No Man's Sky* [476]. However, the most influential work in the field of archaeogaming is no doubt the book *Archaeogaming* [474] by Reinhard, and this has drawn criticism from Politopoulos and Mol as "It rests in the suggestion that we can and should use existing archaeological theory and methods to study games because game artefacts and spaces are homologous to archaeology" [458]. Furthermore, they go on to argue that field studies in video games have "not yet produced a clear argument" [458] for their value. This thesis, through the development of novel archaeological methodologies for studying video games, aims to simultaneously build an alternative approach to archaeological field studies in video games while also answering Mol and Politopoulos' alarm at archaeogaming in crisis; archaeological methodologies need to be thoughtfully adapted to the affordances of digital games, for the purpose of play preservation.

1.4. Preserving play in the present

1.4.1. Why preserve play?

A 2023 study conducted by the Video Game History Foundation found that "Only 13 percent of classic video games published in the United States are currently in release. This figure is comparable to the

commercial availability of pre-World War II audio recordings" [505]. *Stop Killing Games* is a consumer movement campaigning for maintained access to video games, especially those that depend on online servers and are often suddenly shut down [515]. In 2025, the Stop Destroying Videogames European Citizens Initiative reached over 1 million signatures [585]. There is both a general imperative and public support for maintained access to video games. Much of the discussion around games preservation does indeed often circle around maintaining access to hardware and software, however there is also a need to consider how we preserve play experiences [413]. Play is a notoriously difficult concept to pin down, sometimes being defined as being spatially distinct and separate from everyday life [275], as discourse [554], as performance [276] or affect [578]. Indeed, Austin Walker has made the argument that *The History of Games Could Be a History of What Play Felt Like*:

> "we need to prioritize the archiving of contemporary, phenomenological, and anthropological records of play… material, and memory, anecdotal accounts of play (recorded contemporaneously with the initial moments of play) bear the added pressures of being not only ephemera, but ephemera of an experience that is culturally coded to be disposable distraction" [601].

We need contemporary records of play so that future researchers can understand their original context. More than that, if we don't record actual play experiences, then we run the risk of flattening video game culture, only accounting for a Platonic "implied player" [2]. It is not just scientifically more rigorous to account for specific lived experiences[118], it's just more interesting.

There are a range of existing play preservation methodologies, whether that be video capture [349], studying paratexts such as photographs of play experiences [560] or anthropological accounts [287]. However, just as Swalwell encourages video game preservationists to "think like archaeologists" [559], I would argue that archaeological methodologies can provide a holistic approach to play preservation that incorporates aspects of all of the above, and more.

1.4.2. Archaeological methodologies for play preservation

Though archaeology is often associated with the deep past, techniques for conducting archaeologies of the contemporary world have been developing for decades [183]. Video game archaeology can be understood as a form of contemporary archaeology [26], and I would argue that work such as surveys of material culture on the International Space Station [604] share affinities with archaeological field work conducted in digital space in that both have to translate existing methodologies to render them appropriate to new ontological contexts. While archaeology is traditionally associated with excavation, it employs a range of different field methodologies including fieldwalking. Contemporary archaeology, which focuses on the contemporary material world, has been described as "archaeology-as-surface-survey" [260], an approach which is applicable to archaeological fieldwork in video game designed landscapes.

To be more specific, archaeological field methodologies often use a combination of different media forms to record archaeological deposits and artefacts. This includes scale plans, photography, field diaries, standardised forms (referred to as context sheets) [343] photogrammetry and videography. As mentioned above, some of these techniques overlap with existing methodologies for play preservation, however archaeology is notable for using a combination of techniques to capture the context of material culture in situ as part of a philosophy of "preservation by record" [483]. That is, a record is made of archaeological deposits and artefacts using a combination of recording techniques that can be cross-referenced later, a bricolage that can never replace the original archaeological record but can be referenced and would allow future researchers to reconstruct the original sequence that was uncovered.

Morgan encourages us to embrace a feminist cyborg archaeology that is attentive to our relationship with digital tools [389], citing Lucas who has remarked on how intertwined archaeologists are with their recording tools "never just a person but always a person with or as part of a larger assemblage of other things—measuring tapes, pencils, cameras, trowels, and so on" [350]. This engagement with not just the object of study, but the tools that are used to study it is relevant to games studies work such as T.L. Taylor's concept of the "assemblage of play" [567] that accounts not just for what is on screen when playing a video game, but the assemblage of human player, hardware, software and the physical

context in which they are playing. Furthermore, archaeological fieldwork in video games, as a result of applying archaeological recording methods, creates paratexts.

As mentioned above, curating player paratexts is one established approach to preserving play. Paratexts broadly speaking are any additional material that relates to an original work, and we can understand that archaeological methodologies don't just study paratexts, but actively create them using a combination of media forms. This is the key contribution to play preservation that will be developed through this thesis.

1.5. Archaeological game design

1.5.1. Environmental storytelling and interpretive play

The term environmental storytelling was coined by Don Carsen [96], and refers to the technique of arranging content in games to tell a story, rather than doing so in prose form. Game studies scholars have already drawn comparisons between environmental storytelling and what they call "archaeological storytelling" [340], referring to the use of material culture in video games to tell a story. Indeed, archaeologists [58] have also commented on players taking on an "archaeological mindset" when interpreting environmental storytelling as well. A key argument of this thesis is that we should consider archaeological games beyond representation and engage with examples that are mechanically archaeological, inviting players to interpret and record their environment.

This line of argument has wider resonance beyond archaeogaming, though. Both fields of game studies and HCI have contended with the concept of "interpretive difficulty" in games [282, 115], including ambiguous environmental storytelling. From a design and development perspective, there is an emerging game genre of narrative deduction games, sometimes referred to as "metroidbrainias" [358] in which environmental storytelling and interpretive difficulty play a key role. Furthermore, many of these games encourage note-taking, the creation of interpretive paratexts not dissimilar from the methods that video game archaeologists use.

Though there have been several studies in which players are tested on their comprehension of a prewritten narrative through environmental storytelling [61, 54], there has not been extensive empirical studies on how players form interpretations based on environmental storytelling. Archaeology, as a field that specialises in the interpretation of material remains, can provide theoretical scaffolding to such a study, as will be explored in this thesis.

1.5.2. Designing for video game archaeologists

Both archaeological interpretation and interpretive play involve engaging with ambiguity. In HCI, ambiguity has been described as a "design material" [215] that leaves room for interpretation, while in game studies Jagoda [282] has described interpretive difficulty as a kind of tactical deployment of ambiguity or incomplete information. In parallel, Gero [220] and Sørensen [534] have pointed out that archaeologists are constantly contending with ambiguity in the archaeological record in terms of fragmentary evidence. I would argue that both video game archaeologists, and non-domain specialist players, engage in interpretive play that produces paratexts. In the case of video game archaeologists, those paratexts are usually a more formal record, but in both cases domain and non-domain experts may use a range of techniques to help scaffold their interpretations, and this in of itself is also a record of play.

Considering the paratexts that video game archaeologists produce themselves as a record of play is also an opportunity to think reflexively about the embodied experience of the researcher from a metaresearch point of view [433]. Thus, designing for video game archaeologists is both a question of research design for domain specialists and game design for non-domain specialists, though the two are not mutually exclusive. This framing also demonstrates how video game archaeology is a form of HCI research that can contribute towards a more holistic play preservation strategy.

1.6. Research Questions

While each individual project has more targeted research questions, the doctoral research project is guided by the following:

- RQ1: How can the adaptation of new recording methodologies, drawing from archaeological practise, supplement existing play preservation strategies?
- RQ2: How can archaeological theory contribute to our understanding of how player interpret environmental storytelling in video games?
- RQ3: How do the records of interpretive play contribute to play preservation?

1.7. Positionality statement

Prior to undertaking this doctoral work in a Computer Scientist department, I studied Classics and Mediterranean Archaeology, specialising in Bronze Age Crete. I then worked in the commercial archaeology sector in London for 7 years, first as a field archaeologist and then as a heritage consultant assessing archaeological significance as part of the planning process. My professional experience informs my interest and focus in archaeological methodologies and how they are applied in different contexts. I have also done work as a games writer and narrative designer; I was a Story Tech at the indie studio Die Gute Fabrik, and I brought experience both working on and playing a range of narrative games to the work. I am a queer and trans researcher, and I am interested in queer game studies more broadly, and I believe this personal lived experience is one reason why queer theory appears at certain points throughout this thesis.

1.8. Ethics

This thesis is made up of four main empirical studies, each with their own ethical considerations that are reported on in the relevant chapters. An overarching point, though, is how my own stance on ethics changed throughout the course of the doctoral research. In the initial archaeological survey of *Elden Ring* (Chapter 7) I stipulated that we would not record any "derogatory" messages, mostly due to my own discomfort. The line in the Code of Conduct reads: "Survey members will not transcribe any messages which they deem to contain derogatory content or have derogatory connotations." In the preceding survey conducted in *Elden Ring: Shadow of the Erdtree* (Chapter 8), I decided to revoke this, as on balance the benefit to the survey was greater than my own discomfort, and this meant that we could more accurately record the full range of messages that we encountered.

1.9. Commitments

1.9.1. Interdisciplinarity

The complexity of video game ontologies are discussed above to make the point that an interdisciplinary approach is required to adequately study and preserve them as a medium. I see this research intersecting with archaeology, game AI, computer science, games studies and HCI. It has been argued that archaeologists are like magpies "cobbling together analytical methods drawn from this field and that field, and bundling the whole mess up into carefully braided narratives," [189], and video game archaeology is no different.

1.9.2. Non-academic sources

This cites a range of "non-academic" sources, including online articles, fan wikis and developer talks. I believe that you can adequately study video games without engaging with games criticism, culture and industry discussions more broadly. Video game paratexts, material associated with a title but not directly part of it, are a key theme in this thesis, therefore it follows that examples of such paratexts that contribute to the background literature and discussion should be engaged with.

1.10. Thesis outline

1.10.1. Background

The background section of the thesis is split into four chapters. The first of these, Chapter 2, provides an overview of the history and major themes of video game archaeology, also known as "archaeogaming." This provides context for how the field emerged, its current state of play and the challenges that it faces, especially in terms of establishing clear methodologies for archaeologically recording video games. Chapter 3 is an overview of background literature on play preservation. It first provides definitions of

the nebulous concept of play, before establishing the distinction between game and play preservation. Finally, this chapter covers existing play preservation methodologies, indicating where archaeological method and theory can contribute to these. Chapter 4 drills down into a more specific type of play, interpretive play. It elaborates on the concepts of interpretive agency and difficulty, as well as the interpretive challenge of environmental storytelling and how this has been linked back to archaeological interpretation and the wider relevance of this to game design. Chapter 5 synthesises the background work to present a critical analysis of where there are gaps in the literature and opportunities to build on existing methodologies, theories and concepts in order to develop new archaeological methodologies for play preservation, and to better understand video game archaeology as a form of interpretive play.

1.10.2. Novel methodologies for interpretive play

Part II presents the first series of empirical studies that I conducted as part of my doctoral research, split into three chapters. Chapter 6 reports on my adaptation of a qualitative research methodology, the go-along interview, to the MMO *Wurm Online*. This involved conducting in-game interviews with participants, exploring the community heritage of a server that has been running with persistent player-created structures for over a decade. The subsequent thematic analysis of these interviews led me to reflect on how video game heritage and archaeology needs to be able to record dynamic experiences, rather than just static sites. This leads on to the second empirical study in Chapter 7. This was an archaeological survey of player traces, in the form of messages and bloodstains left in the in-game landscape, in *Elden Ring.* I used scale plans to record these traces archaeologically, and was able to infer player behaviour through the gear and items they were using, as captured incidentally through bloodstain ghosts. Chapter 8 reports on the collaborative autoethnography of archaeologically recording player messages and bloodstains in the *Elden Ring* DLC, *Shadow of the Erdtree*. This produced a unique dataset of 537 player messages and 61 bloodstains at a key part in the game's lifecycle. Furthermore, it makes the case for the benefits of using videography for recording player traces and the researcher experience of play.

1.10.3. Video Game Archaeology as Interpretive Play

Part III covers a player study (n=202) and the subsequent grounded theory of the archaeological gameworld mental model that I formulated. Chapter 9 details how the theory was formulated from a study in which participants played an abstract game with PCG elements that I co-developed called *Nothing Beside Remains*. Players were asked to interpret what happened to the ruined village in the game, and their survey answers informed a theory of how and on what basis players form interpretations of environmental storytelling. Chapter 10 provides a more in-depth discussion of emergent narratives inspired by an intentionally placed anachronistic object in *Nothing Beside Remains* and an unintentional glitch, applying the micro-theory of archaeological gameworld affordances developed in the previous chapter to these examples.

1.10.4. Archaeological game design for interpretive play and play preservation

The final part of the thesis braids together Part II and Part III to argue for what I call archaeological game design; designing for both video game archaeologists and non-domain specialists in encouraging interpretive play and the production of paratexts that are a form of play preservation. Chapter 11 lays out the methodological, theoretical and design contributions of this thesis, as well as its limitations. Finally, I reflect on potential future work projects that will build on this research.

Part I

Background

2

Archaeogaming

> ”Archaeology and video games share a number of affinities, not least of which is that they are both procedurally generated. Just as games use algorithmic procedures to set up the world and to govern the range of interactions within that world, that is to say, the ways of knowing how the world works, there is a procedural method for field archaeology.”
> *-An Approach to the Ethics of Archaeogaming*, Shawn Graham [236]

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2.1. Introduction

As the portmanteau would suggest, archaeogaming is the archaeological study of video games. Andrew Reinhard, who coined the term in 2013 [480], describes the field as the “intersection of archaeology and video games” [479]. Building on the previous chapter, archaeogaming is an example of an interdisciplinary field which has encountered problems due to its heterogenous nature and a lack of clarity on where its interdisciplinarity lies. More recently, arguments have been made for archaeogaming as a marriage between archaeology and computer science, or archaeology and game studies. This chapter will map out the development of the field over the last decade, demonstrating the need for multidisciplinary approaches appropriate to their complex objects of study. This chapter begins with an overall history of archaeogaming, before charting the background literature according to its main sub-areas; reception studies, archaeological game development, code archaeology and field studies. Finally, I position archaeogaming as a form of contemporary archaeology.

2.2. History of the field

In *Archaeogaming The State of the Field in 2022* Reinhard [475] states that the “very first article comingling archaeology and video games” was written by Quentin Jones in 1997 [295]. However, as early as 1986 the Council of British Archaeology published a report on presenting archaeology to young people, which includes the article *Sandwell Adventure: An Educational Computer Package* [79] that essentially describes an educational computer game in which grid squares are virtually excavated. In addition, Kathleen Wilson’s 1988 thesis [619] *The Palenque Design: Children’s Discovery Learning Experiences in an Interactive Multimedia Environment* details what is arguably a game prototype for teaching children about a Mayan archaeological site.

Other notable pre-2013 work on archaeology and video games includes Wattrall’s 2002 article on video games as public archaeology, in which he erroneously begins the article by mentioning that the game “Adventures in Fugawiland was the first archaeological multimedia to marry screen-based visualization and instructional content” [610]. Bernadette Flynn’s 2005 article *Gameplay as Interpretive Cultural*

Heritage [183] reads as ahead of its time (at least in archaeologists' consideration of the medium), posing that:

> "Rather than focusing only on high-end visualization and archival issues, the use of games methodology coupled with archaeological data can be tailored for different user groups and sets of cultural knowledge."

Continuing the theme of games as an educational and representational tool for archaeologists, Colleen Morgan published *(Re)Building Çatalhöyük: Changing Virtual Reality in Archaeology* [394] in 2009, using the multiplayer virtual world *Second Life* [326] as a sandbox for collaborative reconstruction of an archaeological site. While this work focused on the affordances of 3D environments, Joyce and Tringham wrote in *Feminist Adventures in Hypertext* [299] about the potential for interactive narratives to allow for polyvocal approaches to the past.

Several historiographies have been written about archaeogaming, with fairly divergent perspectives. Politopoulos and Mol rightly point out that the early emergence of the field was characterised by grass-roots blogging in the 2010s [459], for example the blog Gingerygamer by maintained by Meghan Dennis [147], which is sadly no longer available. In particular, Dennis, Tara Copplestone, Shawn Graham, Andrew Reinhard and indeed myself blogged and published on various aspects of archaeogaming in the mid to late 2010s. This point is relevant, as in their overview of the field, Politopoulos and Mol identify a "crisis" in archaeogaming scholarship with these aforementioned blogs becoming stagnant or being taken offline completely [458].[1] In contrast, Reinhard sees the period post-2019 as one in which "we encounter specialization within each of archaeogaming's three main branches." [475]

It is important to note that Reinhard's book *Archaeogaming An Introduction to Archaeology in and of Video Games* [474] was published in 2018 and remains the most-cited authority on the topic, both within and outside of the field. In his survey of archaeogaming, Hanussek [254] identifies two main location-based strands of archaeogaming, one based around the University of York, including Reinhard, Perry and Morgan, and another around the University of Leiden and the VALUE Foundation (Politopoulos and Mol are two founding members of the latter). He criticises the lack of critical engagement with games, as:

> "digital game archaeologies may not succeed in being beneficial to archaeology if archaeological studies of digital games serve the popularity of games more than that of a sustainable archaeology itself" [254].

Politopoulos and Mol suggest one possible solution to the apparent stagnation of archaeogaming is in truly fulfilling its interdisciplinary potential by building bridges with game studies and historical game studies[458].

2.3. Reception studies

Ethics and accuracy

> ...adventure games are tainted by the 'Indiana Jones' quandary. Archaeology is glorified via popular culture, but not for preservation, only for exploration of novelty and the demonisation and destruction of other cultural perspectives [101].

This quote from a 2004 article by Champion succinctly encapsulates some of the main concerns that archaeogaming grapples with in terms of how archaeology, heritage and archaeologists themselves are represented in video games. Hageneuer [248] identifies three main themes that continue to be perpetuated through problematic depictions of archaeologists: imperialism, racism and sexism. Lara Croft, probably the most famous video game archaeologist, is a symbol of female objectification, while also perpetuating the white saviour trope. While Engelbrecht considers more recent depictions of Lara Croft to embody a form of intersectional fourth-wave feminism [168], Winter [623] criticises these games as perpetuating the primacy of colonial over indigenous knowledge. Hagneuer [248] and Draycott [157] both consider the protagonist of *Heaven's Vault* [278], Aliyah Elasra, to be a more positive archaeologist role model in a video game, and praise the depiction of her as a woman of colour from a working class background.

[1] My blog https://florencesmithnicholls.com/ is still online and active.

Concerns over ethical representations of archaeology also extend to looting mechanics that proceduralise an extractivist and imperialist approach to the past [144]. Meghan Dennis has been one of the strongest proponents of taking the ethical implications of archaeological misrepresentations in games seriously. In her doctoral thesis she presents the results of a survey into player perceptions of archaeologists based on their depictions in games, finding that players will be more impressionable if they have no experience of archaeology outside that context [146]. Emery and Reinhard have also reflected on the depiction of archaeology in games and "potentially dangerous misconceptions" that are spread as a result, while also acknowledging the educational potential of the medium [377]. Fitzpatrick [180] has also written extensively on zooarchaeology and video games, while Fothergill and Flick wrote a notable article on the ethics of human-chicken relationships in video games, and how this compares with historical and archaeological sources [186].

A considerable amount of scholarship has been dedicated to the perceived accuracy and realism of how the past is depicted in video games. Manning shows how "historical accuracy" has been used as a means of critiquing historical games that depict women in combat roles, despite there being archaeological evidence to back this up [356]. Nordhagen, the developer of *Where the Water Tastes Like Wine* [153], also points out that "historical accuracy" is being leveraged by conservatives "as an excuse for why games cannot include women, queer people, or people of colour" [425]. He also provides examples of where he deliberately eschewed historical accuracy for better thematic resonance in the game. Tara Copplestone [128] conducted 156 interviews with developers, players and cultural heritage professionals on the concept of accuracy. Her resulting analysis, on reconstructionist, constructionist and deconstructionist approaches to the past, provides a sophisticated understanding of 'accuracy' beyond an idea of immutable, objective truths.

Bowman et al [74] have also conducted an online survey of perceived realism in the *Assassin's Creed* franchise. Perceived realism is not based on historical accuracy, but rather perceptual pervasiveness (audiovisual immersiveness) and character involvement (player's considering an avatar an extension of themselves). Bowman et al admit that the perceived realism model has historically been used to evaluate perceived graphical realism, and the high budget visual fidelity of the *Assassin's Creed* franchise is discussed as one of its core strengths by Politopoulos et al [460].

Virtual tourism and pedagogy

The Assassin's Creed franchise is particularly well-represented in work on representation and the past [99, 456]. Outsized focus on these titles has often been justified in terms of their outsized influence. As Politopoulos et al put it:

> "Increasingly, games such as Assassin's Creed are the main encounters many people, including current and future students, have with the past. This is why it is important to understand that the series problematically presents its players with two faces: one of a virtual heritage tourist, mouth wide open in wonder at the beauty of the past; the other of a time-traveling murderer" [460].

Indeed, there has been scholarship on the potential of the *Assassin's Creed* franchise as a digital tourism experience. Echoing Chapman's work on *Digital Games as History* [107], Michał Mochocki [383] considers games as being able to structure affordances according to heritage environments, such as museums, and he uses *Assassin's Creed Unity* [386] as a case study. As mentioned above, Bowman et al surveyed players of several *Assassin's Creed* games, and found that "increased sense of place had a positive independent association with tourism." [74] Regarding virtual tourism, I have done work on video games as dark tourism, [527] commodified experiences of heritage sites associated with death and suffering, such as a recreation of the Volterra asylum in the indie game *The Town of Light* [341].

There is also a vibrant thread of archaeogaming research into the pedagogical potential of games in the classroom, especially the *Assassin's Creed* titles. In his analysis of student responses to those who completed tasks in *Assassin's Creed Odyssey* [468], Stephan [544] found that of those that chose to do the game assignment rather than a more traditional learning task, 93% already played video games recreationally outside of the class, suggesting that it was not attracting students who were not already engaged in the medium. In *Undergraduate Teaching and Assassin's Creed*, MacLeod [12] reports on the enthusiasm of students for using games as a teaching aid on an Egyptian archaeology course,

but that they were cautious in engaging with the topic for a graded paper due to the need to critically engage with a new medium.

Another game which has inspired creative pedagogy is the sandbox game *Minecraft* [384]. It is an obvious case study due to its popularity, but also the ability to be able to recreate buildings and structures within it. The VALUE foundation organised *RoMeincraft*, in which participants reconstructed a Roman border in the Netherlands within the game [72]. They stress the importance of these workshops as collaborative experiences in which older family members would help young children with their reconstructions. Another example is the *Bryn Celli Ddu Minecraft Experience*; Edwards et al [165] discuss the difficulties of recreating the environs of the Neolithic passage tomb of Bryn Celli Ddu at scale, and the importance of using a game platform that was accessible to children during the COVID-19 pandemic. There have been additional projects that use *Minecraft* to teach students about archaeological stratigraphy [289, 462]. Overall, these studies show that there is great pedagogical potential in using games to teach about the past, but an interdisciplinary approach also needs to be taken in being conscious of the technological barriers and affordances of this software.

Thematic studies

There are numerous examples of archaeogaming-related work that explores the representation of specific periods, for example Classical Greece and Rome [112, 491], or Ancient Egypt [132]. More generally, Boom et al [72] surveyed which games had been tagged as ”historical” on the games retail platform Steam, ad through inter-tag relations identified three main subgroups: strategy, action-adventure games, and first-person action games. All three subgroups are united by violence as a game mechanic. As Boom et al say:

> ”It also provides a challege to all archaeological, heritage and other academic professionals to contribute or create playful experiences themselves that provide a more nuanced perspective on the past” [72].

2.4. Archaeological game development

Serious games and pedagogy

Some archaeologists and heritage practitioners have explicitly aligned their work with ’serious games.’ The term has wider application in HCI and game studies, and was originally coined by Abt [3] in 1970 to refer to games that “have an explicit and carefully thought-out educational purpose and are not intended to be played primarily for amusement.” A general survey of serious games by Laamarti et al made this point about serious games for cultural heritage:

> “Although games for cultural heritage provide some cultural education, they differ from other games for education in that they aim at supporting the preservation of artifacts and their reproduction” [325].

The wider links with serious games and cultural heritage are worth dwelling on as they supersede archaeogaming and continue to thrive outside of its remit. From the archaeology side, Mariotti has written extensively about serious games, especially in terms of their recent academic recognition in Italy and the need ”to understand the ‘new rules’ of video game form” [359], while also stressing that there is an ethical imperative for archaeologists to get involved in games creation [360]. DeCosta and Kinsell have also charted the large range of heritage location-based games and provided design insights [136]. Kingsland [314] explicitly refers to her own work as creating serious games, emphasising how narrative and environment design were core to her work on re-using digital archaeological datasets of the Roman villa del Casale.

Other work discusses the challenges and potential of designing games for pedagogical purposes. Champion [102] reflects on his PhD project in which he evaluated 80 students playing a browser-based recreation of the Mayan city Palenque. He reports that those participants who completed tasks more quickly in the game also scored lower in terms of memory recall when asked about Mayan history, which is a good indication of the brittleness of these kinds of applied game metrics. Hiriart [267] asked primary school children to draw how they imagined Anglo-Saxon life before and after playing a game set in the period, reflecting that a deeper understanding of history can only be accessed through empathising with people in the past. Rubio-Campillo and Mayans aimed to create an educational archaeology

game that makes use of the affordances of the medium beyond traditional text-based didactic content [496]. There are also examples of games and digital applications created by archaeologists that aim to emotionally engage with players. McKinney et al created a multi-component digital kit for young people learning in both formal and informal environments, with an emphasis on the importance of fostering emotional experiences, in that:

> "The evidence suggests that it is through personal, emotional connections that humans are more likely to be primed to acquire knowledge about, protect and promote the archaeological record" [368].

Ottonello has critiqued the relative lack of engagement with emotional responses in archaeogaming and digital archaeology scholarship more broadly, and created a game with the aim of eliciting difficult emotions [435]. This has parallels with the work of Gonzalez-Tenant's work creating a virtual reconstruction of Rosewood, Florida as a dark heritage site [232].

Game making as pedagogy and multi-vocality

There are several examples of archaeogaming projects in which the actual process of game development itself was a pedagogical tool. The VALUE Project has organised numerous workshops teaching scholars and students to make historical games using the open source tool Twine [72]. This builds on particularly influential work by Copplestone on the affordances of the tool that favours non-linear storytelling [125], and as a challenge for scholars and students to engage with their work in a form of non-traditional dissemination [73]. Hageneuer [249] has also written about teaching game development to digital archaeology students and stresses the impact this can have in terms of digital literacy, thus showing how the conversation has shifted to cover the interdisciplinary pedagogical benefits.

Furthermore, archaeologists have reflected on how their own use of particular digital platforms or tools has shifted their own understanding of the archaeological record. Morgan [394] contends that the process of reconstructing the site of Çatalhöyük in *Second Life* [326] has increased her "engagement with the materiality of the objects and how they might have related to each other during their use-lives."

In some cases, archaeologists have used existing tools or mods as part of their development process. Majewski [354] contends that there are four types of cultural heritage games; commercial games, serious games, culture-centric games and mods. Regardless of the limitations of this model, Majewski's point about mods being an accessible entry point to game development is important. This also chimes with Graham's [236] provocations on mods as a form of resistance against hegemonic structures, as we must consider the labour ethics of game development.

Accessible gaming tools and use of archival materials

As mentioned above, scholars such as Copplestone [127] have explored the potential of open source tools, such as Twine, for archaeologists exploring interactive fiction. Sampatakou [506, 507] argues that Twine is especially suitable for archaeologists with limited resources and time to create their own 'DIY' projects. This can be contrasted with the work of Nørtoft et al [428] who suggest that the advent of generative AI large language models makes game development more accessible to archaeologists, though even by their own admission there are numerous ethical issues with this technology in terms of its environmental impact and the reliability of guardrails put in place to safeguard against the generation of racist, sexist or otherwise derogatory content. More broadly, there are increasing examples of games which draw from and reinterpret archaeological archives. This includes the work of Kingsland mentioned above [314], as well as Bedford's cosy game *No Stone Left Unturned* [53], drawing from the archive of Avebury Henge.

Virtual archaeology and simulations

The term virtual archaeology long antecedes archaeogaming and was used as early as 1990 to refer to the use of 3D models to recreate archaeological sites [233, 472]. Cruz [133] also situates archaeogaming within the wider lineage of "cyber-archaeology," that draws from cybernetics but specifically has engaged with virtual and augmented reality in particular. Indeed, as early as 2003 Anderson [6] repurposed the game engine for *Quake III Arena* [531] to create a real-time 3D reconstruction of the house of P. Paquius Proculus in Pompeii. As Shawn Graham says:

> "Archaeologists are natural gamers already: they have been building virtual worlds long before video games emerged" [239].

Graham has done extensive work on agent-based modelling and simulations of the past, which he considers to be a specific sub-set of game which "plays itself" [239]. In *An Enchantment of Digital Archaeology* [238], he poses that agent-based modelling and archaeogaming sit on opposite sides of a spectrum in terms of their approaches to the archaeological imagination and the affordances of digital technology. Though agent-based modelling and archaeological simulations may not necessarily be classed as 'games,' they are all part of a longer history of exploring space, time and agency through digital archaeology.

2.5. Archaeology of digital artefacts

Retrogaming

Another way to approach video games from an archaeological bent is to treat them as digital artefacts. John Aycock published his book *Retrogaming Archaeology* [23] in 2016, which focused on technical, developer and player constraints of games broadly dating from 1973-1993. Aycock is a Computer Scientist who has collaborated with archaeologist Katie Biittner for numerous studies retroengineering pre-90s titles. A good example of their interdisciplinary approach [27] is in their work on the implementation of the 1980 Apple II game *Mystery House* [563], in which they make a critical appraisal of the original code through the archaeological framework of the *chaîne opératoire*, considering the technological choices made by a person creating an object (in this case, a digital game). Aycock and Biitter have been spearheading this work in archaeogaming, with other retroengineering projects including examining how amateur developers used Graphic Adventure Creator (GAC) in the 1980s [28] and code reuse in Atari 2600 games [31]. Aycock has also collaborated with Copplestone [30] on a study of the Atari 2600 game Entombed [569], and with Reinhard [32] on work retroengineering the copy protection of *Jet Set Willy* [466] and game with full-motion video alongside Carl Therrien [33].

Aycock and Biittner contend that oral histories have limitations and that "We need to develop methodology in preparation for the inevitable future where digital artifacts are all that remain of some human activity" [27]. However, they also engage with autoethnographic interviews as part of their investigations. For example, in *Computer Theatre* [63] they interviewed Dona Bailey and Paul Allen Newell, two developers who worked on what could be conceived as an early visual novel prototype, to compliment a study of the original code.

In addition, Ganesh, Aycock and Biittner have worked on a framework for the analysis of Atari 2600 games at scale using AI gameplaying techniques [211]. They directly built on this work in a second paper [29] by demonstrating through two user studies that a testing-related gameplay task involving a set of Atari 2600 games produced the same results but with less time and resources with humans versus AI agents. Aycock and Biittner characterise their multidisciplinary experiments as a form of "experimental archaeogaming," [26] in which they try to reconstruct past techniques in the present in much the same way that experimental archaeology is conducted to better understand how ancient artefacts were produced in the past.

Techniques for recording digital artefacts

There has been some experimental work on recording game software updates using Harrix matrices, which are traditionally used to visualise the relationship between deposits in the archaeological record. Work by Moshenska [398] on recording the file structure of a flash drive found during an excavation at a school in North London, and of a hard drive by Perry and Morgan [452], can be seen as a precursor to Reinhard's later work of adapting a Harris Matrix [473] to document updates to the game *No Man's Sky* [262]. Aycock and Biittner followed his example, but instead for an older game not subject to live updates, the 1982 Atari 2600 game *Entombed* [410].

2.6. Field studies

Archaeology of player traces

Another strand of archaeogaming research consists of treating video games themselves as archaeological sites in which archaeological theory and methods can be applied. Indeed, Reinhard has advocated

for what he calls “practical archaeogaming,” arguing:

> ”At the core of my research is the fundamental argument that human-occupied digital spaces can be studied archaeologically with existing and modified theory, tools, and methods to reveal that human occupation and use of synthetic worlds is similar to how people behave in the natural world” [479].

Reinhard’s archaeological survey of the Galactic Hub Community in *No Man’s Sky* is perhaps the best known example of this work [476]. He recorded messages left behind by a community that was effected by a software update, using photography, videography, plans and field diaries. Initially, Reinhard was focusing on the procedurally generated landscape of the game and considered that there was “nothing one could traditionally call ‘archaeological’”[474] in the game. It was once he pivoted to studying user-generated content that he was able to engage with the artefacts of play activity. Discussions of archaeological fieldwork in games have also focused on specific recording methodologies, especially mapping methodologies. Analogue archaeology has standardised methods for recording archaeological remains that cannot be easily translated to digital space, such as drawing scale plans. Reinhard and Zaia have published on using GIS and photogrammetry to record human-occupied game environments, stressing the importance of this methodology given the rapid pace at which those environments change [481]. This arguably represents a shift in thinking from Reinhard’s earlier statement that people behave similarly in analogue and digital worlds, also reflecting Morgan’s thoughts that skeuomorphic emulation of analogue archaeological methods in a digital context “may inhibit truly transformative uses of these technologies” [390]. I have examined different ways archaeogaming scholars use maps in their work and their colonial history in archaeology [421], including my own exploratory work [418] mapping player corpses in *NieR:Automata* [210]. Mol conducted early archaeogaming work [385] mapping sociomaterial networks of items in several games. Overall, there are very limited examples of this kind of archaeological fieldwork being done in video games.

Archaeology of fictional worlds

Despite Reinhard’s pivot to focusing more on applying archaeological methodologies to games in order to record traces of player activity, the legacy of his work outside of digital archaeology has been on work recording the fictional landscapes in games themselves. Manuel Darío Palacio Muñoz suggests that both archaeogaming, and the concept of geofiction from geography, can be instructive for a deeper understanding of how players experience space in games [438], however this is manifested in his article as a speculative meditation on a Byzantine ship in *Rise of the Tomb Raider* [162]. Similarly, Calleo, inspired by Reinhard’s work, has used photogrammetry to record an in-game building [87] in *Shadow of the Colossus* [284]. Somewhat relatedly, Van Alst and Cory [589] took an archaeological approach to the fictional world of *Zelda Breath of the Wild* [172], focusing on themes of landscape, indigeneity, and lost civilizations.

Ethnoarchaeological studies

There are a few examples of archaeologists using ethnographic methods in their studies. A notable hybrid approach is Hansen’s work [253] on the abandoned MMO *Star Wars Galaxies*[170], in which he uses a multi-modal approach of archaeological site mapping and anthropological semi-structured interviews. Graham’s autoethnography of a *Minecraft* playthrough is also notable for being self-reflexive, in which he poses that in order to be ethical digital archaeologists we must challenge the perceived norms of intended gameplay [236]. Lammes and Smales’ [329] collaborative autoethography of postcolonial play is another example of how the first-person perspective of the researcher can be incorporated into the archaeological study of play.

2.7. Archaeogaming as contemporary archaeology

Video game archaeology can be conceived as a form of contemporary archaeology [26]. What is considered “contemporary,” as González-Ruibal writes in *Archaeology of the Contemporary Era* [231], is not without debate, but broadly speaking we can follow Schofield’s [514] definition of the contemporary past being that which is within our living memory, while also taking into account “the collective memory in which we have been socialised” [231]. Thus, it seems sensible that all games culture of the 19th and 20th centuries is relevant.

Framing video game archaeology as contemporary archaeology is especially useful when demonstrating the applicability of archaeological methodologies to this medium. Firstly, it challenges the idea that archaeology is only concerned with the material culture of older periods. González-Ruibal cites the work of Bruneau and Balut, who in 1982 proposed that archaeology not limit itself by time periods, and instead its focus has to be the study of "all the creations of human labour" [80]. This definition, of course, can include video games.

Secondly, contemporary archaeology has long challenged the idea that archaeological knowledge production can only be facilitated through the traditional excavation methodology. As Harrison argues:

> "The simultaneous push– pull of and with the past is a symptom of archaeology's investment in the modernist trope of archaeology-as-excavation, and the modernist metaphor of excavation-as-investigation, alongside its construction as a discipline which is concerned with the abandoned, the disused and the dead. I suggest that it is only by moving away from the trope of archaeology-as-excavation and towards an alternative metaphor of archaeology-as-surface-survey and as a process of assembling/reassembling that we will be able to move forward in developing a viable archaeology in and of the present" [260].

Aycock and Biittner [26], as well as Reinhard [482], have considered archaeogaming as a form of contemporary archaeology. I would argue that this framing strengthens the arguement for adapting archaeological methodologies for video games by looking beyond "archaeology-as-excavation," while also providing an answer to Politopoulos and Mol's [458] call for archaeogaming to engage more in contemporary political issues. Furthermore, games studies work on the ludological semiotics of playful traces by Sihvonen and Suominen [524] essentially constitutes such a form of surface survey in which the traces of play are interpreted in a contemporary landscape, which shows there is beginning to be parallel developments across fields.

2.8. Discussion

This chapter has charted the history of archaeogaming and typologised it according to reception studies, archaeological game development, code archaeology and field studies. There are some limitations to this typology, not least that some of my work does not confortably fit into it, such as a chapter on *Androgynous Artefacts: The Princess as Heirloom in The Legend of Zelda franchise* [526] which ironically enough is about the limits of gender typologies in games and archaeology. In any case, this review has demonstrated how varied archaeogaming research has been over the last decade, but how it also builds on decades of work prior to "archaeogaming" became a brand in 2013. This chapter has also demonstrated the relative paucity of work exploring how archaeological methodologies can be applied to video games, a gap that this thesis seeks to address.

2.9. Conclusion

This chapter introduces the field of archaeogaming, its history and major research interests, as well as making a case for it as a form of contemporary archaeology. If we understand archaeogaming also to be a form of "playful archaeology" [459], then it arguably can contribute to an understanding of and even a *preservation* of play. The next chapter defines play and lays out different methodologies for preserving it, including archaeological ones.

3

Play preservation

> ”Can we recall with accuracy our first impression of the tiered city of Vivec, its weathered cantons under the shadow of an asteroid held in place by the power of a self-made god? Where is the record of my first, resource-draining trip through the ash storms, or of the terrifying descent into the diseased laboratory of the Corprusarium?”
> -*The History of Games Could Be a History of What Play Felt Like*, Austin Walker [601]

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3.1. Introduction

The last chapter discussed how cultural heritage is represented in video games, as well as how video games themselves can be considered as archaeological sites. Beyond archaeogaming, preservation scholars are also arguing that they constitute cultural heritage [257] [244] that needs to be conserved and archived. However, the complex nature of video games as multimedia artefacts presents significant challenges in terms of their preservation. To date, there has been more focus on preserving games as hardware and software artefacts [166], however beyond preserving access to the “original experience” of a game, it is important to preserve the socio-material context of play. As Swalwell argues “we need to think more like archaeologists than game lovers,” [559] in preserving the contextual materials of play. This chapter presents an overview of existing literature on play, where play preservation sits in the broader landscape of video game preservation, and existing methodologies for preserving these ephemeral experiences.

3.2. What is play?

Overview

In his highly influential 1938 book, *Homo Ludens* [275], Huizinga writes: “play is a function of the living, but is not susceptible of exact definition either logically, biologically, or esthetically.” Almost a century later and games scholars seem to be no closer to providing an unambiguous definition. Huizinga is often associated with the concept of the “magic circle,” which broadly refers to a space for play set aside from the everyday world, though this term was actually popularised by Zimmerman and Salen in their 2003 book on game design, *Rules of Play* [570]. Huizinga saw play as a precursor to culture; “We have to conclude, therefore, that civilization is, in its earliest phases, played” [275]. Play has been

extensively studied in developmental psychology, especially in terms of how it facilitates children's cognitive development [454, 622]. Callois is also a particularly prominent name in the game studies literature. He is generally in agreement with Huizinga that "play is essentially a separate occupation, carefully isolated from the rest of life, and generally is engaged in with precise limits of time and place" [85] He specifically defines play as that which is: not obligatory, temporarily and spatially separate, uncertain, unproductive, governed by rules and make-believe [85]. As will be discussed below, the relationship of many of these qualities with play have been disputed.

Though this thesis is primarily concerned with video game play, it would be limiting not to consider this type of play as somehow exceptional or separate from other forms of play in different media or analogue forms. Indeed, in *Playing is Performing – Video Games as Performance* Huuhka [276] discusses similarities between the act of playing a video game and a theatrical performance through several themes; temporality, things, rules, nonproductivity, space, liveness, audience and agency. Different aspects of play will be thematically presented below.

Play as spatial and temporal context

In a 2006 interview study of both adults and children, Vickerious and Sandberg [595] emphasise the importance of the material culture and environment in which play happens, and that this had changed over time. In their account, they contend that digital media actually impedes play: "There are many things that compete with play: computers, television, video and organised activities children take part in," [595] revealing the frictions between play studies and the study of digital games more generally. Thus, it is important to consider the materiality of video game play beyond just what is happening on the screen itself. In the game studies literature, T.L. Taylor coined the term "assemblage of play" to refer to the network of actors involved when an individual plays a digital game:

> "the flows between system and player, between emergent play and developer revisions, between practices and player produced software modifications, between local (guild) communities and broader (server) cultures, between legal codes, designer intentions, and everyday use practices, between contested forms of play, between expectation and contextualization" [567].

To give a specific example, and to potentially problematise the idea of play as non-obligatory and unproductive, we can consider Woodcock and Johnson's [292] work on affective labour and live streaming games in a particular lived context. Another example of gaming in a specific temporal context are studies of how the COVID-19 pandemic affected peoples' gaming habits, including an interview study [445] of parents and children who played *Animal Crossing: New Horizons* [171], and a HCI study [70] in Italy of player escapism during the pandemic.

Play as state of mind and discourse

Much has been written about play as an attitude and a way of communicating ideas. Sutton-Smith examined the rhetorics surrounding play [554], for example the rhetoric of play as progress, especially in terms of children's development (as mentioned above). Sicart sees play as a "portable tool for being," which involves creating worlds and communities, but is also always personal, "attached to our own sentimental, moral and political memories" [523]. Play can even be solitary, such as the "first person audience" that Huuhka [276] talks about where they conceive that the gameplay can involve a non-human audience. Bogost [69] gives an example of his daughter inventing a game of avoiding cracks while she walked through a mall to illustrate how play can be spontaneous and a way of dealing with the mundanity of the everyday.

Play as constraint

Some scholars have approached play through the constraints that can be imposed on playful activities, especially in terms of rules. Djaouti et al [154] have attempted to understand the nature of gameplay by typologising game rules and concluding that game bricks relate to the goal of the game while "play bricks" are independent from the goal. Also somewhat related is the work of the Digital Ludeme Project that represents games as a series of game-related information (ludemes), reconstructing ancient board games using AI to "To more objectively and transparently use the archaeological evidence to propose rulesets" [131].

Fassone makes the point that "video games are a peculiar category of games that require the use of a computer to be executed and played," [174] where he defines a computer as broadly being any microprocessor-driven machine. He also states that "In video games rules are final and unmodifiable" [174], in a way that they would not be in a physical game. However, if taken at face value, Fassone's statement can easily be contested. Consider the landmark work of Boluk and LeMieux on metagaming, that is, the games we play with and around games [71]. Galloway's work on artist-created game mods that make the original games virtually unplayable is also relevant [204]. Arguably the idea of queer play builds on Galloway's countergaming. A good example of this is the flourishing of scholarship on speedrunning [495] as a form of queer play that often involves glitching through game space in a way that was originally unintended by the developers. Of course, even and especially when players elide the rules of a game it could be said that those same rules are still structuring play to an extent. Berge and Schmaltzer's work on speedrunning as "unmoving play" is a great response to this, complicating the idea that "movement that is not normative or anti-normative, not queer or straight, but rather a movement that fundamentally unmakes and remakes the world" [59].

Play as affect

Perhaps the most incisive critique of the idea that play is inherently fun, and that it is best understood through the lens of white Western civilisation, is Trammel's *Repairing Play: A Black Phenomenology* [578]. Trammel makes the point that by restricting our definition of play to only a pleasurable play activity, we do not see beyond an incredibly privileged lens. He provides more specific examples of the Black phenomenology of play, such as the dangers of playing *Pokémon Go* [417] in public as a Black man. Trammel also argues that we should consider torture to be a form of play:

> "Yet so much of play is torturous: BDSM, memorizing long lists of rules, exhausting one's physical limits, and the tedium of simply playing *Monopoly*" [578].

Related to this point is the concept of "dark play," play that is treacherous, masochistic or subversive. For example, Carter [97] has explored dark play in the context of the MMO *Eve Online* [206], in which stealing and scamming are actually designed for and considered to be a valid form of play (if controversial). Giddings and Kennedy's [313] reflections on their own experiences struggling with a new game made them consider that "At the very least we can argue that 'mastery' is only one pleasure among many, that activity and passivity are not opposites in videogame play but fluctuations in the circuit."

3.3. Games vs play preservation

Overview

The umbrella term "game preservation" refers to a broad set of technological, social, legal and methodological challenges in terms of how we maintain access not just to playable versions of specific titles, but related paratexts and an understanding of the historical contexts in which they have been experienced. McAllister and Ruggill [367] break game preservation down into four categories; software preservation, hardware preservation, experiential preservation, and adjacent (paratextual) preservation. I differ with their typology in that I consider paratexts to be a form of play, or experiential, preservation, and demarcate development documentation and interviews under a separate category. I thus include development documentation in the summary of game preservation below, and return to paratexts when discussing methods for play preservation.

Development documentation and interviews

As early as 1979, there were calls for the preservation of archival documents relating to the development of software [348]. However, like any other aspect of curating interactive media, curating development documentation comes with its own challenges, especially regarding commercial video games. Firstly, accessing this documentation may be fraught in terms of concerns around intellectual property and copyright. Even in a study in which an archivist was embedded within a games studio, they found that many employees were reticent about participating in their research due to fear of breaking non-disclosure agreements [621]. Furthermore, many games studios adhere to the Agile Development methodology which puts emphasis on rapid prototyping and iteration over documentation [621, 336]. This means that there may be limited development documentation to begin with, even if it can be accessed by archivists.

Developer interviews are another option for recording knowledge and experience. Recorded interviews not only provide contextual information about a piece of interactive media, but when commissioned by memory institutions they may also provide meta-contextual information on the archival process itself, such as the developer interviews that were on display in the *Game on! El arte en juego* exhibition in Argentina [436].

Prax et al [465] describe the experience of co-curating an exhibition at the *Suomen Pelimuseo*, a museum dedicated to preserving and exhibiting Finnish games. Reaching out to the developers of the 70 digital games they exhibited, they were able to collect over 300 game design related objects. However, the co-curation process varied considerably with different development teams; while some were very enthusiastic, when trying to collect materials relating to a successful mobile game they found that without established workflows within the company itself, dialogue with them languished.

Software Preservation

There are numerous, compounding technological and legal challenges for the preservation of video game software. One immediate problem is that of "bitrot," the deterioration of the medium code is stored on, or the environment required to run it [274]. There are several possible solutions to this, including migration of data to a ROM (read-only memory file) or the creation of emulation software involving the reverse-engineering of an operating system [161]. However, accessing games through ROMs and emulation software has been considered by the industry as a form of software piracy, even when a game is no longer available to buy [411]. Indeed, in October 2024 the US Copyright Office ruled against granting an exception to the Digital Millenium Copyright Act (DCMA) after three years of work on the case by the Video Game History Foundation and the Software Preservation Network to allow libraries to provide remote access to games that are no longer being sold [609]. Johansson [290] conducted questionnaires and semi-structured interviews with 148 participants with game developers, museums and enthusiasts. In their study, about 60% of game developers had a positive impression on the use of emulation for preservation, though with some caveats around it being done ethically and legally. Waszkiewicz et al identify further concerns when it comes to game software preservation in terms of:

> "the use of proprietary software distribution formats that are tied to specific iterations of hardware through carefully managed regimes of backwards (in)compatibility; through the 'retiring' of online activation servers that allow/deny the operation of gameplay; to the fixation of consumer gaze on the 'next generation' of games" [609].

Online multiplayer games such as MMOs also require the maintenance of a server to be playable, and with 75% of all video games purchased in Europe in 2024 being digital [158], there is also the problem that once a title is taken offline there is no recourse to find older copies in the same way that has been possible with the second-hand market of analogue distribution. Furthermore, video games as software are not static, we also need to consider the challenges of archiving live service games that are continually updated, as well as both official and unofficial mods [609]. In addition, there are cases of localised software development that have not been adequately preserved, as Swalwell [560] has discussed in terms of New Zealand's 1980s development scene.

Hardware Preservation

Kirschenbaum et al have argued that "there is a strong argument for preserving the original hardware and storage media accessioned with a collection, however generic or unremarkable these may appear" [315]. The National Videogame Museum in the United Kingdom has a large range of bespoke video game hardware, such as prototype *Rockband* [258] controllers donated by the developer Harmonix [626]. Woolley et al detail the various conservation efforts that are made to preserve the fragile plastics these artefacts are made from, such as maintaining temperature and humidity [626]. There is also the challenge of maintaining electrical components. Magnetic disks lose polarity over time [274]. While software can be emulated, broken hardware has to be recreated using modern materials [367]. Then there is the physical scale of hardware. The Strong Museum in the United States has a large collection of video game hardware, including an Atari Coin Op collection that was so extensive it took a dedicated person an entire year to catalogue [181].

