Classification of Gameplay Interaction in Digital Cultural Heritage

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ABSTRACT

Digital heritage has matured over the past twenty years and now calls are being made for interactive experiences that augment digital representation with digital performance. The paper considers sources for such a performance: be it documented sources, contemporary cultures, or gameplay from other entertainment game genres. It considers the needs of various stakeholders: the archaeologist, the historian, the game designer and the target audience and suggests thematically consistent multiple gameplay options that serve the different needs while reusing game assets and characters. This aims to contribute to the collaboration with the DiGRA community on serious cultural heritage game development, focusing on the player as performer, rather than just as an observer.

Keywords

Virtual reality, interactive narratives, cultural heritage, player-centric game design

INTRODUCTION

A discussion paper issued by the School of Journalism, Media and Culture in Cardiff University on the immersive experiences in Museums, Galleries and Heritage sites identifies storytelling, social experiences, emotional engagement, embodied spatial interaction, authenticity, and learning as recurrent themes in such experiences (Kidd and Nieto 2019). While the authors stress that by immersive experiences they are not only referring to Mixed, Augmented, and Virtual Reality (VR), it is true that they are the technology that readily ticks all the checkboxes. And yet this paper shall argue that they have not yet reached their full potential. In twenty years of digital cultural heritage, we have seen the use of VR to represent the tangible aspect of cultural heritage, through increasingly faithful digital reproduction of structures and artefacts. But the VR community recently claimed that the time is ripe to enhance these representations with experiences (Ch'ng, Cai, and Thwaites 2018). Such experiences are ones that can provide the virtual visitor with agency not only in terms of navigation or world interaction but also participation in the enactment of intangible heritage: skills, rituals, and practices of past cultures. Virtual Reality Interactive Narratives (VRINs) offer the possibility to present such aspects of heritage within a participatory storytelling context while offering 'cultural presence', which is defined as '*the emotional, physical and intellectual "immersion" in a simulation of the research process that leads to some degree of awareness, appreciation and knowledge of the cultural significance of locally situated beliefs and shared practices*' (Pujol and Champion, 2011). However, apart from the challenges of usability, uptake and onboarding, it is here argued that maintaining authenticity should not be limited

to 3D reconstructions, evidence and historical facts (Kidd and Nieto 2019) but should also extend to the representation of intangible heritage through relevant interaction afforded by the medium, echoing the call for virtual heritage experiences to serve as interactive learning environments (Pujol and Champion, 2011).

This paper explores the relationship between the ludification of cultural heritage and the authenticity of gameplay interaction afforded by VRINs. Gameplay is classified into documented, speculative, and repurposed cultural heritage interaction and a case study of a 5000-year old historical setting in Malta is used to demonstrate their applications. Finally, in the light of these considerations, the paper contributes to the discussion on who is entitled to design, play and enjoy games in a cultural heritage context.

BEYOND DIGITAL PRESERVATION

Over the past twenty years, the use of VR in the field of cultural heritage has mainly focused on the preservation of inherited historical structures and artefacts reminiscent of past cultures. Such preservation was mainly *"through digital capture or detailed reconstructions, both having digital accessibility as an outcome"* (Ch'ng, Cai, and Thwaites 2018). An example with a high promise of utility can be found in the realistic representation of the Notre Dame Cathedral in the *Assassin's Creed Unity* (Ubisoft, 2014) which is being considered to be used in its reconstruction. By digital accessibility, it is understood that virtual visitors are able to feel present in a virtual representation of the space without physically being in the represented space. This is opposed to Augmented Reality where the visitor is expected to be on site and have digital representations overlaid on the real site, such as the CHESS[1] project in 2013 where visitors were mapped to museum personas with personalised digital storytelling and the 'Reliving the Sacra Infermeria'[2] experience in 2020, both provided through Augmented Reality on-site at the museum and site respectively. The historian David H Trump paints digital accessibility as being "worse" than a modern replica, itself inferior to real presence (Trump 2002) but on the other hand, the benefits of VR in Cultural Heritage include worldwide accessibility, access for physically disabled visitors, and site protection from weathering, accidents, and vandalism. Furthermore VR can be used to provide access beyond what is physically possible on site due to size and safety restrictions.