The National Videogame Museum has working hardware that it never turns on "in an attempt to preserve their original condition" [626]. This stands in contrast to a pinball museum in Krakow, where the owner

takes the view that: “Machines are there to be played, just like paintings are there to be looked at. If the machines couldn’t be used, it would be as if one wasn’t allowed to look at the paintings in an art gallery.” [177]. Rios et al [487] also advocate for a “preservation through use” approach, acknowledging that using physical hardware may cause some wear and tear but that requiring the constant upkeep of these objects may help a preservation community to learn more about them. Finally, with the advent of digital-only game distribution, bespoke video game hardware is not as crucial for accessing games in the 21st century as it once was, as games have moved from goods to a service [257].

Play preservation

As elaborated on above, much of video game preservation is often described in terms of maintaining access to the original hardware and software of the medium [559]. As Newman and Simons state in their white paper on games preservation:

> “Much formal and informal game preservation has proceeded from the stated or unstated assumption that maintaining playability is the de facto objective of game preservation” [413].

Even if an archived video game is playable in a museum, this can lack further context. During the *Game On 2.0* exhibition hosted by The National Museum of Science and Technology in Sweden, qualitative interviews were conducted with museum staff regarding the contextualisation of the playable games available [464]. An interviewee pointed out that although one section of the exhibition was set up like an arcade hall, it lacked the original social and economic context of arcade play [464]. As we will discuss below, play is socially and culturally constituted, and for players “the nature of their experience aligns them more closely with theatre or dance, in which fleeting and transitory actions form the core of their experience” [609]. Then comes the question, “How does one archive an entire experience?” [161]. After all:

> “Play experiences hold significance in historical and social contexts as the embodied play moments amongst self-identified gamers vary heavily depending on factors such as race, social class, gender identity, able-bodiedness, and access” [264].

Thus, as Newman sees it [412], play should not be merely the outcome of video game preservation efforts, but the subject of them.

3.4. Approaches to play preservation

3.4.1. Video capture

One strategy for archiving video game play experiences has been the use of videography, and fan-made gameplay videos have their own rich history. The term “machinima” refers to the practice of making animated films using computer graphics, often through filming gameplay footage, stemming from the 1980s. Lowood considers machinima as potent historical sources, albeit ones that may not capture the emotional and social context of the original gameplay [349]. More recently the “Let’s Play” has been popularised on online platforms such as Twitch and YouTube, in which a player documents a playthrough of a game. Newman et al [414] have produced a taxonomy of video game-related content on YouTube involving direct representation (everyday play, instructional play), indirect representation (exploits, news, reviews, theory), re-representation (challenges, memes, offline events) and platform representation (collaboration, engagement with viewers). However, they only included YouTube channels with over 200,000 subscribers in their corpus, and admit that they have to contend with the algorithmic politics of YouTube as a platform [414]. This observation is echoed by Manning, who studied videos of *Super Mario Maker* [163] uploaded to YouTube as part of his work preserving play experiences of the game:

> “...they are mostly products of hegemonic discourse, not a true reflection of the range of practices performed by the majority of SMM players. Even then, content uploaded to commercial platforms such as YouTube is far more likely to dissipate than persist” [357].

Roinioti and Gluzman advocate for the documentary form as both a creative practise and a research method for studying online gaming communities, especially in terms of “the embodied, affective, and visually performative dimensions of gaming cultures” [490]. Other scholars and archivists have taken to actively recording gameplay footage themselves. Dene Grigar coined the term “traversal method” to

refer to the archival practice of having the author of a piece of interactive fiction narrate a playthrough on the original hardware [399]. Even with several video captures of the same piece, ultimately this method will only provide a limited number of 'readings' [511]. That being said, Moulthrop and Grigar argue that the more recordings are made of a piece of interactive fiction the better, especially as they are likely to be subject to 'Sappho Syndrome' in the future: "all that remains are fragments and references to them by others" [399]. In summary: the more contextual information that is created for interactive fiction, the more likely that at least some of those records will survive or be copied in the future. The Strong National Museum of Play, based in the United States, has a Video Game Play Capture Project [455]. Much like the NEXT, the Strong aims to capture gameplay footage on the original hardware and considers it a way to:

> ensure that even if the original artifacts themselves are no longer functional, their content will be preserved for future generations to study and enjoy" [455].

While the NEXT and Strong arguably have a narrow view for what they understand to be an 'authentic' performance of gameplay for the purposes of archival footage, Glas et al [225] contend that attempting to capture some kind of 'original experience' is to preserve an idealised form of play. At the Netherlands Institute for Sound and Vision they undertook a 'Let's Play' project, inspired by the informal playthrough videos that are often attributed to the term which appear on online streaming platforms such as YouTube and Twitch. They recorded visitors to the Institute playing games on the Commodore 64 console (originally released in 1982). Unlike the NEXT, the participants in these recordings had often not played the games before and their struggles to understand the controls form part of the archival footage [225]. However, the authors still stressed the importance of playing on the original hardware [225], implicitly reiterating the same benchmarks of authenticity that we saw at both the NEXT and the Strong. Overall, staging of video capture with regards to interactive narratives and games more broadly is key; the use of original hardware, who plays and how they commentate on that gameplay are just a few factors to consider. There is a general consensus across institutions though that such footage is invaluable for long-term preservation of gameplay experiences. As Newman and Simons put it:

> For some stakeholders, future access to archival recordings, replays and commentaries on styles of gameplay may be of more value than the continued ability to play those same games" [413].

That being said, it would be remiss to consider gameplay footage as some kind of objective "perfect capture" [349] without its own attendant biases, conventions and technological affordances, though these also contribute to the historical record in their own right.

3.4.2. Paratexts

The term "paratext" was originally introduced in literary studies by Gérard Genette [219] to refer to those elements of a book, such as its cover and illustrations, that provide further context to the experience and interpretation of a core text. Consalvo [119, 120] popularised the term in game studies, and established a wider definition that includes not just those materials officially associated with the game, such as marketing materials, but also reviews and fan-created content. Though Švelch [556] considers the term reductive, we will use it here in its broadest sense. Švelch himself has done extensive work on video game trailers as paratexts [555]. Monica Miller [381, 380] has also produced considerable work on the representation of gender in video game magazines, demonstrating their paratextual contributions to an understanding of play cultures. Indeed, Mukherjee has pointed out that video game paratexts have great potential in revealing and unravelling the colonial narratives that surround the medium [400].

I would also broadly include fan works and fan archives under a wide umbrella of paratexts. Winget [620] contrasts personal collections, such as fan archives of video games and associated paraphernalia, with institutional collections that develop through more formalised procedures. The more informal nature of personal collections does lead to greater flexibility in terms of what and how material is collected. However, to characterise fan collecting as less sophisticated than institutional collecting would be a misrepresentation - especially when fans or 'amateurs' are actually often at the forefront of devising new techniques for digital preservation. This is the argument that Kraus et al [320] make, referencing user-generated content such as game mods and ports. There are several examples of institutions collaborating with fans to enhance their collections. The Video Game Museum in Rome (VIGAMUS)

was able to display formerly buried cartridges of the infamous failed Atari 2600 adaptation of *E.T. the Extra-Terrestrial* [21] thanks to close collaboration with local community members in Alamogordo, New Mexico where they were dumped [484]. The Popular Memory Archive is an online research portal which collected material on 1980s micro-computer games in Australia and New Zealand, while also acting as a repository for the public to upload photos of them playing games from that period [547]. The National Videogame Museum in Sheffield crowd-sourced fan content as part of their Animal Crossing Diaries project, presenting screenshots, video and written material documenting player experiences during the first year of the COVID-19 pandemic [405]. Furthermore, there has been rich recent scholarship from scholars such as Webber [613], Wright [629] and Pennington [449] on paratexts as a form of player history.

3.4.3. Ethnography

Ethnography, broadly speaking, is the deep immersive participant observation of a group of people. Bartle made the case in 2013 that we need to do anthropological studies on contemporary online gaming communities:

> "Unfortunately, anthropological studies can only be undertaken while a virtual world is alive and vibrant; as in real life, it's no use writing an ethnographic study of Pompeii after it has been buried in ash – it has to be done beforehand if it is to capture the essence of the place" [49].

Numerous landmarks ethnographies have been done within MMOs [67] [566] [443] [407], though these are not necessarily framed in terms of their contribution to play preservation. However, Liebeseller and Rivers have pointed out that anthropology has a long history of studying play [338], and Jennings advocates for the autoethnographic method:

> "This is one of autoethnography's most critical functions, and this is a value we must accord it: autoethnographies are, themselves, records of history. They can tell us about the corporeal sensations of learning to play Breakout on an Atari 2600 in the early 1980s. They can relay the terror that came with doing public feminist work before, during, and after GamerGate" [287].

Spors et al [537] have also written about their ethnographic study of visitors to an exhibition at the National Videogame Museum, in which they identified four phases of activity; "prepare", "play", "wind down"and "exit" games, and provided design insights. Thus, video game ethnographies can record both play within a game, and its physical and social context.

3.4.4. Archaeology

"Preserving only the software of a virtual world is like preserving only the buildings of a city. That's better than nothing, but it basically leads only to future archaeology" [49]. So says Bartle in *Archaeology versus Anthropology: What can Truly be Preserved?* This is a simplistic idea of what an archaeology of play can contribute. As we have seen in the previous chapter, there are cases where photogrammetry has been used to preserve a specific structure in a digital landscape [87], and we would consider this to be an archaeology of fictional worlds, rather than player traces. Reinhard's work on preserving the material culture of the Galactic Hub community [476] is an example of the latter, while Hansen's [253] study of *Star Wars Galaxies* demonstrates how use of archaeological and anthropological methodologies are complementary. Indeed, we would follow Liebeseller and Rivers' [338] example in conceiving of these disciplines as being inherently entangled, especially in terms of considering methodologies for play preservation. Bartle's call to preserve play experiences in the present is actually in line with Reinhard's call for a "salvage archaeology" that "must sample from the source and the sites and times of creation and use" [475]. Aycock has also written about the coming "tsunami" of digital artefacts and asks:

> "Will archaeologists in 100 or 200 years lament that the field of today not only failed to engage with these ephemeral artefacts, but that no groundwork was laid to train new generations of archaeologists in how to deal with them?" [24].

There have been numerous calls to engage with an archaeological approach to play preservation outside of archaeogaming itself. Simone Belli & Cristian López Raventós advocate for a "cultural archae-

ology" approach to the study of what they call "playformance and play-world" [55]. In *A New Charter on the Preservation of Digital Game Heritage* Rowe states:

> "4.2.2 Effort should be made to present a reconstructed game within an environmental context that preserves the experience of playing the original game" [493].

He cites the *Seville Charter* as an inspiration for this point, specifically principle 4.5.3: "The environment, landscape or context associated with archaeological remains is as important as the ruin itself" [345]. Furthermore, we can look to Swalwell [559] drawing on Laforet's model of an Archaeological Museum as an inspiration for the future of play preservation:

> "Archaeology proceeds by fragments, assembling objects of different status and in different states which make sense when put together. It knows how to deal with voids, gaps, missing parts, and through a re-contextualization, how to propose a plausible state of what the original situation could be, while maintaining open alternative hypotheses" [327].

3.4.5. Play as research

There are discussions around play as a research methodology that, while not explicitly related to play preservation, are relevant in that by studying play they result in a record of it. In *Playthrough Poetics: Gameplay as Research Method*, Droumeva makes the following statement:

> "Playthrough Poetics articulates the playthrough as a scholarly form of digital (auto)ethnography that can produce unique perspectives and insight into games as cultural artifacts" [159].

Here we can see examples of new methodologies for studying play, such as Droumeva and Scholl's gamespace soundwalking. They distinguish their work from the practise of close reading:

> "Close readings tend to focus on the finite media "text" of the game and research is performed on the game rather than in the game" [160].

Close reading is well-established in literary and media studies as a process by which the researcher "unpacks the meanings embedded or encoded in mediated content" [539]. Chang and Welsh have written about close playing as a pedagogical method [106], with Chang writing seperately that:

> "Knowing how to play a game is not enough. Knowing what the game is about is not enough. And [to] know how the game works, even at the level of code or interface, is not enough. The best close playing (and I think close reading, too) does in fact put into practice a kind of interdisciplinarity that is hard" [104].

In the *Well Read Game* Fullerton and Farber express that their main interest is in the "ephemeral and emotional experiences" of playing games, and that:

> "When we think of a game that is experienced in such a way, we call it "well-read" rather than well-played because we want to emphasise the personal, interpretive nature of the experience and the way in which it relates to our readings of texts of all kinds" [202].

Though we might not agree that "well-played" cannot imply such personal, interpretive experiences, this matter of semantics is not as important as the approach they are espousing, which is also complementary to an archaeology of play.

3.5. Conclusion

This chapter has reviewed various definitions for what 'play' is, demonstrating how multivalent it is. The highly subjective nature of play experiences is precisely what makes them both so difficult and so crucial to capture. Though games preservation discussions often focus on maintaining access to hardware and software, it is also imperative that we preserve play experiences in their cultural and historical context. With this in mind, I have also charted various existing methodologies for preserving play. This includes archaeological approaches, although the potential of archaeological methodologies to preserve play experiences has not been extensively explored. However, there is potential for understanding video game archaeology as both the study of, and the enactment of, a form of interpretive play. In the next chapter, I will focus exclusively on interpretive play, it's relationship with environmental storytelling and *archaeological* interpretation.

4

Interpretive play

”Like any archaeologist, the gamer theorist treats these ruins of the future with obsessive care and attention to their preservation”
-*Gam3r 7H30RY*, McKenzie Wark [606]

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4.1. Introduction

To interpret is to try to explain or understand the meaning of something. Hermeneutics is the study of interpretation. Arjoranta [17] applies hermeneutics to games, distinguishing between real-time hermeneutics that refer to the ongoing process of interpretation in-game, and game hermeneutics is the interpretation of games as cultural objects. In terms of understanding interpretive play, I am primarily interested in the former (though the two are not mutually exclusive). Hermeneutics are also widely discussed in archaeological theory, especially in terms of an interpretive archaeology. As Tilley says:

> "Contexts include both the interpreting archaeologist(s) and the questions asked and entities existing in the archaeological record...Part of the context of material culture is the contemporary event of its understanding" [575].

Interpretations are culturally contingent, subjective and subject to change. In *Interpretation as Play: A Cognitive Psychological Model of Inference and Situation Model Construction* [265] Higgins conceived of the interpretation of narrative in video games as a form of play which is contingent on expectations set by previous experiences, as based on a study of player responses to *Gone Home* [117]. In this chapter we explore interpretation as a form of play, how it is designed for and the potential artefacts of play it produces.

4.2. Aspects of interpretive play

4.2.1. Interpretive agency and eudaimonia

Cole and Gillies define the concept of interpretive fictional agency in games as follows:

> "A game with a significant level of IFA gives the player a minimal narrative framework and

> encourages them to build their own understanding of the fiction, story, and characters. Players are encouraged to conceptually explore the representative and historical elements of the diegesis and construct their own personally nuanced interpretation" [115].

They cite a participant in their study who felt more invested in the game *Gone Home* because were building interpretations of characters through their possessions as discovered in the designed environment. Cole and Gillies frame interpretive fictional agency within the wider study of eudaimonic experiences in video games. In contrast to hedonic experiences, eudaimonic experiences can be broadly defined "as game appreciation connected to self-reflective, meaningful, emotionally moving, and challenging experiences" [230]. While many surveys of the literature on eudaimonia and games [137, 461] do include narrative, Cole and Gillies' work [115] is distinctive for considering player interpretations as part of this.

Other work, specifically in HCI, has focused on designing for player interpretations. Denisova [143] et al interviewed 14 indie game designers regarding their approach to designing games with emotional impact, and "that their design approaches facilitate unique personal experiences and interpretations from their players." Kärnä [309] interviewed 5 narrative designers with AAA experience, leading to the creation of a design tool for interpretive agency, specifically in terms of "designing an avenue for interpretations" through grounding information, unanswered questions, and thematic coherence.

4.2.2. Interpretive difficulty and incompleteness

As well as interpretive agency, there is the complimentary concept of interpretive difficulty. Jagoda's tripartite framework [282] for video game difficulty includes mechanical difficulty, based on performance and skills, affective difficulty as characterised by difficult emotions such as boredom and frustration, and interpretive difficulty. Jagoda claims that, just as a poem can present interpretive difficulties for a reader, so can video games, an approach that Mateo Teerasa Torres also follows [571]. Jagoda borrows Steiner's conception of interpretive difficulty [542] when reading texts, including "tactical difficulties that involve deliberate or stylistic obstructions" [282]. This kind of tactical difficulty is arguably evident in games which have been deliberately designed to be ambiguous and provide incomplete information. Both Vella [594] and Andriano [9] explore deliberate ambiguity in various aspects of the design of *Dark Souls* [190]. Vella describes, for example, ambiguous item descriptions, while Andriano focuses on the use of level design to create a sense of illusory vastness and lack of control. Ambiguity and interpretive difficulty can not just be found at the level of narrative and level design, but also in terms of the game system itself. In *Ambiguity as a Resource for Design*, Gaver et al [215] identify that "ambiguity can make a virtue out of technical limitations by providing the grounds for people's interpretations to supplement them." Furthermore, Vella's piece discusses the "ludic sublime" and:

> "the 'black box' nature of the computer's upholding of the game system precludes the player from direct knowledge of the game system. In practical terms, what this means is that at no point can the player assert with complete certainty that the phenomenal cosmos she has arrived at is a perfect reflection of the game system" [594].

As Tilley puts it when discussing interpretive archaeology: "We only *have* to interpret if we are puzzled or ignorant about something…we interpret only if things are not obvious to us" [575].

4.3. Interpretation of game environments

4.3.1. Environmental storytelling

The coining of the term "environmental storytelling" is generally attributed to Don Carson [96]. It refers to a technique in which objects and other environmental factors, such as lighting, are used to tell a story without relying on the written word. Carson wrote an article in 2000 about applying his experience from designing theme parks to videogames. In relation to the discussion of ambiguity above, he encourages creating points of interest through contrast:

> "If you must create a long expanse of repeating pillars, or some such element, make one unique among the rest. Nudge it out slightly, or knock the thing right over" [96].

He also describes the use of "cause and effect vignettes" that "lead the game player to come to their own conclusions about a previous event" [96]. He provides these examples:

> "doors that have been broken open, traces of a recent explosion, a crashed vehicle, a piano dropped from a great height, charred remains of a fire" [96].

In *Game Design as Narrative Architecture* [285], Henry Jenkins argues that the ludology vs narratology debate[1] is reductive, and that we need to consider the ways in which video games are particularly good at telling spatial stories. In his taxonomy of environmental storytelling, he writes:

> "Environmental storytelling creates the preconditions for an immersive narrative experience in at least one of four ways: spatial stories can evoke pre-existing narrative associations; they can provide a staging ground where narrative events are enacted; they may embed narrative information within their mise-en-scene; or they provide resources for emergent narratives" [285].

Pearce, like Carson, also draws parallels between environmental storytelling in theme parks and video games, and makes the point that this kind of spatial design has a much longer history:

> "Ancient "imagineers" shared some of the same skills as Disney's army of creative technologists: they understood light, space flow, materials and the techniques of illusion" [444].

Fernández-Vara's concept of indexical storytelling [176] refines the original concept of environmental storytelling by understanding it as a "story building" technique, focusing more on how narrative contributes to gameplay, rather than how a game world generates narrative. While much work as focused on the semiotics of indexical storytelling [605, 437, 54], Fernández-Vara takes this approach further by discussing how both designers and players can be indexical storytellers by leaving traces in the world to interpret. She specifically cites player messages and bloodstains in FromSoftware's *Demon Souls* [194] as an example of this:

> "Players can also leave hints and warnings to other players, such as "Beware of the ambush ahead" [176].

She characterises the player not just as a visitor to a space but as an active agent or even a detective who interprets and leaves traces in the game. This idea of the player as detective is taken up by Larsen and Schoenau-Fog [335] who class *Dark Souls* [190] as a non-detective game that nonetheless encourages players to interpret the past through environmental storytelling.

4.3.2. Materiality and ambiguity

In the literature on environmental storytelling, several themes reoccur. Materiality, or evidence of change, use or decay of objects comes up frequently. This can be in terms of how ruins and ruination are depicted in games [199, 347], but also how objects in modern contexts can be shown to age over time, such as in the puzzle game *Unpacking* [52] which tells a narrative about its protagonist through the items she unpacks as she moves to different homes over the course of her life [558]. The theme of ambiguity also comes up in Svensson and Bergman's work on *Unpacking*, for example:

> "As the items in *Unpacking* come without descriptions, there can sometimes be a divide in what an item represents, which also results in different interpretations of the story" [558].

These themes of materiality and ambiguity will also come up in the following section on archaeological interpretation as play.

4.3.3. Designing for environmental storytelling

There has been limited empirical work on players' interpretations of environmental storytelling. In 2012, Bevensee et al [61] published the results of *Project Aporia*, in which they tested player comprehension of a pre-written narrative in a game prototype, as told purely through environmental cues. Of the 20 participants, only 4 understood the pre-written narrative on each level, however:

> "many had great imagination and level of detail when describing the narrative and many formed their own emergent narrative" [61].

[1] To briefly summarise, the ludology vs narratology debate occured in the 2000s in game studies, in which ludologists argued for studying games through their mechanics, while narratologists argued for understanding games as narratives.

Dahl et al [7] conducted a study on conveying environmental narrative in a fast-paced first-person game called *Project Chaser*, focusing on the use of indexical storytelling and semiotics. As was the case with *Project Aporia*, they tested player comprehension of a pre-written narrative. Furthermore, ambiguous objects were identified as a problem to be solved:

> "We had two different implementations of our banners in the game. One of them was whole, the other ripped intending to show it had been vandalized. The latter was intended to serve as an index pointing back to the conflict, however it proved to be ineffective. One possible reason for this is that the ripped flag connoted two different meanings. One, it was vandalized, and the other is that it deteriorated over time, the latter being the conclusion most likely drawn by the players"[7].

In this example, ambiguous materiality did not fit the researchers' design goals. Wang et al [605] created a tool for what they call "interpretation creators" such as YouTubers who post about their interpretations of environmental storytelling in games such as *Elden Ring* [196]. Their tool helps these creators organise and interpret narrative clues:

> "The volume and diversity of narrative clues, ranging from environments to item descriptions, make it difficult to organize them effectively. The sheer number of these clues can be overwhelming. Additionally, its fragmented structure requires substantial effort to interpret the narrative clues holistically" [605].

Overall, much of the empirical studies on interpretations of environmental storytelling have been about testing, or facilitating, players interpreting a fixed or "correct" narrative. This will be contrasted with work on emergent narrative in the subsection below.

4.3.4. Archaeological Storytelling

Several scholars have drawn parallels between the process of archaeological interpretation and player interpretation of environmental storytelling. Livingstone et al [340] introduced the concept of "archaeological storytelling" in their 2016 paper, in which they advocate for the use of material culture in a game world to tell a story. I appreciate the authors' emphasis on going beyond singular stories or a preconceived 'ground truth,' as in archaeology:

> "A single 'correct' story may never be discoverable, instead it may be that a collection of plausible and possible stories may be found" [340].

Tara Copplestone's [126] work on the development of archaeological games as a self-reflexive process allowing for non-linear storytelling and multiple interpretations echoes Livingstone et al's sentiment above. In a 2022 GDC talk [423], I coined the term "generative archaeology games," which pertains to games that encourage their players to archaeologically interpret and record environmental storytelling. Though I have since moved away from that term because to avoid any potential association with generative AI, this core idea still drives the thesis.

4.3.5. Archaeological interpretation as play

Livingstone's emphasis on "archaeological thinking" and interpretation echoes Bennett et al's [58] argument that players can take on an "archaeological mindset" when interpreting objects in *The Last of Us* [408]. Caracciolo [89] has also discussed archaeological interpretation as a game mechanic that encourages indeterminacy through materiality. Furthermore, he argues that community engagement with the interpretation of 'lore' and environmental storytelling in titles such as *Elden Ring* is an example of what he calls "archaeological fandom." Carracciolo explicitly refers to content creators like VaatiVidya [509] who engage in a "computer-mediated equivalent of archaeological care" [89], meticulously interpreting environmental storytelling and object descriptions for their audience (and this also links back to the work on *ClueCart* [605] mentioned earlier). Cyran et al [135] also discuss this kind of community engagement with *Elden Ring's* environmental storytelling, describing the YouTuber Tarnished Archaeologist [13] as interpreting "lore as archaeological stratigraphy." For example, noticing that different layers of activity in the environment that imply change over time, such as newer statues placed to hide older reliefs. This deeper engagement with archaeological theory indicates the potential of archaeological interpretation as a form of play, and also community engagement.

There are increasing calls for archaeologists not just to focus on surface level representations of the past and the profession in video games, but to engage with designing games that indeed centre archaeological practice through game mechanics and environmental storytelling. Murtas and Lombardo [404] surveyed 63 serious games for archaeology, and identified that there is a need to bridge "the gap between archaeological storytelling and archaeological thinking," citing *Outer Wilds* [152] and *Heaven's Vault* [278] as commercial games that demonstrate:

> "design patterns, such as branching narratives, player-driven reconstruction, or interactive hypothesis testing could be used to model archaeological interpretation itself—not just its outcomes" [404].

Though he is more specifically discussing historical games, Gluzman [227] also similarly suggests that "Certain elements of historical practice, such as working with fragmentary evidence or tracing causality, can be adapted to games." Again, these themes of archaeological interpretation as a form of play, space for multiple interpretations, and designed ambiguity continue to reappear in these discussions.

4.3.6. Archival adventuring

Though somewhat adjacent to the concept of archaeological storytelling, Kagan's term "archival adventuring" [302] is nevertheless worth discussing in terms of its emphasis on environmental storytelling and the archive. As Kagen explains:

> "When we conceive of these game worlds as archives, players become researchers and game worlds come into focus as highly organized spaces; the objects and texts one finds within them, no matter how random they seem, can be recognized as careful arrangements" [302]

Kagan discusses archival adventuring in both the video game *What Remains of Edith Finch* [535] and the site specific installation *House of Eternal Return* [624], thereby opening up the discussion of environmental storytelling beyond the video game medium. Furthermore, she cites the work of Pavlounis [442], who criticises the video game *Gone Home* for essentially presenting an archive of objects for the player to explore, but limiting its radical queer potential through the use of conventional design conventions. As Pavlounis explains:

> "The conclusiveness of the ending and the fact that it is triggered by a single specific object suggest that there is a correct, natural end point to the archive and the stories it can tell. All previous objects are relegated to the past and put in service of the present narrative" [442].

Furthermore, Pavlounis moved beyond a discussion of a generic "implied player" [2] to providing examples of specific players rearranging the objects in *Gone Home* to create their own narratives, such as a shrine to a non-player character.

4.4. Emergent narrative

4.4.1. Designing for emergent narrative

The term "emergent narrative" has long been applied to video games, and is commonly attributed to Aylett's 1999 article *Narrative in Virtual Environments - Towards Emergent Narrative* [34] in which she defines it as when an "explicit narrative structure is absent but narrative frequently emerges through interaction," using a football game as an example of there being of an overarching game structure that can lead to emergent play narratives. Discussions of emergent narrative tend to be split into two camps; designing for emergent narrative systems, and studying the emergent narratives that players narrate themselves.

In the former category, there has been extensive work on the design challenges of emergent narrative. Louchart and Aylett [346] have done influential work in this area, concluding that RPGs and improvisational drama provide more relevant frameworks than traditional theories of authored narrative. Ryan, Mateas, and Wardrip-Fruin [499] frame open design challenges for emergent narrative in terms of the interactive experience of the player, stressing that much earlier work focused on the simulations themselves rather than what it is actually like to play with them. One specific problem they highlight is the inability of existing systems to recognise the stories they generate:

> "While humans who play experiences like *Dwarf Fortress* are capable of recognizing which event streams are storylike, the system itself is not" [499].

In his thesis, Ryan [497] introduces curationist emergent narrative, in which he advocates for the ongoing curation of simulation outputs which "recasts story generation as an act of recounting, rather than invention." Ryan's curationist approach, and more specifically the technique of "story sifting" for more interesting story events out of a wider pool of procedurally generated content, has been taken up by other scholars, especially Kreminski [500]. They discuss using *story sifters* as a way to curate content based on heuristics of what constitutes potentially compelling narrative [323]. However, in order to curate for compelling content, one has to understand what makes it interesting in the first place.

One way to sift for interactive narrative content is to use an existing framework from another domain. Lessard and Paré-Chouinard [337], for example, draw on Georges Polti's dramatic situations for playwriting. Qualitative and quantitative methods have also been used to evaluate the output of interactive emergent narratives. A quantified analysis of eighty-one playthroughs was applied to *Bad News*, a simulation and performance art piece, in order to inform a story-sifting interface [508].

4.4.2. Retellings

As mentioned earlier, emergent narrative can also be understood as the narratives that players themselves tell about their own gameplay experiences. Eladhari conceives of game re-tellings as an indicator of emergent narrative quality [167], as players are sufficiently motivated to relay their experiences that they have encountered something interesting, surprising, or at least worth sharing in some way. Kreminski et al [322] have also expanded on this work through a qualitative analysis of retellings of games with AI-based games. As well as studying retellings, they also interviewed retelling creators, which they concluded provided more insight than studying either in isolation.

Gretig et al [240] conducted a study on what inspires retellings of the game *Genshin Impact* [378], conducting eight in-depth interviews. Echoing the points around interpretive difficulty and ambiguity above, they found that players were motivated to engage in the creation of fiction and art when there were gaps in the worldbuilding. Taking a slightly different approach, Synch [562] sees retellings not necessarily as a mark of emergent narrative quality, pointing to what he calls "critical retellings," that are " anecdote-style game retellings that both refer to their own narrative systems reflexively and do so with a critical, ironic edge." Thus, recording retellings is a way of accessing diverse affective responses to play experiences.

4.5. An emerging game genre

Metroidbrainia is a term that has been loosely used to define games in which "knowledge unlocks further exploration." [358]. To date there has been limited academic engagement with metroidbrainias, likely because the term is still highly debated and ambiguous. As perhaps a case in point, Pan and Cheng [439] have discussed *Animal Well* [374] as a metroidvania that is also arguably a metroidbrainia as "the game features layered puzzles, where the breakthrough of each layer is experienced as an epiphany, representing a deeper understanding of the game." The term has been applied to a variety of different titles with differing mechanics, including *Return of the Obra Dinn* [342], *Heaven's Vault* [278], *Outer Wilds* [152] and *Her Story* [376].

Video game writer and designer Bruno Dias has rejected the term on the basis that:

> "At best, most of those are what I'd call 'thinky games' – a broad aggregation of deduction, knowledge, and puzzle games that would include everything from *Zork* to *Myst* to cryptic crosswords to *Ultros*" [151].

A competing name for these kinds of games is developer Tom Francis' term "information game" where the main goal is to acquire information and come up with theories based on the information one has, to in turn be able to acquire more information [187]. There has also been some limited academic work on information games, for example Cook's work on procedurally generated information games, in which they stress that one of the key design challenges for information games is modelling player knowledge [123].

Metroidbrainias and information games are relevant to the discussion on interpretive play because they

are designed for player interpretations, and often make use of environmental storytelling as part of this. Indeed, *Heaven's Vault* and *Outer Wilds* are two games that are often considered to be metroidbrainias and are also included in the literature on archaeological games [89, 404]. Thus, there are wider applications and overlaps.

4.6. Conclusion

This chapter has explored the concept of 'interpretive play' and how it has been understood through the lenses of interpretive agency, eudaimonia and environmental storytelling. The parallels between the interpretation of environmental storytelling and archaeological interpretation of material remains in the analogue world is well-established. However, the potential of archaeological theory to aid our understanding of interpretive play goes beyond this in terms of materiality and ambiguity. Furthermore, we can understand that interpretive play can produce emergent narratives and retellings, and that the theoretical insights from archaeology also have wider relevance to the design of an emerging game genre, metroidbrainias. In the following chapter I will bring together the three strands of archaeogaming, play preservation and interpretive play, setting out the opportunities for developing on existing scholarship.

5

Critical assessment of background literature

”The keeping of records is in itself evidence
of an intention to take down more than human memory can ever preserve.”
-Minoan Archives: A Case for the Preservation of Institutional Memory, Artemis Karnava [310]

5.1. Introduction

In this chapter, the preceding background literature will be synthesised in order to highlight the relative paucity of archaeogaming research in the ”fieldwork” category and the need to expand on existing play preservation methodologies. Furthermore, there are parallels between the archaeology of player traces and the interpretive play that those same players engage in. Another way of approaching play preservation is to design for interpretive play and encourage player recordings of their own subjective experiences.

5.2. Interdisciplinary video game archaeology

In the 2018 book *Archaeogaming* [474], Reinhard does contend that archaeogaming could be seen as intersecting with game studies. However, he then goes on to say that:

> “While game players and gaming culture certainly inform archaeogaming to some extent, they are not the end goal for archaeological research but rather a means to an end, especially when describing an object’s biography, its history of use” [474].

Politopoulos and Mol have critiqued *Archaeogaming*, as well as Chapman’s *Digital Games as History* [107], as being seminal pieces of work that “were written emphatically from within their disciplines looking outward at games” [458]. Archaeogaming has often been described as an interdisciplinary field at “the intersection of video games and archaeology,” [469] however it has not fully lived up to this promise, not least because “video games” is a medium and not an area of academic study. While describing archaeogaming using these terms might seem like a minor semantic point, it does belie the general epistemological limitations of archaeogaming, which has generally not deeply engaged with game studies, computer science or HCI work. There have been some obvious exceptions to this in our literature review of archaeogaming in Chapter 2: Aycock and Biittner have written about that “archaeogaming requires collaboration between computer scientists and archaeologists” [25], and have done work collaborating with developers that has involved reverse engineering, ethnographic interviews and the application of archaeological theory [63]. That being said, and as Politopoulos and Mol state in their critical reflection on archaeogaming over the last decade:

> “the interdisciplinary potential of archaeogaming is not being realized because overarching disciplinary silos and practices have a constraining effect on a potentially much wider sci-

> entific and societal debate around the (re-)creation and experience of the past in games" [458].

As I argued in the Introduction, video games are complex artefacts that require interdisciplinary input to adequately study them. Archaeogaming must engage with the theory and methods of other fields that study games in order to develop new, truly interdisciplinary methodologies for video game archaeology. This approach provides the framing for answering RQ1.

5.3. New methodologies for archaeologies of play

One of the other key critiques that Politopoulos and Mol have of archaeogaming is:

> "the study of video games using archaeological tools and the use of video games as tools for archaeological research have not moved much beyond their conceptual phase, or in cases where they have, they have not yet produced a clear argument for how archaeological tools can consistently and structurally be of added value for the larger scholarly understanding of games" [458].

As demonstrated in Chapter 2, there has been to date very limited examples of archaeological fieldwork being conducted in video games [476, 418, 253]. One major challenge in this kind of work is the need to adapt existing methodologies to suit the affordances of specific games, something that Reinhard has perhaps been more brittle about in terms of insisting that the archaeology of video games is no different than that of the analogue world [458]. However, he has also advocated for archaeologically recording video games as a form of "salvage archaeology" [475] before user-generated content is irreversibly lost, with his work recording the material culture of the Galactic Hub community in *No Man's Sky* being a good example of this.

In the game preservation literature, various scholars have called for an archaeological approach to the fragmentary sources available for studying the medium [559]. This thesis takes up this call with the development of novel archaeological methodologies for play preservation. The first example of this, a series of go-alongs in the MMO *Wurm Online* [529] (Chapter 6) draws on game studies and anthropology in order to adapt a methodology used for walking interviews to better understand the player heritage of a long-running multiplayer game with a persistent world. The second study, an archaeological survey of *Elden Ring* (Chapter 7), was inspired by game studies work on indexical storytelling and contemporary archaeological methodologies in order to develop a new methodology for recording the context of player traces in the game's landscape. The follow-up study to this, a collaborative autoethnography of a survey undertaken at the release of the *Elden Ring Shadow of the Erdtree* [195] release, combines this methodology with a form of ethnography, drawing on HCI metaresearch practises and discourse in order to conduct a personal archaeology of my own experience as a player-researcher. Furthermore, the exploration of play as a research method in Chapter 3, in terms of the self-reflexive qualities of "close reading" video games [202], has also informed the development of an archaeology of play in these studies. These chapters present a proof of concept for adapting archaeological methodologies to play preservation in answer to RQ1.

5.4. Interpretive play and archaeological interpretation

There has been growing work within HCI on interpretive agency in games as part of a eudaimonic experience [143]. Cole et al [115] in particular have pointed out how players experience interpretive agency through trying to understand environmental storytelling in games, though both their article and Possler et al's are less convinced by the eudaimonic potential of emergent narrative:

> "Too much interactivity, in turn, may be detrimental to the narrative induction of eudaimonic experiences as, under this condition, the presentation of a pre-planned, well-timed, eudaimonia-themed narrative is hardly possible … players can presumably narrate their own story in highly interactive games…this requires players to take on the role of creators instead of co-creators" [461].

There is also growing scholarship linking environmental storytelling with archaeological interpretation, [138] [89] [58] [404]. The link between environmental storytelling, archaeological storytelling and emergent storytelling has actually been made by Ryan in his thesis, in which he explicitly cites Livingstone's

concept of archaeological storytelling [138] and Reinhard's *Archaeogaming* [474], stating:

> "I am also interested in the prospect of generative environmental storytelling. As I note at several points later on, this is arguably an unavoidable feature of world generation, especially when artifacts are modeled: the result of such a procedure is a storyworld scattered with indices that encode and suggest the history of that world. What I would personally like to see is exploration of game designs that are specifically built on this idea" [498].

However to date there has been limited empirical work on how and on what basis players form theories based on environmental storytelling. Chapter 9 presents a grounded theory of the archaeological mental models that players form when interpreting environmental storytelling, based on a study of 202 people who played an archaeological game I co-developed called *Nothing Beside Remains* [122]. Chapter 10 then builds on this with more specific examples of participants' emergent narratives. These two chapters thus directly respond to RQ2 and how archaeological theory can help us to understand the process via which players interpret environmental storytelling in games.

5.5. Application of archaeologies of play to play preservation

In Chapter 3, it was established that there has historically been a greater emphasis on preserving video game software and hardware [166, 413], however play experiences are ephemeral, personal and historically constituted. Preserving play experiences is important for understanding video game culture in specific contexts [568, 578]. As Hibbard explains :

> "To preserve only a single play experience is to ignore the multiple variants game narratives are capable of producing and the infinite amount of meaning-making people who play games can engage in, both individually and together" [264].

In addition, in Chapter 4 I also explored how players sharing their experiences through retellings [167] and paratexts [562] has been established as a method of evaluating the quality of interactive fiction or gameplay in general. An archaeological approach to play is particularly powerful because it can incorporate various different recording methodologies, such as photography, videography [475], cartography [253], autoethnography [236]; it produces paratexts as well as referencing them. In particular, the study reported in Chapter 10 identified recording method affordances, of methods like map-making or creative writing that help scaffold a player's mental model. This links back to the production of paratexts of play experiences as discussed in both Chapter 3 and 4. In answer to RQ3, designing for interpretive play thus can also lead to paratexts of play experiences that can be preserved.

Part II

Novel methodologies for play preservation

6

Go-alongs in Wurm Online

”The archival adventurer, like the flaneur, moves through space and becomes an agent of narrative creation through the choices they make in their wandering.”
-Archival adventuring, Melissa Kagen [302]

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6.1. Introduction

The ethnographic study of massive multiplayer online games (hereafter MMOs) developed into a thriving field in the mid-2000s. A key characteristic that has made MMOs so attractive to ethnographers is their apparent persistence [68] – the worlds continued to exist and change regardless if particular players were online. The deep irony of this is that the continued persistence of MMOs is very fragile, relying not only on server architecture but sustained communities to cultivate their culture. From a games preservation point of view, maintaining access to the MMO software is profoundly insufficient. Records need to be made of what it is actually like to experience an MMO, with all its attendant social and cultural complexities. Ethnography is one method which has been employed to do this, however to date the “go-along” method has had limited application in games, if at all. With this methodology, researchers accompany participants on a walk, asking them questions and reflecting on the environment that they pass through. I wanted to explore the potential of this method for capturing a deeper understanding of player experience and ties to an MMO environment. We chose to conduct go-alongs in *Wurm Online* [529], an MMO with a small but consistent player base which has yet to be subject to considerable academic study. Wurm presented an interesting case study for go-alongs as it has been online since 2006, with player-created structures over a decade old that still exist within it.

6.1.1. Wurm Online as a case study

Overview

Wurm Online is an MMO originally launched in 2006. Unlike more story-focused MMOs, *Wurm* is an open-ended sandbox game, where players are largely given no direction, and instead set their own goals to achieve. A player has hundreds of skills which govern both the chance of succeeding at certain actions and the quality and performance with which those actions are carried out. Some skills are more general, such as ‘Mining’ while other skills are more specific – for example, the ‘Cooking’ category has five sub-skills including Baking and Butchering. Skill gain is notoriously slow – only a handful of players in the game’s history have reached the maximum level of 100 for even a single skill.

Wurm is an interesting case study for several reasons. Firstly, it is past its prime but not abandoned.

As the game was only added to Steam in July 2020, we can only use sources like SteamDB [541] to track player metrics of the last few years. This shows that in July 2020 there was a peak of 1,371 players, which has steadily declined, plateauing at an average monthly peak of 288 players. *Wurm*'s playerbase may be small, but it is consistent.

To my knowledge, there has not been any English language academic studies done on the game. There has been some YouTube coverage of it, with one video being titled *Wurm Online is a cosm of Desolation and Decay* [156]. If we wanted to place *Wurm* within a kind of video game hagiography, then the fact that Markus Persson (also known as "Notch") worked on it prior to making *Minecraft* would also be relevant context. Persson's involvement is not to be lauded; he has expressed transphobic and racist views online which has led to his name being removed from the game's loading screen [330]. However, it is undeniable that Persson has been an influential figure in games culture, and the development context for *Wurm* as a precursor to *Minecraft* is another reason to examine it.

Wurm as a persistent yet degrading world

A key feature of *Wurm Online's* design is that the landscape can be modified by any player, and that these changes persist. Mining rock, digging holes and chopping down trees all have a permanent impact on the geography of the game world. Player-made structures and items also persist in the world, but unlike terraforming actions these changes slowly decay over time: buildings degrade and parts will eventually collapse, while items are subject to wear and tear and will disappear. These processes are slow; some structures can last for several (real-world) years without maintenance. Every item also bears on it the signature of who made it, although it may not be readable if the item is of low quality.

The persistence of player-made structures and terraforming in the game world, as well as the degradation mechanic, makes *Wurm* stands out among other MMOs with persistent worlds. The persistent worlds of games like *World of Warcraft* and *Second Life* have led to them being considered as a form of heritage [259, 296]. Gustafsson and Mackay developed a MMO called *We Ride* in order to test their *Narrative Substrates* framework: "a theory for designing game infrastructures that support persistence, management and reuse of player narratives" [246]. They also implemented what they call story artefacts:

> "as persistent objects that: record players' actions in the game; act as representations of historical records of personal player experiences in the context of the game world; and can be shared with other players, who can both expand its story as a new author and learn from it by reading its records" [246].

Gustafsson and Mackay also discuss what they call "meta persistence," through online retellings of game activities that also involve accounts of the real world and how this relates to gaming experience [246]. This work links back to observations made about retellings and paratexts in Chapter 4, while also providing more context for why *Wurm*'s persistent yet degrading world's affordances are particularly interesting to study from the perspective of game heritage.

The Dragon Fang Pass

Players often collaborate on large projects that require skilled characters and large amounts of time and resources. These projects vary in purpose, but include the creation of infrastructure such as highways and canals, and the construction of monuments and feats of engineering. During an initial exploration of *Wurm's* Independence server we encountered the *Dragon Fang Pass*, a large tunnel dug through the largest mountain in Wurm (see Figure 7.1a), the eponymous Dragon Fang. The tunnel has been designated as a Heritage Site (see Figure 7.1e) which means it is protected from being modified. It was this Heritage Status, and the fact that the tunnel would have taken thousands of real-world hours to create, that led to us using it as the starting point for our investigation and conversations with the community.

6.1.2. Archiving Wurm

Wurm's community is highly active, and many members have been playing for over ten years and have a deep connection to the community, the world and the game. Many player activities constitute a kind of archival work, either consciously or otherwise, that contribute to a partial preservation of the culture and history of its players. Some of this work emerges from necessity, such as its player-made maps,

which can be traced back over a decade [216]. Since *Wurm* does not have a meaningful in-game map, and the world is full of buildings, roads and cultural sites players have added, these player-made maps are both functional for active players and act as an archive of how the world and its players have changed over time. Other projects are social, rather than functional – many videos exist documenting player activity, from time-lapses of monuments being constructed, to everyday video diaries of player life in the game.

The changing nature of online communications has affected the *passive* archiving of *Wurm's* community. Early on in the game's development *Wurm* players communicated often through IRC, an instant messaging protocol equivalent to a live chat. Over time, the *Wurm* community transitioned to the use of online message boards. This format creates a static and public record of discussions, meaning that one can still view conversations about *Wurm* and its culture today by looking at the forum archives. In recent years, social networking app Discord has grown as a second place for *Wurm's* community. However, from a preservation perspective Discord has two key disadvantages compared to forums: discussions cannot be easily viewed or archived publicly; and the server itself is not owned by the community. Discord's inaccessibility and lack of archival tools poses serious problems for games preservationists, for *Wurm* and beyond.

Wurm players also engage in active, *intentional* archival work through the creation of shared resources. The *Wurmpedia*, a wiki maintained by the community, is created in the style of many game wikis, to provide a catalogue of knowledge about the game to assist players [593]. However, unlike a wiki for a more static game, the *Wurmpedia* also records historical and cultural knowledge about the player base. Similar projects seek to archive information from the game for other reasons. For example, a player called Andrea maintains a fan site of craftable item 3D models. The aim of the project is to make it "easier to decide which items to create for your homes and deeds to get the right look" [198].

Some archival work takes place in the game itself. The Rockcliff Museum, which opened in 2022, is an in-game museum curated by a player known as Nirav in order to recognise, record and preserve many different aspects of community culture [489]. The museum features tributes to various player and staff groups, examples of rare items and memorials for players who have passed away. *Wurm* also has a formal notion of archival and preservation, in the form of Heritage Sites. Players can submit applications to the developers to request a location be granted heritage status, which confers special protections that prevent players from modifying or damaging the structure in question. There are two types of heritage site: sites of cultural importance such as buildings and monuments; and sites of infrastructural importance, such as canals, tunnels and other transport or economic projects.

6.1.3. Ethnographic study of MMOs

The ethnographic study of MMOs builds on earlier work into the anthropology of text-based online multiplayer games, such as MUDs (multi-user domains), which provided an opportunity to understand how culture and communities formed within these emerging digital contexts [365], and the importance of not just spectating but participating in play as a researcher [396]. Two key strands in the work on ethnographic studies of MMOs relate to methodology; what does it mean to apply the ethnographic method in a digital space, and to what extent is the study of MMOs limited by constructing binary dichotomies between the physical and digital?

In one of the classic digital ethnographies of the 00's, *Coming of Age in Second Life*, Boellstorff contends that he can study virtual worlds "on their own terms," conducting his research entirely within *Second Life* itself [67]. This fits into the "third ethnographic scale" in Boellstroff's own typology, in which the first ethnographic scale interfaces between the real and the virtual, and the second across two or more virtual worlds [66]. Though T.L. Taylor's ethnographic work on the MMO *EverQuest* [279] and an associated fan event [566] arguably fits the first scale, and Pearce's ethnography of a displaced MMO community [443] fits the second, Nardi's work [407] on *World of Warcraft* [169] involves in-person interviews of players accessing the game, which potentially problematises these categories.

A key criticism of Boellstorff's work is that he limits his analysis exclusively to the virtual world, not considering the lived reality of players [263]. This criticism ties in with a long-running theme in ethnographic studies of MMOs: the fallacy of the virtual/real dichotomy. Nick Taylor [564] has claimed that ethnographic research into MMOs has followed a trend of reifying the online/offline demarcation, eras-

ing the presence of the ethnographer in their own analysis, a process which he terms "periscopic play." Taylor also argues that if classic ethnographic methods are transposed onto MMOs uncritically, then this new wave of scholarship runs the risk of emulating the colonial narrative of the 'lone ethnographer' who treats digital space as just another 'pristine wilderness' without accountability to their research subjects. More recent work continues the trend of complicating the role of the ethnographer, with Wilde using autoethnography to reflect on the post-human entanglements she had with her *World of Warcraft* avatar [616].

Interestingly, in a 2022 paper T.L. Taylor draws on a piece of classic ethnography, Geertz's account of deep play and the Balinese cock fight [217], to make the point that ethnography is inherently playful and that we should look to "qualities of ethnographic practice that are not easily distilled to work that looks serious, planned or controlled" [565]. The go-along methodology that we use in this chapter arguably fits into Boellstorff's third ethnographic scale, however as a hybrid of participant observation and interview, it does not seek to replicate the classic ethnographic model. The affordances of the go-along, as a method that invites participants to lead the conversation according to their everyday experiences in a particular place, led us to look beyond the "serious, planned or controlled" [565], and reflect on our role as researchers invited to share in that space.

6.1.4. Archiving MMOs

While ethnographic methods can aid in the understanding of MMO play cultures, they can also aid in preserving them as well. As discussed in Chapter 3, game preservation in general is fraught with numerous complications, not least access to original software and hardware, but MMOs have the added complication of being online play experiences which are contingent on the existence of a sustained community. MMOs like *Wurm Online* depend on the maintenance of server infrastructures, while ongoing software updates also have the potential to change the game landscape irrevocably [46].

Bartle [49] observes that the application of both archaeological and anthropological methodologies is required for the preservation of MMO worlds. In the case of the former, archaeological work on online settlements and communication actually originates in the 1990s. In *Virtual-Communities, Virtual Settlements & Cyber-Archaeology: a Theoretical Outline* [295], published in 1997, Jones considers forms of computer-mediated communication such as listservs and Usenet news groups to be a form of virtual settlement. Jones sees cyber archaeology as contributing to understanding of virtual settlements as scale:

> "Cyber-archaeology allows for the examination of virtual community one step removed from social theory, where human intent is not of particular importance and larger scale cultural changes can be assessed" [295].

This differs with our own approach of what could be conceived as smaller-scale, personal archaeologies of virtual communities in *Wurm Online*. Harrison later builds on Jones' work in the 2007 article *Excavating Second Life: Cyber-Archaeologies, Heritage and Virtual Communities* [259], in which he examines virtual material culture in *Second Life*. Harrison explores locations that the community describes as heritage sites, coming to this observation:

> "While archaeologists working in the field of heritage have become accustomed to the idea of subaltern and alternate forms of heritage, and even official heritage management agencies see the need to preserve the heritage of multiculturalism and heritage 'from below' …there is little evidence within SL of alternative heritage discourses or community generated heritage projects" [259].

Harrison sees heritages sites and memorialisation being tied up with authority, land ownership and the construction of a homogenous "official" community identity. Hansen's work has also considered the role of power and monuments in an MMO. He has used both archaeological site mapping and ethnographic interviews to investigate a player community in *Star Wars Galaxies* [253]. There has been work on archaeologically recording the remains of settlements abandoned after a software patch in *No Man's Sky* [476]. Johnson's ethnographic work on player engagement with the past in *Skyrim* [548] combined both participant observation and an online survey [291]. Pearce's work [443] on the *Uru: Ages Beyond Myst*[627] community following the closure of its servers provides documentation of how fragile and ephemeral these MMO cultures can be.

A key concern in the academic literature on preserving MMOs is the need to record the experience of play and not just maintain access to the game worlds themselves. There are numerous strategies for this, such as archiving live streams or other video footage [395], though:

> ”Ethnographic narratives can present the subjective and emotional experience of playing an MMO in a way that gameplay videos cannot. Anyone aiming to document the player community of an MMO should consider the ethnographic narrative an essential tool” [403].

Leaning into the subjectivity of the ethnographic account can be one way of avoiding the potential decontextualization of the lived experience of MMO players through their “heritigazation” in the archive [81]. The go-along, informed not only by the contemporary experience of the MMO landscape, but its attendant memories, is one way of constructing this kind of emotional ethnographic narrative.

6.1.5. Abandoned MMOs in games culture

“Ten years ago, massively-multiplayer online role-playing games (MMOs) had a bright and exciting future. Today, their prospects do not look so glorious” [50]. So writes Bartle in 2016 after the golden age of MMOs had passed. While MMOs do still exist, or have been remastered, they do not hold the same position in games culture as they once did. That being said, abandoned MMOs continue to be the object of both academic study and wider fascination. Bergstrom et al returned in 2016 [60] to study the user profiles of participants of a 2013 study in the MMO *Rift* [628] to see what they could learn from the abilities left in a player’s action bar, what armour and weapons they had equipped, how much currency they had, plus some other data. Though the authors do not explicitly engage with archaeological theory or method, they do acknowledge that:

> “Well established disciplines, particularly archeology and anthropology, have made significant advances through the study of refuse, waste, detritus, what has been discarded or left behind long after human agents who used these artifacts have left the research site” [60].

Archaeology is also mentioned in Jon Saklofske’s proposal for “MMOmuseums” [502]. Rather than maintaining access to playable versions of abandoned MMOs, he calls for:

> “museum-like, virtual archeological sites, places that preserve recollected stories and memories from diasporic communities of players who once inhabited and originally populated these architectures with action, conflict, and cooperation?” [502].

As well as abandoned MMOs inspiring work that has parallels with archaeological research and preservation, they continue to hold a place in the popular games imaginary. There are countless videos with millions of views about this topic, such as a video about exploring an abandoned 1999 MMO called *Dark Ages* [416] with 5.1m million views published in 2025 [64]. Beyond YouTube, creators have also been inspired to create work that is set in abandoned games, such as *No Players Online* [467].

6.1.6. Go-alongs

The “go-along” is a qualitative methodology in which a researcher literally ‘goes along’ with a participant, accompanying them on an everyday walk while observing and asking questions. Kusenbach describes the go-along as a hybrid between traditional participant observation and interviews, with the key difference being that the “ethnographers are able to observe their informants’ spatial practices in situ” [324]. Furthermore, Kusenbach identifies that the go-along is particularly well-suited to studying how subjects engage with their environment, and the social architecture of specific communities [324], which makes it particularly suitable to exploring those dynamics in *Wurm Online*.

This work was also inspired by the work of Sam Stiegler, who has done considerable work using go-alongs with trans, queer and non-binary youth [545]. Vannini and Vannini [591], contend that walk-alongs (a type of go-along) “are still too often informed by textualism, cognitivism, and representationalism.” With this in mind, Stiegler “worked toward a style of writing that accounted for the sensuous aspects of the go-alongs, the feelings and affects that rippled through the go-alongs but might not have been discussed or captured on the recording” [545]. Attending to the distributed embodied experience of the digital go-along is a particular challenge of this work.

To date there have been limited examples of go-alongs being conducted in digital space. Jørgensen defines the “media go-along” as a method in which the researcher and participant navigate social me-

dia together [297]. We follow Jørgensen's approach of critically re-examining the affordances of the methodology in a digital context, as well as diverging from Kusenbach's original approach in recognising the value of a more "contrived" go-along in which the researcher pre-determines some aspects of the interview [297]. A more recent go-along study conducted in a VR environment also took this approach, having a checklist of points to direct the focus of the interview [599].

Though there has been limited academic study of *Wurm*, and little application of the go-along in games, arguably there is an example of both in games media with a "ridealong" in *Wurm* published in *Rock Paper Shotgun* [86]. Furthermore, machinima that document players' personal histories with game spaces, such as Gina Hara's *Your Place or Minecraft* [255], arguably have affinities with the go-along.

6.1.7. Walking as a research method

Walking is well-established as an embodied research method. The flâneur was a 19th century archetype of an affluent urban man who wandered the city [51], the term later popularised by Benjamin as one "who goes botanizing on the asphalt" [56]. Related to the concept of interpretive play in Chapter 5, Benjamin also characterises the flâneur as an amateur detective in literature, though one who gets involved in investigations "for it accredits his idleness" [56]. The figure of the flâneur has been discussed in terms of games in which walking and exploration are a major mechanic. In *Wandering Games* [303], Kagan links the gendering of so-called "walking simulator" games with the legacy of the flâneur and who is allowed to take up space, both in physical and digital places. Bibler [62] contemplates a three hour video work by Le Tusman that frames the gamer Derm McGuigan as a virtual flâneur in *Grand Theft Auto V* [427], seeing in this performance the female counterpart of the flâneuse, in that McGuigan is both embodying a female avatar and is playing against the intended conventions of the game. Building on this even further, Perluson argues that walking simulators:

> "illustrate an alternative view of video games, making it a site of queer appropriation, a 'flâneur medium' that is different from the oppressive heteronormative environment it is too often associated with" [448].

Beyond games that use walking as a central mechanic, walking can be a research methodology in any game that affords this kind of traversal, as was the case with the gamespace soundwalking [160] study discussed in Chapter 3. Furthermore, as Jørgensen asks:

> "If physical walking relationships can become heritage, as is the central argument in this volume, could the same be true for walking in virtual worlds?" [296].

6.2. Method

6.2.1. Research questions

In this study, I was interested in the affordances of the go-along in a digital context, specifically with regards to how it could elicit responses based on presence in particular in-game locations, and how players conceived of *Wurm's* heritage. As such, we formed the following research questions:

- RQ6.1: How did the go-along methodology contribute to our understanding of the player experience of *Wurm*?
- RQ6.2: How are player memories tied to specific locations?
- RQ6.3: How do players approach the curation of their own history and that of the game more broadly?

6.2.2. Ethical review and participant selection

This study was subject to King's College London's Low Risk Review process[1]. Participants were provided with an Information Sheet and Consent Form stating that the research team would publish anonymised transcripts of the go-alongs. We later requested a modification to our project requesting participant consent to publish their in-game usernames, to have their role in the research be recognised and recorded should they wish for that. Two of the participants consented to this, while one did not.

[1] Ethical review reference number: LRS/DP-23/24-39970

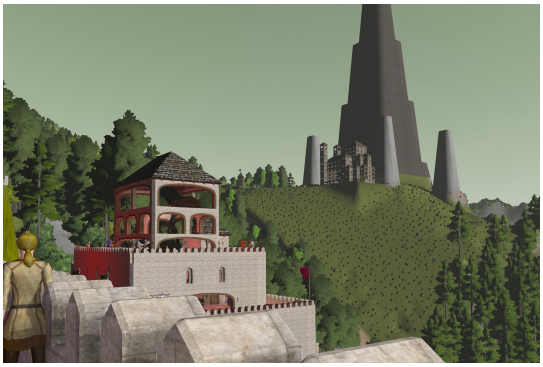
(a) R1 (pictured) and R2 walk through the Dragon Fang Pass on their way to meet Participant 1 (Nirav) at the Rockcliff Museum for the go-along. In total, the authors walked the pass nine times in the course of this work.

(b) A memorial to players who have passed away in real life, as part of the Rockcliff Museum. Participant 1: "I felt like [this] corner was a great place 'cos there's kinda this feeling of things going on infinitely... in this view here'.

(c) R1 stands in the tavern exhibit in the museum. This was a temporary construction built by a player for the museum's opening gala. This player is well-known for building and operating taverns at important in-game events, and so once the gala was finished it became a permanent record of their work.

(d) A screenshot taken during R1's playthrough of the game's tutorial. In this screenshot the full default user interface for the game is visible (as viewed on a Steam Deck). The action log is in the bottom right, chat is in the bottom left, while a hotbar for actions is in the bottom center.

(e) R1 standing in front of a sign marking the Dragon Fang Pass. It reads: "Dragon Fang Pass - Heritage Site - Do not alter without consent of Wurm GM team."



(f) R1 on the roof of the Rockcliff Museum. In the distance, Fang Henge can be seen towering over the horizon. Just in front of it is the Rockcliff Cathedral.

Figure 6.1: Screenshots of go-along locations. All screenshots are from the perspective of R2, except Figure 6.1d.

We posted invitations to participate in an interview on both the official *Wurm* forums and the official Discord server on November 13th 2023. The posts clearly identified our interest in the Dragon Fang Pass on Independence, and a desire to hear from people who had used, constructed or maintained it. During the course of recruiting interviewees we were also made aware of the existence of the Rockcliff Museum, located a short distance from the Dragon Fang pass. Due to the archival nature of the project, we approached the curator of the museum and asked them if they would be willing to participate in an interview as well, to which they agreed.

6.2.3. Interview structure

The go-alongs were conducted within *Wurm Online*, with voice chat enabled through Discord. We arranged meeting points near the Dragon Fang Pass as suited each participant. Both the in-game activities and audio of our conversations were captured to aid subsequent transcription. The interview was structured in three parts, with pre-interview questions, the main go-along, and post-interview questions. The pre-interview questions pertained to what gaming setup participants used and whether they had a specific schedule for when they played, in acknowledgement of the wider "assemblage of play" [568]. With some open-ended questions prepared ahead of time, the go-along constituted a semi-structured interview. The decision to have post-interview questions asking the participants to reflect on their experience of the go-alongs followed Moran's practice of asking follow-up questions [388]. We also created maps of the go-along routes following the example of a study on memory mapping and go-alongs in a post-mining landscape [501], which are included in the Appendix.

The interview transcripts have been published on the Internet Archive.[2] Usernames of other players mentioned by participants were redacted, as this is identifiable information under GDPR. This presented a tension between our desire to accurately record the history of *Wurm Online*, and the need to consider the ethical implications of publishing those histories. We also honoured requests by participants to redact sections of their interviews, and chose to redact the co-ordinates of an abandoned deed in order to protect it. The usernames of deceased players have not been redacted as UK GDPR only applies to the information of identifiable living people [431], and we wanted to include their contributions to the game's community.

6.2.4. Reflexive thematic analysis

We conducted a reflexive thematic analysis on the go-along data [78, 77]. This specific type of thematic analysis was chosen as we wish to acknowledge our role in the process of knowledge production, following Braun and Clarke's assertion that:

> "Themes are creative and interpretive stories about the data, produced at the intersection of the researcher's theoretical assumptions, their analytic resources and skill, and the data themselves" [77].

We take a constructivist epistemological approach, conceptualising that language is implicit in the construction of meaning, with an experiential orientation in that we focus on participant's reporting of their own reality [84]. We primarily aimed for an inductive analysis of the data, although we acknowledge that our approach was framed by preconceived research questions. Similarly, a combination of latent and semantic coding was used. One researcher coded the data, then discussed initial themes with the co-author, before iterating on them, following a collaborative and reflexive approach [84]. The finalised thematic map can be seen in Figure 6.2.

6.3. Results

We conducted go-alongs with three participants (abbreviated for consistency to P1, P2 and P3; the authors are referred to as R1 and R2). The paths that we took with each participant can be seen in Figures A.2, A.3 and A.4 in Appendix A. Nirav (P1) is the curator of the Rockcliff Museum, Gumbo (P2) is associated with the creation of the Dragon Fang Pass and P3 is a long-term *Wurm* player familiar with the Pass' history. The go-along with P1 lasted approximately two hours, one hour with P2, and an hour and a half with P3. P2 no longer has access to the game and did not want to use voice chat, so we compromised by conducting the interview entirely through text chat, using a YouTube video of Dragon Fang Pass [382] as a multimedia aid. Arguably, this does not constitute a digital go-along, however we believe that the interview is useful as a point of comparison with the other two.

6.3.1. Themes

Distributed Identity

Distributed Identity is a theme that encapsulates how participants understood themselves, and other players, as having identities that crossed not only different platforms but multiple game avatars as well. For example, P1 has five 'toons' in *Wurm Online* ('toon' is slang for a character or account in an MMO),

[2] https://archive.org/details/wurm-online-go-along-transcripts

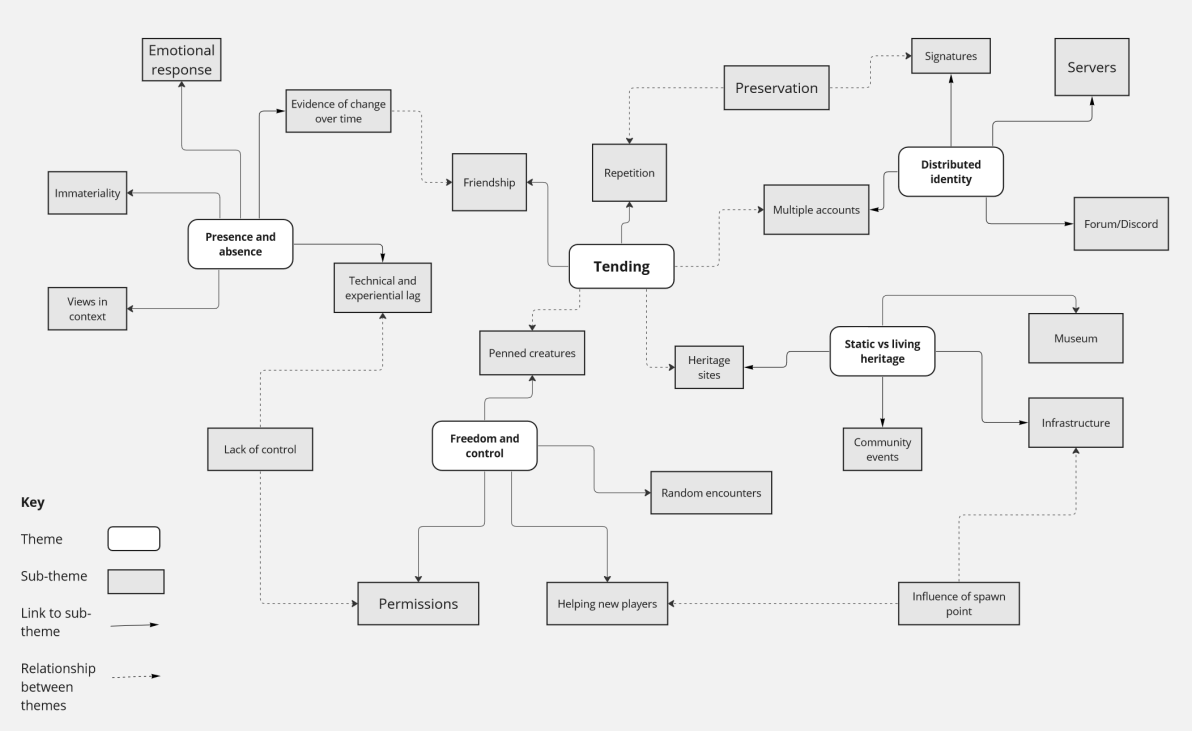


Figure 6.2: Thematic map

one of which exists on a separate PvP (Player vs Player) server to the one we were doing the go-alongs on:

> P1: I live in a cave by myself on Gold Coast, and I used to get killed, and at this point **after seven years pretty much every kingdom knows me**, and I can probably go anywhere I want

P1's identity as a museum curator in the game transcends individual avatar identities, allowing them freedom of movement even on servers where that would usually not be the norm. P3 chose to come to the go-along interview as the character that they had when they originally started playing on the Independence server in 2012:

> R2: So this is - is this your usual character that you play on?
>
> P3: No, this is my **original character**... the one that was around when this [the Pass] was built.

P3's "original" toon was associated with a part of their identity tied to a particular time and place within *Wurm*, a point with particular relevance to RQ6.2. P3 in particular also commented on how the server infrastructure of *Wurm* has changed over time:

> P3: Well, for one thing, **Wurm was a lot more populated back then**. When this tunnel was built this [Independence] was the only server, there were no other servers to uh you know start on unless you were going to the one that was exclusively player versus player.

Arguably, the identity of the game *Wurm Online* has become further fragmented over time through the segmentation of the game on different servers, leading to a different play experience, especially for those who remember the game before those changes were made. Beyond *Wurm* itself, participants commented on how the *Wurm* forum is an important platform for reinforcing player reputation and enabling networking:

> P3: Because he would be posting on the forums, and... that's a lot of **name recognition** right there

> P2: Knew [redacted] from streaming, I think. Like at an Impalong event or some such thing. Thought popped in my head to ask him, via the game forum, and he was there next day. Awesome person.

The *Wurm* forum is a place where "name recognition" can be garnered through repeated posting. The sense of identity being tied to names is also linked to how items in Wurm will bear the signature of the person who crafted them, and it is these signatures that P1 particularly values in terms of their curation strategy:

> P1: …what I'm looking for, **I don't... really care if it's valuable or not**, you know, the signatures are what matter, so I'll go through and I'll look at what signatures are there and [what matters is] whether I have those signatures and how big the items are and whether they're gonna fit in the museum at this point.

The implication that signatures are particularly valuable from a preservation point of view relates to RQ6.3, and demonstrates how the affordances of distributed identity in *Wurm* influence that.

Presence and absence

This theme pertains to our own experience of the go-along alongside our participants, how that shaped knowledge production, but also participants' own ambivalent emotional relationship with *Wurm* as a digital space. R1 accessed *Wurm* through a Steam Deck, which presented difficulties due to *Wurm*'s interface being designed for a desktop keyboard and mouse set-up. Several times R1 had difficulty accessing ladders and a cart during the go-along with P1, leading to a running joke:

> R1: Yeah I chose the wrong ladder -laughing-
> R2: Yeah you chose poorly!
> R1: I did choose poorly -laughing-
> P1: -laughing-
>
> ---
>
> P1: **You guys'll totally know how to do ladders at the end of this tower**.
>
> ---
>
> R1: Sorry it's a strange -inaudible- thing to like... I'm trying to use the touch screen...
>
> ---
>
> P1 [joking]: I'm making a rule you can't disembark [from the cart].

Having difficulty with simple actions was embarrassing, but also led us to reflect on lag as a concept that can be applied not only to technology, but also to experience – we lagged behind our participants in terms of our own expertise with the game and its mechanics. This also became apparent when we encountered a hostile 'cave bug' during the go-along with P3, leading to an awkward situation in which they prompted us to help them fight it:

> P3: ... uh there's a cave bug. I can probably take it on, cos even though I'm not premium I do have gear that's pretty good. [P3 starts fighting the Cave Bug] **You can help if you, if you want to...**

The affordances of the go-along, requiring us to traverse a route in-game with our participants and contend with our discrepancy in terms of lived experience in *Wurm*, is very relevant to RQ6.1. In contrast, this kind of spontaneous experience was not possible during P2's interview. That being said, P2 felt that they didn't even need a YouTube video of Dragon Fang Pass as a visual aid:

> P2: time has flown by and didn't need the stream.. been through that tunnel more than enough times before

This indicates that while participants believe they can rely on their own memories of a game, the texture of the interview responses will be different. This is demonstrated by P1 reflecting that:

> P1: Um, I would've had to have a pretty extensive vocabulary to try and explain -laughs- everything.
> R2: -laughing-
> R1: Right! Yeah.
> P1: -laughing- And and I mean, there's no way, I think the bridge between me trying to tell

> you what this world looks like and what the heritage site looks like and what the museum looks like, I don't think there's any possible way I could've done it, so I dunno how else we could've done that.
> R1: Yeah I think especially like, um, just like being able to be in certain places and see the views and things like that, I can't imagine, you just couldn't do that any other way, yeah, so.
> P1: Well and I probably wouldn't have thought to bring it up, because...
> R1: Mmm! Right, yeah!
> R1: ...i**f we're having a phone call and I'm remembering stuff, and I'm answering your questions, I'm focused on your questions and we're not experiencing it, you know?**

Subthemes for the presence and absence themes are immateriality and emotion; these were identified in response to an apparent dissonance between an emotional attachment to the game and it's immaterial nature:

> P2: all good... is only a game... **pixels**... memories always great

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> P1 [reflecting on an emotional response]: What am I *thinking*, you know? I **mean these are pixels, like, wh-, 'sacred ground', what am I even *talking* about**, I mean part of me was just like, am I getting too involved?

P1 and P2 reflected on the nature of *Wurm Online* as "pixels," and the perception that the digital nature of the game would apparently make any kind of significant emotional response inappropriate. However, each participant arguably preserves their experience in their own way, whether through personal memory or in-game curation practises.

Static vs living heritage

We initially focused on Dragon Fang Pass as a case study for this work due to its designation as a Heritage Site by the community of *Wurm Online*. Discussing the nature of heritage sites with our participants, we found that there were differing attitudes towards Heritage Sites with infrastructural affordances, and those that constituted a memorial or architectural monument:

> P1: Um, so you have heritage sites that you know people made this really cool thing and it has meaning for the game, and you have all the canals and roads and boatways

P3 explicitly encouraged us to look into community events rather than Heritage Sites like Dragon Fang Pass:

> P3: [Dragon Fang Pass] I mean this is... this is a relic, people still use it, it doesn't have the number of users that it once did because the community, you know not as many players are active at a given time, but it's essentially... it's essentially something that will remain here until the game shuts down and it's not gonna change much, **but something like an impa-long** [a large community gathering], **that is all player driven and you know interactive, and you can have like a hundred people connect into one**.

P2, who was involved in the construction of the Pass, felt that their involvement in a community event recreation of a TV programme was more significant than the tunnel:

> P2: heh... Deal or No Deal is prolly more my "legacy"

This theme encapsulates the tension between the desire to preserve content in the game in a way that renders it static, versus an interest in dynamic community events which cannot be captured through a traditional preservation strategy. The affordances of the Heritage Site designation in the game are actually inappropriate for P1's museum:

> P1: we can't figure out how to make [the museum] a heritage site, and the reason why is because it's ever-changing, h**eritage sites usually lock 'em down and that's it, and then nothing can either be added or taken from it,** and this has stuff that's on loan, and, it's gotta constantly be repaired and maintained, and... so I run it as a heritage site but it's not technically a heritage site.

Furthermore, the official designation of Heritage Sites is only applicable to public-facing infrastructure or monuments. P3 maintains a settlement that they had with their friends as the only remaining inhabitant:

> P3: Uh, well. You know, I can... I.. it was such a ... community with the friends and all, at the time, that **I kind of like maintain it as a heritage site on my own**.

Attitudes towards the curation of content in *Wurm* is context dependent; there may be a desire to engage with the living heritage of public community events with a coexistent desire to maintain a personal settlement as it once was. This indicates there is no singular answer to RQ6.3.

Freedom and control

Freedom and control is a complementary theme to static versus living heritage, however it is distinct in that it concerns the wider affordances of *Wurm* and how that affects player experience. Participants expressed that the freedom to behave and interact with the game environment is what sets *Wurm* apart:

> P1: I mean that's one of the things about the freedom we have here, **we have the freedom to be really amazing beautiful people, but we also have the freedom to be shitheads**. And, you know, you can be who you... whoever you want to be in this game, but there's consequences and they're real, they're real social consequences

---

> P3: I... see Wurm as retaining the players it has now due to its **uniqueness**, you can't really find a game that has the same, you know, destructibility of environments, when everything is created by the players.

This freedom to act altruistically or selfishly renders acts of generosity even more meaningful in the game because they are voluntary and not explicitly incentivised. P3 wanted to take us to The Howl, a starter town on the Independence server where new players had permission to stay without charge:

> P3: The person that settled down here that I was helping out, that was a newer player, um that I had met at the Howl one time that I was just, you know, just passing through

The designation of spawn points for new players affected the development of such friendships as well as permissions around infrastructure, as P2 chose for veins of valuable metal ores exposed by the creation of the Dragon Fang Pass to be publicly accessible:

> P2: I left them open to mine because i**t's just helpful for new players to have access to that stuff**. The spawn city was very very close, south side of Freedom Market.

There is a culture of helping induct new players into *Wurm*, and this is arguably influenced by the acknowledgement that the game is difficult due to the lack of control players have over the outcome of in-game mechanics:

> P1: I mean there's people from all over the world, there, I would think, sociology wise there would have to be similarities in personality, um, I think that in a sense this would have to be a bubble in the in the greater world because you know **there's certain personalities that just cannot handle true random**, there's some that don't like the step by step tediousness, the real life feel of this.

The simultaneous freedom and lack of control that characterise *Wurm* are important considerations for RQ1, while the significance of The Howl as a primer for discussion about helping new players is relevant for RQ6.2. In terms of curatorial practises, P1 describes an ostentatious candelabra made out of a precious metal:

> P1: ...they gave me this rare forge, and an adamantine candelabra - who the hell makes a candelabra out of adamantine! That is crazy.
> R2: -laughing-
> P1: That is like one of the most valuable metals there is, and they made a candelabra out of it.
> R1: That's funny.
> P1: And it was called **"I am gay and dumb"** which - I'm part of the LGBTQ community, and I wanted to leave that there because -laughing- I was like -laughing- this is fabulous, you know?
> R1: Yeah, it is -laughing-
> P1: But there are things that you're not able to put in a museum. Um.

P1 has the freedom to decide how and what is preserved in the museum, and there are concerns around how objects will be interpreted without additional context – this would be beyond their control.

Tending

Although somewhat unorthodox for a reflexive thematic analysis, we have a theme which could be defined as an overarching theme: tending. This theme links to all the others while still being distinct and internally consistent (see Figure 6.2 for additional context). Under the themes of both tending and power and control are examples of participants looking after rare creatures in pens for a long period of real-world time. P3 is the last person left at their deed and must log into the game to feed five giant champion dogs at least every three days, and has been doing this for years:

> P3: **I have five dogs at least, five champion dogs at least, so that's five pumpkins a day**, and the bucket holds twelve, so... like every three days I'd have to refill.
> R1: Mmm, wow.
> P3: Refill with pumpkins. That's not really a thing that we do as a community, I'm the only one left at my deed, so it's not like any of my friends are still there. Uh.

P2 tells the story of a dragon that they looked after for five years before it escaped and was killed:

> P2: [Redacted] slowly drifted from the game... I kept up the dragon feedings and such... One day the in-escapeable pen.. Faultered
> We knew she escaped and was loose for maybe a year... then she showed up and tore up a village, **well they had a dragon slaying event**. Was huge

Here we have cases where players invested time and energy over a long period of time to maintain rare creatures, which could be conceived as a form of preservation relevant to RQ6.3. Another example of tending is in relation to friendships, and the presence and absence of those relationships. P3 showed us their boat at Freedom Docks, which had a Hungarian name:

> P3: I'm not, I don't... I don't even speak Hungarian, but... that was... kind of a community aspect that lasted. **They were Hungarian, so you know, it was doing things like this to kind of show... uh... yeah to make it something they'd be familiar with** and uh... be able to identify and... you know, be more comfortable with, I guess, would be a way of describing it.

Players tend to friendships through the affordances of the game and their ability to shape their environment. Tending activities also relate to the distributed identity of player signatures. As signatures deteriorate over time in *Wurm*, in order for them to be legible a player will have to 'imp' or improve it, which requires repeated time and resource investment. The signatures are crucial for P1's curation of the museum:

> P1:...**So many hours**... and really most of the hours have been in improving items to get signatures, because to find the signature, you get another letter every ten place [every item in *Wurm* has a 'Quality' or QL score, between 0 and 100. Improving the quality of an item requires you to have a skill in excess of the target QL, which is very hard at high values] so at quality 20 you get some, at quality 30 you get some, at quality 40, some of 'em have to be taken all the way to 90?
> R2: Oh my god.
> P1: Yeah.
> R2: So... I did not know this either, so as you improve an item the readability of the signature on it increases and eventually you can read it again? I thought it was one-way, once the signature decayed... okay, that's fascinating.
> P1: Right! So the amount of time people have spent improving these items is uncountable, honestly.

Tending as a repetitive activity was also reflected in the non-verbal actions of P3, who would stop to repair objects such as a fountain in Dragon Fang Pass during our go-along, without comment or drawing attention to it. These observations were one way in which the go-along methodology provided insight into how players habitually preserve *Wurm* as they move through it. This persistent tending to *Wurm* as a shared world is perhaps best expressed by P1:

> P1: Wurm is... going to go away. It's... that's life. This is not something that lasts forever, and... this is... **this is a sacred place**, the whole thing is, I'm not talking about the museum - the game. The game is a sacred space, it's a place where people... are... you know, we're *here*, together. Making a world together.

The preservation of *Wurm*, then, is a continuous group effort, and that itself is what lends it significance.

6.4. Discussion

6.4.1. Submerged play

If the ethnography of MMOs which do not acknowledge the presence of ethnographers is termed "periscopic play," then the go-along methodology could well be termed "submerged play." To answer RQ6.1, we found that the go-along provided us with insights into the unique frictions of *Wurm* as a game alongside our participants in ways that could be frustrating, amusing and also deeply rewarding, allowing us further insight into their extensive lived experience in this digital space. Leaning into the affective qualities of the go-along [545], whether that be getting frustrated with the Steam Deck or reflecting on a friendship that faded over time, provided us with a deeper context for the heritage of *Wurm* beyond what was visible. There is a trend for digital ethnographers to self-validate by stating their own expertise with a game [564] but we seek to instead embrace the messy reality of our research and relinquish any kind of projected mastery over *Wurm*, or indeed the direction of our go-alongs. Inviting our participants to guide the path we took led to discussions that we never could have predicted, which is apt for a game that is defined by freedom and the relinquishing of control.

6.4.2. Wurm as heritage site

The affordances of *Wurm* as a smaller scale MMO confirms T.L. Taylor's speculation that:

> "Might there be ways – structural, economic, organizational, – in which smaller game worlds are at an advantage in exploring participatory practices, innovative forms of government, or even radical design challenges?" [566].

The whole of *Wurm*, as a landscape that has been shaped by players, developers and server infrastructure, is arguably a heritage site. With reference to RQ6.2, being in that landscape with participants contextualised their memories, but also the passage of time. For example, we followed P3 to the site of a friend's former deed that had become overgrown in the last decade due to the designed decay of the game:

> P3: Okay, yeah it looks like this stretch over here of this woodland is where it's at, it's changed a great deal, it didn't used to be like it is now. But. This this plateau and where the trees are and all this is where his small deed was.
> R2: Oh wow.
> P3: It... like I said **it's totally changed now**, it's all been uprooted no longer the same but this was... I started playing around the year 2011.

Conducting our research of *Wurm* in its present state, as an MMO that is arguably beyond its peak but still maintains a dedicated player base, has afforded us the opportunity to understand what it means for players to contend with a digital landscape that is simultaneously surprisingly persistent and painfully fragile.

6.4.3. Preservation as process, not record

With regards to RQ6.3, we found that players had different attitudes to the preservation of more personal heritage sites as opposed to the broader history of the game. P3 maintains their deed for no one but themself, while P1 is so renowned as a curator that this identity transcends any one avatar or server. P2 is content with memories, but is also barred from accessing the game itself.

Wurm demands not only time but repetitive tending from its players to be maintained. We heard of the huge time investment that goes into maintaining the memory of past players through improving signatures, and witnessed the habitual gesture of repairing monuments. Like the champion dogs that must be fed every three days, *Wurm* is a tended garden that is constantly in tension between the desire to preserve it and the need for it to continue to grow for the sake of a living community.

> P1: I don't know if you saw Babylon 5 but I kinda see myself in that moment, Garibaldi shuts the lights down, he's the last guy there, you know? And... I feel like that's gonna be me. **I'm gonna be the last person standing in this game when the lights go out**.

If indeed, ethnographic projects are never finished, only left [602], then the process of preserving *Wurm* will only finish when the last person leaves the game. It was never about saving a world, only finding a better way to live in it.

6.5. Future Work

6.5.1. Wurm as living heritage

While this study primarily focused on *Wurm* player's situated memories, the game's community remains alive and active today, with a recent developer report even suggesting the player base is growing. As suggested by Participant 3, recurring events such as 'impalongs' (where players 'imp', or improve, one another's items and tools) would provide the opportunity to study active community events and document the living rather than just the static heritage of the game. Furthermore, participants referred to the differing cultures and attitudes between PvE (player versus environment) and PvP (player versus player) servers in *Wurm*. One participant offered to negotiate permission for us to explore a PvP server safely, without the local player kingdoms attacking us (as new players are often mistaken for spies). Such permission may not extend to our interview participants, however, adding new complications and potentially interesting findings for the methodology. Studying and understanding both PvP and PvE communities in a game such as *Wurm* is important to capture a more well-rounded perspective on the game's culture and history.

6.5.2. The go-along as transcription

In the process of transcribing the interviews, we observed that simply recording the verbal conversation was not sufficient to capture the go-along experience. For example, the tempo of conversation, interruptions and silences are also vital to understanding the dynamics of the discussion. As Stiegler puts it:

> "Approaching "data" from a different perspective, the feelings that build up inside the actors in a research process—whether participant or researcher—coalesce into objects that necessitate examination rather than having these moments be interpreted as impediments to seeing or understanding the "real" data that was spoken into a tape recorder to be transcribed and analyzed later" [545].

Though we were of course not physically embodied within the game space for the go-along, non-verbal communication should also be considered in a digital context, whether that be through interaction with items or even the distance between different player avatars as they traverse a space. We believe that developing new approaches to visualisation and transcription of digital go-alongs would help record this information, leading to richer qualitative research, especially for future readers who may have a reduced familiarity with the contemporary game context.

6.5.3. The go-along as record

Our application of the go-along methodology in *Wurm Online* was, in part, as a game preservation strategy. However, as mentioned above, more work can be done to adapt the methodology for a digital game context. Much has been written on the potential for recording gameplay footage for game preservation purposes [464, 429], and a video recording of go-alongs would allow for the capture of more nuance beyond that which a traditional transcript would provide. Furthermore, adopting a connective ethnography approach, as demonstrated by Pellicone and Ahn [447], would allow us to engage with the multiple communication platforms that *Wurm* players use concurrently during play. This also ties in with conversations around the sustainability of game preservation that contends with both tangible and intangible cultural heritage [212]. Newman and Simons [413] have stressed the importance of future access to gameplay recordings that can provide a sense of what it was like to play a game in a specific historical context, which cannot be provided by merely maintaining access to the software itself. Though there would be attendant ethical and privacy considerations, video recordings of go-alongs could also include footage of the physical context in which the researchers (and potentially participants,

if they consented) accessed the game. This has parallels with the work of the Popular Memory Archive [547], for example, which has collected photographs of players in the 1980s in order to document the domestic context of play in Australia and New Zealand at that time.

6.5.4. Wurm as memory craft

As mentioned above, *Wurm* invites its players to tend to it with repetitive actions. Sullivan et al have observed that although many games include crafting mechanics, few capture the materiality, creativity and communal bonding of physical crafting communities [552]. We would be interested in examining community events in *Wurm*, such as impalongs, through the lens of craft, especially as a gendered practice. Evidence of craft practise has been widely studied in the archaeological record, and there is potential to study the affordances as craft as social memory in *Wurm* as a form of contemporary archaeology. As Fulcher puts it:

> ”Material metaphors can be physically experienced, and engagement with a material solidifies this conceptualisation, making the metaphor real. For example, walking through a door is an analogy for transition in many cultures; the experience not only expresses the concept but also help us to understand it”[200].

Thus, in order for us to understand *Wurm* as a community crafted space, it is imperative our documentation go beyond merely recording the landscape, we must also engage with it as a space that has personal and collective mnemonic affordances.

6.6. Conclusion

In this exploratory study, we found that applying the go-along to the digital space of the MMO *Wurm Online* provided us with incredibly rich qualitative data, particularly with regards to how specific locations elicited memories and reflection. We interviewed three participants with diverse experiences in the game, and then conducted a reflexive thematic analysis. We identified five themes, with the overarching theme of tending arguably linking the other four. The go-along invited us to reflect on our own role and limitations as researchers, and to challenge the idea that to preserve something we have to freeze it in time. As *Wurm* constantly invites its players to reaffirm themselves through repetitive actions, no static record could ever encapsulate its *genius loci*.

Indeed, one of the limitations of this study was approaching heritage sites in video games as static entities. In the following study, I developed a methodology for archaeologically recording player traces in the landscape of *Elden Ring* as they dynamically appeared. While I conducted research within *Wurm* almost two decades after its original release, the initial survey in *Elden Ring* was undertaken just after its release in order to capture a snapshot of data early on in the game’s life cycle.

7

Archaeological survey in Elden Ring

”A finger of corpse wax, so emaciated the bone is visible. It is a relic of those who came before, left to help those who would come after.”
-*Tarnished’s Wizened Finger*, Elden Ring [196]

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7.1. Introduction

While the previous chapter reported on the adaptation of a walking interview methodology to study an MMO community’s heritage, this chapter details the development of a methodology for archaeologically recording player traces in the 2022 action-adventure game *Elden Ring*. This builds on the previous case study by demonstrating how archaeological method and theory can contribute to both recording and analysing user-generated content.

In this chapter we report on an archaeological survey conducted at two sites in *Elden Ring*. *Elden Ring* utilises a form of asynchronous multiplayer. This means players leave information behind, both intentionally and unintentionally, that can later be encountered by others. We conducted a survey in the starting area of *Elden Ring*, Limgrave, and we report on the nature of messages and player death recordings found at both sites, offering a qualitative analysis of the role these features play in the overall game design. We also use this as an opportunity to provide a meta-perspective on the nature of conducting archaeological surveys of transient artifacts within a game environment.

Furthermore, Elden Ring, as well as other FromSoftware games, have come up multiple times in Chapter 4 in the literature on interpretive play, specifically in terms of ambiguity [594] and interpretive play [335]. In particular, Fernández-Varawork’s article on indexical storytelling [176] uses player messages in *Demon Souls* as an example of players becoming active agents, not just interpreting indices but leaving them as well. Reinhard has done an archaeological survey of user-generated content in *No Man’s Sky* [478] in response to a software update. In this chapter I develop a novel methodology for archaeologically recording such asynchronous multiplayer traces in *Elden Ring*, ascribing archaeological context of artefacts in a digital game according to the temporal context in which they are observed by the surveyor.

7.2. Motivation

7.2.1. Overview

In games studies, researchers have used a wide variety of techniques, from simulation and modelling [453] to surveys and interviews [235], or simply recording player activity in-game [373]. Many of these studies rely on ground truth recording of player activity, such as the ability to directly ask a player questions via interview, or extract player behaviour data through key logging. User- generated content, however, likely does not afford researchers the same opportunities to directly question players about their activity and motivations.

The field of archaeology also aims to understand human behaviour, but through the study of material remains. Archaeologists are faced with a similar challenge to the one described above: the people they wish to study are usually not available for questioning, and the remains they left behind are incomplete and in many cases unintentional. Instead, archaeologists must interpret these partial material remains and contextualise them within wider research.

For games with user-generated content, archaeology offers a new lens through which to study player behaviour. By viewing the remains of player activity as analogous to archaeological remains, we can employ the techniques of an archaeologist to theorise about the behaviour and intentions of both the players whose remains we find, and the wider community they were a part of. Applying archaeological methods to games to better understand past player behaviour can in turn provide insights into both the limitations and potential advantages of conducting archaeological investigations in a digital space.

7.2.2. Contemporary archaeology

As I argued in Chapter 2, video game archaeology can be conceived as a form of contemporary archaeology [26]. A potential critique of the kind of methodology I developed in *Elden Ring* could be that instead of studying players indirectly, you can just interview them (indeed, I did this in the previous chapter). However, “what people say they do and what they actually do are often different” [470]. This was the case with *The Garbage Project*, a contemporary archaeology project conducted between 1987 and 1995 in which archaeologists ”systematically excavated, hand-sorted, measured, and recorded thirty tons of contents from fifteen landfills located across North America” [470], which found that people self-report that they waste less food than they actually do.

There are numerous examples of how contemporary archaeologists have adapted “archaeology-as-surface-survey” [260]. Work on recording contemporary graffiti has parallels with the recording messages in the *Elden Ring* landscape. Crisp et al surveyed two 200m units in the Sydney suburbs of Newtown and Miranda in order to compare their respective graffiti assemblages, arguing that “the application of archaeological methods to the contemporary landscape, this study has shown how an archaeological approach can test general assumptions about graffiti generated within other disciplinary frameworks” [130]. Other examples of similar sampling methodologies include documenting changing assemblages of detritus left in Tromso’s Sentrum area during the COVID-19 pandemic [352], and even an archaeological survey on the International Space Station, that involved periodically recording what material culture was present within six sample locations over a 60 day period [603]. These methodologies, while applied to the contemporary analogue world, have affinities with the methodology that I developed for sampling player messages and bloodstains in *Elden Ring*.

7.2.3. Elden Ring

Elden Ring is a 2022 action-adventure game developed by From Software. Although technically a new IP, *Elden Ring* is a continuation of games made by the developer that are similar in mechanics, themes and aesthetics, though they do not share the same narrative or setting. This collection of games is sometimes referred to as the ‘Soulsborne’ series, a portmanteau of the *Demon’s Souls*/*Dark Souls* series and *Bloodborne* [192].

Soulsborne games, particularly post-*Demon’s Souls*, share a number of common features. These include a variant of permadeath in which the player loses the currency they are holding on death[1]; an emphasis on large, challenging boss fights; and arcane world-building. There are also many thematic and narrative links between the games: the corrupting influence of power; the perpetuation of cycles

[1] This currency can be recovered if they make it back to their corpse without dying, a so-called *corpse run*.

Figure 7.1: A player message. It reads ”Be wary of dog”.

Figure 7.2: Player bloodstains.

and traditions; and how legacy and history motivate people. Another key connecting feature present in every From Software game from *Demon's Souls* onwards is a specific form of asynchronous multiplayer interaction.

However, there are some key divergences between *Elden Ring* and other Soulsborne games. Apart from its open world setting, *Elden Ring* has a much larger player base. By March 16th 2022, *Elden Ring* had sold more than 12 million copies after only a few weeks, compared to *Dark Souls 3* which has only sold 10 million copies since 2016 [450]. According to SteamDB, *Elden Ring* reached a high of over 950,000 concurrent players on March 3rd 2022 [540].

We decided to undertake an archaeological survey of *Elden Ring* not because has been popular or financially successful, but because it was a particularly active site of player activity in March 2022. Essentially, we wanted to take a snapshot of the game at this peak of popularity which will likely wane over time.

7.2.4. Asynchronous Multiplayer

Soulsborne games are an example of *asynchronous multiplayer*, sometimes referred to as *mingle-player*, in which players feel the impact and presence of other players without direct live interaction between them. Since *Demon's Souls*, players have been able to leave messages on the ground using fixed templates and a limited vocabulary, which are then sent to a game server. When a player enters an area, messages from others are randomly retrieved from the server and placed in the world exactly where they were written. This messaging system has been used by players to warn about dangers, guide to secrets, make jokes, trick players into death or danger, and more.

Soulsborne games have two other related features: bloodstains, and player ghosts. When a player dies, the last few seconds of their actions are recorded and sent to a game server. Other players may then encounter this recording in the form of a bloodstains on the floor. If they interact with the bloodstain a red ghost of the dead player will appear and play out the last moments of their life. Only the dead player's actions are shown - any effects, interactions, items, spells or enemies are not recorded. Ghosts are non-interactive and do not affect the current player's world. Similar to in-game messages, ghosts

both provide and depend on contextual information. They may reveal ambushes, hidden traps, secret doors, or the tactics of other players.

The messages in *Elden Ring* have garnered a large amount of interest from games journalists due to their propagation of memes and their often deliberately misleading nature. While some journalists believe that the messages make the game feel like a conversation and enjoy the in-jokes [361] [574], they have also been criticised as a distraction to gameplay, enabling toxic players [440]. An article by Cian Maher [353] elaborates on how jokes and memes are often lost in translation, such as 'fort, knight' (a reference to the Battle Royale game *Fortnite* [207]) being misinterpreted by Japanese players assuming they referred to a special event happening at night. Bloodstains have not received the same critical attention, though their potential humorous nature has been highlighted by Kapron [306]. They discuss how a video was shared on Reddit by the user Shinokijorainokage, touching four bloodstains to reveal different players jumping off the same balcony for no apparent reason. This example demonstrates how bloodstains add to the gameplay experience of *Elden Ring* and create an anonymous camaraderie among players.

7.2.5. Elden Ring as an Archaeological Site

There is a considerable precedent for understanding the Soulsborne games from an archaeological perspective. In 2012, *Forbes* published an article titled *The Wonderful Archaeology Of 'Dark Souls' Lore* [304] which delves into how the game excels at environmental storytelling, requiring the player to interpret the narrative through its ruined world. This is a point also emphasised in a 2017 *Eurogamer* article by archaeologist Philip Boyes [75] who comments that "it invites the player to share in the narrative process and become a researcher-cum-author themselves." Focusing on *Bloodborne* specifically, Kerry Todd has also recently published an article on the narrative archaeology of the game [576].

Archaeologist Bill Farley has covered the Soulsborne games in his YouTube series *Video Game Archaeology*. In one video [597] he uses the Undead Asylum in *Dark Souls* to explain archaeological theory, and he has also produced commentary videos about *Elden Ring* from an archaeologist's perspective [596].

There has been a considerable amount of academic work on *Elden Ring* since its release in 2022, with much of it focusing on its difficulty [266, 488, 175], mythology [184] and fan community [110, 334]. Of particular relevance to this study is Carriccio's [89, 90] work on the ambiguous environmental storytelling in the game which motivates players to band together and come up with interpretations, a phenomenon he has called "archaeological fandom":

> "In Elden Ring and in other FromSoftware games, the archaeological imagination goes hand in hand with a fundamentally ambiguous narrative that requires constant input from the player" [90].

This analysis also chimes with Van de Mosselaer [590] writing on "folk genetic criticism" of *Dark Souls III* [193], which refers to the community deconstructing the production process and cut content of the title. Indeed, there has also been considerable work that is not formally academic but related to the community archaeology of *Elden Ring*. YouTubers The Tarnished Archaeologist [13] and VaatiVidya [509] made a name for themselves by producing videos interpreting the game's narrative through environmental cues. It is important to make the distinction here that much of the popular and academic engagement with the archaeology of *Elden Ring* has been in terms of interpreting the fictional gameworld and its development, which while complementary to our approach, has a differing focus. Our work engages with the archaeology of play generally; of other players and ourselves, which is inherently ephemeral as it documents active engagement with a game in a specific ludic context.

7.3. Method

Building on previous work archaeologically recording player-created content in video games, this survey aimed to record a sample of player messages and bloodstains in *Elden Ring*. As stated in the background section, we recorded this sample in March 2022 as it represented a period of high player activity in the game following its initial release in February 2022. The study was devised with the following research questions in mind:

- RQ7.1: Is it possible to archaeologically record player messages and bloodstains in *Elden Ring*?
- RQ7.2: What do the messages and bloodstains indicate about player experience of *Elden Ring*?
- RQ7.3: How do these messages or bloodstains inform us about the metagame of *Elden Ring*?
- RQ7.4: How are the results of this study applicable to game design and archaeogaming research more broadly?