Two examples of VR experiences in historical cultural heritage are *Nefertari: Journey to Eternity* (CuriosityStream, 2018) which used photogrammetry and physical-based rendering and *Chauvet: The Dawn of Art* (Tanant et al, 2020) a multimedia project including mobile-based AR and VR interactive narratives. And yet, these experiences have been limited to point-and-click navigation and bringing up narrative descriptions of artefacts digitally re-contextualised into their original place of discovery, with interaction falling far short of what agency is afforded by digital experiences, especially games, as had been identified by Granström (2013).

Serious VR games use the highly immersive presence of VR to teach real-world lessons, such as the impact of plastic on our environment in *Oceans We Make* (Thomas et al, 2018). The player's ability to virtually pick up plastic from the ocean is overwhelmed by the amount of plastic encountered as one progresses through the experience. Similar agency can be applied to intangible heritage in order to attribute meaning to rituals and skills of the time (Granström, 2013).

CASE STUDY: THE NEOLITHIC HYPOGEUM

A unique site demanding attention is the Hypogeum of Hal-Saflieni in Malta, a Neolithic underground complex within which partial remains of about 7,000 humans have been found (Zammit, 1935). Excavated in three stages between 4000BC and

1500BC, it bears evidence of being used as a burial site while markings in the form of red ochre paintings of spirals and representations of the tree of life, and holes in the walls resulting from primitive drilling with bone and stoned tools, suggest artistic and architectural skills. A laser scan of the complex has been ported into a 3D game engine allowing for a virtual tour of the site. Such a tour allows an experience beyond the limitations imposed by the recently installed cordoned wooden walkway and the ability to visit areas unreachable by the common physical visitor (such as the lower level that needs a ladder to be reached). Furthermore the site has a very delicate microclimate and only ten visitors are allowed per hour each day. This limitation, and it being inaccessible to wheel-chair bound visitors, makes VR the only way to make the site accessible to the masses without further deterioration of the site.

CULTURAL HERITAGE INTERACTION

Following the call of Ch'ng et al for VR experiences (Ch'ng, Cai, and Thwaites 2018), a design question that needs to be addressed is what kinds of interactions should be offered by such experiences. Bontchev considered video games for cultural heritage based on whether their primary aim was entertainment or education (Bontchev 2015). In entertainment based games, game designers may repurpose virtual representations of existing buildings into contexts for their game mechanics, such as in *Assassin's Creed* (Ubisoft, 2007). Serious games whose aims are education and appreciation of cultural heritage may manage to stay away from popular genres but still find themselves repurposing the digital representation of the historical space because of lack of documentation to convey the intended use of the original construction. Based on whether, and to what level of detail, documentation about original behaviour is available or not, serious game interaction is hereby categorised into three: (i) documented (ii) speculative and (iii) repurposed.

Documented Cultural Heritage Interaction

Cultural heritage is composed of evidence and demonstrations of human creativity that is inherited and valued by communities. Such communities endeavour not only to preserve, but also share with current and future generations of the community as well as outside visitors (Pereira Roders and van Oers, 2011). Tangible evidence, such as in the form of historic buildings, is sometimes made accessible to visitors via physical access to the site, whilst artefacts (or copies thereof) are usually presented in museums for safe keeping. Information panels around the site and the museum explain the exhibits' role, function, and importance within their contemporary generations. Such information is acquired from primary sources of information, such as the buildings and artefacts themselves, and supported by secondary sources of information, such as documentation, photographs, paintings, or narrations, that explain their construction, meaning, and/or utility. Tangible cultural heritage that has survived throughout history may be enough a source for its digital representation but secondary sources are needed to help understand how it was used – a necessary aspect of experience design. Known as intangible cultural heritage, these include the practices, representations, expressions, knowledge, and skills that are recognized as part of one's cultural heritage (Pereira Roders and van Oers, 2011).