7.3.1. Code of Ethics

As Shawn Graham states "Video games are built environments and thereby invite archaeological study, in which case professional archaeological ethics should apply" [236]. Meghan Dennis has done crucial work on the ethics of archaeogaming, which has been instructive for this investigation. We draw attention to her doctoral thesis [146] and her 2016 article *Archaeogaming, Ethics, and Participatory Standards* [145]. The section on researching in a multiplayer environment is especially relevant to this study, as we had to consider our roles as surveyors in the game world as well as our duty of care towards other players. Unlike other online multiplayer games, *Elden Ring* does not provide any extraneous information regarding the identities of players whose messages and bloodstains you encounter, such as aliases. Regardless, it is imperative that we treat all data we collect in *Elden Ring* with respect and in full knowledge that it was created by other participants in the player community.

Another key source for our study is the *No Man's Sky Archaeological Survey Code of Ethics* [182], as this presents an example of how an archaeological code of ethics was co-created for a similar project. We highlight Principle 5 of the Code in particular:

> "Ensure the integrity of archaeological sites, humans and non-human people and animals, and archaeological artefacts where possible; work to ensure good stewardship of sites, peoples, and artefacts; and avoid and discourage activities that enhance the commercial value of archaeological artefacts" [182].

As Dennis has demonstrated in her aforementioned thesis [146], archaeological artefacts, if they are present in video games, are often commodified through looting mechanics. This reflects real-world unethical looting practises that damage archaeological sites for commercial gain. A key guideline for our work is to consider the nature of our survey and to ensure our methodology does not contribute to the commodification of the archaeological record, whether digital or analogue.

Another aspect to consider in our Code of Ethics was *Elden Ring* own 'Manners During Online Multiplayer.' In order to start the game, the player must agree to this code of conduct. As can be seen in Figure 3, one of the requirements of this code is "Do not play games by using the in-game functions in a manner other than what they were originally intended for" [191]. This general statement could impinge upon our survey – after all, in-game messages and bloodstains were certainly not intended to be studied archaeologically. However, as Graham puts it:

> "If we play games not as ethically informed archaeologists, if we do not write about games or critique games from an archaeological perspective, we are submitting to the power of the game publisher and the game maker to set the terms of reference about the past" [236].

Even if archaeologically recording *Elden Ring* does not technically fall within the intended player experience of the game, it is a valuable undertaking in providing that record.

We follow appropriate guidelines as have been set out in the *No Man's Sky Archaeological Survey Code of Ethics*[182] and the Chartered Institute for Archaeology's Code of Conduct [16] and the Computer Applications & Quantitative Methods in Archaeology Ethics Policy [280]. We have also drafted our own *Elden Ring* Survey Code of Conduct Guidelines to accommodate the specific requirements of our study, as follows:

1. Survey members will not rate any messages they encounter. Survey members are not to impose or express any value judgements on any messages, bloodstains or any other aspect of player data they encounter.
2. Survey members will not leave any of their own messages in the survey area.

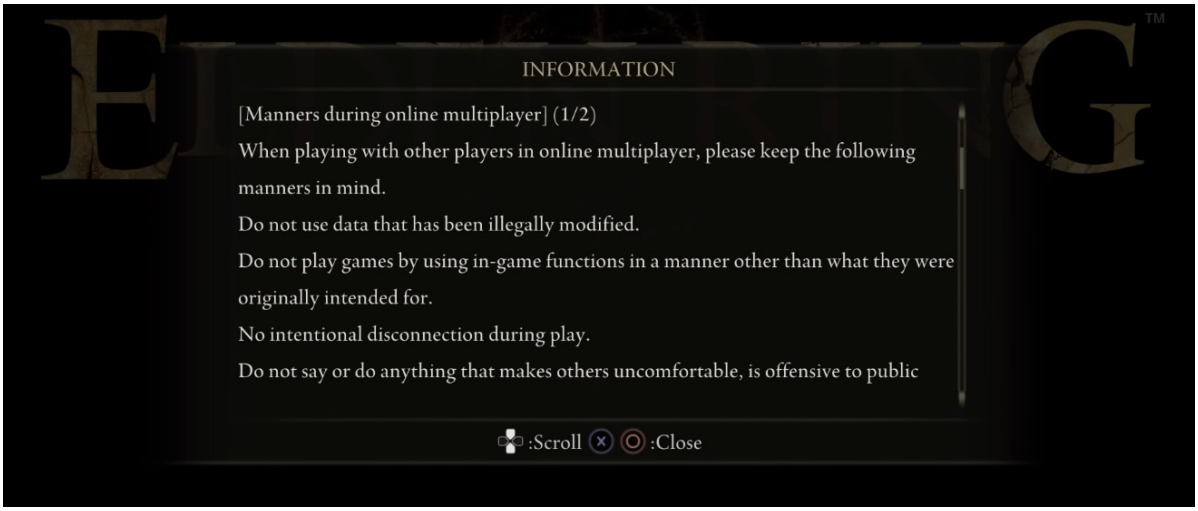

Figure 7.3: Elden's Ring's 'Manners During Online Multiplayer.'

3. Survey members will not transcribe any messages which they deem to contain derogatory content or have derogatory connotations.[2]
4. Survey members are to take their role as stewards of player data seriously. In particular, blood stains show player deaths, which are understood to be potentially vulnerable moments for players.
5. Survey members will uphold professional archaeological standards and maintain accuracy in their recording as far as reasonably possible. It is understood that network connectivity or other technical issues could interfere with surveying. If this is the case, survey members will make a note of any such interruptions.
6. Survey members are to put their own health, safety and wellbeing first. The archaeological surveying of video games can be intense work. Survey members are to take frequent breaks during the recording process.
7. The results of this survey will be publicly accessible, published online.[3]

7.3.2. Site Selection

Overview

We initially considered a large open area in *Elden Ring* and modelled our investigation as a kind of fieldwalking survey [243]. We chose an area in Limgrave (see Figure 4) with varied topography and enemies. Limgrave is the first area that the player encounters after the initial prologue of the game, and is also an area that both surveyors were familiar with, so it presented an appropriate case study. As part of a trial run, we mapped the location of enemies and other points of interest on the map using in-game markers. Once we tried to record the location of player bloodstains, however, it became clear that the in-game map was too schematic for this purpose. Moreover, the density of bloodstains that would appear over time meant even within one small building (the Church of Elleh) there was a large amount of data to record. For this reason, we decided instead to focus our attention on two small self-contained areas in Limgrave.

Church of Elleh

The Church of Elleh is a ruined church located due north of the location the player begins the game in. The player is explicitly led to the Church as part of the game's critical path by following golden trails of light produced by Sites of Grace[4], and corresponding golden map markers (one of which can be seen in Figure 7.4, guiding the player north from the church). The Church contains two important features: an anvil, which allows players to upgrade their weapons (the only way to do this during the first few

[2] My thinking on this changed in the subsequent survey of *Elden Ring*, as is discussed in Chapter 8.
[3] https://github.com/florencesn/Elden-Ring-Survey-2022
[4] Sites of Grace function as checkpoints which the player can fast travel to and level up at.

hours of the game); and a merchant, enabling players to purchase items (likely the first merchant the player encounters, although it is possible to meet others by exploring off the main path).

New players are also likely to encounter two key narrative beats in the church, too. Melina, an NPC who is central to the plot and also provides players the ability to level up and increase their strength, can appear for the first time at the Church of Elleh[5]; and Ranni, an NPC who has a large secondary storyline and quest, also appears to the player here and gifts the player the Spirit Calling Bell [6].

In addition, the Church is close to optional bosses, dungeons and other special game content, many of which the player will be encountering for the first time. Therefore, the Church represents an excellent location to study, as it has narrative, mechanical and structural significance for the player, and thus should allow us to observe a rich collection of player experiences and recorded reactions. We chose to survey all of the ground within the boundaries of the Church walls.

Stormfoot Catacombs

Elden Ring's world contains many caves, catacombs and dungeons which act as optional side content for players. Most of them follow a similar pattern: a linear sequence of rooms, often with a unifying mechanical theme, culminating in a boss fight with a significant reward. Stormfoot Catacombs is geographically one of the closest dungeons to the start of the game, however it is not necessarily the most commonly encountered dungeon as it is off the main path and requires exploration to find.

We selected Stormfoot specifically as it is one of the earliest examples of a side area with both novel mechanics and ambush traps. Stormfoot contains several rooms in which enemies are hiding behind entrances waiting to attack the player as they enter, and it is also the first appearance of 'fire pillars', stone statues that periodically shoot fire down corridors. Attacking the pillars in any way causes them to recess into the floor and stop shooting fire.

A key role for both bloodstains and messages in areas such as this is to act as a warning for players. Bloodstains indicate danger and can give hints as to how someone died, and messages are often used explicitly to warn others. We theorised that Stormfoot Catacombs would have good examples of both of these, given the nature of the traps and ambushes present. We chose to survey a corridor midway through the catacombs that immediately precedes the room containing the first fire pillar, and an ambushing enemy.

7.3.3. Data Collection

When considering methodologies for data collection, it was important to prioritise what was most relevant to our research questions. Being able to identify and record individual player messages and bloodstains was our focus, so we considered both as artefacts and created a spreadsheet modelled on an archaeological small finds register [517]. Unlike artefacts in the analogue world, messages and bloodstains are all of identical dimensions and usually at the same depth on the ground (edge cases are messages which are placed on in-game surfaces). Each artefact was given a unique ID corresponding with the 'trench' it was found in. Each surveyor played the game on a different platform (PC and PlayStation4) which was also recorded in the spreadsheet for context. In addition, there were fields for 'Associated Game Assets' and 'Associated Player Created Assets' to capture if messages or bloodstains were in close proximity to game assets such as non-player characters (hereafter NPCs), or if they were associated with other player created messages and bloodstains.

The ephemeral, fleeting nature of both bloodstains and messages in the game presented a challenge, as they could appear and disappear within a few minutes depending on when the game server updated. We approached this through the methodology of archaeological context. An archaeological context is the:

> "position and associations of an artifact, feature, or archaeological find in space and time. Noting where the artifact was found and what was around it assists archaeologists in determining chronology and interpreting function and significance" [5].

[5] This is slightly variable as it triggers based on player exploration, but Elleh is a common site to first encounter Melina in.
[6] Ranni only appears at night, thus it is possible but unlikely to miss this.

Figure 7.4: Map of trial study area outlined in red. Bloodstain locations are denoted by numbers highlighted in red.

Site code: ER22	Trench No: 1		
Context	Asset ID	Platform	Asset Type
29032	1013	PS4	Message
29032	1014	PS4	Message
29033	1015	PS4	Blood Stain

Figure 7.5: Extract from survey spreadsheet

To give an example from analogue archaeology, the archaeological context of an artefact would be the fill of a pit it is found in. The pit fill is identifiable from its distinct composition as opposed to the clay into which the pit has been cut. By identifying the context of the artefact, archaeologists can infer that it was deposited in the pit after it was dug, and that it would likely be contemporaneous with any other artefacts found in the same pit fill.

While we recorded the spatial context of each message and bloodstain on a plan (see the section below), we recorded the temporal position of each asset relative to when it was observed on a particular day and at what observable number of server refreshes. Figure 5 provides an example of this from our spreadsheet. In this example all three assets (1013, 1014 and 1015) were recorded on the same day (29th of March), but 1015 appeared after the other two and so is given the context number 29033.

7.3.4. Archaeological Planning

Recording the location of messages and bloodstains relative to the extent of the surveyed areas also presented a challenge for our study. In the case of Reinhard's *No Man's Sky* Archaeological Survey, he used time maps (a record of how long it took to walk to different assets from a set point) and aerial photography to make plans. Aerial photography is not an option in *Elden Ring*, and our survey 'trenches' were small enough that scaled plans were deemed more appropriate. Archaeological plans are a standard method for recording the extent and surface of a context [615]. Using an online graph paper tool, we were able to create base plans of the Church of Elleh (Figure 6) and part of Stormfoot Catacombs (Figure 7) by using a player avatar 'tarnished foot' as a measurement.

This method was time-consuming and required some approximations, but it did produce base plans that we could use for the purpose of our survey. Where possible, in-game assets were recorded on the base

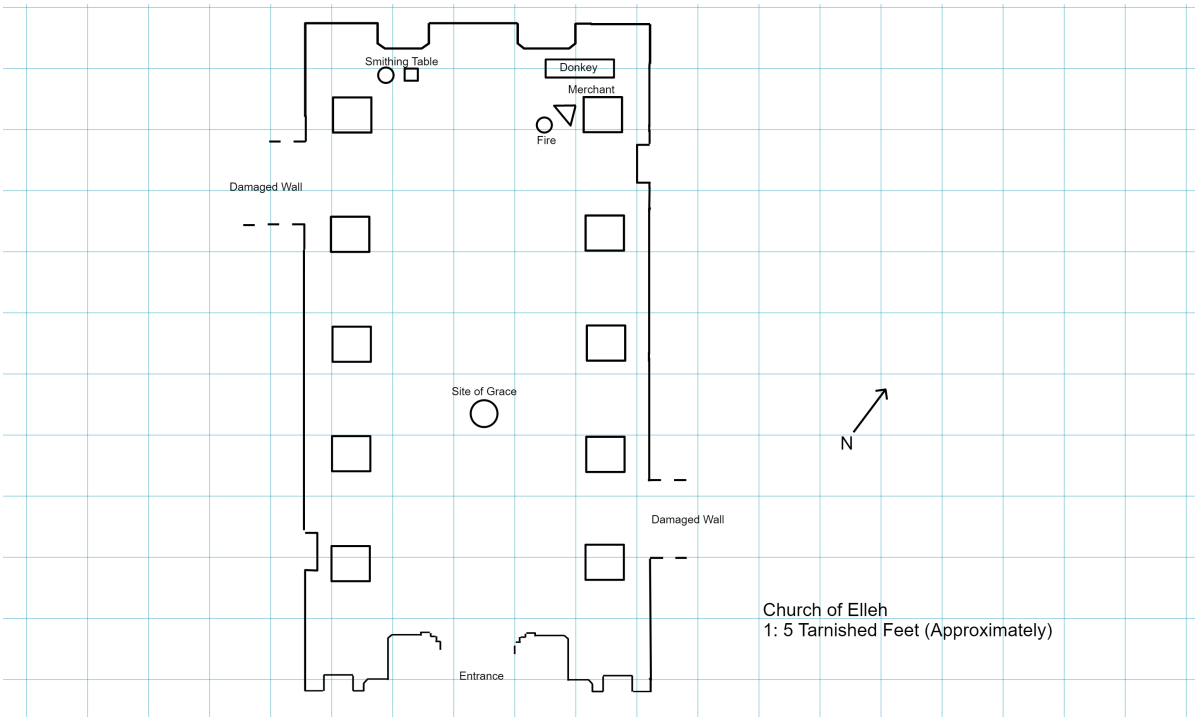

Figure 7.6: Church of Elleh Base Plan

plans. In the case of the Stormfoot Catacombs plan, for example, only skulls and not individual bones were recorded on the plan as there was some concern this might make the recorded messages and bloodstains less legible. To our knowledge, this is the first time that hand-created plans to scale have been used as part of an archaeological survey of a video game, rather than in-game maps, photographs or more abstract methods.

7.3.5. Photography

As in analogue archaeology, photography was a crucial recording method in our archaeological survey. Initially we also considered recording video footage, but decided that for the purpose of this study screenshots would be sufficient to record the location and contents of messages and bloodstains. On further reflection, video footage would have been particularly useful as an aid in analysing bloodstain ghosts that often moved quickly and were difficult to capture with screenshots. *Elden Ring* does not have a dedicated photo mode. There is a mod available which allows players to move the camera around freely and pause the game [116], however it has to be used offline, rendering it useless for our survey. Archaeological photos usually contain some form of scale for later reference. In our case, our own player avatars functioned as a scale in the screenshots. Though this was effective for the purposes of our survey, this practice of using a human body as a scale in archaeological photography does have colonial antecedents [100] and we would aim to explore alternate methods in future, especially in other games.

7.4. Results

Not including the pilot study, the survey was undertaken between the 29th and the 31st of March 2022 by myself and Mike Cook. I conducted my survey on the PlayStation 4 (hereafter PS4), and Cook conducted theirs on PC. In total, 14 bloodstains and 14 messages were recorded in the Church of Elleh, and 8 bloodstains and 4 messages were recorded in the Stormfoot Catacombs. Each location was surveyed on three discrete occasions (once on the 29th by both surveyors and once on the 31st by one surveyor). The greater number of records produced in the Church of Elleh likely reflects that location serving as a player hub and it representing a larger surveyed area. The overall small sample size is a result of time constraints and other work commitments we had during the survey. The results will be discussed by location and context.

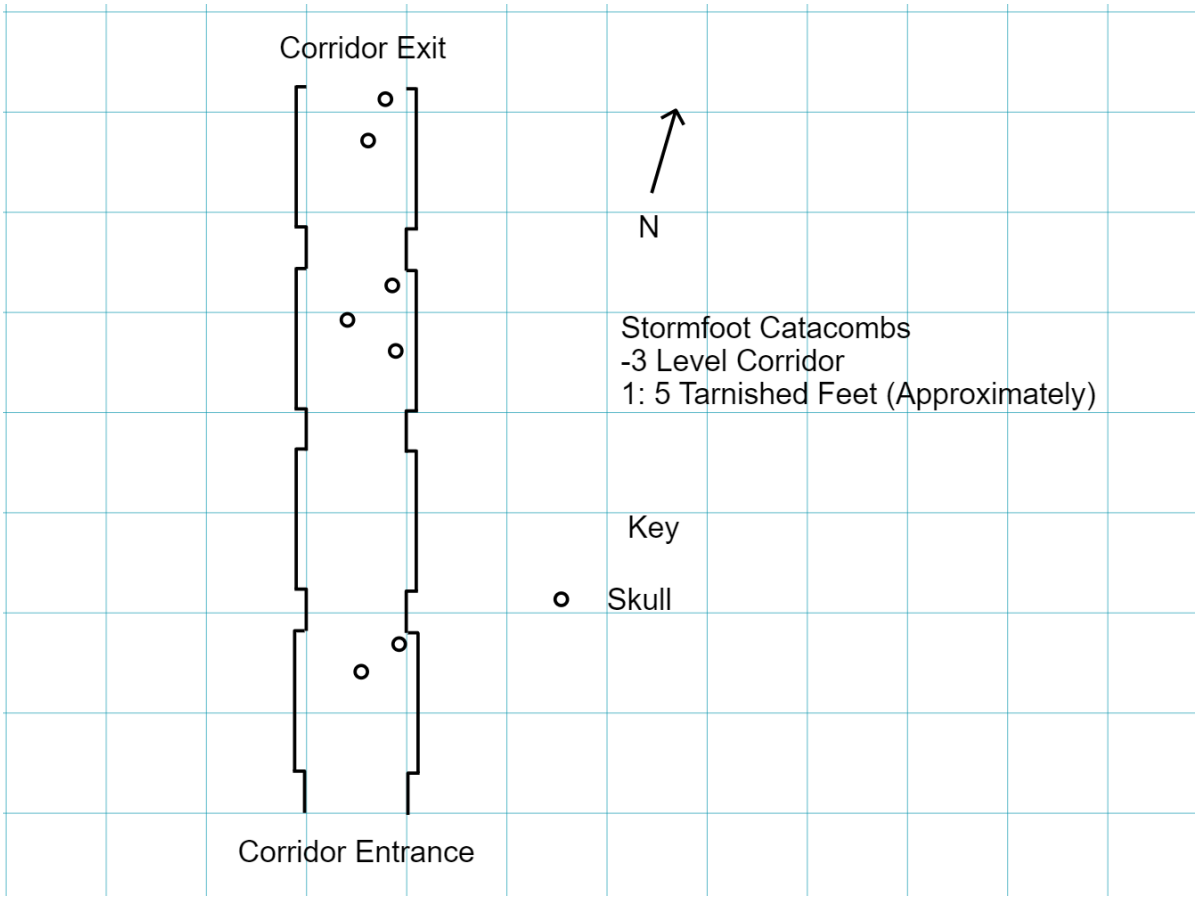

Figure 7.7: Stormfoot Catacombs Base Plan

7.4.1. Church of Elleh

Contexts 29032 and 29033

Both contexts were recorded on the PS4. Context 29032 contained two messages (1013 and 1014). Message 1013 read ”Praise the fingers!” which is assumed to be a reference to the Two Fingers NPC. Message 1014 reads ”Behold, something incredible!” and was placed in front of the smithing table, perhaps as a joke. Context 29033 represented a discernable change with the appearance of four bloodstains which were rapidly batch recorded under the asset ID 1015 in the northern half of the church. Unfortunately, this meant that no further data pertaining to the bloodstain ghosts were recorded in this case.

Context 29036

Three messages were recorded within this context on PC, all located near the Site of Grace within the church. Message 1016 read “Seek lover”, and was placed directly in front of where the NPC Ranni appears, as described in Section 7.3.2. Such messages serve a dual purpose: to players who are yet to encounter Ranni they act as player-authored foreshadowing, whereas experienced players may experience them as the textual equivalent of a knowing nod, acknowledging the shared experience. Message 1017 and 1018 were closer to the Site of Grace itself. The first reads “stay calm/skeleton”. We interpret this as addressing the player. In previous *Dark Souls* games the player is explicitly ‘undead’ in the narrative - in *Elden Ring* they are referred to as ‘Tarnished’ but similarly unable to die permanently. Addressing the player as skeleton would make sense. Message 1018 reads “First off, safety/And then time for lover”. This is likely an instructive message to new players, informing them this is a safe place, and following up with foreshadowing a meeting with either Melina or Ranni. Female-coded NPCs in From Software games are often referred to romantically in messages, and the NPC calling herself Ranni in particular became a fan favourite shortly after release.

Context 29037

Context 29037 was recorded on PC. Shortly after recording Context 29036, walking across the site to the merchant, two messages were spotted. Message 1019 read “Be wary of dog”, and is located just in front of the donkey belonging to the merchant. A consistent joke in *Elden Ring*’s community is mislabelling any non-canine animal as a dog, which this is a prime example of[7]. Message 1020 expired while recording Message 1019, so its content is not known to us, but its location is significant: it is written directly behind the donkey’s hind end. Given our experience of community messages throughout *Elden Ring*, we suspect this message was probably a joke at the donkey’s expense.

Context 29038

Context 29038 was recorded on PC. Turning around from Context 29037, three bloodstains were spotted – two close to the merchant, with a third further away near the Site of Grace. Bloodstain 1021 shows a character fighting near the merchant, wearing armour that is found in mid-game areas after advancing certain questlines. This is notable as the Church is very near the start of the game. Bloodstain 1022 is located almost on top of the merchant, and may depict a player fighting the merchant and dying. They also appear to be wielding a late game weapon, in this case one obtained by fighting a secret boss at the very end of the game. Bloodstain 1023 is located nearer to the Site of Grace, close to Message 1018, and thus is further away from the merchant so the cause of death is harder to identify. The player wields another late game weapon found in a rare area.

Context 31031

This context was recorded on the PS4 and contained three messages, two of which (1025 and 1026) appear to be identical to 1013 and 1014. This indicates that it is possible for messages not to be refreshed in an area, even after several days have elapsed. Message 1024 was located close to the Site of Grace and read “Time for night.” This is assumed to refer to the ability to allow time to pass at a Site of Grace. It could potentially be referencing the presence of the NPC Ranni the Witch, who appears at the Church of Elleh on one occasion at nightfall.

Context 31032

Context 31032 was also recorded on the PS4 and contained four bloodstains (1027-30). All of these bloodstains showed players dying in combat. Bloodstain 1029 was particularly interesting as it displayed a player wearing the Iron Kasa helm. This helm can only be acquired following a specific NPC questline [281], indicating this player had completed this and returned to the Church afterwards.

Context 31033

Context 31033 was also recorded on the PS4 and contained eight bloodstains and two messages. This context rapidly appeared after 31031 and 31032, indicating the speed with which the player-created content can change the experience of a space in the game. Out of these bloodstains, 1034 and 1035 are of particular note. Bloodstain 1034 showed a player holding the Fingerprint Stone Shield. This shield can only be obtained after defeating a lategame boss and dispelling an illusory wall [612]. It is a desirable item as it is one of the best defensive armaments in the game. Bloodstain 1035 also showed a particularly desirable item: the Sacred Relic Sword. This sword is acquired by trading an item which can only be obtained by defeating the final boss of the game, indicating that this player may be on their second playthrough. Messages 1037 and 1038 were both located near the entrance to the Church of Elleh and appear to be earnest guidance to other players. Message 1037 read “merchant ahead and then sorcerer ahead” and message 1038 read “friend ahead.”

Context 31034

This context was recorded on PS4 and occurred as a result of the surveyor accidentally dying at the hands of the Tree Sentinel by the entrance to the Church of Elleh. Upon death, the surveyor observed the Tree Sentinel damaging the church itself. This observation was confirmed to be true by a Reddit forum post [139]. Rather fittingly, message 1039 was the only asset recorded in this context upon the surveyor respawning and returning to the entrance, and it read “First off, keep moving” which was likely a reference to the danger of the Tree Sentinel.

[7] Later in the game, many canine animals are found next to messages that label them as anything *but* dogs.

Context 31035
This context was the last recorded on PS4 in the Church of Elleh and contained only one message, 1040, which read “Could this be a love?” Like message 1016, this likely refers to the NPC Ranni the Witch.

7.4.2. Stormfoot Catacombs

Context 29031
This context was recorded on the PS4 and contained only one bloodstain (2001), which reflects the paucity of player created assets that can on occasion spawn in this area. The message was located at the end of the corridor and likely was a result of the player dying to the Imp or Fire Pillar in the next chamber.

Context 29034
In this context, recorded on PC, two messages were discovered at the end of the corridor, immediately preceding the opening into the next room. Message 2002 reads “Be wary of up”, a reference to the Imp waiting to pounce on the player, clinging to the wall above and to the right of the doorway. Message 2003 reads “fire ahead”, a reference to the fire pillar trap in the next room. Both messages act as warnings for the player about obstacles ahead.

Context 29035
This context, also recorded on PC, was encountered outside of the official site area, in the room directly following the corridor. Two bloodstains and one message were observed and recorded. Message 2005 reads “Be wary of fire/Try attacking”. This is a cryptic reference to the fact that fire pillars will deactivate if hit by an attack, therefore a ranged attack fired down the corridor will render it completely safe. Bloodstain 2006 shows a player in mage’s robes fighting something (most likely the Imp) and dying, while bloodstain 2007 shows a player running quickly down the corridor and then dying, almost certainly to the fire. The fire pillar periodically stops to allow players time to dash, this player mistimed their run and died just inches short of the next safe zone.

Context 29036
This context was recorded on the PS4 and contained one message (2008) and one bloodstain (2009). Message 2008 read “be wary of fire” which is assumed to be a reference to the fire pillar in the next chamber. The bloodstain showed a player of likely Samurai class running from the south-east, potentially attempting to run away from one of the Imps in the preceding chamber.

7.5. Discussion

7.5.1. Surveying Elden Ring

This study represents one of only a handful of video game archaeological surveys that have ever been undertaken, and the only known archaeological survey of any Soulsborne game. Furthermore, this is the only known study which used hand-drawn plans to scale as part of the recording process. The survey was small with only 40 records made in total (not counting the pilot survey) and would certainly not be applicable for quantitative study. However, we believe it does represent a successful qualitative sample of the asynchronous mingleplayer experience in the game, proving that it is possible to archaeologically record player messages and bloodstains in *Elden Ring*. Moreover, and more importantly, we were able to respectfully and accurately record player messages and bloodstains in line with our stated Code of Ethics.

The experience of creating the base maps was intense screen-based work, and we would certainly flag this as an important wellbeing consideration for future surveys. We would hope to see more engagement with creative plan-making in archaeological surveys of video games. A recent study [392] highlighted the importance of drawing for archaeologists in terms of forming mental maps, and our experience creating plans of the Church of Elleh and Stormfoot Catacombs confirmed this. For example, the in-game experience of carefully delineating each survey area aided us in understanding how the spaces were constructed from repeated assets.

7.5.2. Excavating the Meta

One of our proposed research questions related to the possibility of recording aspects of the *Elden Ring* metagame. A metagame can be defined as a game within a game, in which players create their own rules beyond the 'canon' constraints of the original. The player messages in *Elden Ring* arguably constitute a metagame in themselves as they represent a broader tradition of players using the feature in Soulsborne games to make jokes and reference memes propagated through social media, as mentioned in section 7.2.4. In the Church of Elleh, we identified three potential references to the NPC Ranni the Witch that referred to her as 'love' or 'lover' (1016, 1018, and 1040). We were able to theorise this based on knowledge of the *Elden Ring* fandom, in which Ranni is a fan favourite character. This is reflected in reporting on fan art of the character [370][608]. These messages represent a kind of metagame in encouraging or guiding other players to the character in-game. In addition, message 1019 is a classic example of the *Elden Ring* meme of referring to any in-game animal as a dog.

In considering our pursuit of the metagame, we found this point from Patrick LeMieux and Stephanie Boluk's Metagaming [71] to be particularly instructive:

> "The concept has taken on renewed importance and political urgency in a media landscape in which videogames not only colonize and enclose the very concept of games, play and leisure but ideologically conflate the creativity, criticality, and craft of play with the act of consumption."

In the Code of Ethics section we discussed how this survey could be interpreted as falling outside of the *Elden Ring* 'Manners During Online Multiplayer.' In a sense, this survey was a metagame, requiring the surveyors to engage with the game space creatively in order to create an archaeological record. That being said, by highlighting aspects of online fan culture in our analysis of the game, perhaps we are falling into the trap of conflating creativity with consumption in exactly the way that LeMieux and Boluk warn against.

7.5.3. `Fashion Souls' as Archaeology

'Fashion Souls' is a specific subset of the *Elden Ring* player community who share outfits they put together in the game, mainly on a subreddit boasting over 80,000 members [471]. So influential is this digital sartorial community that they were even featured in a mainstream fashion magazine [234]. This aspect of player culture and experience became relevant to our survey when we realised that we could identify specific armour and weapons from bloodstain ghosts. For example, when recording bloodstains in the Church of Elleh we found some player ghosts wearing starter clothing for certain character classes. This makes sense, as the Church is one of the first locations a player will encounter in the overworld. Other bloodstain ghosts, however, wore more unusual armour sets and weapons. We were able to identify some of these through our own experience of playing the game, while others required looking through the player-authored wikis and comparing our screenshots with online images. We sought out identification for one particular weapon by consulting an *Elden Ring* expert player. This aspect of our analysis was particularly interesting because it mirrors the practice of consulting with finds specialists in analogue archaeology, such as experts in pottery or metal artefacts. Our observations on players with items or armour from the late game of *Elden Ring* also has implications for studying player experience in demonstrating that the Church of Elleh is a hub that players return to, despite being in the starting area of Limgrave.

7.5.4. Elden Ring as Palimpsest

The metaphor of the 'palimpsest' is perhaps overused in archaeology, but in this case we believe it is highly appropriate. A palimpsest is a manuscript which has been scraped or washed so that it can later be re-used, often with fragments of the original writing remaining. With the continual overlay and removal of player messages, *Elden Ring* can be considered as a digital palimpsest. Bailey [35] has discussed the application of the palimpsest metaphor in archaeology. The *Elden Ring* messages are potentially an example of what he defines as true palimpsests in the sense that all remains of previous messages will eventually be removed completely when the server updates for a specific player. However, as messages often reference each other, there is a sense in which partial impressions of other players' experiences are also preserved. Bailey argues that palimpsests, in potentially totally erasing or obscuring earlier contexts, present a challenge for archaeologists. In particular, he argues that:

> "we cannot work out what tools we need until we know what sort of phenomena are there in the longer-term record to investigate, and we cannot investigate those different phenomena until we have some tools to do it with" [35].

This paradox is at the heart of archaeogaming research – we need to develop new tools and methods for the archaeological recording of immaterial space, but we cannot know what methods will be most effective until we apply them. This survey constitutes one potential approach for recording complex digital palimpsests, and we hope to build on this in future.

7.6. Limitations

7.6.1. Recording Interpretive Play In Situ

Different archaeological sites present their own opportunities and affordances, and digital game worlds are no different. Games provide an opportunity to use other software to enhance or automate elements of the archaeological survey process. For example, both messages and bloodstains must be retrieved from the server before they can appear in-game. In theory, we could watch network traffic and (assuming the information was not encrypted) automatically collect this information from the server, instead of finding it in-game. However, there would be ethical concerns about harvesting player data using this approach, and it would definitely contravene *Elden Ring*'s Online Code of Conduct.

This approach would also have implications for the nature of the survey. We gained important insights by experiencing the data *in situ*, as well as a better understanding of the environment itself. One contribution of this work was the adaptating the concept of archaeological context to our own *in situ* experience of how and when we encountered specific assemblages of messages and bloodstains. In this sense, this survey not only recorded player traces but our own interpretive play experience as well. As stated in subsection 7.3.5 above, videography would have been particularly useful for better capturing the dynamism of bloodstain ghosts. We built on this study by using videography in the follow-up survey, as detailed in chapter 8.

7.6.2. Longitudinal Surveying

It is unclear to us, at the time of writing, how the distribution of messages in a From Software game changes its lifespan. *Dark Souls* was originally released in 2011, and few people play the game regularly today compared to its peak. Yet playing it today still shows player ghosts, bloodstains and messages, as the servers retrieve older messages and display them. Playing *Elden Ring* in 2027 or 2032 will likely yield a different mix of messages and player ghosts to today – although some of the messages we have recorded may still be seen by some players.

Performing several studies of this kind, interspersed over a long period of time, could help yield new insights into how the composition of messages and ghosts changes. This could show us evidence of *Elden Ring*'s social meta developing, the composition of the player base changing (since more hardcore players tend to make up a larger proportion of the community as the game ages), and the nature of player communication maturing.

7.7. Conclusion

In this chapter I present a proof of concept for archaeologically surveying ephemeral player-generated content in *Elden Ring*. To date, there have been an extremely limited number of archaeological surveys in video games. This work helps fill the gap in this research area with new recording techniques and methodological approaches which could be applied to other games. Through a survey of just two sites, we recorded 40 messages and bloodstains, which represented a rich qualitative sample. Furthermore, this work included the first known use of scale plans to archaeologically record a video game. In terms of the four research questions that we posed, arguably we most successfully answered whether it is possible to conduct a survey of this nature in *Elden Ring*, and only partially addressed the other questions. Further, more extensive surveys would allow us to more fully engage with these research questions, especially in terms of player experience and game design.

Our findings show that archaeological surveys are an effective method not just for gathering user-generated content directly, but also for observing the culture and essence of a player community. Player

messages referring to the NPC Ranni, for example, are indicative of a wider metagame of messages to signpost and comment on popular characters, events and mechanics. It was also possible to make specific inferences about player behaviour through observing player avatars – we were able to interpret the armour worn by bloodstain ghosts to deduce that even after accessing late game content players return to the Church of Elleh. This shows that this research has applications in the study of player behaviour and experience, as well as archaeogaming and game design.

The following chapter builds on this initial survey by refining the methodology in order to more holistically capture the researcher-player experience, and provide a sample of *Elden Ring* at another key stage in its life cycle. In Chapter 6, I adapted the ethnographic methodology of the go-along. Chapter 7 is a proof-of-concept for adapting the archaeological survey to player traces. Chapter 8 ties these both together by conducting a collaborative autoethnography, recording the experience of an archaeological survey undertaken in *Elden Ring Shadow of the Erdtree*.

8

Collaborative autoethnography in Elden Ring: Shadow of the Erdtree

> ”I opened the book at random and read, ’...by which means a picture might be graven with such skill that the whole of it, should it be destroyed, might be recreated from a small part, and that small part might be any part.’ ”
>
> – *Shadow & Claw: The First Half of The Book of the New Sun*, Gene Wolfe [625]

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8.1. Introduction

To date, there has only been a limited number of projects that could be counted as “practical archaeogaming,” [479] which involves the treatment of in-game environments as archaeological sites. There is currently a “tsunami” [24] of digital content that, unless it is recorded, will be lost or without context in the future. The application of practical archaeogaming methodologies to video games is one strategy for preserving ephemeral play experiences.

In Chapter 8, we established a novel methodology for archaeologically recording player traces in the base game of *Elden Ring*. One limitation of that previous survey is that we did not include videography in order to capture dynamic player traces, and we were interested in sampling the game in future to see if and how the use of these asynchronous multiplayer features changed over time. The work in this chapter addresses these points. We report on a combined archaeological survey and collaborative autoethnography of the single player action role-playing game *Elden Ring* [196]. We conducted our survey immediately before and after the release of *Shadow of the Erdtree* [197], a downloadable content (DLC) expansion, in order to sample the game at a time in which its players were experiencing a significant update to the base game. This was in June 2024, over two years after the previous survey in March 2022.

Collaborative autoethnography as a methodology has not been widely applied to the study of video game experiences, however we chose this method as it allowed us to engage in first-person reflection on our affective experience as player-researchers. Collaborative autoethnographies also have an advantage over singular autoethnographies in that they allow for the comparison of multiple viewpoints. In our case, the two authors wrote memos while watching the video footage of the original archaeological survey, and then came together to engage in a diffractive analysis of these materials.

8.2. Motivation

This work began as an archaeological survey of *Elden Ring* at the time of *Shadow of the Erdtree*'s release in June 2024. Surveying player traces in the game's landscape is a form of indirect play preservation - applying archaeological methods to digital artefacts such as this is appropriate for a discipline that is traditionally concerned with interpreting fragmentary evidence. Furthermore, we are motivated to record ephemeral traces in games in line with the archaeological concept of "preservation by record" [483]; this is the process by which archaeological remains are preserved through rigorous records that can be accessed in the future. This is also applicable to play preservation.

We realised that the video recordings of the fieldwork formed another layer of play preservation record - that of our own research process. We decided to conduct a *retrospective* collaborative autoethnography based on these video diaries in order to reflect on our own interpretive experience. This analysis is a form of metaresearch, which has been recently flagged as an important strand of HCI research [433]. Furthermore, capturing the process by which we interpreted the traces of other players has also been highlighted as a key part of archaeological enquiry, beyond just focusing on a static record [8].

Thus, the work functions as play preservation on two levels; the indirect play preservation of traces left by players in a game environment, and the autoethnographic analysis of our archaeological fieldwork. We argue that we were engaging in what we call *archaeological play*, that had its own self-imposed rules and limitations, and involved engaging with and interpreting the environment and enemies in the game as well as player artefacts. Furthermore, the use of retrospective collaborative autoethnography allowed us to interrogate the limits of videography as play preservation [415], as even our own recordings required further contextualisation.

8.3. Hauntology, entanglement and video games

8.3.1. Definitions

The term "hauntology" was coined by Jacques Derrida [148], broadly referring to cultural ideas from the past 'haunting' the present. The scholarship of Mark Fisher [179], on contemporary music being stuck in nostalgia for an imagined future that never actually materialised, is perhaps some of the best known work on hauntology. The concept has also been applied more broadly, for example to ethnographic studies in the form of "spectral ethnography," that engages with the "traces, artifacts, and other resonances that people leave behind" [18].

8.3.2. Hauntology and video games

Aside from music, there has been a considerable amount of research interrogating the video game as a hauntological medium. For example, the indeterminacy of the video game playthrough, in which a player can load a previous save, is discussed in Janik's work [283], a thread which is further pulled by Atkins [22] who considers a player's memories of previous playthroughs as an Other to which they compare themself. Sweeting [561] has argued that the video game form is haunted by nostalgia, exemplified by the continual production of remakes. Kreminski has also applied hauntology to procedural content generation, a technique used to algorithmically generate content in games, arguing that both players and designers are haunted by the prospect of its perceptual collapse [321]. Hauntology has been used to recontextualise design choices in specific video game titles, such as glitch aesthetics[294] in *Tacoma* [201] , and the representation of ancient societies [185] haunting the fictional worlds of the *Mass Effect* Trilogy [65] and *The Legend of Zelda: Breath of the Wild* [424].

8.3.3. Hauntology and HCI

Hauntology's uptake in HCI, has mainly focused on its design potential [247] [83]. In particular, Patil et al have engaged with hauntology as an invitation for designers "to attend to absence, uncertainty, and plurality in their work." [441].

8.3.4. Relationship with entanglement theories

Entanglement theories can be broadly defined as a suite of theories that challenge the epistemological separation between humans and technology. Frauenberger has defined a new wave of HCI work that engages with these theories as "entanglement HCI." [188]. Specifically, he references the work of

(a) A player viewing a message left by another player. On the left is a ghost performing a gesture, attached to the message.

(b) A player viewing a bloodstain ghost. The bloodstain can be seen near the player's feet.

Figure 8.1: Asynchronous multiplayer features in Elden Ring.

Barad [44], in making the point that entanglement theories "have demonstrated how our knowledge practices have direct implications on the very nature and boundaries of things" [188]. Barad herself has made a link between the concept of hauntology and entanglement, questioning linear conceptions of time and scientific progress [45]. The broader implications for our own study relate to metaresearch – how do the methodologies we apply and our own subjectivity as researchers influence the data we produce?

8.4. Elden Ring Shadow of the Erdtree

As detailed in Chapter 8, *Elden Ring* is an action-roleplaying game released in 2022 by FromSoftware, whose games are characterised by high difficulty, indirect storytelling and asynchronous multiplayer. *Elden Ring* is From Software's best-selling game to date, selling 20 million copies in the first year of release [38], and acting as a first introduction to Soulsborne games for many players. Two years after launch, Elden Ring Shadow of the Erdtree, the game's only piece of DLC, launched. As of July 2025 the DLC has sold ten million copies – comparable to the sales of full-sized From Software games [39, 40].

8.4.1. Asynchronous Multiplayer

Elden Ring, like many previous FromSoftware games, provides a range of indirect forms of player interaction, usually referred to as 'asynchronous multiplayer' or sometimes 'mingleplayer'. These systems allow players find evidence of the past presence of other players. Though these features were explained in the previous Chapter, we will briefly reiterate how they work.

Messages

Players can leave messages on the ground during play, composed using a specialised grammar containing a modest set of template phrases and keywords. As players explore the game, other players' messages are retrieved from the server and appear as glowing runes. Inspecting a message will display a pop-up window with the contents of the message along with any attached gestures (see below). Because of the high density of players, the server retrieves only a few messages at a time, although the process by which it does this is not known. Messages are also translated across languages, which has led to unusual cultural phenomena surrounding puns or untranslatable memes [353].

Upon viewing a message players can optionally appraise it. When this happens the author of that message receives a small amount of healing when they next play. Historically, message-writing has been used to both help and hinder players. Messages are also used to propagate jokes and other cultural trends, some of which have persisted across many games, such as messages reading 'Don't give up!' left next to skeletons and dead bodies.

Bloodstains and Ghosts

Along with messages, players may sometimes find bloodstains on the ground. Interacting with one of these bloodstains will cause a 'ghost' to appear, a translucent red shadow of another player who has died nearby. The ghost will act out their final movements up until their death. Nothing else from the ghost's gameplay is visible, including enemies, spell effects, and summoned creatures, and it cannot

be interacted with. Unlike messages, bloodstains cannot be intentionally left –- the game automatically handles recording, but it is not known whether every player death is stored as a bloodstain.

Gestures

Many FromSoftware games include a set of 'gestures' – actions the player can take to perform an animation, such as pointing or bowing. The main function of gestures in FromSoftware games has been to communicate with players during synchronous multiplayer such as invasions or co-operation. For example, it became convention to use bowing or other reverential gestures before engaging an opponent in player-versus-player combat. *Elden Ring* allows the player to attach a gesture to a message. When the message is read a ghostly form of the message author will appear and perform that emote, wearing the clothing and wielding the weapons they had when the message was written. This greatly expanded the social importance of gestures, since it allowed users to perform them even when not engaging in direct multiplayer. *Elden Ring* also has the largest set of gestures in a Soulsborne game, as well as a large set of unlockable gestures, which require certain actions to be taken to obtain them, some of which are quite complex.

8.5. Method

8.5.1. Study aims

Our study has two main strands; an archaeological survey at the time of *Elden Ring Shadow of the Erdtree*'s release, and the subsequent collaborative autoethnography of the survey and its paradata. Our research questions are anchored around these two complementary strands, and can be summarised as the following:

- RQ8.1: To what extent do player messages and bloodstains reflect community engagement with the Elden Ring Shadow of the Erdtree DLC release?
- RQ8.2: How does a collaborative autoethnography of an archaeological survey of Elden Ring Shadow of the Erdtree contribute to play preservation practise?

8.5.2. Archaeological survey

We surveyed five sites in both the base game of *Elden Ring* and its DLC. We provide a short description of each site and the reason for its selection below.

Church of Elleh

The Church of Elleh is located in Limgrave, the first region that a player encounters in the base game of *Elden Ring*. A ruined church, it functions as a kind of early game player hub, containing a Site of Grace (a place that allows the player to heal, replenish resources and pass time), an anvil where players can upgrade their weapons, and a merchant from whom they can purchase items. Non-player characters Melina and Ranni, both of whom have relevance to the wider narrative of the game, can also appear here. Furthermore, the Church was targeted in our previous survey, thus it provides a point of comparison with other work. For the purposes of our study, it is also an early game location that had no direct link with the DLC release, which was useful to contrast with the other sites we selected to survey.

Mohgwyn Dynasty Mausoleum

The Mohgwyn Dynasty Mausoleum is located in Mohgwyn Palace, a late game area in the base game which is difficult to access. The area does not need to be visited to complete the game, but it contains a boss fight against Mohg, Lord of Blood, who is one of the game's five 'shardbearers'. The player must defeat at least two of these to complete the game, therefore it is possible some players never see this area. However, defeating Mohg also allows access to the cocoon at the back of the area, which is the only way to enter the DLC. FromSoftware announced that the entrance would be here ahead of its release, and so we selected this area as we hypothesised that player behaviour around the entrance would change before, during and after the launch day.

Gravesite Plain

Gravesite Plain is the first large region the player encounters upon entering the Realm of Shadow, where the DLC takes place. The site we have designated 'Gravesite Plain' is a smaller area within

Context	Asset ID	Transcription	Appraisals	Gesture	Armour	Associated Game Assets
M1-18061	3003	don't give up!	0	Finger Snap	Wearing Hoslow's Helm and potentially Cuckoo Knight Armour (or similar)	At entrance to mausoleum

Table 8.1: Excerpt from survey data of the site Mohgwyn Dynasty Mausoleum. Some columns have been omitted for space.

this, consisting of the space from the cave the player spawns in, through to the first Site of Grace encountered (which is called 'Gravesite Plain' in-game). This Site of Grace is in a large open field, with a dramatic view of several major landmarks, and offering multiple directions in which to begin exploring, but has no enemies nearby and is a relatively safe rest point similar to the Church of Elleh. We chose this site as it is the first location only accessible to players of the DLC, and is the only site all players of the DLC are guaranteed to have experienced since there is no way to diverge from the path before the Site of Grace. It also provides continuity with the Mausoleum site since accessing the entrance via the cocoon teleports the player to Gravesite Plain directly.

Three Path Cross

The Three Path Cross is the name given to a Site of Grace in the northern section of the Gravesite Plain region, situated at a three-way fork in a road which gives the Site its name. Although the player can explore in several directions from the start of the DLC, the 'critical path' takes them here, towards Belurat Tower and eventually the Shadow Keep. Its significance is reinforced by it being the site of the first of Miquella's Crosses, landmarks which are central to the DLC's narrative. The NPCs Redmane Freyja and Hornsent can also be found here initially. Both are critical to the DLC's story, and Freyja is first encountered in the Mausoleum, and so acts as the player's introduction to the DLC. Although the area is mostly safe, it also is near a patrol area for a rare miniboss, the Furnace Golem, which is several times the player's size and can be seen in the near distance at all times of day. We chose this location for these significant factors, and for its role as a thoroughfare for players in the early parts of the DLC.

Main Gate Cross

The Main Gate Cross is a Site of Grace located in the north-west of the Gravesite Plain region, along one of the paths from the Three Path Cross. It is located outside the entrance to Belurat Tower Settlement, the first major dungeon of the DLC. Two major NPCs are located here: Sir Ansbach, who is involved in a critical questline that changes the ending of the DLC, and Moore, another significant NPC who is also the first major merchant on the critical path and has his own significant sidequest. It also has a second Miquella Cross. This Site of Grace is closer to areas with enemies, as well as a major dungeon, and more connected to side paths and hidden routes across the edges of the Gravesite Plains region. We chose this site as it has more functionality than the other DLC sites (such as having a merchant) but is still located relatively early on the critical path, and so we could observe changing player behaviour there even very early after the DLC launched.

Data collection

Our data collection methodology was shaped around recording the artefacts of *Elden Ring*'s asynchronous multiplayer, namely player messages and bloodstains in the environment. We followed the procedure of our previous archaeological survey in *Elden Ring*, in recording each bloodstain and message with a unique identifiable number in a spreadsheet,[1] much like registered finds are recorded in more traditional archaeological excavations [14]. Player messages, along with their number of appraisals, were fully transcribed. We also recorded auxiliary information about associated game assets and player created assets which might have influenced the placement or content of messages. As player gestures became an important part of the data we recorded, these were also individually identified in the spreadsheet, along with fields for "Weapons" and "Armour" to take note of any notable gear visible in gestures or bloodstain ghosts.

[1]The dataset has been uploaded to the Internet Archive: https://archive.org/details/elden-ring-survey-dlc-dataset

As was the case in our earlier survey of *Elden Ring*, we chose to record the context of player messages and bloodstains according to which date and at what discernable server refresh they were observed at. In traditional, analogue archaeology, a context is defined according to the position and associations of an artefact, and in relation to other contexts [343]. For example, the content of a pit would have a specific context number, and the cutting of that pit must have happened later than the deposit into which it was dug. *Elden Ring*, like other digital archaeological sites, does not have contexts in the way that an analogue site does. However, when conducting a survey of player traces we are also essentially trying to document our own experience in how we encounter them, thus ascertaining context according to when messages and bloodstains appear in association with each other is one way of recording this. Table 8.1 shows an excerpt from the survey spreadsheet. The context "M1-18061" corresponds to the first surveyor in the Mohgwyn Dynasty Mausoleum ("M1") surveying on the 18th of June ("1806") with the first observable context set of messages and bloodstains ("1").

Videography

Screenshots were taken of each message and bloodstain.[2] While screenshots are useful as a static reference, they do not capture the dynamism of encountering these artefacts in the game environment. Other archaeological surveys have used videography to provide more context for a survey site and the spatial relationship between finds [478]. For the purpose of our work, in which we were particularly interested in recording not just traces of other players in the game world, but our own experience as player-researchers [88], focusing on making video records of our active survey process was a key part of our recording methodology.

As part of the survey, we recorded footage of ourselves doing two 'circuits' of each site in which we noted every message and bloodstain we encountered in the aforementioned spreadsheet, and took screenshots of them. In focusing on making video records for later reflection, and due to the high volume of data we collected, we chose not to draw plans of message and bloodstain locations, which does present a limitation in our recording process. However, we provide annotated screenshots of each survey site which can be found in Appendix B.

8.5.3. Retrospective Collaborative Autoethnography

Autoethnography is a qualitative research method in which the self is the primary subject of study. More specifically, Chang [105] defines it as the study of personal life stories in particular sociocultural contexts, using this personal lens to gain a deeper understanding of society. The method emerged during the 1980s during what is known as the "crisis of representation" in the social sciences [305], leading to criticism of research seeking "objective" truths, and recognition of the scientific value of subjectivity and researcher reflexivity. However, while autoethnography has been suggested as a solution to the ethical problems of representing the experience of others, it has been critiqued in terms of its limitation to one individual perspective [332]. Collaborative autoethnography, in which two or more researchers share their experiences and interpret this shared data, has been posed as a potential alternative [332] [105].

Like autoethnography more generally, collaborative autoethnography has considerable precedent for application in HCI. In recent years, HCI researchers have used collaborative autoethnography to reflect on their personal experiences as researcher-practioners, especially in terms of difficult emotions and topics, such as frustration and embarrassment [149], failure in design research projects [273], misunderstanding and ableism [268] and discomfort at heritage sites [36]. We chose to conduct a collaborative autoethnography as we were particularly interested in sharing our personal, affective experience of the survey, as they are a part of both the play and research context that can easily be lost.

More specifically, we engaged in a *retrospective collaborative autoethnography*, as we analysed the video diaries that we had made of the archaeological survey a year after their original production. As stated in the Motivation section above, we conducted this work retrospectively when we realised that our field videographies provided a further dimension to the project in terms of recording our affective experience of the knowledge production process. Retrospective collaborative autoethnography is a well-established methodology that "provides a serendipitous opportunity to discover new knowledge" [581], and it has has been employed in multiple HCI studies [273, 41].

[2]The scrnshots have been uploaded to the Internet Archive: https://archive.org/details/eldenringdlcsurvey

Autoethnographies have also been used to study personal experiences in games from an HCI perspective, such as the potential for transformative experiences [588] and the experience of returning to long-term single-player games [252]. The latter is particularly useful to our work as it conceptualises the role of the "Player-Designer" whose play experiences fed into their design work; we use the complementary term of "Player-Researcher" to define our role in this project.

The autoethnographic method has been used more widely in games studies research, for example, an analysis of players' semi-academic research in a video game lore subreddit [573]. Collaborative autoethnographies are far less common, with a few key exceptions. The first of these is a recent collaborative autoethnography [614] focusing on authenticity in historical games research and the *Plague Tale* series [20], especially in terms of engaging with historical games discourse from an affective dimension as opposed to a more traditional textual analysis. The second is a collaborative autoethnography of narrative and postcoloniality in *Civilisation VI* [178] [328], which also discusses the discomfort of interruptions while doing research.

In terms of video game archaeological projects, or "archaeogaming," there are limited examples of the application of ethnographic methods. Hansen employed both archaeological and anthropological methods in his study of the MMO *Star Wars Galaxies* [533], including participant observation [253]. Reinhard [477] incorporates oral history accounts in his archaeological survey of *No Man's Sky* [262]. The go-along study in Chapter 7 used a combination of of semi-structured interview and participant observation, with the purpose of employing the methodology to preserve the game's cultural heritage. Closer to our own work is Graham's autoethnographical account of a playthrough as an archaeologist in Minecraft [384] and the ethical considerations he made [237]. As he puts it: "When I write about video games, I am the player-subject I know best."

From a meta-science point of view, ethnographic studies of traditional archaeological practice are highly applicable to this study. Edgeworth's ethnographic study of archaeologists [164] and archaeological fieldwork as a craft practice is one example of this. Olsson [432] has also examined the embodied information practises of field archaeologists, who identified that "there are aspects of the relationship between documents and their creators that remain under-researched in our field."

Procedure

I led the archaeological survey, collaborating with Michael Cook. I used a copy of his *Elden Ring* save file in order to be able to have immediate access to the DLC on its release, as they had already met the requirements for accessing it. I also duplicated their data a second time before the final survey on the 6th of July 2024, in order to reset so that the Merchant in the Church of Elleh would no longer be aggressive towards me. These file duplications had profound implications for the survey, as will be discussed in the Results below.

We engaged in a concurrent model of iterative collaboration. The preliminary data collection phase, that is the archaeological survey and the footage recorded of it, was recorded individually. Subsequent autoethnographic data was collected through each of us watching our survey footage back and writing memos[3] about our experience in the original survey, as well as our reactions revisiting it. This collaborative ethnographic work was done a year after the original survey, thus it constitutes a form of "retrospective collaborative autoethnography" [581]. We paid particular attention to the affective experience of this process, as:

> "This is one of autoethnography's most critical functions, and this is a value we must accord it: autoethnographies are, themselves, records of history. They can tell us about the corporeal sensations of learning to play Breakout on an Atari 2600 in the early 1980s" [288].

One of the key strengths of autoethnography is its potential to provide an affective play preservation record. To this end, and keeping in mind RQ8.2, we also made a conscious effort to consider the "assemblage of play" [567], that is, the spatial and temporal context in which we ourselves conducted this work, such as our workspace and the time of day, as well as other factors. After writing our memos, we then chose one video recording from each of the five sites we surveyed for the other researcher to watch, so as to focus our collaborative discussions. We then went on to read all respective memos from the other researcher, and wrote our own memos on the five specific videos that we viewed. After

[3] The full memos have been uploaded to the Internet Archive: https://archive.org/details/elden-ring-dlc-survey-memos/

this, we came together for two face-to-face discussions of the footage and memos. These discussions formed a key part of the iterative data analysis and interpretation; we made spider diagrams based on each of the five survey sites, and subsequently identified three major "layers" of archaeological inquiry in the work that anchored later discussion: an archaeology of the game and its players; an archaeology of the game server; and an archaeology of ourselves.

Chang et al argue that "the combination of individual and group works adds rich texture to the collective work" [105]. We also follow their lead in terms of using a parallel writing structure in that writing tasks were assigned to the respective authors based on their strengths and expertise. I was responsible for writing and synthesising the subsequent results and discussion from the collaborative autoethnography, but did so while in continuous dialogue with my collaborator in order to ensure they felt their perspective was well-represented.

Diffractive analysis

Following the example of Bala et al [36], we decided to engage in a diffractive analysis of our collaborative autoethnography. Diffractive analysis in HCI research is indebted to the work of Karen Barad, who conceptualises diffraction as:

> "…reading insights through one another in ways that help illuminate differences as they emerge: how different differences get made, what gets excluded, and how those exclusions matter" [44].

Having parallels with Harraway's work on situated knowledge [256], Barad stresses the material conditions and apparatuses that produce data, rather than following a positivist line of enquiry. Engagement with diffraction forms part of the wider "entanglement HCI" [188] wave, which also has affinities regarding growing engagement with new materialism and the more-than-human in digital archaeology, with work on cyborg archaeology being one example [389]. However, we are also careful to keep in mind that Barad's work itself is now part of the "on-going apparatus" of knowledge production, and that there are tensions in the work in terms of its applications at different scales [269]. That being said, we are encouraged by the diffractive art/archaeology approach of Dawson and Reilly that understands:

> "…embodied practice as a form of paradata-making normally airbrushed out of the hegemonic accounts of how works of art and archaeological excavations are presented and analysed" [140].

We specifically aimed to engage in a diffractive analysis of our own embodied paradata, which both collaborative autoethnography and diffractive analysis affords.

8.5.4. Ethics

In terms of the archaeological survey, we follow an amended version of the Code of Ethics established in our previous survey (see Chapter 7) (see below) as well as the Ethics Policy of the Computer Applications & Quantitative Methods in Archaeology organisation [280]. We also followed the ethical guidelines set out by our institution. The importance of ethical research in digital worlds is a key strand in archaeogaming work [145]. Though *Elden Ring* player messages, bloodstains and other asynchronous multiplayer traces are entirely anonymous, it was imperative that we treat them with respect, and not express any value judgments through appraising messages, for example. One aspect in which we differed from our previous survey of the game is that we chose to record messages that might be deemed "pejorative." Messages that we observed in this vein involved sexual innuendos or scatological humour, and though they could be uncomfortable to engage with, we saw this as an ethical imperative in terms of accurately reflecting the holistic range of human experience [513] expressed through these mechanics.

Though collaborative autoethnography has been posed as an answer to some of the ethical challenges of solo autoethnography, it is by no means without its own ethical concerns [332]. Chang et al identify some key considerations in terms of researcher vulnerability, power dynamics, interdependent work and confidentiality [105]. For our own project, we found that the sequential collaboration model functioned well to allow us to work around other commitments. Furthermore, we had extensive discussions around what autoethnographic data we were comfortable sharing, and in the end decided on making our memos publicly available but not the full video recordings, as this would allow both authors to be vulnerable in their analysis without having to release raw footage they felt self-conscious about.

	Elleh	Mausoleum	Gravesite	Three Path	Main Gate
16/6	-	1	-	-	-
18/6	7	20	-	-	-
19/6	9	22	-	-	-
21/6	6	13	13	8	3
22/6	8	17	17	-	3
24/6	10	16	14	4	3
29/6	7	20	14	4	3
06/7	1	25	12	3	3

Table 8.2: Messages observed at each site context, per date, for surveyor A1.

	Elleh	Mausoleum	Gravesite	Three Path	Main Gate
16/6	-	N/A	-	-	-
18/6	1	N/A	-	-	-
19/6	0	N/A	-	-	-
21/6	0	N/A	0	0	3
22/6	1	N/A	1	-	2
24/6	3	N/A	2	0	4
29/6	4	N/A	0	0	3
06/7	6	N/A	1	1	1

Table 8.3: Bloodstains observed at each site context, per date, for surveyor A1.

	Elleh	Mausoleum	Gravesite	Three Path	Main Gate
18/6	13	27	-	-	-
20/6	13	24	-	-	-
21/6	9	19	15	4	4
22/6	6	11	14	4	3
30/6	10	13	11	5	3
06/7	9	16	13	3	2

Table 8.4: Messages observed at each site context, per date, for surveyor A2.

	Elleh	Mausoleum	Gravesite	Three Path	Main Gate
18/6	1	N/A	-	-	-
20/6	2	N/A	-	-	-
21/6	1	N/A	3	0	3
22/6	0	N/A	0	0	1
30/6	0	N/A	6	0	2
06/7	1	N/A	5	1	2

Table 8.5: Bloodstains observed at each site context, per date, for surveyor A2.

8.6. Results

8.6.1. Overview

The archaeological survey was conducted between the 18th of June and the 6th of July 2024, in order to collect data both before and after the release of *Elden Ring Shadow of the Erdtree* on June 20th. The first researcher collected data on seven separate days over this period, while the second collected data on six separate days (these were not always the same depending on personal circumstances). The sites within the DLC itself were only surveyed from the 21st of June onwards, as it was at this point that the DLC was accessible and we had decided on the locations to target within it. In total, 537 player messages and 61 bloodstains were recorded in the survey. Video was recorded concurrently with the survey and totalled 5 hours and 12 minutes of footage overall.

Memos were recorded between the 7th of July and the 31st of August 2025. In total, the memos of the two authors totalled 24,466 words (including memos responding to the other researcher's videos and memos). Given the large amount of data, it has been broken down by site and methodology below, with three subsequent sections addressing overarching diffractive themes.

8.6.2. Church of Elleh

Archaeological Survey

Overall, 108 messages and 20 bloodstains were recorded in the Church of Elleh. In contrast with our previous survey that also targeted the Church [530], a considerable amount of messages (n=25) were observed at height, either balanced on walls or pillars, which required platforming to reach them. We do not know if this is a recent trend or was just not captured by the previous survey.

However, some trends still remain from when the Church was previously surveyed in 2022. The strongest of these were consistent references to the NPC Ranni near a ruined wall on the north-east side of the Church where she can potentially spawn, with at least 16 messages identified as likely referencing her due to their wording and location [370]. Furthermore, and not surprisingly, there were messages referring to the merchant and their donkey, calling the latter a "dog," a joke within the game that has been ongoing since its release in 2022 [307].

This location was chosen as an early site in the base game of Elden Ring, thus not surprisingly the messages in this location do not appear to have been influenced by the DLC release. For example, we did not encounter the Ring of Miquella gesture, which is associated with the DLC, in this location.

Collaborative Autoethnography

There were two main points in our diffractive discussions of the Church of Elleh. Firstly, during their second survey of the location, A1 accidentally hit the NPC Merchant Kalé while taking a screenshot because the key binding for this on the Steam Deck is the same as for performing a main weapon attack. This meant that the merchant was aggressive towards them for the majority of the survey, except on the last day when they had overwritten their save data with new data from A2. This rendered A1's experience of this site to be completely different from A2's, as they had to move stealthily around the Church while doing the survey in order to avoid the NPC, while A2 continued to associate the space with nostalgia and peace. The second point regarded how we navigated and narrated the site and how this reflected our retrospective anxieties over lack of experience in different areas. For A2, they were anxious about performing the archaeological survey "correctly" as their background is not in that area:

> "I think I came in very goal-oriented of wanting to record these messages and understand the players and analyse stuff. Probably a function of the performance anxiety I experienced I guess" (Memo 2 for file 2024-06-19 23-53-20, A2, Church of Elleh).

Conversely, A1 felt embarrassment and shame around not being able to reach certain messages that required platforming:

> "I'm really struck by how easy it is for [A2] to reach a message higher up in the church in a place that took me ages to be able to reach in my own survey" (Memo 2 for file 2024-06-18 23-19-06, A1, Church of Elleh).

Our respective academic and gaming backgrounds informed how we approached and experienced this site, and this has implications for the data that we recorded. Furthermore, the aggressive merchant is

an example of how the surveyors had to contend with the combat elements of the game even while the survey did not primarily demand it.

8.6.3. Mohgwyn Dynasty Mausoleum

Archaeological Survey

The Moghwyn Dynasty Mausoleum was our largest survey site, and this is reflected in the overall largest number of messages recorded in one location: 244 in total. No bloodstains were recorded in this site as we decided not to collect data that would likely relate primarily to boss combat and instead focused on messages as they were much more likely to pertain to the release of the DLC (and thus RQ1). We found that messages immediately outside the entrance to the Mausoleum's central area, where the boss is fought, pertained to the boss battle. Messages around the cocoon often referred to the DLC, while those in the area behind the cocoon overlooking a starry sky commented on that view, an area that is only accessible after the boss is defeated.

As well as spatial trends, we also observed temporal ones in which there was a greater frequency of highly appraised messages referencing the DLC in the days immediately leading up to its launch and immediately afterwards (spanning from the 18th to the 21st of June 2024). One message in particular exemplified this: it read "fat coinpurse required ahead, are you ready?" (with the Ring gesture) placed immediately behind the cocoon, a reference to paying to preorder the DLC in advance of launch. A2 observed this message's appraisals go up from 344 to 349 within the same survey on the 18th of June. A1 then identified the same message on the 19th of June at 931 appraisals. Finally, A2 saw the message again on the 20th of June, this time with 3577 appraisals, the last time it was observed. It was very unusual for both authors to see the same message, especially multiple times, and this is potentially reflective of how the server prioritises highly appraised messages, but also is indicative of the increased activity in the Mausoleum around the release of the DLC.

There are examples of players using gestures in a specific spatial context that require experiencing them first-hand in the environment to understand. For example, message 3052 reads "visions of something incredible... therefore tranquility…" and is located directly in front of the cocoon. The player uses the "Casual Greeting" feature to make it look like they are stroking the hand that emerges from the cocoon. This is also a reference to touching the hand as the means by which players initially access the DLC.

We identified further trends in terms of players engaging with the cocoon as the locus for accessing the DLC. Overall, there were 12 messages that deliberately referenced their spatial relationship with the cocoon. For example, message 3080 "praise the left!" was located to the left of it, message 3101 "praise the right" was to the right of the cocoon, and messages 3220 and 3237 are variations on "praise the back!" and are, predictably, to its rear. We identified these spatially co-ordinated messages throughout the survey period. However, we observed more localised temporal trends. We only observed the Ring of Miquella gesture being used in this location from the 24th of June onwards, and only in three instances. While this reflects the fact that the gesture was only accessible to players who pre-ordered the DLC from the time of its release on the 20th, it also perhaps represents a lag between the gesture being memeified in the DLC space itself (see Gravesite Plains below) and it being used outside of the DLC proper.

Collaborative Autoethnography

One of the key points of diffraction for the two researchers materialised through an incident on the 29th of June when A1 was surveying in the Mausoleum and took off the player character's armour to make them lighter, in an attempt to reach a message just out of reach at the base of a pillar. This led them to realise that the player avatar was of the Type B Elden Ring character model (which is generally assumed to be more "feminine" compared to the Type A model). This is because A1 was using the save data of A2 and had not created the character themself, and had been wearing the large Veteran's Armour throughout the survey until that point:

> "I put the Veteran's Armour back on and say "that feels a lot better now." I think there are weird gender dynamics at play for me with this character and my (dis)identification with them." (Memo 1 for file 2024-06-29 21-53-39, A1, Mohgwyn Dynasty Mausoleum).

In response to watching this footage and reading A1's memos, A2 also wrote:

> "we both inhabited this character for many hours working on this game, and my character wore this armour set for most of that time, so it does burn into your brain not just as an association with this character but, frankly, with Elden Ring itself." (Memo 2 for file 2024-06-29 21-53-39, A2, Mohgwyn Dynasty Mausoleum).

In our subsequent discussion, A2 pointed out that they had a different, personal connection to this player avatar as they had played the base game and the DLC itself with them, thus they saw them as the 'protagonist' of *Elden Ring*, as opposed to A1 who associated them more directly with the survey, especially as they played *Elden Ring* recreationally with a different character. Another diffractive observation is that A2 was much more strict about keeping to the same route when surveying:

> "A2 is much more stringent about following a particular path then I am, which I find very interesting. I do have my set routes but I will diverge from them sometimes" (Memo 2 for file 2024-06-20 21-06-12, A1, Mohgwyn Dynasty Mausoleum).

> "So rather than treat the entire space as one area to be looped around, instead they [A1] break it into four distinct areas which they loop individually as they go up, and then walk straight back through without needing to check much." (Memo 2 for file 2024-06-29 21-53-39, A2, Mohgwyn Dynasty Mausoleum).

In our subsequent discussion we talked about the discomfort of commenting on each other's approach to the survey due to anxieties around seeming overly critical. Again, our approaches were informed by our own divergent expertise and expectations as researchers.

8.6.4. Gravesite Plain

Archaeological Survey

Overall, 123 messages and 18 bloodstains were recorded at the Gravesite Plain site. The defining characteristic of the messages in this area was one of excitement for the DLC launch, accompanied by the "Ring of Miquella" gesture, which was received by players who pre-ordered *Shadow of the Erdtree* and was thus a way of gesturally evoking that excitement. There were 31 messages that displayed the "Ring of Miquella" gesture in our survey, which was roughly a quarter of the messages overall. In contrast, the four other sites combined only had 9 messages using this gesture.

We also observed a temporal trend, in that the majority of messages that used the "Ring of Miquella" gesture were observed on the 21st of June (11 in total). This perhaps reflects the initial excitement at both the release of the DLC, and the new access to the gesture itself. One message, 4083, even referenced this memetic behaviour, reading "first off, gesturing" while also doing the Ring of Miquella gesture as well. We did not see as highly appraised messages in this location as we did in the Mausoleum, potentially reflecting this area as a a more transitory space that players moved quickly through when first accessing the DLC.

In terms of spatial trends, as was the case with the Church of Elleh, players placed messages at height, specifically on a rocky outcrop behind where they spawn into the DLC (n=14). There were also a number of bloodstains showing players riding Torrent[4] off a cliff to the east of the cave (n=10); we can only assume this is because they were not aware of the immediate drop.

Collaborative Autoethnography

A1 experienced one incident on the 21st of June in which, after viewing a message near the Site of Grace in the Gravesite Plain, two messages (4012 and 4013) nearby immediately disappeared and so they were unable to record them. This also happened on the 24th of June (messages 4042 and 4043). This did not happen to A2. We theorise that this could have been the result of internet connectivity issues for A1, but this is not certain due to the unknown nature of *Elden Ring's* many network features and algorithms. In any case, the experience made A1 paranoid about interacting with messages in this area, something that obviously A2 did not share. This, of course, did have a direct effect on the messages that A1 recorded as part of the survey as well.

As mentioned above, there were several bloodstain ghosts that showed players riding Torrent off a cliff nearby in this location. In order to record one of these bloodstain ghosts, A1 mimicked their behaviour

[4] Torrent is a steed that can be summoned by the player.

and also ended up accidentally falling off the nearby cliff. They make the point, though:

> "This is a really good example of how photographs, and indeed plans, alone just could not capture this well." (Memo 1 for file: 2024-06-22 22-40-16, A1, Gravesite Plains).

The recording of dynamic artefacts like the bloodstains and gestures, and being able to subsequently reflect on them through retrospective collaborative autoethnography, indicates the benefits of using videography as part of the fieldwork process. Furthermore, the records capture our affective responses to such traces of other players' behaviour, as both A1 and A2 comment on footage of themselves laughing seeing other players fall off the cliff in their memos. That being said, there is a sense, even with the video records that we have, that we are of course never able to capture everything:

> "I remember seeing a lot of bloodstains and ghosts fall down there, even just casually playing" (Memo 1 for file: 2024-06-30 10-15-54, A2, Gravesite Plains).

The process of reflecting on the records we made, though, can act as a general *aide memoire* for other play experiences we had.

Another divergence in our experience at these sites was exemplified by a rather innocuous action that A2 took:

> "Interesting to see [A2] just ambiently pick up the Rada Fruit without commenting on it, I don't think I picked up any items specifically? But also we didn't specify whether we would do it one way or the other." (Memo 2 for file 2024-06-30 10-15-54, A1, Gravesite Plain).

Rada Fruit is a collectible item that spawns in the game and can be used in crafting other useful items during play. In our subsequent discussions, A2 considered that they likely did this out of habit, as they were actively playing the DLC alongside the survey, while A1 was not. Thus, they had developed a distinct *habitus* in the game.

8.6.5. Three Path Cross

Archaeological Survey

This site is one of the smaller areas we surveyed, and we recorded 35 messages and 2 bloodstains overall. The strongest trend of messages here is that their context and placement was either directly in reference to the two NPCs at the Three Path Cross, Redmane Freyja and Hornsent, or the Miquella's Cross that was also within the survey area. For example, there were two messages in front of Hornsent (5012 and 5013) that read "edge,/lord" (here a "/" is used to denote a line break in the original message), while there were five messages in close proximity to Freyja, referring to either a "lover," "lovable sort" or "love."

A1 observed one particularly creative use of a gesture to perform interacting with this NPC, as message 5005 had the message "flower," and the player used the "Reverential Bow" Gesture while holding Varré's Bouquet[5] to make it look like they were offering a bouquet of flowers to Freyja. In the context of the DLC questlines, message 5018 was also located in front of Freyja and read "not here!?" which is potentially a reference to the NPC disappearing from this location once a player advances her questline or progresses further in the DLC.

Both A1 and A2 (on June 21st 2024) saw the same message with the "Ring of Miquella" gesture on top of Miquella's Cross which read "seek holy/but hole" with the maximum number of 9999 appraisals. This exemplifies the kind of messages that were seen at this site.

Collaborative Autoethnography

A2 felt a stronger affinity with this site due to their affection for the NPCs that can be present, after encountering them several times over the course of their *Shadow of the Erdtree* playthrough. A1's experience of the site was tarnished by the presence of lewd jokes towards the female NPC Freyja, such as "offer seed" (message 5004). This point is relevant because, as discussed in the Ethics section above, our previous survey of *Elden Ring* did not record "pejorative" messages, so our decision to record messages regardless of content did have a material effect on the survey and the experience of the surveyors. A2 also noted that:

[5] A hammer that resembles a bouquet of flowers.

> "the sexual messages were way higher in the DLC for whatever reason. Probably due to it being close after launch and the high player count" (Memo 1 for file: 2024-06-22 21-22-00, A2, Three Path Cross).

A1 was also particularly struck by the lack of NPCs on their last visit to the site on July 6th 2024. For this survey they used A2's updated save data, which meant that the NPCs had moved to a different location as a result of plot progression. Furthermore, the nearby Furnace Golem enemy had also disappeared:

> "The big golem has also disappeared because [A2] must have defeated it. I now realise that as you progress in the game, the landscape becomes more empty? It feels very sad." (Memo 1 for file 2024-07-06 22-33-59, A1, Three Path Cross).

This feeling was something that A2 also shared, though they had a different relationship to the save data:

> "I also made this observation about the NPC absence feeling very weird/sad." (Memo 2 for file 2024-07-06 22-33-59, A2, Three Path Cross).

8.6.6. Main Gate Cross

Archaeological Survey

Main Gate Cross was another small survey site, and we recorded 27 messages and an unusually high number of 27 bloodstains there overall – almost half of the bloodstains observed in the entire survey. As was the case with the Three Path Cross, a major theme in this location was that messages were located near where NPCs Moore and Sir Ansbach can be found when you first visit this location. In particular, there were messages near Moore referring to him as "friend," "lovable sort" and "angel" (n=13). In particular, there were several instances where an assemblage of three messages was observed in a semicircle around Moore, such as messages 6001, 6002 and 6003 that were all recorded together in context MG1-21061 and referred to him in such positive terms. This led to a very strong sense of asynchronous community investment in the character, which is reflected in the autoethnographic insights below.

Similar to the "not here?!" message at the Three Path Cross, A1 also observed what we would consider a site specific performance at the location where Moore is found. Message 6035 read "i've failed....." and the player used the "Dejection" gesture to make it look like they were imitating Moore's seated position. This perhaps indicates, as was the case with Freyja, that the player had gotten further in the NPC's questline and returned to his original location after the NPC had moved on.

The message with the highest number of appraisals in this location was 6013, "fort/night" that had the maximum of 9999. Like other highly rated messages recorded during the survey, it was recorded almost immediately after the launch of the DLC, on the 21st of June. What is interesting about this message is that it copies a meme (referring to the video game *Fortnite*) that has been circulating in the base game since it was released in 2022 [353]. This meme was also seen a second time in this location (message 6042) and once in the Gravesite Plains (message 4091).

Collaborative Autoethnography

A1 had a lot of affection for this site and for the NPC Moore in particular because, as was the case with Merchant Kalé, they accidentally hit him. However, unlike Kalé he does not become aggressive when hit, he simply disappears. A1 actually managed to accidentally hit him three separate times while taking screenshots at this site, for example:

> "The terrible moment where I accidentally hit the beloved NPC and he disappears! I remember instantly being very stressed about this and it becomes a recurring problem throughout this survey. I just don't understand why I didn't at least put the sword away again! There's also a funny juxtaposition with the message and gesture I'm recording at the same time: it says "behold, angel!" and the player is bowing. It feels like what I've done is almost sacrilegious." (Memo 1 for file 2024-06-21 22-02-20, A1, Main Gate Cross).

A2 did not have such a strong emotional tie to the site because they had not had the experience of interacting with the NPC in this way. Furthermore, there is a strange irony in that once A1 received A2's updated save data, at this point the player character was wearing the Verdigris Set, which is

the same armour that Moore wears, leading to an odd and uncanny experience both surveying in that character's likeness, and later watching this in the recordings. Just as we interpreted what other players were wearing, our own recordings are a form of autoarchaeology in which our personal connections with NPCs forms part of the archaeological record, to be potentially interpreted by future researchers.

8.6.7. Overarching diffractive themes

Through the course of our discussions about the memos and recordings, we realised that the archaeology we were undertaking operated on three different levels; that of player traces, the server, and also of ourselves. These were also key points of diffraction that cut across the entire archaeological survey, its recording and later embodied interpretation.

Archaeology of player traces

The most obvious way in which we engaged in an archaeological survey of *Elden Ring* was through recording the traces of other players' activity through asynchronous multiplayer artefacts. With the retrospective collaborative autoethnography, we are able to contextualise this recording process as player-researchers who were also participating in the asynchronous community event that was the DLC launch. A1 commented on entering the Gravesite Plain for the first time:

> "This is probably the point that I've been most enthusiastic about so far when I discuss the new "emote" and how much I adore it. It's also really heartwarming to see all the messages from people excited to play the DLC." (Memo 1 for file: 2024-06-21 21-07-09, A1,Gravesite Plains).

Messages in particular are deliberately placed by other players and are often intended to instill some kind of affective response, whether that be humour, annoyance or something else. Thus, our own affective responses to these traces of play activity forms part of the indirect play preservation record. Furthermore, watching the footage back, we were haunted in a sense by both the constraints and opportunities that the survey afforded us as player-researchers, as A2 commented:

> "Ah, feeling conflicted and wanting to appraise them [messages] (which is against our ethical code). I totally understand that feeling even now a year later" (Memo 1 for file: 2024-06-18 23-19-06, A2, Church of Elleh).

As researchers, we decided not to appraise any messages we found during the survey, as this could be construed as a value judgement. However, in this case A2 felt conflicted as they wanted to interact as they normally would as part of the asynchronous player community.

Archaeology of the server

Recording player messages and bloodstains meant that we were also engaging with the underlying mechanism that made those features appear: the game server. One complication that both authors ran into is the fact that it often took a few minutes for messages and bloodstains to load into a location if they spawned in there through fast travel. This led to us developing personal superstitions or rituals when waiting for messages to appear. In the case of A2:

> "I remember I'm pushing outside of Elleh here to intentionally try and trigger message loading." (Memo 1 for file 2024-06-21 21-23-06, A2, Church of Elleh).

In addition, A1 commented:

> "...you get a certain feel for how you can "prod" the game to produce more messages." (Memo 1 for file 2024-06-19 23-34-39, A1, Church of Elleh/Mohgwyn Dynasty Mausoleum).

A1 was particularly anxious about the idea that the survey was "contrived" in that we deliberately waited and tried to prompt the game to load in messages in a way that an average player wouldn't. However, A2 had a different perspective:

> "I'd liken it more to waiting for the tide to come in or recede to reveal something. Anything we do is mostly based on superstition anyway since we don't actually know what triggers server updates." (Memo 2 for file 2024-06-24 20-56-26, A2, Gravesite Plains).

Archaeology of the self

One unexpected discovery of watching back the footage is that both surveyors discovered that their microphones had picked up background noise from the physical environment in which they were conducting the work. In the case of A2, this was bird song:

> "I think these are [non] diegetic birds singing which makes me realise a) I haven't put bird food out this year and b) there is no birdsong at the moment outside my window. " (Memo 1 for file 2024-06-21 21-30-00, A2, Mohgwyn Dynasty Mausoleum).

In the case of A1, this was music and singing come from a pub near their flat:

> "I can also hear people singing Happy Birthday in the background! I have absolutely no memory of this happening while I was doing the recording, its pretty incredible that I incidentally caught it." (Memo 1 for file 2024-06-24 20-56-26, A1, Gravesite Plains).

The apparatus we used ended up capturing auditory artefacts. In *The Assemblage of Play* T.L. Taylor [567] calls for us to acknowledge the wider assemblages we are implicated in when we play, not just the technology and hardware we use, but the spatial contexts and living conditions as well. This reflection has implications for the metascience and hauntological contributions of this work, which will be discussed below.

8.7. Discussion

8.7.1. Methodological contributions

Anticipatory video game archaeology

In "Archaeogaming: The State of the Field in 2022," one of the grand challenges Reinhard identifies, echoing Aycock [24], is the high volume of digital media being produced and consumed in the contemporary world [475]. In the case of digital games, play experiences and their cultural context are highly ephemeral and easily lost. Reinhard calls for a form of "salvage archaeology" that "must sample from the source and the sites and times of creation and use" [475]. We agree with this, and would go even further to argue that our work demonstrates the need to anticipate events or updates that would benefit from archaeological survey.

Our survey function as a preservation by record of the *Shadow of the Erdtree* DLC release in June 2024. There are examples of HCI and games research that examined social media and forum content [587, 486] to better understand player communities, however in-game traces of player activity such as the asynchronous multiplayer features in *Elden Ring* are inherently ephemeral and best recorded *in situ*. Thus, the open source corpus of 537 messages and 61 bloodstains that we archaeologically surveyed is of benefit to other researchers as a temporally-specific record. Furthermore, and in answer to RQ1, we were able to identify temporal and spatial trends across our five sites because we repeatedly sampled them before, during, and after the DLC launch. Messages with over 1000 appraisals were observed in the Mausoleum in the days immediately before and after the release, potentially reflecting greater player activity in the area at this time. As a point of comparison, no messages with over 1000 appraisals were observed in the Church of Elleh throughout the survey. We also saw players deliberately placing messages to reflect their spatial relationship with the cocoon that acted as the entry point to the DLC, and the trend of players using the "Ring of Miquella" gesture immediately upon entering the DLC proper in the Gravesite Plains.

Collaborative autoethnography as HCI games metaresearch

One of the main methodological contributions of our work to HCI is in the value of retrospective collaborative autoethnography as a form of metaresearch applied to games. Metaresearch is an area of increasing concern in HCI, as evidenced by the establishment of a new workshop on the topic at CHI [433]. The work also builds on Howell, Desjardins and Fox's retrospective trioethnography of failure in design research [273]. Our retrospective collaborative autoethnography allowed us to reflect on how our shared, and indeed divergent experiences, carrying out the fieldwork contributed to the final record. For example, A1 struggled to reach messages left at height, while A2 felt they had a more goal-oriented approach and noticed different details as they had progressed further in the DLC at the time of the recording.

(a) A message recorded during our survey, showing a player performing the Dejection gesture (bottom-right of image).

(b) A screenshot of the NPC Moore, in their normal location. This is where the player gesture is performed in Fig. 8.2a

Figure 8.2: An example of a site-specific performance in Elden Ring.

In terms of best practices, we would suggest that memos associated with this kind of collaborative autoethnography be shared as a record of the research process, while also keeping in mind that collaborators may want to redact some personal information. In addition, we found the use of video field diaries to be particularly useful as a metaresearch methodology, as they allowed for spontaneous responses without having to stop to take notes and impede the flow of the work. They also enabled our retrospective autoethnographic insights, and provide a complimentary record to the corpus of asynchronous play artefacts. Furthermore, it is important to acknowledge the different play styles of collaborators and how this contributes to results.

Video game archaeology as hauntological practise

Related to the metaresearch insights from our work is the theme of video game archaeology as a hauntological practice. Throughout the process of conducting this research, we have been haunted; by the ghosts of other players and the indeterminate way in which they are disseminated through the game server, but also by our past selves. The imprecise nature of our apparatus ironically led to a deeper autoarchaeology of our assemblages of play by picking up everyday background noises; a washing machine, a kitchen door opening and closing, birds and humans singing. The digital fantasy world of *Elden Ring* was haunted by domestic ghosts in the recordings. Beyond this, by recording ourselves and then revisiting those recordings, any perceived mistakes we made during the process were crystallised:

> "Watching me trying and failing to get up on the wall is frustrating, and I wonder as a researcher where my responsibility lies or how hard I should have been pushing to reach them" (Memo 1 for file 2024-06-24 21-18-50, A1, Church of Elleh).

> "You can definitely see blindspots that I'm not checking, it seems less thorough watching it back than it felt to do at the time" (Memo 1 for file 2024-06-21 21-30-00, A2, Mohgwyn Dynasty Mausoleum).

This tracing of past decisions, or each "agential cut" [44], has some affinities with Morgan and Crowe's use of Twine as a means of paradata documentation [391]. The diffractive analysis we undertook also highlighted the indeterminacy of the survey and how our individual apparatus affected our interpretations. As stated above, there is value in recording this wider "assemblage of play," especially in terms of metaresearch and considering the conditions under which research takes place. Furthermore, from a play preservation point of view, the labour that goes into video recordings of gameplay on platforms such as Twitch and YouTube is usually obfuscated [579]. Thus, detailing this in these first-person accounts also provides further context, and should be considered as part of best practises.

8.7.2. Contributions to HCI and design

Elden Ring players as environmental storytellers

One major thread in our archaeological survey of *Elden Ring* was the playful way in which players incorporated gestures with the placement of their messages. A good example of this is a message with the "Wave" gesture close to the donkey in the Church of Elleh to make it look like they were stroking

it (message 1053). Another was a player using the ”Dejection” gesture (message 6035) to imitate the seated position of the NPC Moore at the site where he is first encountered at Main Gate Cross, along with the message ”I’ve failed...”. Figure 8.2 shows this latter example. The gestures in *Elden Ring* are themselves dynamic recordings of player activity by their very nature, but they are also ephemeral and their dynamism must be captured through video recording and put in context to be parsable later. There is growing literature on how players interpret environmental storytelling in games, especially those with high interpretive difficulty such as *Elden Ring* [89, 90]. Existing work on player interpretations of the game have focused on discussions of the fan community outside of the game [110, 334], however our work builds on this by demonstrating how players not only engage in theory-crafting about the world, but also conduct their own environmental storytelling through the asynchronous multiplayer features in the game world itself. This is relevant to HCI and games research on *eudaimonia* and interpretive fictional agency [115, 528], specifically how players create meaning through interpreting environmental clues. This work shows how players’ interpretive fictional agency can be empowered through such features, as they comment on and perform in response to the game environment. Furthermore, our methodology was what enabled us to record these dynamic site specific performances, which is relevant to RQ8.2.

Archaeological play and play preservation

We would propose that in conducting the archaeological survey of *Elden Ring* we engaged in what could be called *archaeological play*, self-imposing rules on how we engaged with the game in order to systematically record the traces of other players. As indicated above, this is useful from a metaresearch perspective. Furthermore, we would argue that it also has relevance to the study of *eudaimonia* in HCI in terms of understanding the potential of games to inspire reflection [372]. Work in this area has mostly focused on the experiences of other players, though there is clearly potential in examining the first-person perspective of researchers themselves [588]. Many of the insights we gained from the retrospective collaborative autoethnography were in terms of reframing our understanding of the game as a networked landscape and the context in which we did our own research. We would encourage future HCI and games work to critically reflect on how their experience as player-researchers has changed their relationship to the medium and the potential design insights this might have, especially as there is evidence that players themselves arguably take on an amateur research role when they engage in such interpretive play [611]. Thus, in answer to RQ8.2, the collaborative autoethnography allowed us to preserve our archaeological play and reflect more deeply on both the primary archaeological findings, as well as our own research process.

8.7.3. Limitations and future work

Sampling limitations

One limitation of our archaeological survey is that we targeted sites in a relatively close vicinity to where a player first spawns into the DLC map, thus we did not sample later game areas that could have provided interesting comparative data about player behaviour as they progressed further. In addition, this study is focused on a single game, which reflects a general approach of depth over breadth. However, one avenue for future work would be to conduct a similar archaeological study in another game with asynchronous multiplayer features, such as *Death Stranding* [318] and *Death Stranding 2: On the Beach* [319]. This would allow for an application of the study methodology to another game with similar but distinct affordances. Another sampling limitation was the choice to specifically not record bloodstains in the Mohgwyn Dynasty Mausoleum. Due to the high volume of bloodstains in this area, and the need to rapidly record ephemeral player artefacts at this location around the time of the DLC release, we chose to prioritise messages instead.

Lack of immediacy

One clear limitation of our collaborative autoethnography was that, although we were able to rely on the video recordings when writing our memos, doing this work in retrospect means we lacked the immediacy [588] of making written reflections shortly after undertaking the research. That being said, we did find value in returning to our own records a year later. This has echoes Perry’s encouragement to seek “enchantment” [451] in the archaeological record by reinterpreting archival material.

Collaboration with developers

Given that the findings of our work relate to the artefacts of an asynchronous multiplayer system, and a culturally significant event in a particular game’s history, we believe there is much potential to collabo-

rate with developers of games with similar community events or features. From the researcher point of view, this could enable us to leverage an anticipatory archaeology enabled by the developers, adding further context to the conditions that enabled an update to take place. This kind of collaboration would also be beneficial for developers, as this work is complementary to encouraging ”pro-social” behaviour in online games [121].

8.8. Conclusion

In this chapter we presented the first retrospective collaborative autoethnography of an archaeological survey in a video game, using the release of the *Elden Ring DLC Shadow of the Erdtree* as a case study. We report on the results of surveying traces left behind by players in the game landscape at five different sites, in which we observed both spatial and temporal trends before, during and after the release of the DLC. This work primarily presents methodological contributions to HCI by providing a proof of concept for combining collaborative autoethnography with archaeological recording techniques in order to reflect on the knowledge production process, as facilitated by the use of videography that allowed us to capture dynamic player site specific performances. Furthermore, we make the case for video game archaeology as a *hauntological practice* that can contribute to metaresearch reflections and the study of eudaimonic experiences in HCI and games.

In this chapter, we recorded the traces of other players, including evidence that they not only interpret environmental storytelling, but become environmental storytellers themselves. Thus, through our own form of *archaeological play* we interpreted these indices in the game environment. In the following section, we turn from the development of new methodologies to an examination of video game archaeology as interpretive play, especially in terms of designing for interpretive play. In Chapter 10, we present a theory for how and on what basis players interpret environmental storytelling, grounded in the data from an empirical study.

Part III

Video game archaeology as interpretive play

9

The Archaeological Gameworld Mental Model

> ”The village was consumed by a sand storm that came from nowhere. Many of the tables and altars still had things on them. I myself also got stuck in the blowing sand, so this felt poetic.”
>
> *Participant 67, Question 1*

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9.1. Introduction

In chapter 8, we examined the interpretive play experiences of researchers conducting an archaeological survey in a video game. In this chapter, we move on to analyse player's interpretive play experiences in an archaeological game. We report on a study in which 202 people played a video game about exploring and interpreting a procedurally generated ruined village. We present the first extended grounded theory analysis of how players form theories based on environmental storytelling in a narrative-led game. Our resulting theory of an archaeological mental model of game worlds builds on the more general concept of a *mental model* (an internal framework for understanding external reality) which has been applied across a range of disciplines including cognitive psychology [293], HCI [95], and archaeology [134]. Intertwined with this is the study of *affordances*, which broadly refers to how an actor perceives the possible actions that can be taken with an object. The concept of affordances has been used to describe how game design can render potential actions perceptible to a player [339, 92], and the potential of affordances to inform mental models in the wider field of design is also well established [426].

The study makes the following contributions to HCI research:

- We present the theory that players form *archaeological gameworld mental models*, based not just on in-game environmental storytelling but also the underlying game system. Pre-existing knowledge about the world and other games media also informs this model.
- Furthermore, players can be motivated to expand on this mental model through what we what call *archaeological gameworld affordances*, a novel way of framing how certain qualities such as ambiguity can encourage further player theorising.
- We argue that certain qualities of procedurally generated content, that we term *procedural affor-*

dances, intersect with archaeological gameworld affordances, making them particularly evocative for environmental storytelling.

- We also discuss how *recording method affordances* can scaffold player archaeological gameworld mental models; recording aspects of their experience through methods such as map-making can help inform player interpretations and also be a method for eliciting player mental models in of themselves.

Overall, this theory builds on existing HCI models of interpretive agency and aggregation affordances, while also demonstrating the interdisciplinary potential of viewing player interpretations of environmental storytelling through the lens of archaeological theory. The archaeological gameworld mental model also has potential applications for designers and researchers interested in modelling player interpretations, prompting engagement through interpretive difficulty or combining grounded theory with iterative game design. We situate this work as a form of interpretive archaeology [94], understanding that archaeological interpretation is a creative crafting of the past in the present, and that this can be a useful framing for how players form theories about fictional worlds in contemporary games.

9.2. Motivation

As discussed in chapter 5, environmental storytelling is a design technique commonly used to convey narrative through assemblages of content in video games. Livingstone et al have drawn parallels between archaeological interpretation and environmental storytelling, introducing the concept of "archaeological storytelling" [340] in relation to the use of material culture for narrative purposes in a video game. To date, there have been limited empirical studies on how players interpret environmental storytelling. Those that do exist [61, 54] have tested player comprehension of pre-written narratives that the environmental storytelling was designed to convey. Our case study *Nothing Beside Remains* is based on a simulation in which different factors can lead to the ruination of the village, however there is no pre-written narrative and we are more interested in the emergent interpretations of players. This approach is informed by a long history of feminist archaeological theory that questions the presentation of interpretations about the past as objective, final and definitive [118]. Gero points out that archaeologists often contend with both ontological and epistemological ambiguity in terms of fragmentary evidence, but also the limitations of their own social context and training [220]. More recently Sørensen has also advocated for engaging with vagueness and ambiguity in interpretations of the archaeological record:

> "The nature of the archaeological record is frequently- maybe always fragmentary and partial, and instead of lamenting this condition, we might embrace it and explore how one of the assets of archaeology is to be able to build narratives on the basis of what remains unclear" [534].

This perspective also chimes with Frieman's "archaeology of unproof" [189], in which ambiguity can lead to the questioning of assumptions we might have about past identities and norms. Of course, players are not (necessarily) trained archaeologists, however, as also discussed in chapter 5, ambiguity can be used as a resource for design in HCI [215], and has been identified as a factor that encourages fan interpretation in *Elden Ring* [89], and in the case of *Dark Souls* contributes to what Vella terms the "ludic sublime" [594]. As such, we present a game with intentionally ambiguous environmental storytelling to see how players engage with and interpret this.

9.3. Related work

9.3.1. Definitions

In this subsection we briefly define terms and concepts that will be referred to throughout the rest of the chapter.

Archaeological Context: An archaeological context is, simply put "any single action, whether it leaves a positive or negative record" [343]; such as a deposit in the former case, or a cut into an earlier deposit, like a pit, in the latter. Archaeologists define contexts in terms of their relative position in space and time in order to develop a site chronology [5]. Thus, a pit cut into clay must have been dug later than the deposition of the clay, and any artefacts in the fill of that pit are likely to be associated with each other.

Archaeological Assemblage: The concept of "assemblage" is common across multiple fields, but it has a specific meaning in archaeology. It is usually used to describe a group of objects with a shared archaeological context [251], for example an assemblage of objects deposited together in a pit. The term is useful to refer to diverse objects with a shared chronological context, potentially revealing more about them as an aggregate, and the function of the context in which they were found.

Procedural Generation: Procedural content generation (PCG) is a term that refers to the creation of content, usually for video games, through the application of generative algorithms [518]. The term 'generative' here is used in the earlier, more literal sense of a process which generates something, rather than its contemporary appropriation to refer to large language models. The design, implementation and evaluation of generative systems across creative domains is a popular subject of research in computer science, but particularly within the practice of game development where it is applied to achieve design goals [631], solve technical problems [124], and augment creative processes [550].

9.3.2. Interpretive archaeology

As stated in the introduction above, this work on player interpretations is understood through the lens of interpretive archaeology. Interpretive archaeology is a theoretical approach that originally gained traction in the 1990s as part of the post-processual paradigm in archaeology, that was a reaction against the positivism of what is often referred to as processual archaeology [351]. Interpretive archaeology is understood as a creative and "material practise in the present" [521] that is framed by the interpreter's own social context. Tilley has posited that archaeological interpretation happens when there is uncertainty, as "When it is obvious to me that the figurine is a frog, I do not interpret it as a frog" [575]. The role of ambiguity in interpretation has links to designed ambiguity as discussed in the Motivation above.

Honouring the multivocality of archaeological interpretations has significant consequences, as Shanks and Hodder argue:

> "Foregrounding the interpretive character of archaeology deprives archaeologists of an authority which would lie in their restricted access to scientific method, abstract truth and objectivity of the past. But they can potentially offer to others their skill in crafting and interpreting material pasts, cherishing their creative responsibilities" [521].