Design of interactions within cultural spaces would do well to refer to secondary sources in order to achieve behavioural accuracy. Granström (2013) highlights the importance of behavioural accuracy in her Master's thesis on game elements for virtual heritage applications but this is mostly reserved for non-player characters (NPCs), as evidenced by her suggestion to use animation, artificial intelligence, crowd simulation and physics to further improve it. This reflects other authors' work who also attribute behavioural accuracy to NPCs: Cruz-Neira (2003) listed correct behaviour as one of the challenges for VR, although in the context of autonomous characters rather than for the player's avatar; Ch'ng (2009) tackled NPC behaviour in

detail but did not concern himself with the quality of the behaviour afforded by the player's avatar; Guttentag (2010) described an experiment by Gimblett et al (2001) in which behaviours of hikers, bikers and passengers in an Arizona recreational area were used to model virtual agents in a digital recreation of the site. All these works are rooted in simulation, where the aim is to present a believable virtual environment.

Game designers, however, are more interested in what agency is to be provided to the virtual visitor and thus behavioural accuracy needs also be achieved by the agency afforded the player. Guiterrez et al (2008) are cited in Guttentag (2010) as suggesting that realistic behaviour employed in a virtual environment is a sign of presence, and is thus a worthy objective. However, such literature only focuses on the provision of sensory data that supports the simulation and restrict interaction to navigation, object interaction and movement of a virtual body – stopping short of performance.

Seeking to augment the VR experience of the Hypogeum of Hal-Saflieni mentioned earlier with performative actions, its curator, whose background is in archaeology, has suggested providing the virtual visitor with the ability to re-enact the excavation of the site. Lacking any form of secondary source documentation, information on this aspect of intangible heritage is acquired directly from the primary source: the site itself. The pock-marks on the wall and the matching pointed tools made from bone and stone recovered from the site indicate a possible method of how the complex was excavated. The ability to cut smooth walls out of the rock was explained by a geological study carried out in the 1990s (Ercoli 1992). This study explained that the presence of water collecting throughout the complex was due to natural fault lines in the rock. This would have allowed primitive man to cut out the chambers from fault to fault leaving it with smooth walls. Thus, in choosing the intangible heritage of carving out the chambers from the rock based on evidence found on site, the archaeologist presented an agency to be offered to the visitor that shies away from the speculative or imaginative.

Speculative Cultural Heritage Interaction

Champion's work on the parallels between rituals and play (Champion, 2015) is partly inspired by the poor educational value of historically inaccurate gameplay employed in games such as the aforementioned *Assassin's Creed* (Ubisoft, 2007). Whilst its digital representation of tangible heritage is very realistic, its representation of intangible heritage leaves much to be desired. Champion draws attention to the use of rituals within cultural heritage, presented as "*culturally specific and socially arbitrated ...performances... in a specially designated space*" (Champion, 2015, p.8). Their importance is highlighted when seen as "*a way of preserving and passing on cultural knowledge*" (Champion, 2015, p. 10). These cultural rituals are inherited from previous generations and "*carries clues*" in its performance rather than be properly documented (Champion, 2015, p.9). Thus how can rituals be accurately represented when secondary sources that document such rituals, or any other intangible heritage, are not available?

Assassin's Creed is definitely not the first video game to be deviant in its gameplay, and surely not the first game in its broader sense. The oldest known board game, *Senet*, was found within burials made in Ancient Egypt but the only documentation we have is a hieroglyph in its shape and paintings of it being played found within tombs from the Third, Fifth and Sixth dynasties (Donovan 2017). Without supporting secondary sources, the original rules of Senet are only conjectures and guesswork, leading scholars to question whether the game still exists. While it still exists physically, its game mechanics, and thus the player's understanding, have been lost leaving us with "a ludic corpse" (Aarseth and Grabarczyk, 2018). Like rituals, the game's rules were conveyed across time and space to younger generations and

neighbouring communities via verbal explanations and observation of actual play. These introduced variations, possibly through misunderstandings or customisations that served the new players.

Such customisation also occurs in the general cultural heritage context particularly in the case of repurposing (adaptive reuse). When the physical durability of a building or artefact exceeds their functional life, they are repurposed into something new (Eyüce and Eyüce 2010). Instead of demolishing and rebuilding them, the tangible artefacts of the original are used within a new rule system, ascribing different meanings and functionalities that fit the new needs. Repurposing often replaces the process of demolition and reconstruction, and thus helps prevent the disappearance of the tangible heritage and loss of its collective memory (Eyüce and Eyüce 2010). However, drastic repurposing has the effect of overwriting the collective memory of a building's or artefact's use as the new functionality takes over (Guglielmucci and Scaraffuni Ribeiro 2016), leading to the disappearance of the intangible heritage. This occurs especially when the repurposing generation do not share cultural commonalities with the former but are rivals or foreign colonizers who bring their own different culture to bear, such as the repurposing of Amsterdam's 17th century City Hall as the official residence for King Louis Napoleon during the French occupation in 1808 (Goossens 1999).

Thus, unless the former functionality of the building or artefact is available as textual descriptions or images, its knowledge may still be lost once the contemporary generation dies out. These records may be suppressed or destroyed but may also not have been recorded in the first place. Buildings and artefacts prior to 3300BC have no record as to their use simply because mankind did not know how to write at the time. A relatively short time later, the use of ochre to paint symbols onto walls and the use of stone and bone tools to chip away representations of animals reared for food was still not enough for them to communicate to modern day man the meaning and use of such representations. This leaves modern historians free to interpret such artefacts in the light of the more recent uses as well as contemporary evidence from similar contexts elsewhere.

Such historians tend to augment the archaeologists' findings with knowledge gained from other historical sites. Dr Themistocles Zammit was the archaeologist and historian who led the excavations of the aforementioned Hypogeum between 1907 and 1910. Based on the numerous incomplete skeletons found in red earth deposits within its chambers, the archaeologist was led to believe that this was not a primary burial site, but rather an ossuary were bones were placed subsequent to a burial above ground (Mifsud and Mifsud 1999). Based on the architectural features discovered in the underground complex, which included a highly resonant oracle chamber (Debertolis, Coimbra, and Eneix 2015; Till 2017) and others that reflected the architecture of other Neolithic temples aboveground nearby, Zammit, now speaking as a historian, suggested that the place was originally a place of worship rather than of burial (Zammit 1935):

"*it is **most probable** that this underground monument was originally dug out by a religious community to serve the purpose of a Sanctuary in honour of a divine power they worshipped and in which devotees were able to consult an oracle under the direction of a numerous priesthood, who among other things practiced oneiromancy, that is they interpreted dreams provoked in the faithful that slept in cubicles still to be seen in the Hypogeum. The Hypogeum served also **very probably** for the training of the priests and for the initiation of the neophytes in the complicated magical rites. When the sanctuary, in the course of time, proved to be less attractive or unsuitable, the mysterious caves, that had acquired fame as a holy temple, were considered by*

the devout population to be a fitting ground for the burial of their dead" (Zammit 1935, 57–58).

My emphasis highlights the fact that these are conjectures, unsupported by primary or secondary evidence, that the historian is making on the basis of findings that do not match expectations. Such expectations include carefully laid out whole skeletons when buried in situ such as in early Christian catacombs, for which documentary evidence exists that helps explain the rituals undertaken when interring a member of the community.

Zammit above suggests the practice of *oneiromancy* – the interpretation of dreams – which is supported by the cubicles hewn into the rock where one could sleep, the oracle chamber, where one could have their dreams interpreted, and the findings of alabaster and terracotta models of sleeping ladies: one on her side and another face down. But what dreams were these? Inspired by the cubicles and terracotta models to suggest incubation, Ferguson draws from classical history, specifically from one of the most popular archaeological sites in Greece, Epidauros, and suggests that:

"*In the classical world, **which is almost all we have to go by**, incubation was closely associated with cults of healing, and none of these was more famous than that of Asklepios at Epidauros… The treatment at Epidauros consisted of an initial purification of the patient by washing and fasting, followed by a night spent in the temple of Asklepios. The next morning the patient's dreams were recounted to the attendant priest who used this information to develop a prescription which paid attention to general regime and diet. So this cult at Epidauros was a kind of medical divination using dreams*" (Ferguson 1986, 155).

Furthermore, Ferguson suggests that the "sleeping lady" models were votive offerings from cured patients in gratitude to their medical divination. Inspired by the tree of life paintings in red ochre onto the walls and ceilings of the Hypogeum, Ferguson suggests that, possibly ignorant of the sexual causation of reproduction, patients came here to become pregnant by the divine intervention of the Goddess of Fertility. Her cult is thought to have been followed throughout the island as evidenced by other findings in other Neolithic temples scattered across the island.