Not surprisingly there have been criticisms of the interpretive archaeology approach. Vaquer and Pey make the point that such calls to democratise archaeology never came to fruition, especially as "Indigenous communities and the general public rarely participate in archaeological interpretation" [592]. The apparent relativism of such post-processual approaches has also been criticised as opening the door to any ideology or interpretation, including bigoted ones [10]. In the case of our own work, we are interested in how and on what basis players interpret material culture in a video game without a "ground truth," while being attendant to the fact that players will bring their own personal experiences to bear on this process [434]. Perhaps then, interpretive archaeology is particularly useful for understanding the process of interpretation itself [203], and the translation between material evidence and written interpretation [106].

9.3.3. Mental Models

In *The Psychology of Everyday Things*, Norman [426] defines mental models as "the conceptual models in people's minds that represent their understanding of how things work." The concept of mental models has a long history in cognitive psychology [293], especially in terms of spatial reasoning [582], as well as HCI [95].

Mental Models in Archaeology

Rather than trying to intuit the thought processes of players, archaeologists try to understand the cognition of past peoples through mental models. The sub-discipline of cognitive archaeology, broadly speaking, attempts to infer past cognition through material remains [134]. However, in terms of our own player study we are more interested in mental models as they relate to archaeological knowledge production. Barceló's work [47] is somewhat relevant here in that it focuses on the requirements for an "automatic archaeologist" AI agent to be able to infer cause and effect from material remains. Morgan et al's work on how archaeologists' mental models are buttressed by different drawing methods is highly applicable to our work. As they put it:

> "The affordances of the tool and how it interacts with our bodies, the environment, and the interpretive subject combine to create a mental model of the archaeological remains" [393].

Though not strictly speaking concerned with mental models, we also consider Shanks' work on *The Archaeological Imagination* [519] to be relevant as it is concerned with creative responses to the past, and how archaeological knowledge production is also shaped by wider popular conceptions of the discipline.

Mental Models in Game Studies

Mental models have been applied widely in game studies, usually as a way of trying to represent changing player knowledge and perception. This is the case with Williams' study on players' use of different video game controllers [617]. Banks and Bowman's work [42] understands video game avatars to not be just singular bodies, but assemblages conceived of through player mental models. Of note is Ubochi's work [584] on using mental model elicitation techniques to better understand how players conceive of complex game systems. Furthermore, Cardona-Rivera [93] conceives of mental-model building as a desired interpretation outcome of narrative design, getting the player to "mentally simulate a real or possible world."

Mental Models in PCG

Though with a broader focus than PCG, there have been a number of recent qualitative studies on how players form mental models of AI agents in games. Gero et al [221] have published work on mental models of agents in a cooperative game, while conversely Villareale [598] have looked at mental models of adversarial agents, identifying how these models shift over time and after the acquisition of new information. Cimolino et al [111] conducted a grounded theory study on non-gamers' experience of automation confusion, identifying player behaviour as the result of inaccurate mental models. Though it does not explicitly reference mental models, Watson's work on "procedural elaboration" [611] in *Minecraft* [384] is also applicable as it refers to players attempting to understand the underlying generative system of the game.

9.3.4. Affordance Theory

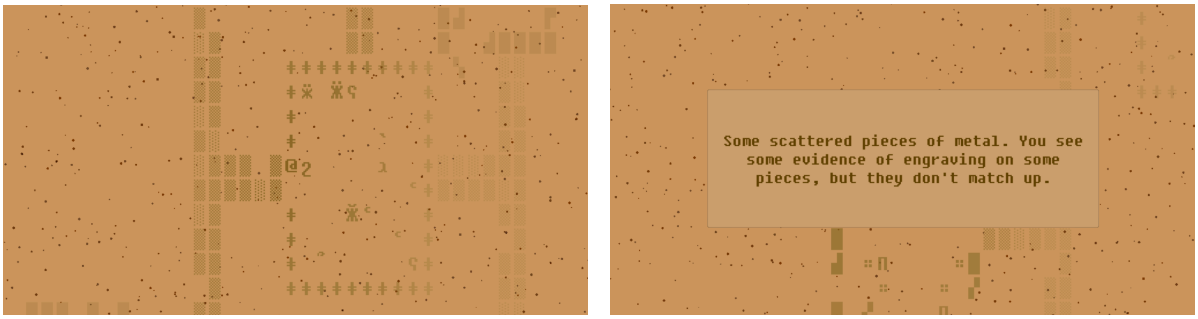
The term "affordance" was originally coined by Gibson [222] in the domain of ecological psychology, with affordances of the environment being: "what it offers the animal, what it provides or furnishes." In 1988, Norman [426] published *The Psychology of Everyday Things*, applying it to the design of everyday objects, which subsequently influenced early work on "technology affordances" of user interfaces [214]. Crucially, Norman disagrees with Gibson's idea of affordances existing irrespective of whether they are perceived or not, instead emphasising the importance of designing for what users perceive as possible instead.

Affordances in Archaeology

Affordance theory has not been extensively engaged with within the archaeogaming literature, with some exceptions. Bozdog [76] has done research into site-specific performances that are informed by the affordances of a heritage site, while Copplestone [127] has examined the imposition of "external affordances" on how narratives should manifest in a media form have limited their application in heritage settings.

As a discipline concerned with the material culture of the past, archaeology contends with object ontologies, including their multiple temporal and spatial affordances as they relate to assemblages [316]. Tim Ingold [277] criticises the tension in Gibson's original theory that objects have inherent properties, instead arguing that affordances only exist as they are perceived. At the same time, he is skeptical of a cognitivist approach that cannot conceive of meaning unmediated by semiotics. He advocates for thinking about affordances "in common," that are constructed in public and through interaction between people and objects. Knappett [317] takes a relational stance on ecological psychology and situated cognition, seeing them as interdependent.

Archaeologists have used digital technologies such as GIS and 3D modelling to attempt to understand experiential and affective affordances of archaeological sites [224][173]. There has been much recent discussion of digital materiality in archaeology [390] and especially the affordances of digital objects in museums [19].



(a) The player (represented by an @) is standing at the end of a path, in the entrance to a field.

(b) When the player walks into an object, a textual description appears.

Figure 9.1: Two screenshots from the original version of Nothing Beside Remains

Affordances in Game Studies

There has been extensive work on affordances in game studies and game design, drawing from different theoretical traditions. Linderoth [339] follows Gibson's ecological model, arguing that games are not well-suited as learning environments but instead can be effective at conveying exploratory and performatory affordances.

Conversely, Mateas [362] follows Norman with an emphasis on providing a sense of player agency through balancing affordances. Cardona-Rivera et al [92] propose a cognitivist theory of affordances in games which that they concieve present real and perceived affordances. Of particular relevance to our study is Young and Cardona-Rivera's work [630] on narrative affordances in games, in which they define the term as the ability for a player to envisage how actions will contribute to the future completion of a storyline. Also especially relevant is Dugas et al's [577] survey of map interfaces in games, in which they identify "atomic affordances" as individual interface components that can be manipulated by players. They also found that the ability for players to make their own records through drawing and text support on maps was particularly useful for puzzle-solving. More broadly in HCI studies, Kaptelinin and Nardi [308] have critiqued Gibson's model as not being able to account for "technologies as a special type of object," with the need for more precise terminology such as "aggregation affordances" that refer to how technological artefacts can be combined with other (digital and non-digital) artefacts. In her work on gameworld affordances, Jørgensen[298] also considers that Gibson's model is inadequate for game designers who need to be cognisant of perceived rather than just innate affordances. Furthermore, we find Jørgensen's definition of a gameworld as being both the fictional designed space for play, and the underlying system that operates it, to be useful for our subsequent analysis.

Affordances in PCG

Affordances have been discussed in relation to procedural content generation in the academic literature, though often as a form of taxonomisation. For example, Summerville et al [553] refer to game affordances in terms of having a PCG system understand the semantic properties of game objects, while Sarkar et al [510] develop an affordance vocabulary to describe the properties of different generated tiles. Smith [525] refers to the affordances of different deployments of PCG in games from a design perspective. Though it relates to artificial intelligence research and art more generally, Mateas' [363] work on interpretive affordances are particularly relevant to the present study in that they "support the interpretations an audience makes about the operations of an AI system." Though it doesn't explicitly mention affordances, Karth's [363] *Preliminary Poetics of Procedural Generation in Games* acknowledges that in existing taxonomies of PCG "the focus has been on the how rather than the why," instead attempting to chart generative aesthetics and how they complement each other. Kreminski [321] has also reflected on the hauntological experience of playing games with PCG that are haunted by their own past cycles of content. Furthermore, Cardona-Rivera's [91] thesis on interactive narrative affordances specifically focuses on how an AI system can model a player's understanding of those affordances.

9.4. Nothing Beside Remains

Nothing Beside Remains is an independent video game originally designed by the second author in 2018. It is a 2D, single player exploration game set in a ruined village that uses ASCII symbols to represent objects and environmental features, inspired by terminal-based roguelikes from the 1980s and 1990s. Figure 9.1 shows two screenshots from the original version of the game. The player, represented by an "@" symbol, can move around using the keyboard arrow keys. If the player walks into an object, a text box will appear with descriptive text. The game has no win condition or end point, and no explicit goal.

Each village is procedurally generated, with two phases of simulation; one which abstracts the life of the village pre-ruin and its progress towards one of three endings: famine, being overrun by wild animals, or ecosystem collapse. Each of these endings then feeds into a second phase of simulation that effects details of the final generated village that a player actually explores. The generator was also designed to give the impression of more nebulous cultural practises, such as a random number denoting the number of legs a chair has. Despite variations between different generated villages, they always have several features in common: a large religious building, four lakes at the corner of the map, and a collapsed statue where the player begins.

In 2022, the first author extended *Nothing Beside Remains* with new content, augmenting its generator with new features, written descriptions and patterns, as well as changing the meaning of some of its generated text. This version of the game forms the basis for both the initial study and theoretical sampling we conducted, both of which we describe in the next section.

9.5. Method

In this section we describe our methodology for two online surveys, the results of which were subsequently subject to a grounded theory analysis. The initial survey was conducted in 2023, and the subsequent theoretical sampling was conducted in 2024.

9.5.1. Grounded Theory

We chose to conduct a grounded theory analysis of player responses to procedurally generated content for several reasons. Firstly, grounded theory is particularly well-suited to work in nascent fields where limited or no theories exist [586]. While grounded theory has been applied extensively to the study of games and HCI more generally, it has had limited application in the analysis of procedural content generation [322] and the archaeological study of video games [146]. The line-by-line coding of grounded theory allowed us to engage with the rich written interpretations of respondents. Furthermore, and as will be further detailed in the section on Theoretical Sampling, the iterative nature of grounded theory analysis complemented our own iterative design of Nothing Beside Remains.

Cognisant of Salisbury and Cole's lament that much work refers to grounded theory in a generic way [503], we follow a constructivist grounded theory approach [108] based on abductive reasoning [114]. The chief reason for choosing this strand of grounded theory is the constructivist emphasis on a reflexive approach that acknowledges a researcher's pre-existing experience and beliefs inevitably influence their reading of the data. Unlike classical grounded theory [226] which encourages the researcher not to engage with relevant literature prior to analysis, we did this to be guided by "sensitising concepts" [108] to frame the study. With this in mind, we began with the following open-ended research questions:

- RQ9.1: How do players form interpretations based on environmental storytelling in Nothing Beside Remains?
- RQ9.2: How does the generative design of Nothing Beside Remains influence player interpretations?

We followed Charmaz [108] in aiming to produce several core theoretical concepts woven into an interpretive narrative that takes into account implicit meanings and social context.

Coding Process

We followed the iterative process of initial coding, focused coding and theoretical coding as laid out by Charmaz and Urquhart [108][586]. This process is illustrated in Figure 9.2. Due to the large volume

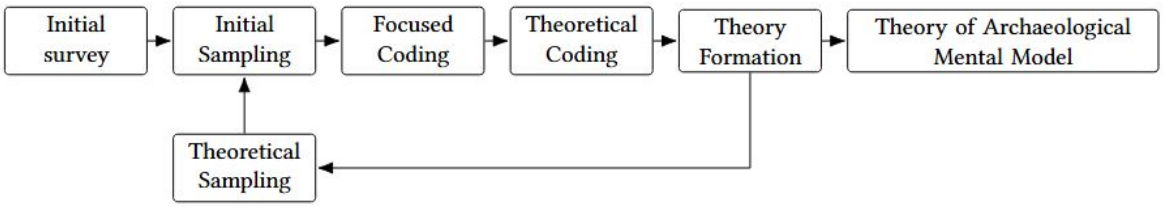


Figure 9.2: The coding process adopted during our work.

of respondents for the initial survey, these were coded after the survey closed. In the initial coding phase, we chose to code the answers in themed clusters, so questions 0, 3 and 5 were coded together as they pertained to procedural content generation, questions 1, 2 and 4 were coded together as they pertained to interpretation, and finally question 6b was coded separately as that pertained to potential recording methods. There was constant comparison both within and between these clusters.

In the initial coding phase, we conducted line by line coding. In the focused coding stage, constant comparison between codes led to the formation of core categories. In the theoretical coding stage, we wanted to understand how these core categories related to each other, and used the "clustering" [586] technique that Charmaz describes, which is essentially a form of rapid mind-mapping to visualise relationships betweens codes or categories. From this process, we had the initial working theory of an archaeological mental model, that we went on to test in the theoretical sampling. Memos were made in all three coding cycles to reflect on the process and make note of emerging ideas, concepts and relationships.

The first author was the sole coder. Charmaz is critical of Strauss' [546] push towards verification with grounded theory, instead advocating that "Rather than contributing verified knowledge, I see grounded theorists as offering plausible accounts" [586]. For this reason, and in the spirit of the constructivist tradition, we leaned into the subjective coding of a single researcher.

9.5.2. Procedure

Nothing Beside Remains as Case Study

We chose *Nothing Beside Remains* as the sole game for our study for several reasons. Firstly, as the developers of the game it allowed us to create bespoke builds for the survey. This was especially important as the game has procedurally generated content, so having the ability to dictate which seeds players would access gave us a baseline for understanding what material culture players could potentially encounter. This also allowed us to collect telemetric data of what routes players took, and what objects they interacted with, which we will analyse in a subsequent complimentary quantitative study. Secondly, as the developers we have insight into the design goals and development of the game that we would not otherwise have. This means we can bring our own knowledge of the generator that underlies the gameworld to the subsequent analysis. *Nothing Beside Remains* was essentially a small petri dish for our experiment, heavily constrained but allowing us to analyse player interpretations at a much granular level than if they were exploring a larger commercial game. Thirdly, as a very short abstract game hosted on the web, *Nothing Beside Remains* was easily accessible to participants in an online survey, with the only hardware requirement being access to a computer with an internet connection. It is also requires a limited time investment to play. That being said, we acknowledge the limitations of our sample, which is indicative of responses to an abstract 2D game designed for emergent storytelling without a comparative case study.

We created a bespoke build of *Nothing Beside Remains* for the study that gave us more control over the configuration experienced by players. In the first seed, depicted in Figure 9.3, the village is partitioned into two parts, separated by a large path, with the religious building placed more centrally. In the second seed, shown in Figure 9.4, the village is densely packed with the player starting directly beneath the only flower field. Water features are plentiful and large, and the religious building is towards the edge of the village map. We felt both villages had distinct qualities that would allow us to see how participants responded to two distinct outputs of the generator.

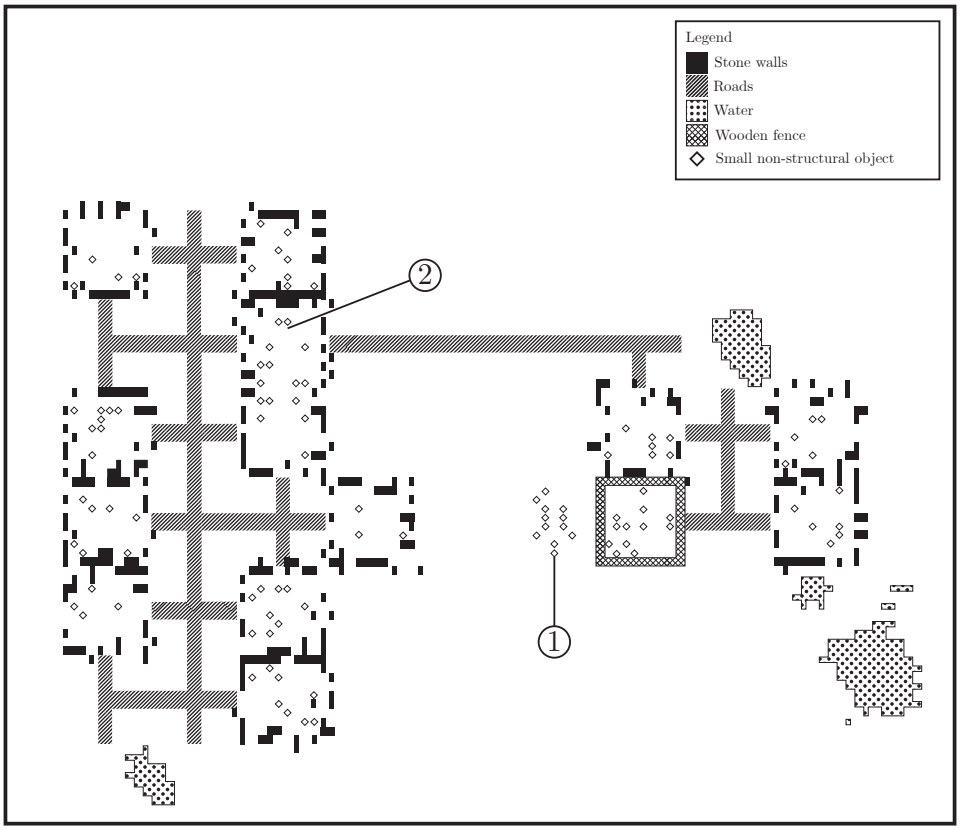


Figure 9.3: One of two village seeds used in the initial study. The player spawns at the point marked 1, next to the scattered remains of the statue. The pocket watch, if present in the village, is at the point marked 2 next to the altar in the religious building.

After generating the village with a 50% chance of picking either seed, our version of *Nothing Beside Remains* then has a 50% chance to place an additional item in the village - a pocket watch. This hand-written item was deliberately included in order to potentially prompt players to question why a mechanical object anachronistic with the other material culture represented in the world was present. If the pocket watch is added, it is generated next to the altar in the religious building. Its description is as follows: ”A pocket watch made of a delicate treacle coloured metal is embedded in the dirt. There are deep scratches and a stain partly obscuring the face. You can make out part of an inscription: DON.” Its in-game visual representation is a unicode symbol of a lowercase delta: δ.

Survey Design

Generally, grounded theory analyses in game studies have utilised semi-structured small interview samples [37, 113, 111], however we used an online survey with set questions. This form of data collection falls under what Charmaz characterises as “elicited texts” [108]. As Charmaz herself identifies, this form of data collection has the advantage of potentially allowing participants to be more honest in their answers than if they were involved in an in-person interview. This point is particularly salient given that participants were aware the game they were playing was one the authors themselves had made, so there may have been a perceived pressure to be complimentary. Further to this point, we found that participants were comfortable being blunt about their dissatisfaction or disinterest in the game. To give an example, when asked about potentially recording the game one participant responded that they would not:

> “Because I don’t think it would be worthy of recording or interesting for others to read/see/-hear” (P127, Q6b).

None of the survey questions, aside from those asking if the participants had played the game before, were mandatory. This meant that participants could opt-in to giving interpretive answers with as much or little detail as they wanted. The survey itself was split into three parts. The first part asked for

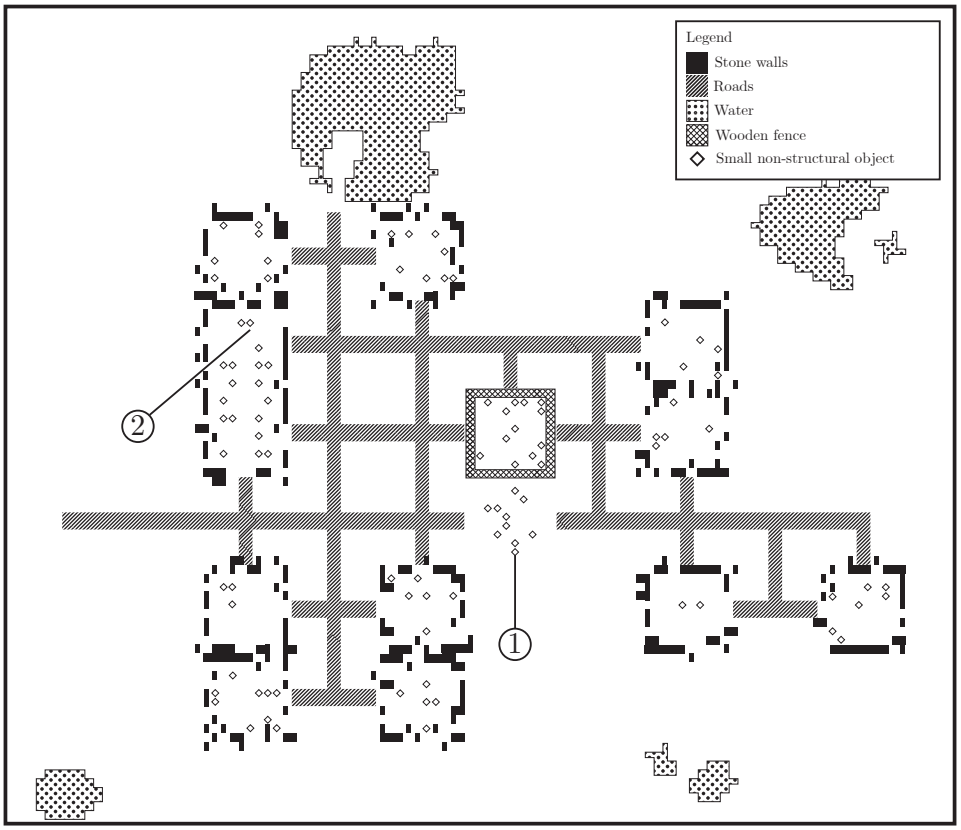


Figure 9.4: One of two village seeds used in the initial study. The player spawns at the point marked 1, next to the scattered remains of the statue. The pocket watch, if present in the village, is at the point marked 2 next to the altar in the religious building.

participant consent. In the second part, participants could access a bespoke build of *Nothing Beside Remains* in a separate window. This build was made so that we had control over what seeds of the game players could access and collect their play data. Cross-referencing between survey responses and play data was made possible through participants entering a personalised in-game code into the online form. The third section had one mandatory question asking if participants had played the game before, as the original has been online since 2018 and player interpretations could be affected by previous playthroughs. We also asked several demographic questions regarding participants' interest in games as a hobby, if they worked in the games industry or used games as part of their academic research. Furthermore, participants were asked to define the term "procedural content generation" so we had a sense of how they themselves understood it in their own words. The remainder of the third section contained six non-mandatory questions with free text responses. The free-text questions relevant to our coding and grounded theory are shown in Table 9.1, while a full list of survey questions is in Appendix C.1.

9.5.3. Participants

In the initial survey, we received responses from 187 participants over five days. Of those participants who volunteered to put their age in the survey form, the average was 35 (st.dev. 9.6 years). Out of these respondents, 174 declared they play games regularly (92%), 36 identified as working in the games industry (19%) and 35 as working in games research (18%), with some participants declared as both. As stated in section 9.5.2 above, participants were randomly assigned one of two seeds either with or without the hand-placed pocketwatch object, leading to four possible variations. Overall, 87 respondents played the first seed, 97 played the second seed, and three respondents could not have their seed determined after the fact due to an initial server error which was quickly fixed. Furthermore, 102 players played the condition with the pocketwatch and 85 did not not.

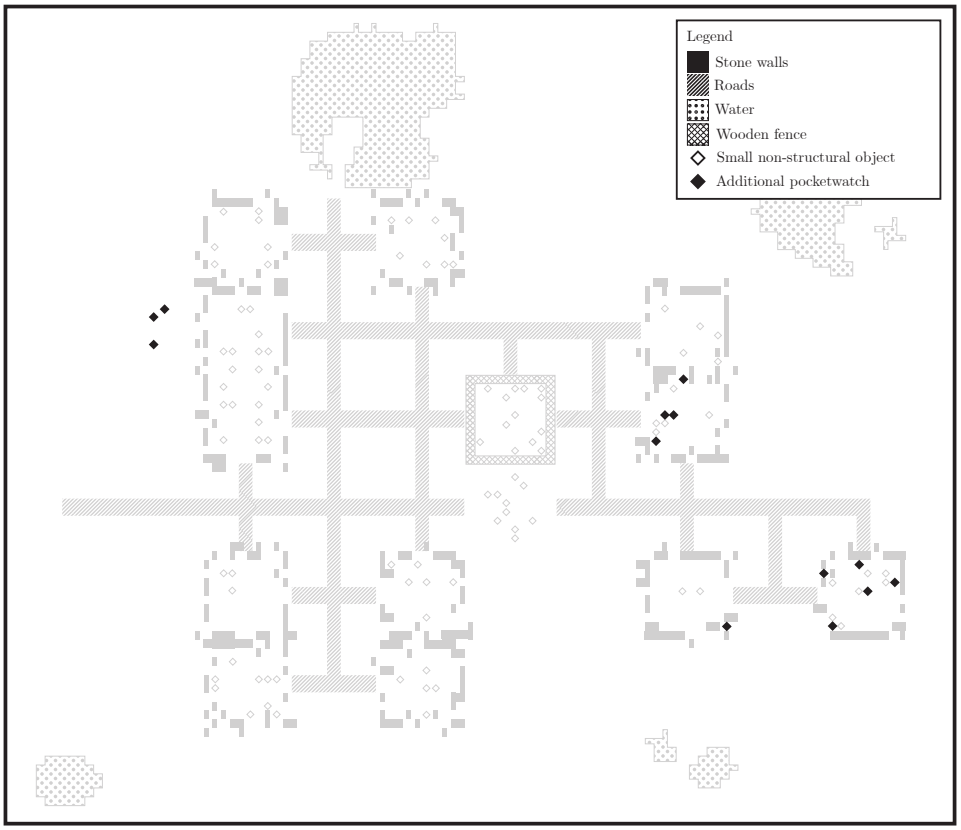


Figure 9.5: The positions of the additional pocketwatches added for the theoretical sampling. This is a modified version of the map shown in Figure 9.4, with the original map lightened to better show the location of the watches.

9.5.4. Recruitment

Participants were recruited through the two authors promoting it through their own personal social media accounts on Twitter, Mastodon, Discord, TikTok and Facebook. This method of recruitment does hold some obvious drawbacks in that it is limited to the authors' online social circle of peers who already have domain knowledge of archaeology and game development, however these are also arguably groups that are the most likely to be interested in and benefit from the research outputs of the study. We collected demographic information related to participants' involvement with the games industry and heritage sector in order to get a better idea of how this was represented in the sample. The only exclusion criteria for the study was that participants had to be over the age of sixteen. For the initial survey, we aimed to get at least one hundred respondents for a statistically meaningful sample size, and collected data between the 20th and 25th of January 2023.

9.5.5. Ethics

Both the initial study[1] and the theoretical sampling [2] were subject to the King's College London minimal risk self-registration process. The studies were conducted anonymously through a Google form that did not collect any identifying or sensitive information. Participants were provided with an Information Sheet[3] that included extra context on the research aims of the project, its data handling policy and stated that data about their movement and interactions in the game would be collected as part of the study. Participants could not take part and access the bespoke build of the game for the study without providing their informed consent in the first part of the Google form.

[1] **Ethical review reference number: MRA-22/23-35186**
[2] **Ethical review reference number: MRA-23/24-45362**
[3] **possibilityspace.org/nbrstudy/information-sheet-nbr-study.pdf**

Code	Question Text
Q0	How would you define “procedural content generation”? If you are not familiar with the term you can leave this field blank.
Q1	Write your interpretation of what happened to the village in the game. What reasons do you have for this interpretation?
Q2	Do you have any alternative interpretations? If so, explain your reasoning.
Q3	Could you distinguish between procedurally generated and hand-written content, and if so how?
Q4	Pick one object from the game and describe how you think it came to be left where you found it in the village. Why did you choose this object?
Q5	Do you think the object you chose for question 4 was procedurally generated? Why or why not?
Q6a	If you were to create a record of your experience in the game, which of the following methods would most appeal to you: Creative writing; Screenshots; Video footage; Map-making; Other (specify)
Q6b	Why did you choose the above method(s)? If you were to share the record with others would that change your answer?
Q6-2	If you made a record of your experience playing the game, what method did you use and why? Did it affect your experience or interpretation of the game?

Table 9.1: All survey questions. In the theoretical sampling, questions 6a and 6b were replaced with the question labelled here as 6-2.

9.5.6. Theoretical Saturation

Participants

The follow-up survey for theoretical sampling was open to submissions between the 27th and 30th August 2024. For this survey, we were not aiming for a specific sample size but for theoretical saturation. We analysed responses from 15 participants. Of the participants who volunteered their age, the average was 31.7 (st.dev. 10.5 years). Out of these respondents, 14 respondents stated that they play games regularly (93%), 4 identified as working in the games industry (27%) and 2 as working in games research (13%). In addition to this, 6 stated they had a personal interest in heritage or archaeology (40%) with some of these participants also identifying as working in the games industry. 3 participants said they often recorded their game play experiences in some form (20%). Of the fifteen respondents, seven received the condition with a single pocket watch (47%), seven received the condition with multiple pocket watches (47%), and one could not be determined due to inaccuracy in the survey entry.

Survey Design

For the follow-up theoretical sample, we made the following changes to the survey:

- We added the option for participants to declare they had an interest in archaeology and heritage, worked in the heritage industry, and studied the past in some form in the demographic section. We had not accounted for this in the initial survey.
- Participants could also declare they regularly recorded their gameplay experiences as this would potentially add extra context to question 6.
- Participants were explicitly encouraged to record their gameplay experience via this instruction in the form: “We encourage you to make a record of what you find in the game – how you do this is up to you.”
- Question 6 was changed to “If you made a record of your experience playing the game, what method did you use and why? Did it affect your experience or interpretation of the game?”

The aim of making these changes to the survey was to better understand the pre-existing knowledge of our survey participants, and also to see if our working theory, especially that of recording method affordances, could accommodate respondents who were actually primed to record their game experience.

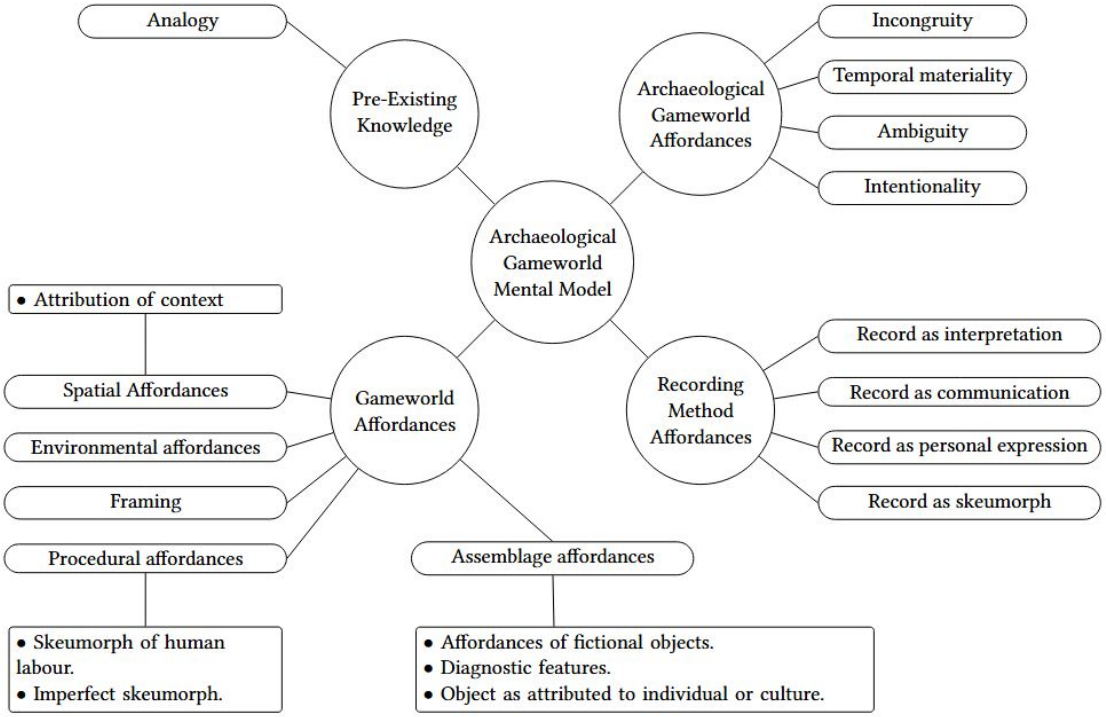


Figure 9.6: Grounded theory of archaeological gameworld mental models in games

Iterating on Nothing Beside Remains

We also prepared a new version of *Nothing Beside Remains* for use in the theoretical sampling phase. Unlike the first phase, this version of the game uses a single seed – the layout of which can be seen in Figure 9.3. The game will generate one of two versions of this seed with equal probability. The first is identical to the pocket watch condition in the original study, with a single pocket watch fixed to appear next to the altar in the village's religious building. In the second, the pocket watch is placed next to the altar as before, however in addition to this there is a 60% chance that a pocket watch will also be generated next to any skeleton object that is spawned in the village. Unlike the original pocket watch, these additional items have generated descriptions using a grammar-based template similar to the rest of the game's generated text. Because the generation and placement of these pocket watches is linked directly to the seeded random number generator used to create the village, all players receiving this second condition with multiple pocket watches saw the same output.

We made these changes to *Nothing Beside Remains* in line with our working theory of gameworld affordances, specifically assemblage affordances, as the new pocket watches were designed to generate near skeletons, which could be conceived as associated assemblages. Furthermore, the multiple near-identical pocket watches were deliberately designed to be incongruous and ambiguous, thus also drawing on the archaeological gameworld affordances we had already identified at this point in the analysis.

9.6. Results

Initial coding resulted in 335 unique codes for the first survey, and 119 unique codes for the theoretical sampling. Codes were recorded in a spreadsheet along with memos to document the first author's process. Through several iterations in the selective coding phase, initial codes were grouped under broader concepts, as can be seen in the table in Appendix C.2. In this section we summarise the theory that the first author arrived at following theoretical sampling and the conclusion to the final theory formation. The diagram of this theory, showing the concepts and how they relate to one another, can be seen in Figure 9.6. The theory centers around our proposal of an *archaeological gameworld mental model*. The remainder of this chapter contains direct quotes of participant responses; they are followed

by a note indicating their participant number (e.g. P20) and the question they are answering in the quoted passage (e.g. Q4). Note that the question to define procedural content generation appeared before the main part of the survey, and has hence been numbered Q0. We highlight sections of quotes in bold for emphasis.

9.6.1. Archaeological Gameworld Mental Model

The core category, player archaeological gameworld mental models of games, is characterised by four sub-categories that will be elaborated on below:

- *Pre-existing knowledge* that *informs* the mental model;
- *Gameworld affordances* that *constrain* the mental model;
- *Archaeological gameworld affordances* that inspire *elaboration* of the mental model;
- *Recording method affordances* that *scaffold* the mental model

We use the term 'gameworld' in our model as Jørgensen [298] defines it to refer to both the playable game space and the underlying system that operates it. The catalyst for this core category was participants' explicit referral to their own internal conceptualisation of the game and their theories about it:

> "Screenshots and video recordings don't do it quite justice since **part of the experience takes place in the mind**, not just on the screen" (P26, Q6b).
>
> "**Almost all of the experience was mental**, taking in the objects I saw and forming my own picture of the village and what could have happened" (P167, Q6b).
>
> "I think the abstract style of the game lends it to some sort of **theatre of the mind** where the player could write and describe their interpretation with screenshots and/or a map for reference" (P170, Q6b).

Participants' expression of their own personal mental models reflects the literature on player mental models that is unique to each individual [598]. One of the ways in which player mental models are particularly hard to predict is that each individual approaches a game with different pre-existing knowledge.

9.6.2. Pre-Existing Knowledge

Pre-existing knowledge is a category that broadly refers to how players bring their own understanding of the world and knowledge of games to their play experience. One of the clearest ways in which players expressed how pre-existing knowledge informed their interpretations of *Nothing Beside Remains* was through referring to or making analogies with other games. For example, when asked to define procedural generation, one participant responded:

> "Something that is not pre-determined by the designer, but the mechanism for its creation is determined by the designer. In my opinion, stitching together from pre-defined building blocks also qualifies (**see Spelunky 2 level generation**)" (P80, Q0).

When asked if they could distinguish between hand-written and procedurally generated content, another participant referred to their knowledge of how terrain generation works in *Minecraft* [384]:

> "It would depend on the setting. Procedural content tends to show patterns, as it would need to be programmed according to a set of rules. **So, for example, a grassland biome in a Minecraft world will always have a relatively flat landscape, and a lot of oak trees**" (P97, Q3).

Just as players would refer to iconic PCG-driven games when discussing PCG, they would also refer to iconic archaeological sites when asked about their interpretation of what happened to the village. Several participants made analogies with Pompeii:

> "The low howling wind tells me whatever happened is still going on, though maybe less intensely. The presence of surface skeletons makes me think it was a rapid event. **Like Pompeii, but somehow with sand instead of ash.** I can't explain it" (P3, Q1).

> "Many of the houses do appear to be totally empty... This implies that many of the residents had already abandoned their village, with the remainder choosing to stay inside. Perhaps they knew something was coming? **Either because it was slow, as in my initial starvation hypothesis, or because they evacuated, as was the case for many of the luckier residents of Pompeii**" (P186, Q2).

Players also expressed how a *lack* of pre-existing domain knowledge likely influenced their interpretations:

> "I don't think I could; **I'm not familiar enough with the difference or capabilities of procedurally generated content.** I think the statue description was hand-written because it was more specific" (P145, Q3).

9.6.3. Gameworld Affordances

The subcategory of gameworld affordances contains many further nested subcategories that can constrain the archaeological gameworld mental model of the player, guiding them towards a potential interpretation over others. In some cases the first author drew from archaeological terminology when coding these categories, such as "attribution of context." In the below example a participant implicitly infers the reason an object was left in a particular location from its assumed context:

> "**The sickle which was left in the fenced off area with plants (probably a farm of some kind).** It was left there because it was probably used for farming, and I chose it because this was the area I saw (before getting stuck at the bottom of the map) that most made sense to me" (P135, Q4).

Assemblage is another term with a more specific meaning in archaeology; it refers to a group of artefacts in the same context, associated with each other. There are numerous examples of participants ascribing meaning through the association and proximity of objects:

> "I choose it because finding all the skeletons in one place felt like an interesting clue to what happened to the village, but it wasn't initially clear whether there were humans, or animals, or what, and **finding a large clearly animal skeleton recontextualized the collection of skeletons and made me consider that maybe this was something like a barn and all the skeletons were from animals that were penned up here**" (P154, Q4).

> "**The seven-legged chair was in a room with a few other chairs, so I suspect the chamber was a living area of some sort**. I chose it because 7 is a memorable number as far as chair legs are concerned" (P68, Q4).

Furthermore, participants' mental models were influenced by the assumed affordances of fictional objects:

> "something happened here which caused the residents to leave. **They appeared to have plenty of time to leave but also had to do so without taking anything too heavy.** This implies to me they may have been suffering a severe drought or some other break down of their local ecology, thus leaving for better places to live" (P184, Q1).

> "The fact that **many of the objects left behind were ones that would not be easily carried (heavy ceramics)** or would not be practical on a journey suggests that the people left rather than dying out" (P86, Q1).

Participants assumed that certain objects would have been too heavy to carry and incorporated this assumption into their own internal mental model of what they think happened to the fictional village and how they believe its inhabitants would have behaved as a result, leading to the resulting material remains found in the game landscape.

Procedural Affordances

Although the subcategory of gameworld affordances can be applied generally, we also identified a subcategory within this that relates specifically to the procedurally generated nature of the game under study, which we term *procedural affordances*. The code of "imperfect skeuomorph" refers to participants

believing that PCG is characterised as an attempt to imitate human labour which can be identified through its strange syntax and other uncanny features:

> "If a large enough amount of the procedurally generated content can be observed specific patterns can be found, such as **similar phrasing and 'mad libs'-like word substitution patterns**. Hand-written content on the other hand is usually very distinct from each other and whatever similarities exist are more thematic or nuanced" (P99, Q3).

> "Using 'the computers' to create a very large, varied set of objects (or maps, images, sounds etc) that would be difficult or impossible to create manually. But **shepherded by a human** who gives direction and adds constraints" (P105, Q0).

> "Algorithmically generating content (often used in a game context but is useful for far more applications) that, **ideally, is of good enough quality that it appears that humans created the content**, as opposed to random-stuff-in-random-places" (P30, Q0).

> "PCG is a system to **extend human intent beyond human effort**" (P64, Q0).

These procedural affordances are particularly powerful as they compliment another subcategory of the archaeological gameworld mental model – archaeological gameworld affordances.

9.6.4. Archaeological Gameworld Affordances

Archaeological gameworld affordances are qualities that invite further elaboration on the archaeological gameworld mental model by providing further evidence for the model or challenging existing assumptions. Here, we discuss two of the four identified affordances. The first of these is *incongruity*. When participants encountered material culture that didn't fit their existing mental model, it motivated them to speculate further:

> "I think that the climate must have changed and the village became uninhabitable. **There are altars and jugs for water, but no bodies of water in this village.** The landscape seems harsh and not as welcoming for human life" (P145, Q1).

> "The bucket in the muck. **I chose this because mostly because it was confusing (what is muck in the context of desert?)**" (P59, Q1).

Another key archaeological gameworld affordance is *intentionality*, which manifested in various ways. In some cases, participants' identified apparent intentionality in the material culture of the fictional village:

> "In one of the houses there's a stone altar that had a metal bowl (or jug) that was split into two. **I think the splitting was done deliberately, for a religious reason. It would be highly unlikely for such splitting of metal to happen accidentally**" (P137, Q4).

> "The pocket watch I found in the large ceremonial structure. **it seems to be a personal object, it was possibly dropped or it might have been left intentionally as a religious object**" (P82, Q4).

> "Ok yeah, the Pocketwatch Apocalypse. **Everyone got addicted to these things**. They don't tell time, but they tell you something, and some have creepy vibes" (P193, Q2).

Intentionality also relates to how participants ascribed this concept to content that they felt was perceptibly unique and handwritten, thus they did not ascribe intentionality to procedurally generated content:

> "I think it may have been procedurally generated, but I really can't say with any confidence. **There are few details to it and it doesn't have the feeling of something that I was specifically meant to find or interpret in a specific way (whereas by contrast the intentional Ozymandias reference feels hand-written and meant to be understood in a specific way because of the reference)**" (P148, Q5).

9.6.5. Recording Method Affordances

Different methods of recording content in games have different affordances, and scaffold the archaeological mental model. Some participants saw the recording method as a skeumorph that allowed them,

or would potentially allow them, to capture the game in as much detail as possible:

> "The way we are presented the game experience is without a complete overview of the village. We get one screen at a time. **I think if I were to record my experience in the game, I'd do so in map form in order to get a more complete view**" (P174, Q6b).

> "I made a map in my notebook of the space... **It definitely structured the experience. Rather than wandering it encouraged me to be systemic and observant of the space**" (P201, Q6-2).

For other participants, their interest in a particular recording method was in its creative affordances that allowed for personal expression:

> "I think writing and map making would be the most interesting ways of recording the experience, **because they require interpreting the evidence and crafting a story on your own, which to me is the real essence of the game**" (P178, Q6b).

> "I think the experience was quite evocative in a way that would be hard to convey with screenshots or even video. **I think creative writing would capture the experience best**" (P168, Q6b).

As seen with the response from P201 above, when we explicitly prompted players to record their game play as part of the theoretical sampling, there was some reflection that this changed their experience of the game. This reflects work done by Morgan et al on archaeologists' mental models being supported by drawing methods [393]. In addition, the record could be a form of interpretation in of itself, and a way of communicating this interpretation with other players.

9.7. Discussion

9.7.1. Building on Existing Models

Archaeological Gameworld Mental Models and Interpretive Agency

Our theory of an archaeologial gameworld mental model builds on and compliments Cole and Gillie's [115] concept of interpretive fictional agency. They explicitly discuss how players couched their interpretive experience of a game through how they interpreted environmental cues. However, Cole and Gillie's model does not engage with how and on what basis players form interpretations about games based on environmental storytelling. This is in part because they see interactive fictional agency as "an ability rather than the result of a process," and they only focus on games that have a pre-existing narrative, rather than those with emergent narratives like *Nothing Beside Remains*. The archaeological gameworld mental model is a new theory that can be employed to understand the process of interpretive agency, not just predetermined outputs. We propose the term "archaeological interpretive agency" to more specifically refer to games with emergent narratives as speculated through environmental storytelling.

Environmental Storytelling as an Archaeology of the Gameworld

Tieing together the strands of environmental storytelling and procedurally generated gameworlds that we set out at the beginning of this chapter, and in answer to RQ9.2, we found that participants engaged not only in an archaeology of the fictional game space, but an archaeology of the underlying generator as well. We saw this through the identification of procedural gameworld affordances — participants attempted to identify procedurally generated content based on how well they thought it could imitate hand-written content. This two-tier archaeological interpretation also correlates with Jørgensen's [298] definition of a gameworld that encapsulates not just the playable game space but the underlying system that operates it.

Recording Method Affordances

Our theory posits that recording method affordances scaffold the archaeological gameworld mental model by externalising information. Recording method mechanics are common across many different games, such as the range of game map interfaces identified in Dugas et al's study [577]. We can also see how Dugas et al's concept of atomic affordances for map interfaces complements this theory, as the smaller affordances of a game map interface contribute to its overall ability to scaffold the gameplay

experience. However, Dugas et al do not examine how these affordances may help players form interpretations about environmental storytelling. Furthermore, the aggregation affordances that Kaptelinin and Nardi [308] discuss, describing how technological artefacts can be combined, is highly relevant to our idea of recording method affordances in which both digital and non-digital recording methods can help to scaffold the archaeological gameworld mental model. This work also complements the study of maps and other tools to support mental models for spatial reasoning in psychology [582].

9.7.2. Interdisciplinary Contributions

HCI, Archaeology and Affordances

Though this was not the focus of our study, we believe that our theory and the supporting literature demonstrates the potential for further interdisciplinary studies on affordances drawing from both HCI and archaeology. As Kaptelinin and Nardi [308] have pointed out, Gibson's original theory of affordances is not appropriate for complex technologies. However, archaeology as a discipline has long grappled with the affordances of material culture and tools, as well as digital materiality [390], but has to date had little impact on wider scholarship regarding the material turn and the digital. Our theory of an archaeological gameworld mental model invites wider application of archaeological theory to digital material culture in HCI, especially in terms of attribution of context and assemblage affordances.

Non-Domain Specialists as Gameworld Archaeologists

With RQ9.1, we posed the question of how players form interpretations based on environmental storytelling in *Nothing Beside Remains*. Through our grounded theory analysis, we identified that participants in the study formed interpretations based on gameworld environments in ways that have parallels with archaeological interpretation and theory. For example, players would assume a particular context for an object, such as a barn, based on the building layout and the nearby presence of plants. Furthermore, participants made interpretations based on object assemblages, such as a room with several chairs being interpreted as a living area. This shows that even non-domain specialists can be understood as gameworld archaeologists. As Shanks [519] defines the "archaeological imagination" to be not just rooted in archaeology itself but also wider cultural practices of historical fiction, personal memory-making and archives, archaeological theory is a productive lens through which to understand both the craft and interpretation of environmental storytelling.

Archaeological Performance and Game Preservation

Player interpretations of environmental storytelling could be conceived as a form of archaeological roleplay, which just like analogue archaeology, is a site specific performance [76] informed by the affordances of a place (or in the case of a game, the gameworld affordances). Our identification of recording method affordances scaffolding a player's archaeological gameworld model resonates with Shanks and Pearson's [446] emphasis on the importance of documenting both archaeological fieldwork and theatrical performance through photography, plans and other methods. More broadly, we would argue that archaeological theory and method can contribute to HCI, encouraging player recordings not only as a means to study player experience but also as a form of game preservation. In tandem, HCI studies can provide insights into designing gameworlds that elicit interpretive agency and the production of interpretive documentation by players, which has broader application in public archaeology and audience engagement.

9.7.3. Applications for Designers and Researchers

Archaeological Gameworld Mental Models and Information Games

As mentioned in the related work section, *Nothing Beside Remains* can be classed as an information game. Game developer Tom Francis coined the term to refer to titles where the main goal is to acquire information and come up with theories based on the information one has, to in turn be able to acquire more information [187]. Games in this genre include *Return of the Obra Dinn* [342], *Heaven's Vault* [278], *Outer Wilds* [152] and *Her Story* [376]. As Cook has pointed out, one of the key design challenges for information games is modelling player knowledge [123]. Eliciting player archaeological gameworld mental models, potentially through recording methods such as photography or map-making, could be an avenue for designers of information games and puzzle games to further explore as a creative mechanic and tool for testing player assumptions.

Narrative Design Implications for Interpretive Difficulty

As mentioned above, this work builds on the model of interpretive agency. We also believe it to be applicable to the concept of interpretive difficulty [282] in games, which can be recognised in titles such as *Elden Ring* [196] that are renowned for their obtuse worldbuilding as relayed to players through environmental storytelling. Caracciolo has identified themes of uncertain materiality and interpretive open-endedness in his study of archaeological fandom and *Elden Ring* [89] and this chimes with our concept of archaeological gameworld affordances that invite players to interpret their material remains. These affordances, incongruity, temporal materiality, ambiguity and intentionality, are useful for narrative designers who want to engage players with interpretive difficulty. In addition to this, we have argued that these qualities also overlap with procedural affordances in a way that is particularly powerful in terms of environmental storytelling. The uncanny syntax of PCG [321], allows for such instances of incongruous or ambiguous content. We propose the term "procedural interpretive difficulty" to refer to this ability for procedurally generated content to provide compelling prompts for archaeological interpretive agency.

Grounded Theory and Iterative Game Design

Grounded theory analyses tend to be conducted on small samples of participants as part of semi-structured interviews [37, 113, 111]. Our study prioritised breadth over depth of responses in analysing set survey responses. However, and as our results demonstrate, participants were able to engage on their own terms and produce extensive and rich written responses to the survey questions. Our study and its resulting theory suggests a novel methodology for HCI researchers wishing to study games in the future. In particular, using grounded theory on participant responses to a game that we ourselves had developed allowed us to incorporate the results of the initial survey into the iterative design of *Nothing Beside Remains*, while also being able to bring these design changes to the theoretical sampling. We believe this "design-grounded perspective" [309] has great potential for future HCI studies on games using grounded theory.

9.7.4. Limitations and Future Work

Sampling Limitations and Assemblages of Play

In this work we focus on a single game, without follow-up interviews. By recruiting participants to complete an anonymous online survey, we did not interact with them face to face and pick up on how the context in which they played the game may have also influenced their experience. This ties in with Taylor's concept of the "assemblage of play" [567], that the hardware and physical context in which a player accesses a game are an integral part of play, not just what is rendered on-screen.

As we argue in §9.5.2, there were distinct advantages to using our own game as the case study for this work, especially in terms of being able to create bespoke builds. The remote approach also had advantages in that participants could engage with the game at their own pace, with less external pressure, which is important for such a reflective and open-ended task. However, we intend to extend this work by conducting further studies incorporating in-person interviews in which we ask participants to produce analogue records of their experience. We have already conducted one in-person pilot study where participants drew maps of the villages as they explored them, which shows promising new avenues for studying the archaeological gameworld mental model and recording method affordances.

Adapting Mental Models

Several HCI studies on player mental models have examined how these change over time, especially as players adapt to new information [598]. Participants in our study were only expected to play the game once, and the game state did not change over time. There was potential for their mental model to be challenged by objects they encountered in the game, as evidenced by some participants explaining how their theories changed over time. The single-round nature of our study is in line with the original premise of the game on its initial release, which instructed players to only play it once. Several participants commented on a desire to replay the game in order to understand the generative system better, however, so a potential extension of the study could measure players' changing mental models over the course of exploring multiple villages across several sessions of *Nothing Beside Remains*.

Nothing Beside Remains as pastiche

The game *Nothing Beside Remains* was inspired by Percy Shelley's *Ozymandias* [522], a 19th century poem that was itself inspired by a description of a ruined statue of the Egyptian pharaoh Rameses II [379]. It was written within the historical context of the British Empire and its "acquisition" of antiquities, and in anticipation of an actual statue of Ramesses II that was taken from Egypt and donated to the British Museum in 1818 by Henry Salt, the British Consul to Egypt [213] The poem itself has been critiqued as an example of "Romantic Orientalism" that "located Egypt as a desert that has become lonely and marginalised" [538]. *Nothing Beside Remains* contains a nameless ruined village in a desert, which could be read as a Romantic Orientalist pastiche, what with its apparent discovery by the player as explorer. Though we were deliberately not intending to recreate or abstract a real place, this non-specificity has arguably led to the rehashing of certain tropes. We would encourage others engaging in related future work to be wary of such unintended replication of tropes, especially as the archaeogaming community has been generally critical of such stereotypes in commercial games [248].

Quantitative Analysis

We reported on the rich qualitative data of our study, however we also collected telemetric data of participants' movements, interactions and sight lines during play. We plan to conduct a quantitative analysis of this data that can be cross-referenced with participant interpretations, potentially giving further insight into how responses may have been shaped by the path they took through the game landscape. In particular, it might provide insight into how theories formed over time or were influenced by the order in which different areas of the map were explored.

9.8. Conclusion

In this chapter we present the first large-scale grounded theory analysis of how players interpret environmental storytelling in a procedural game world, using *Nothing Beside Remains* as a case study. We propose the archaeological gameworld mental model as a way of understanding not only how participants interpreted the playable game space, but theorised about the underlying procedural system that generated it. This model also accounts for prior knowledge of analogue and digital culture, the constraints of the playable gameworld, archaeological gameworld affordances that prompt a player to engage in further interpretive activity and recording method affordances that shape and reaffirm the model itself. This interdisciplinary work draws on theory from archaeology, HCI and procedural design, and has implications for the broader study of interpretive agency in games and recording player interpretations as a form of games preservation.

The following chapter details further results from the same study, expanding on two specific factors that led to participants' emergent narratives; a deliberately included anachronistic object and an unintentional glitch. Arguably these emergent narratives were inspired by players encountering ambiguous content.

10

Ambiguity, Glitches and Emergent Narrative

> ”In common computing jargon, a bug is an error in code that produces incorrect or unexpected behaviour. According to a piece of computer folklore, the term was coined on September 9 1947, when the Harvard Mark II computer malfunctioned because of an actual moth, discovered by the team led by the computing pioneer Grace Hopper. The moth has been preserved for posterity in her notes, taped to a log-book page.”
> *-Player vs. Monster The Making and Breaking of Video Game Monstrosity,* Jaroslav Švelch [557]

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10.1. Introduction

This chapter builds on the previous one by providing more specific examples of emergent narrative in response to archaeological gameworld affordances. We deliberately included an anachronistic object in the player study to test how participants would potentially be influenced by this. In addition, an unintentional glitch ended up being incorporated into participants’ interpretations. These are both instances in which the archaeological gameworld affordance of *ambiguity* motivated further elaboration on player interpretations, as will be discussed below.

10.2. Glitches

10.2.1. Overview

The term “glitch” is commonly used to refer to hardware and software errors in audiovisual media, but particularly in computational media such as computer programmes and video games. Höltgen has defined a ‘bug’ as an error in code which can lead to glitches [270], but there can be many causes of glitches, including bitrot of code over time. In *Glitch Studies Manifesto* Menkman [375] adapts McLuhan’s theory of ‘hot’ and ‘cool’ forms of media [369], with ‘cold’ glitches are created through experimentation and can only be fleetingly captured, while ‘hot’ glitches are the result of “skip the process of creation-by-destruction and focus directly on the creation of a new formal design” [375]. Moradi [387] also employs a binary typology of glitches, with a “pure glitch” being one that happens spontaneously, and a “glitch-like” being deliberately created for artistic effect. We discuss an example of a pure glitch and what could arguably be conceived as a “glitch-alike” in our player survey of *Nothing Beside Remains*.

10.2.2. Glitches and emergent narrative

The emergent narrative potential of glitches is well established in game studies, as is the compulsion for players to record and share them [371]. Murnane [402] dedicates an entire section of their doctoral thesis on emergent narrative to glitches and the proclivity for players to include them in retellings. Herobrine, a *Minecraft* urban legend, is inspired by visual glitches in the game that often occur at the boundary of it's draw distance [364]. From the perspective of developers, several talks have been presented at the *Roguelike Celebration* conference on glitches in games with procedural narratives. Jason Grinblat [241], developer on the roguelike role-playing game *Caves of Qud* [208], discusses glitches in both his own game and others, and how players can engage in reparative play [242] "to repair the emerging narrative." In their ethnographic study of *Destiny 2* [82], Larsen and Carstensdottir identified rituals of play that were important for reinforcing a sense of community and storytelling practises, and that glitches broke these routines. However: "When possible, players and developers often try to incorporate these into the fiction of the game, or make fun of how the fiction begins to break down once this happens" [333].

10.2.3. Glitch as design material

In HCI, glitches have been embraced as an opportunity to engage with technology beyond normative ideas of technological progress and obsolescence. For example, in *The Seven Year Glitch: Unpacking Beauty and Despair in Malfunction* Sturdee et al [549] write from the point of view of a smartphone, documenting its glitches over time, advocating for a "Tiny Ontologies" approach "that frame how we might begin to delve into the reality of another type of thing." This work is arguably another example of how glitches generate emergent narratives which invite informal archiving. Jaurez has argued that:

> "As both glitch and serendipity share the connection of discovery through the unexpected, I encourage pushing the limitations of interfaces, structures, and systems to bring about novelty" [300].

Even if they do not explicitly engage with glitches, such boundary-pushing is evident in Song and Paulos' *Unmaking: Enabling and Celebrating the Creative Material of Failure, Destruction, Decay, and Deformation* in which they experiment with creating a new "unmaking" vocabulary for digital fabrication technologies, making the point that " the unmaking concept enables and perhaps even forces designers to think about and consider how their objects should fail and destruct" [532].

Within studies of games and HCI, there has been a flourishing of recent scholarship on the concept of "jank": game content that is "sloppy, glitchy, or clumsy" [57]. Bennet and Mekler argue that it has been understudied in HCI, which is a shame as "players can appreciate and find meaning in jank even where it is unintentional: caused by errors, accidents and glitches" [57]. In *This Game SUX* Cormier et al also explore video game jank from a user experience perspective and highlight the queer design potential of:

> "the intentional use of game logic and graphical errors – can be employed to communicate queer experiences as players encounter unexpected game states. Jank can create space for reflection or allow a break in immersion for a player to consider in-game events with objectivity" [129].

10.2.4. Archaeogaming and glitches

Reinhard has argued that glitches should be considered as archaeological artefacts as they "appear at an observable game-space and game-time, are artifacts within the game and therefore have archaeological context" [474]. He compares them to misfired pots that archaeologists discover in the analogue world [474]. I extended this analogy in my work on glitches as queer archaeological artefacts in games, comparing them to fingerprints preserved in ceramics:

> "Glitches and other perceived imperfections, like preserved fingerprints, also have an affective aspect in that they manifest the otherwise implicit human labour that went into the creation of analogue or digital craft. The glitch as queer agent invites player reflection on the process of the game's creation" [419].

In his thesis *The Poetics of Ruin: Towards a Playful Archaeology*, Ian He links glitches with ruin and the emergent process of play:

> "In the emergent process of glitch-hunting and exploitation, we as players not only discover ruin (in the sense that we "dig up" broken artifacts), we also produce ruin, the ruining of the game itself" [261].

10.2.5. The glitch as unruly artefact

In *Unruly Heritage*, Godin, Farstadvoll and Olsen [229] discuss their approach to archaeology, and its "profoundly unmatched ability to care for all things - wanted and unwanted, welcomed and unwelcomed, curated and ruined, intentional and not - and to both learn and be swayed by them." In *Avatars, Monsters and Machines: A Cyborg Archaeology*, Morgan makes the argument for a posthuman cyborg archaeology, "to reveal the monstrous underbellies of our virtual realities, failed and fully realised" [389]. The unruly and the monstrous are intertwined with the entanglement theories that were discussed in Chapter 8 in these papers. This is also true of Godin's work on *Monstrous Things* in archaeology, in which they additionally draw upon queer theory as a lens to examine material afterlives and failure:

> "In embracing hybridity and fragmentation, unruly things simultaneously seek to be made monsters and reject the contemporary ordering of space—as defined in the field of industrial archaeology—which demands that objects remain properly categorised and in their rightful place" [228].

The characterisation of heritage as 'unruly' or 'monstrous' has parallels with Williams' identification of "unruly encounters" in virtual reality (VR) experiences, "that veer away from perfect immersivity towards immersion in worlds of error" [618]. Furthermore, in Švelch's *Player vs. Monster* he makes the point that "the agency of the computer has also been attributed to monstrous creatures - among them bugs and daemons" [557]. I would argue that glitches are a form of unruly, monstrous heritage in video games.

10.2.6. The glitch as queer artefact

There is extensive work in the game studies literature on the queerness of the video game glitch. As Chang argues:

> "Queergaming dances with the possibilities of non-competitive, non-productive, non-judgmental play, as well as the uncertainty and inefficiency of glitches, exploits, and other goofiness and the de- sire for queer worlds as opportunities for exploration, for different rules and goals, and even for the radical potential of failure" [103].

Though it could argued that failure is almost inevitably experienced at some point when playing a video game [301], queer theorist Jack Halberstam understands the queer art of failure to be "the acceptance of the finite, the embrace of the absurd, the silly, and the hopelessly goofy" [250]. Beyond failure, there has also been considerable discussion of the queerness of glitchness in terms of speedrunning and its communities of practice. Speedrunning involves trying to complete a video game as fast as possible, often involving the exploitation of glitches in order to skip content. Ruberg has argued that speedrunning "engages with queer time and space" [495]. Scully-Blaker has described the speedrunning community as a "museum of accidents" that engages in "curatorial play" to exhibit them [516]. In *A Trans Historiography of Glitches and Errors* Whit Pow writes:

> "To write a trans historiography of glitches and errors is to unmediate an entire mode we use to write and tell media histories. Noting the "firsts" or "onlys" of something, especially with regard to queer and trans histories of digital media, is itself an eliding process, which reinforces the idea that existing histories of technology are already complete timelines with momentary lapses in acknowledging the contributions of marginalized people" [463].

Thus, the glitch invites us to reconfigure the archive and indeed, by extension, the archaeological archive. Schmalzer's postmortem of a glitch in *Queers in Love at the End of the World* [11] is a deliberate act of centering ephemera and personal experience to create an affective, trans archive [512], and is another important addition to the growing game studies literature on not just the queerness of glitches, but their archival complications. As I write in *Burn the Glitch*:

> "Recording the affective experience of gameplay, including player intimacy with glitches, is not just an important part of their archaeological context but also a way of queering what

Item	Count
Statue	15
Chair	10
Skeleton	9
Ceramic pieces	7
Altar	5

(a) Non-bait condition

Item	Count
Pocketwatch	20
Statue	16
Trident	12
Chair	6
Altar	4

(b) Bait condition

Figure 10.1: The five most commonly-selected items by survey participants to record in the survey.

Item	Statue	Trident	Pocketwatch
On screen	164	163	54
Interacted With	161	141	51
Recorded	31	11	18

Figure 10.2: A breakdown of three items and how often they were on screen, interacted with, and subsequently chosen as the single item to record.

archaeology and games history traditionally deems worthy of record" [419].

10.3. Method

This chapter details additional work that we did after the initial player survey. Thus, in addition to the research questions laid out in Chapter 9, we had an additional more specific question with regards to the deliberate placement of an anachronistic item:

- **RQ10.1**: Do players explicitly refer to a deliberately anachronistic object included in some iterations of Nothing Beside Remains and how does this affect their interpretation of the village?

10.3.1. `Bait' Item

In order to test RQ10.1, we came up with the concept of a 'bait' item – an object with a distinctive description hand-authored to be seemingly anachronistic in the pseudo-ancient setting of *Nothing Beside Remains*. We chose to include an item with the following description:

> "A pocket watch made of a delicate treacle coloured metal is embedded in the dirt. There are deep scratches and a stain partly obscuring the face. You can make out part of an inscription: DON."

A pocket watch was chosen as a bait item to be distinctive in the game world[1]; there are no other mechanical objects in *Nothing Beside Remains*. The description of the pocket watch was consciously written with partial information and details that could potentially be interpreted as the result of the 'wildlife attack' simulation outcome. It was hand-placed in front of the altar in the church, a building which always appears in every iteration of Nothing Beside Remains. However, in order to test if the inclusion of the object affected player responses, each of the two seeds (see Chapter 9 above) could also randomly have the item spawn or not. As such, there were four possible versions of the game that a participant could potentially randomly encounter during the survey.

10.4. Results

10.4.1. The Influence of Bait Items

We categorised participant responses to question four of the initial survey: "*Pick one object from the game and describe how you think it came to be left where you found it in the village. Why did you choose this object?*". We manually gathered similar responses together – for example, participants who chose the feet or head of the ruined statue were all recorded as 'statue'. Table 10.1 shows the five most-picked objects, broken down into baited and non-baited conditions.

We can see from the table that in the baited condition the pocket watch was the most frequently picked

[1]The item also implicitly references the Watchmaker analogy, a theological argument for evidence of a designed universe.

object, with 20 of the 102 respondents choosing it. In both conditions the statue was very commonly chosen. Notably, the trident – which is found near the statue at the beginning – is chosen commonly in the baited condition but less commonly in the non-baited condition (just two times). We are yet to find an explanation for this, however future exploration of play data might shed light on this.

As described earlier, the player always starts in front of the statue. There is exactly one statue in each village, and it stands out as a unique and narratively important structure. By contrast, the pocket watch is located in the church, which is one of a dozen or more buildings, and in both seeds was more than three full screen-spans away from the player's starting location. Thus, its presence as the most chosen object is significant, as it shows that players explored enough to find it, and remembered it later. We theorise that the anachronistic nature of the object helped it stand out, rather than it simply being unique in that world – other unique items, such as the altar or the statue, were picked less despite their apparent significance. This is reflected in the respondents' interpretations of the pocket watch, as detailed below.

To investigate the difference in object selections, we extracted player interaction and vision data for three objects: the pocket watch bait item, the trident, and the statue. We separated the trident and the statue as the former has a distinctive appearance and was explicitly mentioned many times by participants. For the statue, we combined any interactions or selections with any part of the statue, including its feet, body, head or the pedestal. An object is considered to have been seen if it was rendered on-screen. The data is shown in Fig. 10.2. Note that numbers differ from those shown in Fig. 10.1; due to some issues with data collection we had to exclude some records from the player activity data.

We can see from this breakdown of data that most participants who saw the statue, trident or pocket watch subsequently interacted with it. Given that the statue and trident are seen by players immediately upon starting the game, the fact that 94% of players who saw the pocket watch then examined it shows a sustained level of interest in this object. We are most interested in how many participants, having interacted with an object, decided to record it in the survey as their one chosen item. Our hypothesis was that the pocket watch was more likely to be selected after having been interacted with, because it stands out as being an anachronistic object in the game world. One possible way to assess this is to use the frequency of participants choosing the statue or trident as a baseline. Like the pocket watch, they are unique items that stand out to the player, both in terms of their placement and textual descriptions. If we take as a baseline the probability of either item being recorded after being interacted with, a simple binomial test suggests that the higher selection rate of the pocket watch is statistically significant ($p < 0.05$) when compared to either the trident or the statue's probability of being recorded in the survey.

A deeper analysis would be required to have more confidence in these conclusions, however. The data is not entirely independent – participants who chose the pocket watch had previously seen the trident and statue, and therefore we cannot rule out this affecting their decision-making. We also do not account for other factors such as how centrally an item appeared on the screen, how long the player played for before and after interacting with these items, and other potentially confounding factors. A between-groups analysis with a different experimental setup might provide stronger evidence for our conclusions. Nevertheless, we believe this preliminary analysis strongly suggests that the bait item had a statistically significant impact on participant experience, and gives us a good foundation to build on in future work.

10.4.2. Bait Item Interpretations

As stated above, our hypothesis was that the pocket watch, as a distinctive item that seemed incongruous with the rest of the village, would be picked more frequently by respondents who saw it when prompted to choose an item of interest in the survey (Question 4). This 'bait' item was also inspired by *intrusive finds* in the archaeological record – more modern artefacts that intrude on earlier deposits due to later disturbance [406]. Players picking up on the object's anachronistic nature shows they are thus applying archaeological interpretation by placing it within the wider context of other material remains in the game world. In a way, the pocket watch functioned as a kind of intentional glitch, a feature to deliberately surprise participants and make them question the nature not only of the village but also potentially the underlying simulation. Of those responses that mentioned the pocket watch, several

explicitly referenced it as seeming to be “out of place”:

> “There was a pocket watch in a house. There were metal objects in the village, so it is possible they produced the watch too, but the other objects were simple things like bowls. The pocket watch seemed out of place. Maybe another explorer simply dropped it” (P3, Q4).
>
> “I found a scratched pocket watch that seemed inconsistent with the technology of the rest of the village which suggests I’m not the first outsider to visit its ruins but there was no hint as to what happened to the outsider” (P6, Q4).
>
> “The pocket watch seemed out of place with the rest of the narrative; let’s say that a person exploring this abandoned place left it behind accidentally” (P108, Q4).
>
> “The pocket watch: I got the idea that I was not the first visitor after the abandoning (?) of the village, as the pocket watch in one of the ruins seemed a markedly more modern object” (P115, Q4).

More than pointing out the potentially anachronistic nature of the pocket watch, some participants went further and questioned if others like them had also visited the abandoned village in Nothing Beside Remains. This is one of the strongest examples of how the bait item prompted emergent archaeological storytelling that considered several phases of activity in the village.

10.4.3. ``The Sandstorm''

During the period the survey was open, we discovered that *Nothing Beside Remains* had a glitch which locked the game if a player moved too far outside of the main village boundary. By the time we discovered this, however, respondents were already incorporating the glitch into their interpretations of the village, so we felt that removing it from the build would be tampering with the experiment. However, the glitch did cause frustration for participants who were unable to continue their playthrough when the game crashed. Though only low stakes, this scenario did present an ethical dilemma in terms of the user experience of the survey.

Normally, it should not be possible to leave the play area in *Nothing Beside Remains*. The player’s position in the world is represented by whole-number co-ordinates, and going beyond the co-ordinates represented by the village grid is not permitted. However, due to a bug in the game’s original code, trying to exit the village to the north or south can cause an out-of-bounds array access, rendering the player unable to move and softlocking the game. This is easy for a player to discern because the edge of the map typically has no landmarks or other objects, so there is no visual indicator they are not moving. Particle effects of sand blowing past and sound effects of wind continue to play as other parts of the game are still running. This gives the impression of the desert as empty and endless, no matter which directional button is pressed (even though, in reality, the player has not moved at all).

The so-called “sandstorm”, unlike the pocket watch, was an actual glitch that led to emergent storytelling. Indeed, some participants even included the sandstorm in their interpretations of the village:

> “Well, since I tried to find the edge of the map and got caught in a sandstorm I couldn’t escape, I’m guessing something similar happened to the village” (P22, Q1).
>
> “Maybe this place has became unlivable because of the sandstorm ? I got caught in the sandstorm myself and got stuck/lost in it. Maybe that happened to them”(P74, Q1).

Furthermore, some participants even explicitly stated they believed the sandstorm was a designed feature of the game:

> “Well, the visual effects of the sand storm might have been procedurally generated, but the sandstorm and its location, probably not” (P13, Q5).
>
> “I think the sandstorm was not procedurally generated but designed by humans” (P74, Q3).

The sandstorm is an interesting case study for us because in some ways it had a desirable effect by prompting players to come up with interpretations from their experience with the game, however by its very nature it is not a feature that could be reliably reimplemented. As mentioned above,Jason Grinblat,

a developer on *Caves of Qud* has spoken about the potential of glitches to engage players, especially in games with PCG, and that developers should question if they enhance a game before trying to get rid of them [241]. The “sandstorm” makes a case for this argument.

10.5. Discussion

10.5.1. Archaeological Storytelling

Probably the most famous example of a game with procedural emergent narrative is *Dwarf Fortress*. Tarn Adams, one of the game’s programmers, has commented that the ability for dwarfs to make engravings has been a particularly powerful prompt for emergent narrative; players can choose the design of the engraving and where it is located [4]. Thus, the spatial *context* of engravings is key, not just their textual description – and context is a key component of archaeological storytelling.

Even in the short excerpts of player responses included above, there are examples of participants framing their interpretations of the pocket watch in terms of its location and other known artefacts. In a more specific example, we can arguably see a participant apply the archaeological concept of *assemblage* in their interpretation:

> “The strange thing was the single three legged chair in the top right house that had a table with three plates set. I would have expected to see another two chairs but it suggests they were moved or destroyed by whatever happened to the village” (P170, Q4).

An archaeological assemblage is a group of artefacts that are associated with each other and were likely used contemporaneously. In this quote, a participant notes how the generated assemblage of objects seemed incomplete – if three plates were set, why was there only one chair? The generative algorithm lacks the contextual understanding to link the placement of the chair and the plates, as they are both put into the world with reference only to the prior simulation and random noise, however even if the result was confusing in this case it prompted player speculation about what created this particular assemblage of objects, leading to the formation of an archaeological narrative. We can apply the theory of the archaeological mental model presented in Chapter 20 to this example; this demonstrates the *assemblage affordances* of *Nothing Beside Remains*.

10.5.2. The Glitch as Affective Queer Artefact

As discussed above, there is precedent for considering that glitches *queer* gameplay experience – they challenge the status quo of a presumed desire for player control and immersion [495]. In terms of procedural content generation, the glitches generative systems produce throw into relief the tension between the marketing of the technique as a way of increasing efficiency, versus the parallel claim that the surprising results they produce are indicative of creative potential [109]. The ‘sandstorm’ in our survey is a case in point. Some respondents understandably complained about it impeding their gameplay, yet incorporated it in their emergent narratives.

We can also apply the archaeological mental model theory to the emergent narratives that the sandstorm glitch generated- the archaeological gameworld affordance of *ambiguity* is relevant. In this case, ambiguity was not the result of procedurally generated content but a glitch that impeded movement, which coupled with the visual particle effects and the wind sound effect led to uncertainty around whether it was a designed experience or not, and if so what the intention behind it was.

Although we only have limited text responses from participants, those answers about the glitch did capture some of the affective responses it produced, especially in terms of frustration. In particular, one respondent wrote:

> ”I imagine that the position of **that darned sandstorm** (the edge of the play area) was hand-written” (P13, Q3).

Archiving affects in relation to glitches is resonant with Schmalzer’s work mentioned above [512], as well as Ruberg’s on *No Fun: The Queer Potential of Video Games that Annoy, Anger, Disappoint, Sadden, and Hurt* [494]. Participants had ”unruly encounters” with the sandstorm glitch, which itself is a queer artefact.

If we also consider that glitches themselves constitute archaeological artefacts of a game’s system

as opposed to its fictional narrative, we believe our survey results suggest there is potential for playing around with intentional and unintentional glitches to compel players to engage in archaeological interpretation of procedurally generated content. As discussed in Chapter 9, some of these players performed a dual archaeological recording within our survey: both of the fictional village, and of the underlying generative system which produced it.

10.6. Conclusion

In this chapter we reported on additional findings from the survey of *Nothing Beside Remains* reported in Chapter 9, which explored the role of interpretation and inference in a player's understanding of a procedurally generated environment. Studying open-ended player experience, especially in the context of generated content, raises lots of new challenges for researchers and designers, as well as exciting opportunities for surprising and emergent effects. A bug in the game created a consistent narrative interpretation among survey participants, effectively turning a glitch into a defining characteristic of the game world. We believe that the unpredictable nature of software, like the unpredictable nature of generative algorithms, can be shaped and played with by designers, and that further research will show how understanding emergent narrative as a form of archaeological storytelling is a powerful tool to help us understand these phenomena.

This micro study allowed us to further examine the emergent narratives that are told through interpretive play, and how both a "pure glitch" and a "glitch-like" exhibited archaeological gameworld affordances of ambiguity and incongruity, the former of which was discussed extensively in Chapter 5. Thus, players engage with interpretive play not just on the level of the fictional game, but the gameworld and its attendant systems. This could have further implications for studies on eudaimonic experiences in games and the role that such "unruly encounters" can have, both designed and spontaneously generated. Thus, this chapter bookends the section on video game archaeology as interpretive play, as players explored the "tiny ontologies" of *Nothing Beside Remains*. This chapter also builds on earlier work regarding how glitches *queer* gameplay, suggesting that such "unruly artfacts" are a key design consideration for interpretive play.

Part IV

Archaeological game design for interpretive play and play preservation

11

Discussion

”There is the you that remains that remains and remains.”
-1000XRESIST, Sunset Visitor [600]

11.1. Introduction

This thesis synthesises two main strands of novel research in video game archaeology; the development of new methodologies for archaeologically recording video games, and a new theory of an archaeological gameworld mental model for how players interpret environmental storytelling. In Part I, I laid out the history of archaeogaming (Chapter 2) as an apparently interdisciplinary field that has yet to reach its full potential in terms of engaging with method and theory across different disciplines, the importance of which I laid out in the Introduction. Video games are ontologically complex, thus they demand truly interdisciplinary methodologies in order to study them. Furthermore, there are limited examples of archaeological methodologies being applied to video games. In Part II, I presented three studies in which I developed novel methodologies to engage with and record video game archaeology. In Chapter 6, I adapted the go-along methodology in order to explore the situated memories and player heritage in the MMO *Wurm Online*. I then adapted archaeological field methodologies in order to contextually record player traces in *Elden Ring* (Chapter 7), before iterating on this methodology by conducting a collaborative autoethnography on the *Elden Ring Shadow of the Erdtree* DLC (Chapter 8), anticipating its release and recording my own play experience as part of the archaeological record.

Just as video games are hard to define, play is also ontologically ambiguous. Chapter 3 provided different definitions of play, before elaborating on the range of existing approaches for video game play preservation. Though there has been some work on archaeological approaches to preserving user-generated content, there has been limited work that has explored the potential for an archaeological preservation by record approach. In Chapter 4, I focused on a specific type of play, interpretive play; specifically synthesising literature which has drawn comparison between archaeological hermeneutics and player interpretations of environmental storytelling. However, there has been limited, if any, empirical work investigating how and on what basis players form these interpretations. In Part III, I presented the results of a player study involving an archaeological game I co-developed, the resulting grounded theory of an archaeological gameworld mental model (Chapter 9) and the emergent narratives that players told as a result of both a “pure glitch” and a “glitch-like” (Chapter 10), which also presented further examples of how the archaeological gameworld mental model can be applied to such interpretations.

Below, I will elaborate on the contributions that this thesis has made to archaeogaming and HCI research.

11.2. Methodological contributions

11.2.1. Anticipatory archaeology of player traces and their context

While the field of video game archaeology, also known as archaeogaming, has produced considerable work with regards to reception studies, developing archaeological games and experimental archaeology of code, there has been limited work examples of archaeological fieldwork conducted in video games [476, 418, 253]. Furthermore, as discussed in Chapter 6, it has been argued that such research has not yet moved beyond a "conceptual phase" [458] to make a clear argument for its wider contribution to studying games.

As laid out in Chapters 7 and 8, I have developed a novel methodology for contextually recording player traces in the video game *Elden Ring* as a form of contemporary archaeology. This work is distinct from other archaeological surveys of video games, and existing qualitative HCI research on video games, in that it targeted the virtual remains of player activity, distinguishing the archaeological context of these virtual remains based on observable changes within the study area. This draws from analogue archaeological methodologies in that, when conducting a 'dirt' excavation, archaeological context distinguishes deposits both spatially and temporally in terms of where they are found and how this relates to original deposition over time. The contextual recording of bloodstains and messages in *Elden Ring* used observable changes to the assemblages of user-generated content as a way of gauging context. Furthermore, in the initial survey, I used the player character's foot as a standard unit of measurement in order to create scale plans of each observable context, which is also a novel archaeological methodology in a video game context. Put simply, these methods contribute to games HCI beyond existing qualitative methods by focusing on the material traces of player activity within video game space, and systematically recording and interpreting their intimate spatial context.

This work answers RQ1 by adapting existing fieldwork practises for the affordances of this game, specifically the ephemerality of the player messages and bloodstains we were recording. This work can be understood as a form of contemporary "archaeology-as-surface-survey" [260] that has affinities with other projects in the contemporary analogue world that adapt traditional archaeological methodologies, such as sampling material cultural assemblages on the International Space Station [604].

Reinhard has urged for a "salvage archaeology" that "must sample from the source and the sites and times of creation and use" [475]. I have gone further and made the case for an anticipatory archaeology of video games. The initial survey of *Elden Ring* in Chapter 7 sampled the game at the point of its release, while the second survey in Chapter 8 anticipated the release of the *Shadow of the Erdtree* DLC. These were key points in the active lifecycle of the game that had to be sampled contemporaneously, and can never be accessed again. The survey in Chapter 8 produced a unique dataset of 537 player messages and 61 bloodstains recorded before, during and after the release of the DLC. The survey design of repeatedly visiting the same sites over time allowed me to see changing spatial and temporal trends in the game, and is rooted in the archaeological practise of the archaeological watching brief [15] which involves repeatedly visiting a development site to monitor and record any archaeological deposits that might be impacted. In addition, it has parallels with the approach of the *Unruly Heritage* project (as mentioned in Chapter 10) that encouraged engaging with a site at different times of day and different seasons and "requires the kind of familiarity and openness that renders us accessible to the 'presence effects' of sites and their materiality" [229].

Though the two surveys were specifically adapted for *Elden Ring* and its mingleplayer features, they provide a proof of concept for archaeologically recording user-generated content in video games, while also demonstrating that any such methodology has to be attendant to the affordances of any specific game, rather than arguing that video game archaeology is ontologically similar to analogue archaeology [458, 478]. Furthermore, while Reinhard [475] and Aycock [24] have argued it is imperative for archaeologists to turn their attentions towards preserving digital culture, there has been limited work demonstrating the wider applicability of archaeological methodologies for contemporary play preservation. Though there has been HCI work which uses ethnographic methodologies to capture user experiences [537], for example, there has not been HCI work which combines both ethnographic and archaeological methodologies for the purposes of preserving contemporary play experiences. As discussed in Chapter 8, the combination of employing an archaeological survey methodology with an emphasis on spatial context, and a collaborative autoethnography, can contribute to HCI metaresearch. I

have argued that the researcher's own play experience is an important part of the archaeological record, especially in terms of a qualitative, reflexive approach. Thus, in the conversation between games HCI and video game archaeology, the latter can provide the former with new perspectives on the use of qualitative, archaeological approaches to recording situated play experiences for future interpretation.

Politopoulos, Mol and Lammes have advocated for a "playful archaeology" [459] however this has mainly focused on finding evidence of play in the pre-modern archaeological record and archaeogaming as a non-traditional, playful mode of scholarship, rather than applying archaeological methods to video games as a form of play preservation. Indeed, I would argue that this thesis provides an answer to Politopoulos and Mol's call for "a clear argument for how archaeological tools can consistently and structurally be of added value for the larger scholarly understanding of games" [458] - a contemporary archaeology of video games can provide play preservation records in terms of the traces of other players, and researchers' own experiences, the latter point of which will be expanded on below.

11.2.2. Video Game Archaeology as a Queer Methodology

We need a truly interdisciplinary video game archaeology. This means engaging with and drawing on methodologies from archaeology, anthropology, game studies, computer science, HCI and more. A case in point is that many of the methodologies I adapted for this research were ethnographic in nature, the go-along methodology in Chapter 6, and the collaborative autoethnography in Chapter 8. However, these methods are inherently archaeological in that they draw on a long history of archaeology and anthropology as overlapping disciplines, especially in North America where archaeology is generally situated within anthropology departments [223]. Furthermore, we could argue that this work constitutes a form of ethnoarchaeology:

> "We can distinguish this subdiscipline from other types of ethnographic research by its explicit focus on material culture and its interactions with social and cultural dynamics, and because it keeps archaeological research problems in mind." [457].

These ethnographic methods were adapted in order to better understand the embodied player experience and situated memories associated with persistent material culture in a virtual world. This was indeed a case of keeping "archaeological research problems in mind." Beyond this, video game archaeology borrowing and adapting methodologies from different disciplines is an example of how it 'queers' disciplinary boundaries. As I argued back in 2020: "archaeogaming works with and beyond canonical archaeological methods and theories; it is a 'glitch' of the academy" [419]. This thesis extends and exemplifies this idea, making the argument that we should consider video game archaeology to be a constellation of queer methodologies that complicate established epistemologies. Furthermore, we can extend this concept to be in conversation with the concept of queer HCI research that calls for engagement with queer joy and lived experience [430].

Indeed, a thread that has run throughout this thesis is the importance of researcher reflexivity, and this was also a key aspect of the methodologies that I adapted and designed. In Chapter 6 I reported on my adaptation of the go-along methodology in the MMO *Wurm Online*, with a particular emphasis on capturing my own experience as a researcher in that space in order to avoid the trap of "periscopic play" [564]. This approach also ties in with the methodology that was developed in Chapter 7 with regards to contextually recording player messages and bloodstains in *Elden Ring* according to when they were observed by the surveyor- I realised that a key contribution of the archaeological methodology was recording how these player traces are actually experienced *in situ* as ephemeral assemblages. This work was extended in Chapter 8 with the retrospective collaborative autoethnography of *Elden Ring Shadow of the Erdtree*. The use of videography in this study, and the subsequent analysis of that footage, allowed us to reflect on the diffractive experiences we had contributed to the knowledge production process. In answer to RQ1, designing archaeological methodologies with the aim of not just capturing other player traces but our own subjectivity as researchers allowed us to engage with our "assemblage of play" [568]. For example, the accidental sonic heritage artefacts that we captured while recording commentary on our fieldwork adds another layer to the play preservation record that is not necessarily commonly discussed.

Thus, the reflexive aspects of these methodologies speaks more holistically to the breadth of literature on play and play preservation (Chapter 3), especially in terms of play itself as a research method

that can speak to the “the personal, interpretive nature of the experience” [202], especially the stated aims of “close playing” [104]. This work also builds on HCI research on autoethnography, games and transformative experiences [588], by specifically focusing on the spatial context of the researcher both within the game world, and in terms of material conditions under which they conducted the research. This additionally chimes with work on play as affect, affective archives and a trans theory of games that lives “with the archive’s failure to capture —and to find life in the cracks of what remains” [512].

11.3. Theoretical contributions

11.3.1. The Archaeological Gameworld Mental Model and Assemblages

As laid out in Chapter 5, there is precedent for considering the interpretation of environmental storytelling in video games as having parallels with archaeological hermeneutics [138, 58]. Furthermore, there have been several studies which have tested player comprehension of pre-written narratives via environmental storytelling [61, 54], however, these did not consider how and on what basis players interpret environmental storytelling. To answer this, as well as RQ2, I conducted a grounded theory analysis of a player survey in which 202 people played a game about interpreting a procedurally generated village (as reported in Chapter 9). This theorises that players form archaeological gameworld mental models when they play a game, based on the fictional world depicted in the game but also the underlying game system [298].

A commitment to interdisciplinarity has also been a major theme of this thesis, and the theory of the archaeological gameworld mental model draws from how archaeology [316], game studies [630] and HCI [298] have all engaged with affordance theory in order to conceptualise how players approach material culture in video games. In addition, the archaeological concepts of context [343] and assemblage [251] have been instrumental in the theory of the archaeological gameworld mental model. The archaeological concept of “assemblage” applied in this thesis differs substantially with how it is usually conceived in games studies and HCI in terms of individuals or entities being entangled in wider sociotechnical networks [245, 536]. An archaeological assemblage is defined as a collection of artefacts that are associated with each other by a shared context that is defined both spatially and temporally [251], e.g. the fill of a pit. Individual artefacts, their shared association and the context they are excavated in can all provide evidence about past human activity that can be interpreted in the present.

In Chapter 9 I demonstrated that some participants in the player study arguably engaged with the concepts of context and assemblage informally, as those interpretations were influenced by the context of objects and other objects associated with them. Thus, we can understand that players, even though they are not domain specialists, engage in a kind of ‘gameworld archaeology,’ exhibiting examples of ”archaeological imagination” [519]. Beyond this, the concept of an archaeological assemblage also has contributions to make to the study of environmental storytelling and level design in HCI and games studies more broadly, in terms of both interpreting and designing for particular player behaviour.

11.3.2. Procedural Affordances and Ambiguity

As discussed in Chapter 5 under the broader theme of interpretive play, there has been considerable work on the concept of eudaimonia and interpretive agency in the HCI and games literature [115, 143, 309]. The theory of an archaeological gameworld mental model presented in Chapter 9 builds on this work by moving beyond understanding interactive fictional agency as “an ability rather than the result of a process,” [115], to instead theorising as to the gameworld affordances that, along with pre-existing knowledge, influence how players form interpretations based on environmental storytelling. Furthermore, the reporting on player gestures in *Elden Ring*, as reported in Chapter 9 is also applicable to existing literature on interpretive difficulty [89, 90, 282] and community interpretations [110, 334]. Indeed, although the archaeological gameworld mental model was applied to *Nothing Beside Remains* in Chapter 9, it can be applied to other games with environmental storytelling such as *Elden Ring* (this will be discussed further in the Future Work section below).

In answer to RQ2, the archaeological gameworld mental model theory very much draws on the theory of interpretive archaeology, that is, conceptualising archaeology as the interpretation of material culture in the present that is always influenced by the social context in which that interpretation is formed [521]. As stated in Chapter 9, even while keeping in mind criticism of the relativistic nature of interpretive

archaeology, it is useful for understanding interpretive agency as a process. Linking this back with HCI and eudaimonia, Morgan's *Cyborg Archaeology* is an example of contemporary archaeological theory that reframes interpretation as an immersive experience:

> "From this stance, creating archaeological interpretations is endlessly immersive, a process that I have compared to telepresence…While immersed in archaeological interpretation, you are not completely in the present, but also not wholly in the past, but inhabit an interstitial space" [389].

The theoretical contributions of the archaeological gameworld mental model can be drawn out by drilling down into its micro-theories. I identified the archaeological gameworld affordances of incongruity, temporal materiality, ambiguity and intentionality, which encourage further player interpretation by challenging their existing mental model. I found that these qualities rhyme with what I identified as procedural affordances, qualities of procedurally generated content that participants identified as uncanny or repetitive. This theoretical contribution is novel in specifically demonstrating the eudaimonic potential of procedurally generated content which can inspire interpretive play. Though there has been discussion on procedural poetics [311] and the potential of leaning into the imperfect outputs of PCG [321], the theory of procedural affordances links up with HCI and game studies research on the power of ambiguity [215], posing that the strange 'texture' of PCG is a useful design material for interpretive play specifically.

11.4. Design contributions

11.4.1. Persistent social worlds

In Part II, the games I focused on had some shared technical affordances. In Chapter 6, I conducted a go-along in the MMO *Wurm Online*, which features a persistent, multiplayer landscape with (semi) persistent user-generated content. In Chapters 7 and 8, I conducted archaeological surveys of user-generated content in *Elden Ring*, and was able to do so because it is a mingle-player game with user-generated content that persists at least to the extent that is can be algorithmically pulled from a server and displayed to other players. Indeed, the archaeological methodologies that I developed in Part II relied on these games having at least semi-persistent shared social worlds in order for me to study the traces of past player activity. In Part III, I was able to study the interpretations of players in a single-player game without persistent user-generated content (*Nothing Beside Remains*), because I solicited their written responses. My player study also indicated the potential of studying player paratexts for indirectly understanding player interpretations. The methods used in Parts II and III clearly had different aims and limitations, but also demonstrate different aspects of video game archaeology in terms of indirectly recording player traces spatially, and directly asking for player interpretations.

Part II thus demonstrates how certain games are better suited to the archaeological methodologies that I developed. However, there are also design implications in that games with these affordances also demonstrably lead to certain kinds of unprompted interpretive play, whether that be in-game curatorial practices in *Wum Online*, or players themselves becoming environmental storytellers in *Elden Ring*. There is thus a huge amount of potential for exploring the possibility space of video games with persistent, social worlds informed by archaeological theory. This chimes with existing archaeological surveys in video games such as *No Man's Sky* that have similar affordances [209], and HCI research on persistent material culture and traces in games [246, 331], however this work goes further by linking up these two areas of research and making the case for archaeological game design, which will be discussed below.

11.4.2. Archaeological game design

In *A Gap In Games Research*, Warpefelt [607] argues that there is a continuum of games research, from the more technical *what* that studies games as technological artefacts, to the *who* that focuses on the historical and social aspects of games. He argues that there is a gap in the continuum, which he refers to as the *how* of games. Admittedly, Warpefelt himself concedes that this continuum is overly simplistic, and that HCI research could be considered to bridge the *how* gap, at least in part. In any case, I would argue that archaeological game design not only bridges the supposed *how* gap, but also addresses the other key interrogative words of *when*, *where* and *why*.

In Part II of the thesis, I adapted archaeological and ethnographic methodologies for contextual recording of player traces and in-game situated memories. These methodologies rely on the production of paratexts by the researcher-player as a form of preservation by record, but also as a way to scaffold interpretations. In Part III of the thesis, I conducted a study of participants and found that their archaeological gameworld mental models are also scaffolded by the production of paratexts. Thus through interpretive play, these participants can be understood as researcher-players themselves. Not only this, in Part II and Part III both myself and the players I studied engaged in what I would call gameworld archaeology, conducting archaeologies not only of fictional spaces but also of their underlying algorithms. This is one example of how video game archaeology bridges the *what* and the *who* gap. In both Part II and Part III, I examined assemblages of play in my own research and for my participants. In both Parts, I addressed the *how* and *why* of player interpretation, which can be understood through an archaeological perspective on the contextual *when* and *where*.

If we understand that interpretive play is eudaimonic in nature [115], and desirable from a game design point of view, then archaeological game design is the iterative process of drawing insights from player-researchers' interpretations through the paratexts they create. In answer to RQ3, the records of interpretive play can contribute to play preservation through an iterative cycle of interpretive play inspiring the production of paratexts, which can inform the design of further interpretive play experiences, that produce more paratextual records of play. This has benefits for game design in two ways; it can help lead to deeper interpretive play experiences based on persistent social worlds and environmental storytelling, and it can also provide insights in encouraging the production of paratexts which in turn help inform video game archaeology research and preserve play experiences. Thus, archaeological game design uses insights from video game archaeology to design interpretive play experiences with mechanics that encourage the production of paratexts. More specifically, the archaeological methodologies I developed can be further adapted into archaeological gameplay mechanics; players can record traces of activity and material culture in persistent social worlds, as well as archaeological assemblages in games with rich environmental storytelling.

Conceiving of archaeological game design as being about archaeological mechanics and players' own interpretive processes, moves the conversation in archaeogaming on from purely focusing on studying and making games that are archaeological on a representational level, to engaging with "archaeological thinking" [404]. Furthermore, the use of *Nothing Beside Remains* as a case study for archaeological game design is also an exemplar of how we do not need to strive for photorealism or use extractive unsustainable technologies such as LLMs to create archaeological games. A focus on mechanics rather than aesthetics makes the case for experimenting with accessible open-source game-making tools and engaging more deeply with the constraints of such tools.

Archaeological game design should encourage archaeological game developers, as well as players, to critically engage with and record their own assemblages of play, bridging the digital-analogue divide. Ultimately, my hope for the future is more, queer, unruly archaeological game design; **games that preserve themselves through the process of playing them**.

11.5. Limitations

11.5.1. Breadth vs depth

This thesis has taken a case study approach in which singular games were the focus of each study; *Wurm Online* in Chapter 6, *Elden Ring* in Chapters 7 and 8, and *Nothing Beside Remains* in Chapters 9 and 10. This does present a limitation in terms of not addressing a breadth of different titles, or presenting comparisons between player experiences in a wide range of different games. However, these three examples do present a cross-section of the breadth of the medium and demonstrate how research methodologies should be adapted according to the affordances of the game that is being studied.

Wurm Online is an MMO with a small but dedicated player base and a persistent world that lent itself to a methodology that explored spatial memory in the game world itself. *Elden Ring* is an incredibly popular AAA game with mingleplayer features that allowed for contextual recording of player traces. Finally, *Nothing Beside Remains* sits at the other end of the continuum; a non-commercial, abstract 2D game that was released on itch.io and co-developed by myself, which allowed me to tweak the game

alongside the grounded theory study. While this thesis presents an in-depth approach to the games studied, it takes a wider, interdisciplinary approach in terms of the background literature and theory that it draws upon. Arguably, this is another limitation, just in the opposite direction. However, as a key argument of this work is that video game archaeology needs to demonstrate interdisciplinarity in terms of actually engaging with scholarship across HCI, game studies and computer science, this was imperative to the design of this document.

11.5.2. Qualitative approach

This thesis has engaged with a range of qualitative research methodologies, including go-alongs, autoethnography and grounded theory analysis. The work could have also been complemented by quantitative studies as part of a mixed methods approach. For example, in Chapter 10 there is a more quantitative breakdown of which objects participants chose when asked to comment on one in the player survey, and this is a useful supplement to the qualitative results of the grounded theory. That being said, a key concern of this thesis has been in centring the reflexivity and subjectivity of the researcher, which the qualitative methodologies lend themselves to. Furthermore, this reflexive aspect added a further dimension to the play preservation record, as discussed in Chapter 8.

11.6. Future work

11.6.1. Adapting methodologies

As discussed above, this thesis has presented a proof of concept for adapting archaeological and ethnographic methodologies to video games. In Chapter 6, I adapted the go-along methodology to be used in the MMO *Wurm Online*. I plan to apply this methodology to other games, especially other MMOs with rich community cultures and heritage. One particular avenue for this would be undertaking go-alongs in *Final Fantasy XIV* [1], which hosts numerous community events including theatre productions in-game [572]. This would be an opportunity to further adapt the methodology and recording of the go-along to a different context.