Thus, for the game designer who finds primary sources of information too little an inspiration for interesting game mechanics or too limiting in terms of scope – such as mere excavation of the site – may well consider not just the archaeologist's perspective but also that of the historian. Historians look beyond the "*what we know*" into the "*what could have been*" and can draw from contemporary or other sources of information to suggest potential explanations for rituals whose only trace remains in the husk of inherited tangible heritage. The undocumented nature of such rituals also allows for more empowered player agency. While choosing the correct stone or bone tool to carry out an excavation at a specific prehistorical period can be deemed to be correct or not based on tools, material, and technology available at the time, undocumented rituals allow the player to explore what could have been. They can be given the chance to partake in the exploration of how life could have been back then and they could attribute meaning to objects, places, and practices that go beyond that already suggested by historians. Rather than having the player follow a predefined series of steps as they excavate the levels in the correct chronological order, a semi-fictional environment is created that justifies relatively weird behaviour (Juul 2005) and is able to house multiple player-stories – much in line with the concept of Worldbuilding (Wolf 2014; Jenkins 2007). These offer opportunities for co-authorship of emergent gameplay and open-ended interactive narratives that may be explored by visitors and historians alike. Indeed, the study of archaeology itself is

taking advantage of such opportunities in the form of Experimental Archaeology wherein formulated hypotheses are tested and retained as valid unless falsified, allowing one to "*escape the shackles of historicism and empiricism*" (Outram 2008, 1). VR can provide an opportunity to try out these hypotheses and providing pseudo-empirical evidence of their validity.

Repurposed Cultural Heritage Interaction

The process of repurposing the Hypogeum from a place of sanctuary to a place of burial finds its modern form in the repurposing of historical places into theatres of entertainment. Medieval tall buildings became the venues for high-diving in *Assassin's Creed* (Ubisoft, 2007) while Chicago became the setting for a game of Cops and Robbers in in *Midtown Madness* (Rockstar San Diego, 1999). The Great Pyramids of Egypt themselves became landing ports for alien spaceships in the blockbuster movie *StarGate* (MGM, 1994) while Fort St Elmo, a 13th century fort guarding the Maltese coast against Ottoman invaders, became a prison in *Midnight Express* (Columbia Pictures, 1978).

Just like new cultures repurpose inherited tangible cultural heritage to fit their own needs and customs, thus happens with the digital representations of such sites. Once a place is stripped bare of its physical and geographical context, it becomes a space that can house activities afforded by its articulation and spatial distribution but may be narratively inconsistent[3] with its origins. The LEGO video games franchise regularly licenses blockbuster intellectual properties within which to situate its core game mechanic of breaking down objects made from LEGO bricks and rebuilding into necessary objects for completing its quests. In *LEGO The Hobbit* (Travellers' Tales, 2014), for example, you start off as Thorin, the son of the Dwarf King Thror of Erebor, and your first task is to oversee the day's mining operations. To get there, you need to smash objects around the throne in order to build a block with which to smash your way through the door – when outside the LEGO world you would expect the guard to open the door for you, since you're technically the prince!

Repurposing cultural heritage space with game mechanics from well-known game genres may serve as an attraction and repulsion to different audiences. Fans of the game genre being implanted into the repurposed cultural space, who are used to the genre's core game mechanics, may feel confident with the game and feel willing to explore the new context – thus serving the educational purpose of exposing the cultural space to new audiences. They will be able to see beyond the possible inadequacy of the mechanics as long as it allows them agency within a space they are usually not allowed in. To those familiar with the cultural space, however, the interaction mechanism that is alien to the place may be seen as a distraction or even a parody of what the cultural space signifies and its historical importance, and detracts from the user experience, particularly immersion. This calls for careful consideration of what game mechanics to employ rather than reskinning popular game mechanics.

PLAYER-CENTRIC DESIGN EXPERIMENT

A question raised by the call for papers for this conference asks who, as a result of the ludification of society, is entitled to design play and enjoy game and under what conditions. Within this paper's scope of ludification of heritage, a study was made to assess which of the documented, speculative and repurposed gameplay options for digital cultural heritage, would target players push for in such games. Being provided with documented history and legends and time to design a game within a historical context, which gameplay option will be the most popular?

Given the use of virtual reality technology and the drive towards raising awareness of cultural heritage in schools by the local heritage authority, the target audience was

identified to be locals in their late teens and early twenties as well as younger members of tourist families. These were invited to participate in a workshop based on a location-based mobile game design workshop run on the historic site of Pompeii (Sintoris, Yiannoutsou, and Avouris, 2017). This workshop was chosen as a model based on three factors. Firstly, no other documented game design workshop on VR was found. Secondly, the ability to augment one's view in virtual reality and the ability to track one's position within the virtual space were functionally similar to location-based mobile game design used in this workshop. Whilst Pompeii is an above-ground site that affords GPS-tracking, this would be impossible to have in the three-level underground cemetery Hypogeum, now located under above-ground dwellings. Conveniently, it would be very possible to port gameplay from location-based mobile games to VR. Thirdly, the workshop did not require the participants to be on site, given that they were presented with maps and information about the site. This fits well with the fragility of the underground Hypogeum complex within which human presence is tightly controlled to a minimum.

18 participants aged between 13 and 35, of whom only two had ever visited the Hypogeum, attended the workshop within which a brief overview of the game design process was given. They were then tasked to design a location based multiplayer game to be played inside the Hypogeum – ignoring the restrictive access currently in place and assuming that one's position can be tracked through Wi-Fi triangulation.

To inspire their game design, the participants were given an A3 map of the middle level of the Hypogeum, with places of interest labelled and described in another handout together with photos or images to help them imagine the place. Such information included pictures of the honeycomb and spiral designs on the walls and ceilings, evidence of its excavation through digging tools and their marks left on its walls, and the inner temple's description suggesting burial rituals and worship as documented sources. They were also handed a sheet with speculative sources such as legends, myths and conspiracy theories linked to the Hypogeum, including (i) the finding of long-headed skulls, suggestive of alien origins (ii) the improbable story of a class of schoolchildren getting lost in the lower levels (Walter 1940) and (iii) the claim of a British embassy worker of seeing live hominids in one of the underground chambers.

These designs were carried out in six teams of three participants and half way through the exercise each team presented their first draft of their idea, allowing others to incorporate the other teams' ideas into their own and so allow for cross-fertilisation. The teams finally presented their polished idea after which possible extensions to these games were discussed, including the implementation of these games as VR games. This would make the location tracking automatic and the players would be freed from having to hold the mobile phone as it would be incorporated into the VR heads-up display.

Outcomes
Of the six resultant game designs, four of them were clones of the popular Escape the Room game. Surely a claustrophobic place like an underground necropolis was too inviting not to adapt such game mechanics, looking for clues and solving riddles in order to get more clues and solve more riddles until one escapes, picking up some lost children and avoiding the odd alien or hominid along the way. One team chose to reskin Niantic's *Ingress* and *Pokemon Go* games by using one's location to unlock several mini games scattered along the complex. These mini games were hosted on an aliens' game server hidden further underground and participants were split into two factions: those resisting the aliens and those working to unearth them onto the surface of the Earth. The sixth team joined the concept of the lost children with the skeletons

and tasked the participant with scouring the complex for skeleton fragments until the full skeleton was assembled in a treasure hunt style game.

DISCUSSION

The ludification of cultural heritage is a delicate subject in that the rigid protective stance held by curators over the historical spaces and artefacts entrusted to them contrasts highly with the loose *laissez-faire* attitude that games are seen to support. Such difference is mostly present in the value attributed to the tangible heritage. In games, no action is permanent and an object's value is scoped to a game's context at best: it can be broken in one session but restored to its pristine state once the game is restarted. On the other hand, historical artefacts are unique and fragile: there is no way of restoring a broken artefact to its original state. They are priceless objects whose value extends beyond one's lifetime many times over.

Thus for the game designer engaging in serious games targeting cultural heritage experiences, there is an unclear task ahead. They are to build a bridge between the cultural objects and the ludic experience while giving priority to neither as it may jeopardise the overall relationship. Provide gameplay that is not fun and immersive, and you have lost your target audience. Provide gameplay that goes against the cultural context and you have lost your funder.