As mentioned in Chapter 8, the methodology I developed for recording player traces in *Elden Ring* could also be applied to other games with mingleplayer features, such as *Death Stranding*. This would be an opportunity to see how well the methodology can be applied in a different context, and to what extent such archaeological methodologies need to be applied on a case by case basis. In Chapter I also explored the potential of collaborative autoethnography to capture the experience of undertaking an archaeological survey in a video game as part of the play preservation record. This work could also be extended by exploring the possibilities of video game "autoarchaeology." This term has actually been used to refer to a branch of autoethnography that focuses on personal artefacts [312], and this could be applied to video games as well.

11.6.2. Applications of the archaeological mental model

The archaeological gameworld mental model has been applied to *Nothing Beside Remains* in Chapter 9. As discussed above, this theory could also be applied to other video games, such as *Elden Ring*, in which environmental storytelling is a key part of their design. This would allow for the theory to be further tested and elaborated on. Another avenue for exploring and extending the archaeological mental model would be investigating how and why players collect objects in games. This type of play has been referred to by Bartle as "dollhouse play" - a type of play that he characterises as being distinct from goal-seeking or narrative-based, and that involves "one's own imaginative play" [48]. This type of emergent play could be an interesting corollary to Eladhari's concept of retellings [167], but instead examining how and why players are motivated to engage with material culture in games.

11.6.3. Recording method affordances and play preservation

There is a lot of potential for further exploring the affordances of specific recording methods that players use, whether these be mechanics within a game itself or separate paratextual practices. I have already applied this micro theory [420] to the puzzle game *Blue Prince* [155], but there is still more to be explored. Individual recording mechanics, such as photography or map-making in games, could be further examined in terms of their affordances and how they scaffold interpretations. Indeed, as mentioned above there is the potential for this research to contribute to studies of HCI and eudaimonia,

as well as video game archaeology, as archaeological methodologies also involve the production of the same paratexts. I am also planning to further explore the idea of keepsake games [422], in which an artefact is produced through the process of play, as a form of archaeological play preservation.

11.7. Conclusion

This thesis makes the case for a truly interdisciplinary archaeogaming that moves beyond being defined as the 'intersection of archaeology and video games' to engaging with methodologies, theory and scholarship from HCI, game studies and computer science more broadly. One avenue for this is in framing archaeological fieldwork in video games as a form of play preservation, which provides a clear contribution to the wider study of the medium. Furthermore, this work has demonstrated how archaeological theory can contribute to understanding the *process* of interpretive play, and also offer design contributions in terms of encouraging players to become video game archaeologists themselves, producing paratexts that form part of the archaeological record. The synthesis of these contributions is *archaeological game design*.

11.8. Postscript: Anticipatory grief

We understand that many video games, and their playful assemblages, are lost to us. For this reason, we can anticipate a future in which we grieve not having access to the full context of play experiences that are contemporary to us now. To speak of anticipatory grief might seem pessimistic, but actually the opposite is true. For there to be a future in which people grieve the loss of video games means to conceive of a future at all, not least one in which subjective experiences of video games matter. Perhaps then, this is a utopian thesis. I follow in the footsteps of the late José Esteban Muñoz, who wrote in *Cruising Utopia: The Then and There of Queer Futurity*:

> "The present must be known in relation to the alternative temporal and spatial maps provided by a perception of the past and future affective worlds" [401].

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A

Go-alongs in Wurm Online

In this appendix we provide maps detailing the area around Dragon Fang Mountain that we traversed during the go-alongs. Figure A.1 shows a full player-made map of the Independence server[551], with the area we are focusing on marked. We also include three maps made by the authors, based on the community-created map, to mark each go-along path, as well as notes on key points visited throughout. The go-alongs for Participant 1, 2 and 3 are found in Figures A.2, A.3 and A.4 respectively.

A.0.1. Points of Interest

Several points of interest are marked on the maps in Figures A.2, A.3 and A.4. The numbers on the labels relate to the points below.

1. Black Dog Canal. A heritage site. Canals are dug by players, and even a small canal such as this represents a major engineering feat. We believe that prior to the creation of the canal, Black Dog Island to the north was actually a peninsula attached to the same landmass as the Dragon Fang Mountain. The heritage site preserves the canal as an important thoroughfare for ships.
2. Lyric Beach. A town built and maintained by the curator of the Rockcliff Museum, built on the remains of an earlier deed owned by the creators of Fang Henge and the Rockcliff Cathedral (see below). Participant 1 took us to Lyric Beach to provide us with supplies and afterwards brought us back to Lyric Beach so that our characters could sleep at the inn overnight prior to conducting our later go-alongs.
3. Rockcliff Museum. The site of the museum where our go-along with Participant 1 began. Figure 6.1b shows a memorial inside the Wurm museum grounds.
4. Fang Henge and Rockcliff Cathedral. Fang Henge is a player-made monument, now standing next to Rockcliff Cathedral, a heritage site. Both were built by famous members of the community, and their significance is such that in-game tapestry items can be crafted depicting their construction. Fang Henge dates back to 2010, while the Cathedral was constructed in 2013. The main architect, Tich, has since passed away.
5. Dragon Fang Pass, South. This is the southern entrance to the pass, near Freedom Market.
6. Freedom Market. Built by players, Freedom Market is a collection of market stalls which were previously staffed with NPC merchants selling player-made goods. Dozens of stalls still stand here, mostly abandoned. The Market's significance as a focal point for players is one of the reasons the Dragon Fang Pass was originally built, and why one of its entrances is so near the market.
7. The Howl. When new players join a server in Wurm, they appear at one of the server's starter towns. The Howl is the only starter town currently active on Independence. It was not the original starter town for the server, but it became active in the early 2010s. This, combined with Freedom Market's draw as a trading hub, made this part of the server the focal point of Independence.

8. Freedom Docks. A long highway connects the Dragon Fang Pass, Freedom Market, The Howl and the docks at the south end. Freedom Docks is the nearest accessible shore to Freedom Market, and therefore a convenient place for players travelling by boat to anchor their ships. A small harbour has been built here, which Participant 3 took us to see.
9. Dragon Fang Pass, East. This is the eastern entrance to the pass. Several highways pass by this area, providing access further north and east across the continent. Figure 6.1e shows one of the authors, R1, standing by the heritage site sign marking the entrance to the pass.
10. A collection of player-owned deeds. One or more of these deeds were previously held by Gumbo, the player who led the construction of the Dragon Fang Pass. All participants commented on the view down the hill from the eastern pass entrance to this area, although no go-along visited it.

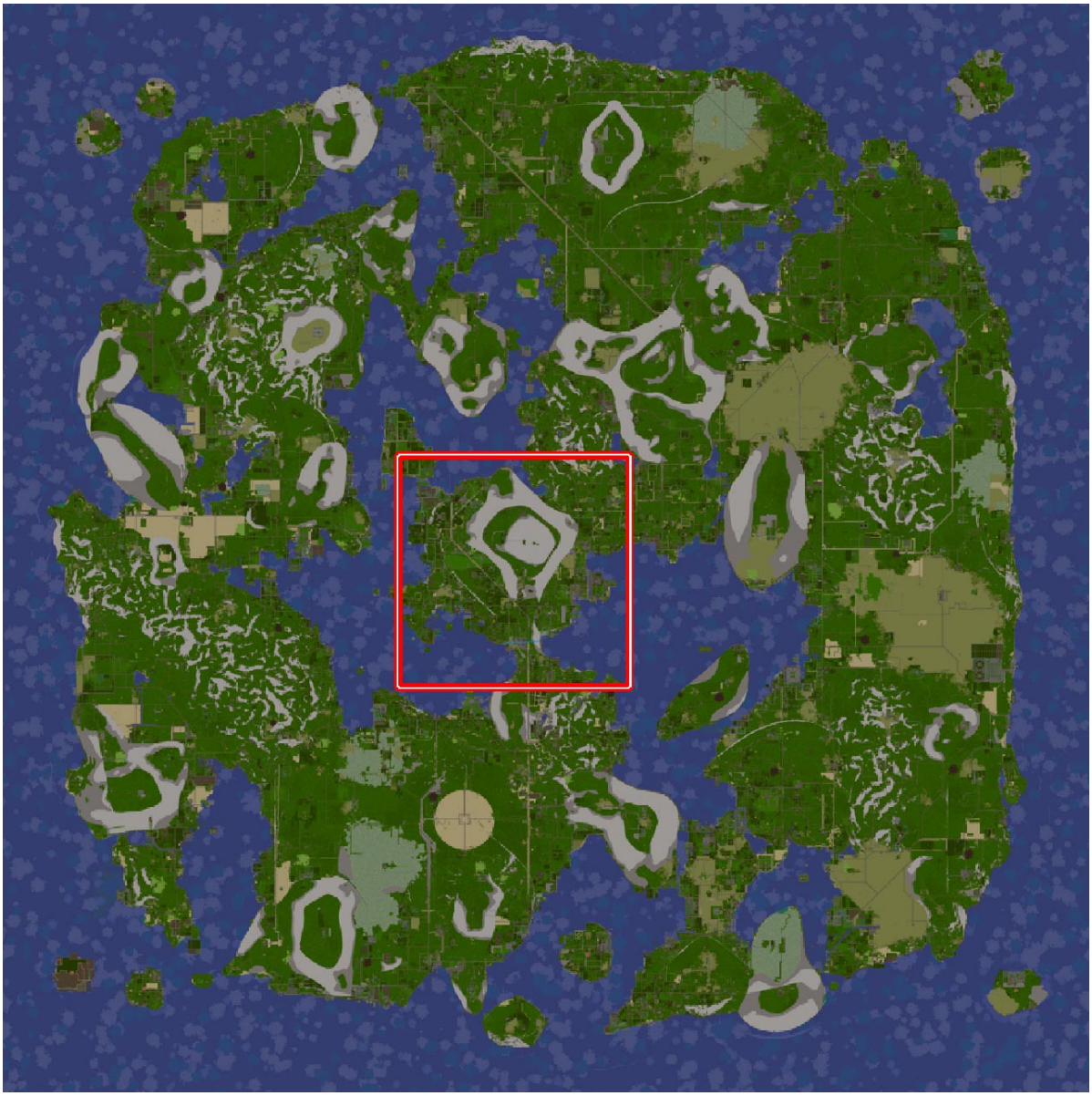


Figure A.1: A player-created map of Independence[551], in full. The highlighted square is the region Figures A.2, A.3 and A.4 are based on. Travelling from the north coast of the map to the south coast, on foot, would take approximately 4.5 hours assuming consistent road coverage (based on a traversal of Cadence, which is a Wurm map of a similar size [272]).

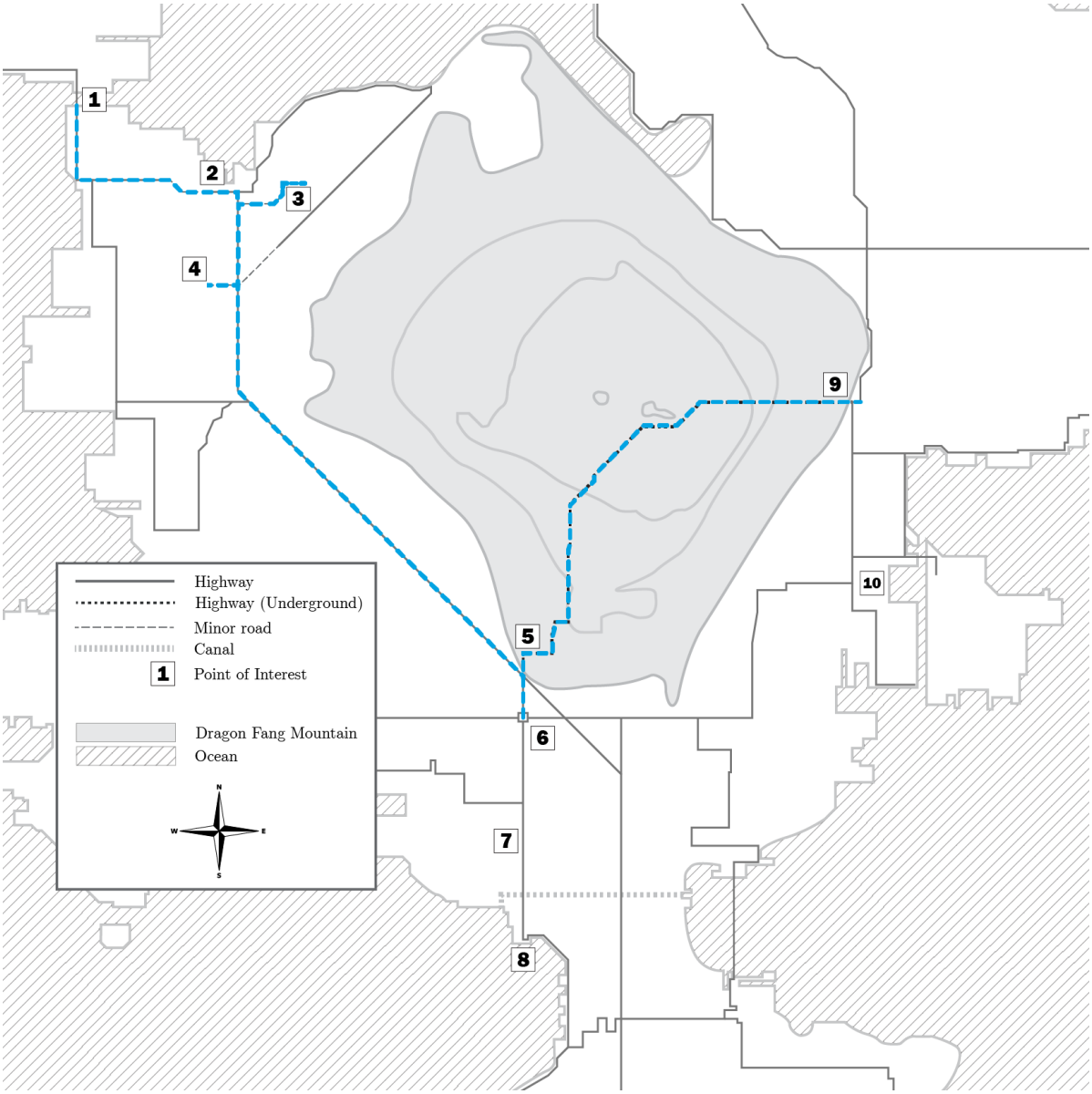


Figure A.2: A map depicting the route taken on the go-along with Participant 1 (Nirav, curator of the Rockcliff Museum). The go-along began at the Rockcliff Museum (3) before beginning to travel via horse and cart to Fang Henge and the Rockcliff Cathedral (4). We then travelled to Lyric Beach (2) for supplies and visited the Black Dog Canal (1), continuing on to Freedom Market (6) before moving through the south entrance to the Pass (5) to the eastern entrance (9). We then retraced our steps back to Lyric Beach (2) to conclude.

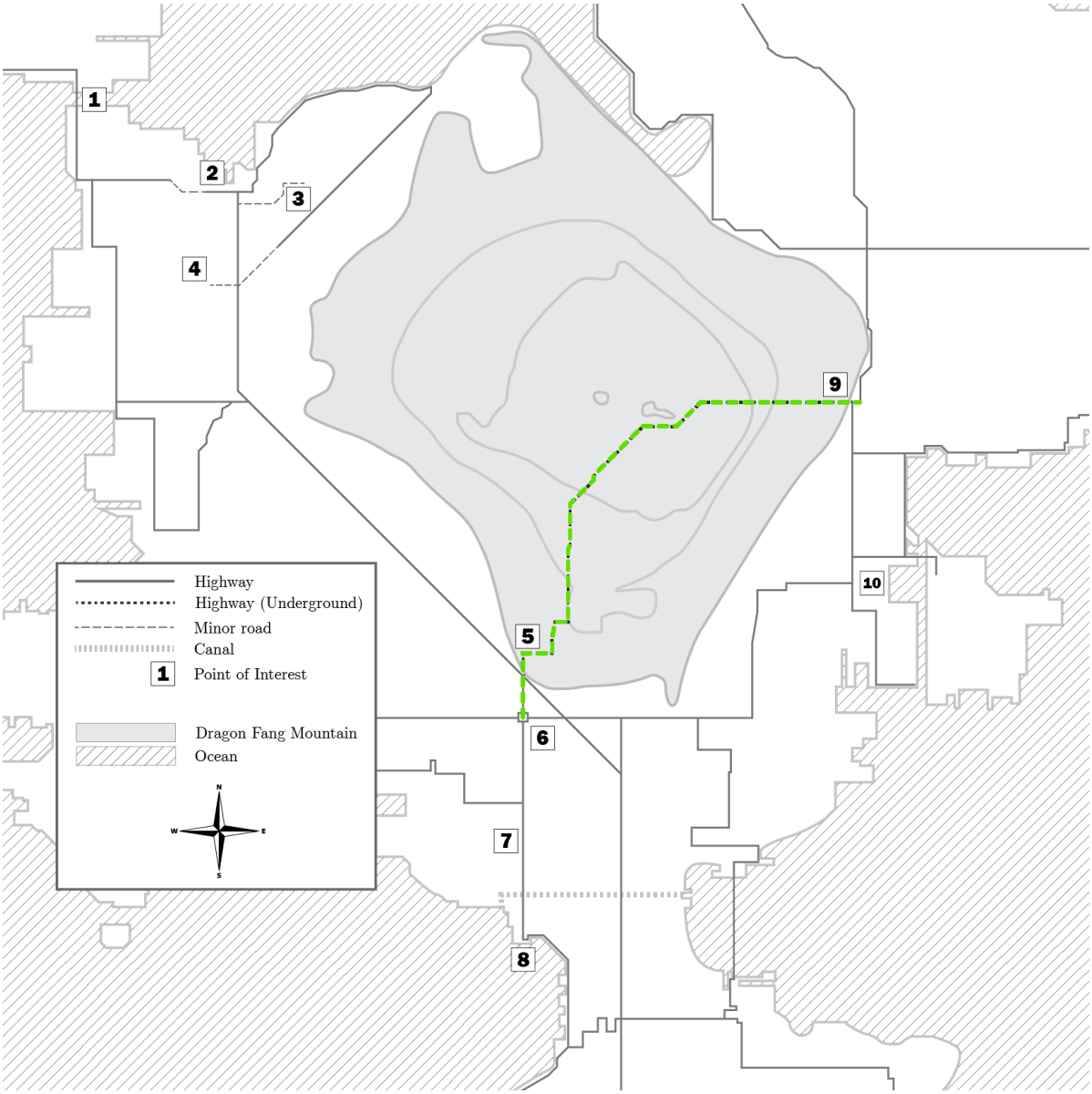


Figure A.3: A map depicting the route observed via video during the go-along with Participant 2 (Gumbo, who is associated with the creation of the Dragon Fang Pass). The video can be accessed online [382].

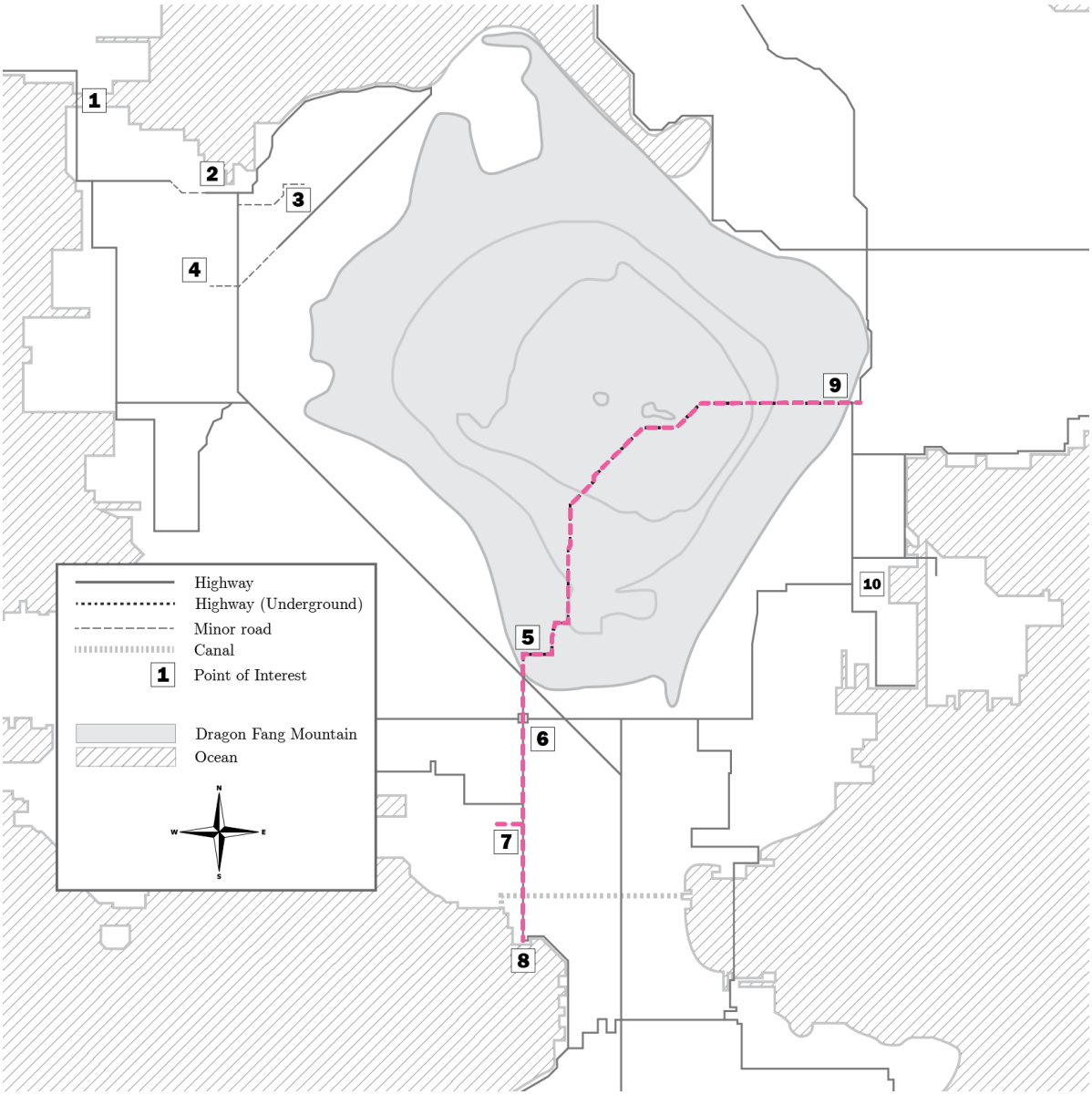
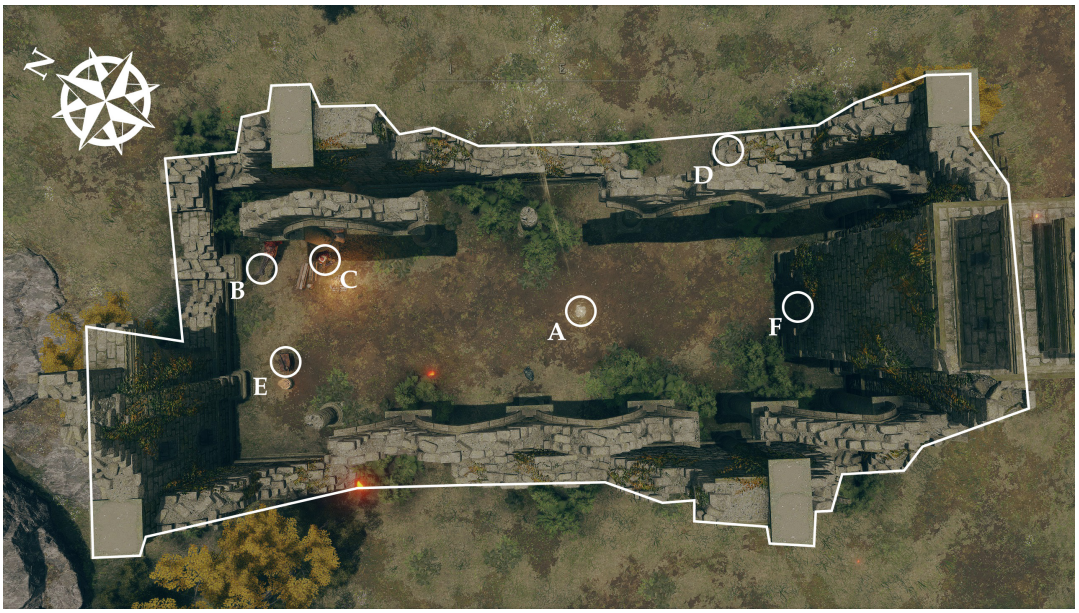


Figure A.4: A map depicting the route taken on the go-along with Participant 3. The go-along began at Freedom Market (6), and led us down to Freedom Docks (8) via The Howl (7). We then returned to Freedom Market, passed through the south entrance to the Pass (5) and concluded our walk at the east entrance (9).

B

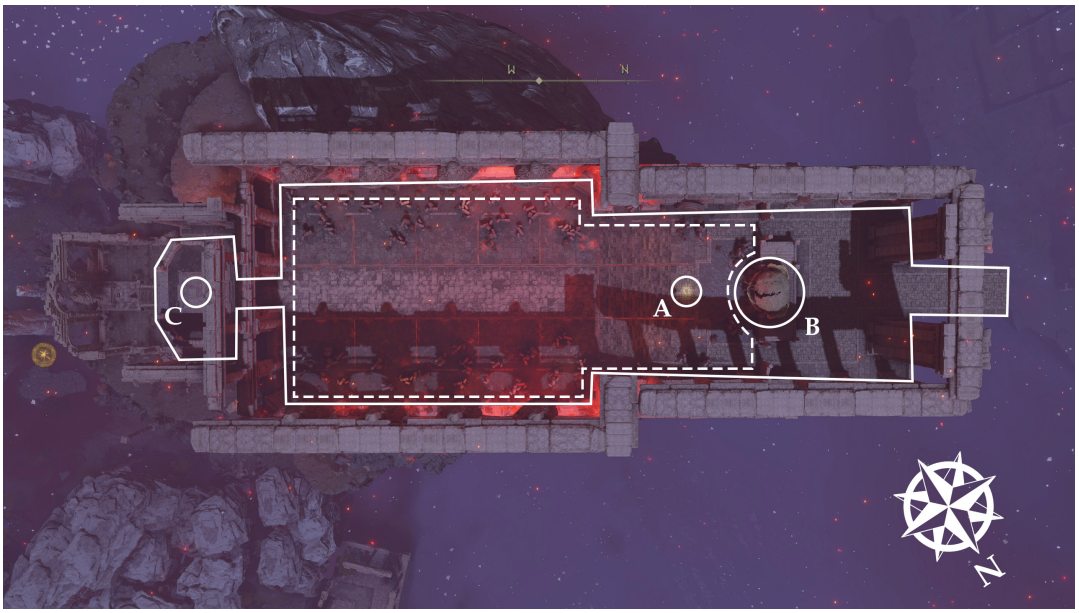
Elden Ring Autoethnography Site Maps



(a) An overhead view of the Church of Elleh site. Marked points of interest: A) Site of Grace. B) Merchant Kalé's donkey. C) Merchant Kalé. D) Location that Ranni appears to the player in a scripted scene. E) Anvil for upgrading weapons. F) Main entrance to the church from the road. The white outline marks the surveyed area, outlining the high ground areas as well. A small part of the survey area is obscured by the church tower.

(b) Isometric view of the Church of Elleh. Merchant Kalé can be seen in the lower left of shot.

Figure B.1: Annotated overhead view and isometric view of the Church of Elleh survey site.

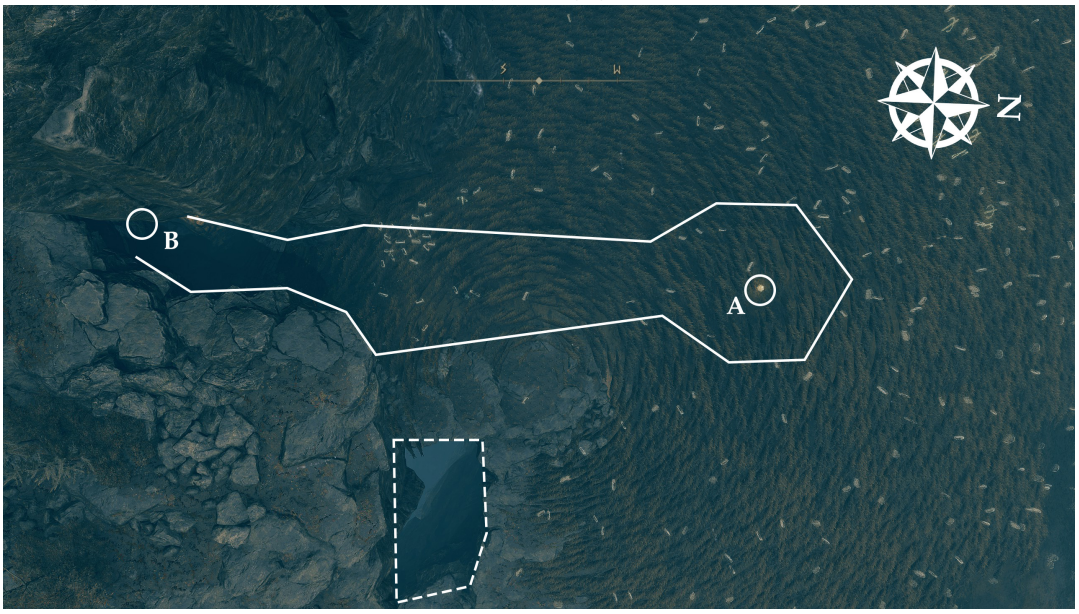


(a) An overhead view of the Mohgwyn Dynasty Mausoleum site. Marked points of interest: A) Site of Grace. B) Miquella's Cocoon. C) The elevator from which the player initially enters the area. The unmarked area to the left of C) is far below the Mausoleum's level, where the elevator is ridden from. The white outline marks the surveyed area. The dashed line marks the limits of the boss arena while fighting Mohg, Lord of Blood.

(b) Isometric view of the Mohgwyn Dynasty Mausoleum site. The Cocoon can be seen in the far distance.

Figure B.2: Annotated overhead view and isometric view of the Mohgwyn Dynasty Mausoleum survey site.

(a) An overhead view of the southern section of the Gravesite Plain site. This site is very long and hard to capture in a single screenshot. Marked points of interest: A) Spawn point for the player when entering the DLC from the Mohgwyn Dynasty Mausoleum. B) Continuation of path towards Figure B.3b. Part of the path has been obscured by overhanging cliffs, we have drawn the site border over them.

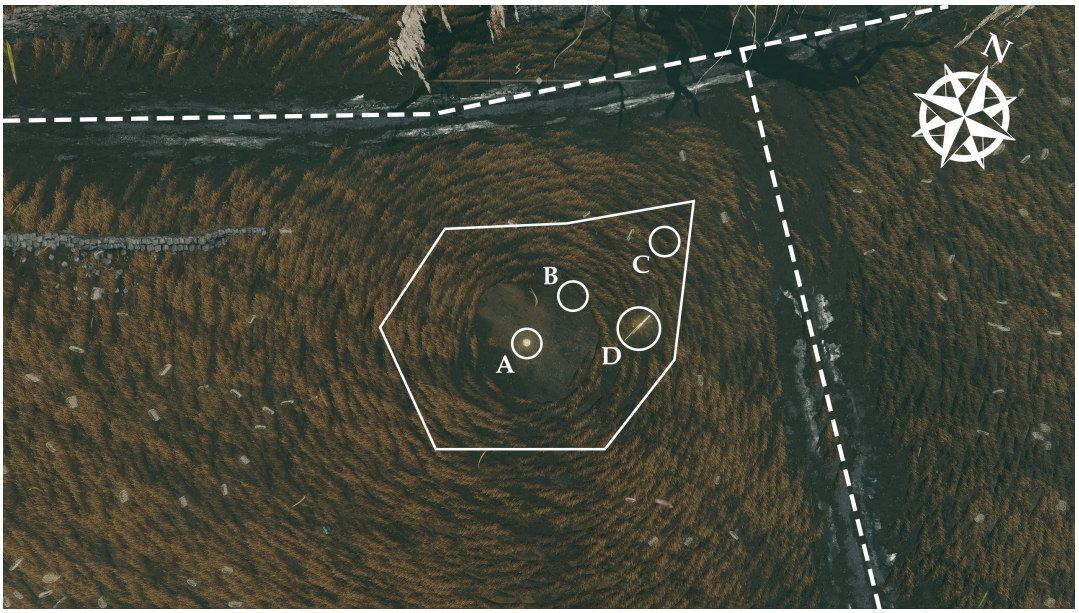


(b) An overhead view of the northern section of the Gravesite Plain site. This site is very long and hard to capture in a single screenshot. Marked points of interest: A) Site of Grace. B) Continuation of path back towards Figure B.3a. The dashed line indicates the sheer drop which many players fell down, resulting in a high incidence of bloodstains observed during the survey.

Figure B.3: Annotated overhead views of the north and southern halves of the Gravesite Plain survey site.

(a) Isometric view of the Gravesite Plain site. The dashed line shows the extent of the full site, ignoring cliffs and overhangs obscuring the path.

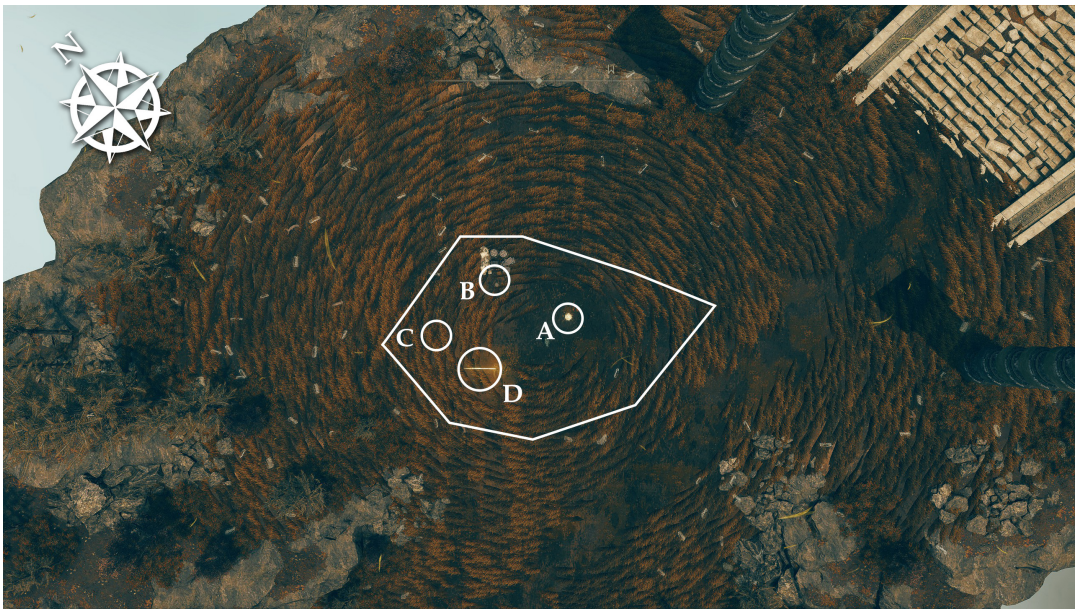
Figure B.4: Full overhead view of the Gravesite Plain survey site.



(a) An overhead view of the Three Path Cross site. Marked points of interest: A) Site of Grace. B) Position of the NPC Redmane Freyja. C) Position of the NPC Hornsent. D) Miquella's Cross. The dashed lines show the roads that give the site its name. The Furnace Golem referenced in the site is further along the road leading south. The south-west road leads to the Main Gate Cross site.

(b) An isometric view of the Three Path Cross site.

Figure B.5: Annotated overhead view and isometric view of the Three Path Cross survey site.



(a) An overhead view of the Main Gate Cross site. Marked points of interest: A) Site of Grace. B) Position of the NPC Moore. C) Position of the NPC Sir Ansbach. D) Miquella's Cross. The staircase in the top-right leads to Belurat Tower Settlement. The path connecting to Three Path Cross site is to the south-west.

(b) An isometric view of the Main Gate Cross site.

Figure B.6: Annotated overhead view and isometric view of the Main Gate Cross survey site.

C

Grounded theory analysis supplementary material

C.1. Survey Questions

The following is the full list of survey questions in the initial survey. We have omitted questions regarding consent for data collection.

- Please enter the 6-character code that was on the screen when you opened the game (e.g. PVY78B in the example below) so that we can connect your responses to your play data.
- Is this the first time you have played *Nothing Beside Remains*?
  - Yes
  - No
- Please check all of the following that apply to you:
  - I play videogames in my spare time
  - I work in the games industry
  - I am a researcher who uses games as part of my work
- What is your age?
- How would you define “procedural content generation”? If you are not familiar with the term you can leave this field blank.
- Write your interpretation of what happened to the village in the game. What reasons do you have for this interpretation?
- Do you have any alternative interpretations? If so, explain your reasoning.
- Could you distinguish between procedurally generated and hand-written content, and if so how?
- Pick one object from the game and describe how you think it came to be left where you found it in the village. Why did you choose this object?
- Do you think the object you chose for question 4 was procedurally generated? Why or why not?
- If you were to create a record of your experience in the game, which of the following methods would most appeal to you:
  - Creative writing
  - Screenshots
  - Video footage
  - Map-making

  - Other (specify)
- Why did you choose the above method(s)? If you were to share the record with others would that change your answer?
- If you made a record of your experience playing the game, what method did you use and why? Did it affect your experience or interpretation of the game?

For the second survey, modifications were made to the question about the participant's background:

- Please check all of the following that apply to you:
  - I play videogames in my spare time
  - I work in the games industry
  - I am a researcher who uses games as part of my work
  - I often record my gameplay experiences in some form
  - I have a personal interest in archaeology and/or heritage
  - I am a researcher who studies the past as part of my work

Additionally, the final two questions were replaced with a single new question:

- If you made a record of your experience playing the game, what method did you use and why? Did it affect your experience or interpretation of the game?

C.2. Coding

The table on the following page shows open codes and the corresponding focused codes under which they were grouped. Codes from theoretical sampling are **in bold text** and are followed by an asterisk (*).

Focused Codes	Open Codes
Skeumorph of human labour	Designed; Focus on designer input; Reducing workload; Labour conditions; Hand-crafted vs algorithmic; Designer oversight; Imitating human labour; Finite input vs infinite output; Algorithmic vs hand-designed; Indirect authorship; Extending human labour; Lack of human input; Evidence of human design; Symmetry; Perceptual uniqueness; **Lack of human input***; **Focus on output***; **Deism***; **Quality of human labour***; **Accurate skeuomorph***; **Perceptibly unique***; **Perceptibly unique content***; **Perceptibly unique output***; **Perceptual uniqueness***; **Perceptibly unique object***;
Imperfect skeuomorph	Coherency; Observable patterns; Curation; Aesthetic of randomness; Procedural aesthetic; Incongruence; Designed repetition; Hand-crafted object vs procedural placement; Perceptibly modular content; Low quality; Procedural logic; Procedural syntax; Identification of glitch; Lack of cohesion; Identical objects; Mundane vs bespoke content; All content generated; Fictional significance; Lack of external reference; Thematic relevance; Interpretation affected by appearance of tiles; Lack of cohesion; Identical objects; Handwritten assumed to be procedural; Writing as enhancing PCG; Procedural content requiring interpretive filter; **Lack of intentionality***; **Narrativisation of procedural syntax***; **Diagnostic bugs***; **Perceptibly modular content***; **Usage errors***; **Lack of cohesion***; **Procedural uncanny***; **Perceived repetition***; **Human skeuomorph of PCG***; **Perceptibly similar content***; **Unique content not procedural***; **Procedural uncanny***; **Lack of consistency***;
Procedural affordances	Randomised; Rule-based; Examples of games assets; Enhancing player experience; Novel content; Cyclical generation; Focus on novelty experience; Generation at time of gameplay; Spatial content; Focus on player experience; Spatial generation; Game example; Impermanent; Repetitive novelty; Focus on output; Use of constraints; Fallacy of definition; Predictability vs unpredictability; Randomness vs constraints; Algorithmic control; Player input; Procedural tone; Affordances of PCG; Unique content vs unique experience; Map-making and procedural affordances; **Rule-based***; **PCG as inherently emergent***; **Filter of the algorithm***; **System-based***; **Seed-based***; **Indeterminacy***; **Constraint-based***; **Repetition***;

Pre-existing knowledge	Game example; Knowledge of procedural design; Spatial design conventions; Challenges of textual generation; Vibes-based; Pattern recognition through repeated generations; PCG as non-narrative; Speculation informed by life experience; Genre conventions; Reference to archaeology; External reference; Architectural conventions; Theory about generator; Pattern recognition; Interpretation affected by appearance of tiles; Fictional significance; Extrapolation from experiencing a glitch; Technical archaeological term; Caught in the glitch; Occam's razor as justification for theory; Meta knowledge of games; Need to explore entirety of map; Meta understanding as game; Reference to other game; Existing knowledge of recording method; Map-making as reference to older games; Metatextual narrative; Emulating archaeological report; Language borrowed from fanfiction; Existing archaeological experience; Lack of experience with recording method; Ease of recording method; Finds list as informed by archaeological background; Standardised itemisation; **Reference to other games***; **Replayability***; **Need to replay***; **Lack of familiarity***; **Need for multiple readings***; **Pattern recognition***; **Reference to Ozymandias***; **Understanding of procedural text***; **Lack of data***; **Uncertain***; **Reference to Ozymandias***; **Habitual use of recording method***; **Pattern recognition***; **Analogy to real-world archaeology***; **Nostalgic affordances***;
Framing	Interpretation affected by framing; Self-referential; Lack of external reference; Lack of framing device; Reference to simulation; Interpretation framed by study; Comparison between playthroughs; Questioning assumptions in text; Role-playing as an archaeologist; Game aesthetics; Need for recording to support theory; Primacy bias; Unreliable narrator; **Primacy bias***; **Statue as primer***; **Framing encouraging creative speculation***; **Structured the experience***;
Assemblage affordances	Context-based generation; Proximity as association; Assemblage of skeletons assumed to be graveyard; Multiple interpretations of altars with bones; Agricultural material culture; Narrativisation of skeletal assemblage; Importance of assemblage; Terminus ante quem; Clear association; **Agricultural assemblages***; **Apocalyptic assemblage***; **Attribution of skeletal assemblage***;
Intentionality	Deliberate tone; Conscious design; Random vs purposeful; Authorial intent; Glitch as hand-written; Statue as landmark; Church as identifiable landmark; Repetition as hand-written; Spatial generation vs hand-written text; Repetitive content as hand-written; Thematic relevance; Mundane vs bespoke content; Randomness vs intentionality; Attribution of intentionality; Lack of proper burial; Evidence of ongoing memorialisation; Broken material culture; Evidence of maintenance; Voluntary or involuntary; Intentional breakage; Intentional toppling of statue; Evidence of design; **Intentionality***; **Uniqueness as diagnostic of hand-written***; **Attribution of context as hand-written***; **Intentionality vs randomness***; **Lack of proper burial***; **Repetition as significant***;
Environmental affordances	Reference to colour palette; Reclamation by desert; Environmental context of object; Environmental conditions; Identification of the sandstorm; Reference to sandstorm; Reason for sustained abandonment; Concept of seasonal occupation; Tool as emblematic of environmental change; **Environmental conditions***; **Sound effect attributed to environment***;

Affordances of fictional objects	Survival bias; Reference to imagery on the pews; Speculation about re-purposed materials; Assumed portability of objects; Affordances of materials; Metal objects as evidence of craft specialisation or trade; Metal objects as evidence of invading culture; Preservation of scents; Evidence of craft specialisation; Longevity of statue; **Assumed portability of objects***; **Technological affordances of materials***; **Affordances of objects***; **Reference to ASCII symbol***;
Attribution of context	Context-based generation; Use of cardinal directions; Identification of cemetery with the church; Identification of zoning; Attribution of mortuary contexts; Location of skeletons; Reference to layout; Attribution of context; Building context; **Generation context-dependent***; **Context-based generation***; **Attribution of grave site***; **Attribution of context***;
Ambiguity	Lack of textual evidence; Reference to number 7; Lack of data; Repetition of the number 7; Need for more data; Need to collect more data; Uncanny; Fallibility of memory; Emergent narrative from limited evidence; Ambiguity of recording method inspiring creativity ; Ambiguity of game inviting creative writing; **Repetition of number 7***;
Temporal materiality	Lack of evidence for wear over time; Evidence of recent abandonment based on material remains; Lack of evidence for re-purposing; Multi-phase occupation; Condition of objects; Time since abandonment; Location and condition of skeletons; Rapid collapse; Condition of buildings; Evidence of abandonment; Nature of ruination; Evidence of slow decline; Change in original function; **Location and condition of skeletons***; **Condition of objects***; **Ruination***; **Multi-phase activity***;
Mental model of catastrophe	Inference through what is abandoned; Ending as part of a natural cycle; Natural disaster; Damage as evidence of violence; Lack of material evidence for violence; Reasoning for why material culture was abandoned; Material evidence of animal attack; Evidence of animal attack; Material evidence of violence; Natural disaster inferred from lack of proper burial; Interpretation of animals abandoned; Unusable environment interpreted as self-isolation; Lack of redevelopment; Post-depositional processes; Association between high walls and animal threat; Rapid abandonment; Evidence of surplus resources; Valuable objects left behind as indicative of catastrophe; Destruction deposit; Assumed lack of value as left behind; Expression of interior mental model; **Mental model of catastrophe***; **Theory of abandonment***; **Enhanced mental model***;
Diagnostic features	Pews as diagnostic of religious structure; Altar as evidence of worship; Reference to Christianity; Classification of building type; Ritual activity based on skeletal and material remains; Identification as religious centre; Identification of religious belief; **Pews as diagnostic***; **Pew as diagnostic of religious structure***; **Identification***;
Object as attributed to individual or culture	Identification of prestige vs non-prestige objects; Population based on material culture; Trident as icon; Pocket watch as diagnostic; Identification of name with pocket watch; Tulip divinity; Evidence of standardisation; Reference to imagery on the pews ; Interpretation of the statue inscription; Identification of sacred vs profane; In-game iconography as idealised past; In-game iconography as representational; Object as emblematic of culture; Name as denoting personal item; Association with an individual; Identification with individual; More detail as more significance; Interest in human activity over evidence of human activity; Later intrusion by other explorers; Identification of everyday object; Perceptual consistency; **Perceptibly unique object as emblematic of individual***;

Incongruity	Comparison between objects; Unique content; Perceptibly unique objects; Statue as incongrous with other material culture; Incongruity of pews with other material culture; Comparison between number of skeletons and buildings; Discrepancy between player size and buildings; Comparison between skeletons; Pocket watch as incongruous with other material culture; Perceptual uniqueness; Recording method to capture perceptibly unique content; **Comparison between objects***; **Incongruity***; **incongruity of pocket watch***; **Watch as anachronistic***; **Unique pocketwatch compared to identical examples***; **Watches as incongruous but not unique***; **Unique objects more significant***;
Analogy (creative speculation)	Analogy with real-world archaeological site; Creative speculation; Reference to fictional media; Large skeletons as fantastical; Theory of religious conflict; Theory of religion falling out favour; Poetic end; Ozymandias as reference point; Association with trident and Poseidon; Divine retribution; Narrativisation of statue; Idea of divine retribution; Theory of political stratification; Supernatural theory; Hubris; Extreme theory as comedy; Opposite interpretation as alternative; Secondary theory as more specific but less evidence; In-game iconography as idealised; Genius loci; **Narrativisation of statue***; **Unnatural disaster***; **Narrativisation of procedural syntax***; **Narrativisation of statue as grave***; **Statue destruction as symbolic***; **Enjoyment of creative speculation***; **Entire village as tribute***;
Record as skeuomorph	Recording method as skeumorph; Capture all details without bias; Desire for in the moment narration; Fidelity of recording method; Limits of direct replication; Video and screenshot as more direct interpretation; Perceived objectivity of recording method; Aide memoire; Desire not to miss content; Affordances of recording methods; Affordances of the digital; **Desire to record everything***; **Vibes vs fidelity of record***; **Reliance on memory***; **Fidelity of record***;
Record as personal expression	Capturing feelings; Meaning from sharing; Capturing experience ; Personal vs public recording; Enjoy recording method; Difficulties of recording while playing; Recording method as breaking immersion; Recording method as personal reflection; Personal sense of achievement and progress; Recording as roleplay; Choosing method they like to consume; **Difficulty recording while playing***; **Not motivated to record***; **Recording as roleplay***; **Note-taking as internal monologue***;
Spatial affordances	Need to see entirety of map; Spatial affordances; Recording own movements; Affordances of partial view; Active use of map-making to understand the world; Map-making to understand spatial affordances; Lack of spatial affordances; Lack of narrative affordances; **Spatial generation***; **Spatial affordances***; **Perceived scale of game***;
Abstraction	Abstract visuals affording abstraction; Parsibility of abstract environment; Recording method informed by affordances of game; Annotational affordances of map; Recording method informed by mechanical affordances of the game;
Record as interpretation	Emergent narrative from theory; Emergent narrative from meaning making; Interpretation and narrativisation; Record allowing for pattern recognition; Stages of map-making; Recording methods complimenting each other; Importance of sharing process behind interpretation; Map as supporting theories; Record as enhancing interpretation; Map as interpretation; Map able to show temporal change; Desire to limit influence of own interpretation; **Recorded perceived notable items***; **Recording interesting content***;

Record as communication	Parsibility of recording method; Parsibility of record; Recording method as encouraging others to experience the game; Immersive quality of recording method; Enjoyment of audience; Visual appeal of record; Recording as aiding engagement; Dependent on purpose; Comparison between interpretations;