Thus to ask who is entitled to design, play, and enjoy games and under what conditions is a challenging question for gamification of cultural heritage. Even adopting the modern trend of player-centric design is a challenge: the control over the game is no longer shared between the game designer and the player, because now the curator wants a share into the design decisions and story progression. Equipping the game designer with knowledge of the different implementation strategies available in providing interactive cultural heritage experiences, that is, documented, speculative and repurposed, helps managing the levels of control involved in their development.

Looking at the results of the above experiment with the potential target audience of a VR cultural heritage experience, it is probably not surprising to see dominant game genres resurfacing within an educational cultural heritage context. Participants came up with popular game mechanics which could be applied anywhere else. None of them came up with the digging action typical of underground chambers documented by the tool marks and the tools themselves found within. None of the game mechanics tried to re-enact speculative rituals such as the burial rite itself, it being a necropolis, or the worship and oneiromantic rituals of the Neolithic community within its walls. Rather, repurposing of the underground chambers with game mechanics with which the participants were familiar was carried out, imposing their norms onto this unknown space belonging to a long gone culture. This is contrary to what experiencing a historical place inherited through the ages from a culture different to our own should be like and illustrates how lack of cultural heritage knowledge invalidates cultural presence.

Pujol and Champion (2011) refer to the socio-anthropological concepts of 'etic' and 'emic'. The participants' repurposing of common game mechanics into the Hypogeum reflects the 'etic' – the biased interpretation of another culture by the external observer – which, the authors suggest, may seem to diminish the authenticity of cultural presence. An 'emic' approach – which would focus on the meaning attributed by the actual culture being represented – would use the VR technology to let visitors immerse themselves into the culture that constructed, revered, and utilised the place in their daily lives rather to allow them the chance to impose themselves upon the place – which is particularly difficult in the absence of relevant documentation such as in the case of the Hypogeum.

Thus, who has the right to design the gameplay behaviour, and the narratives to support such behaviour, in serious games situated within non-documented historic buildings or complexes? Is it the archaeologist who reverse engineers knowledge from the hard evidence found on site? Is it the historian, equipped with comparative histories of geographically or chronologically adjacent cultures, formulating conjectures upon their use? Is it the virtual visitor who wants to interact with a serious game expecting to be allowed the chance to attribute their own meaning as if it was abstract art? Or is it the game designer who seeks to patch together all the above?

Maybe the answer lies there in the last question: an experience that patches together all the above options – supporting the 'etic' while striving towards the 'emic'. Rather than providing a choice of level of difficulty at the start of the game, one can offer a level of authenticity: documented, speculative, and repurposed. Based on their selection, different game mechanics can be provided: excavation in the first, ritual performance in the second, and some dominant game genre mechanics in the last. This might appease the archaeologist who is ensuring that the historical accuracy of portrayed behaviour is qualified accordingly, the historian engaging in Experimental Archaeology who wants visitors to explore possibilities, and the gamer who wants to experience the space in their own terms. This eclectic approach would also be efficient in that it allows asset reuse and consistency across the three experiences, letting the visitor choose for themselves how they would want to engage with the cultural heritage.

CONCLUSION

As the VR community calls for the creation of experiences that make use of the now mature digital representation of tangible cultural heritage, this paper reaches out to the game design academic community to consider how best to meet the challenge.

While commercial games have repurposed such spaces into venues for game mechanics of well-known game genres, the heritage community would surely appreciate experiences that represent the intangible heritage of such sites: the skills, the customs, the rituals and the happenings specific to cultures that inhabited and constructed such historical spaces. Different academics in these communities have different perspectives: archaeologists tend to eschew fantasy by sticking to the tangible evidence found on site while historians tend to wonder what could have been, drawing from contemporary cultures. Knowledge of such heritage is dependent on availability of concurrent, or relatively contemporary, documentation which diminishes as sites become older, up to prehistoric times.

Thus, three levels of cultural heritage interaction have been proposed, reflecting the nature of the interaction, its source, and possibly its target audience:

- Documented cultural heritage interaction re-enacts intangible heritage that is documented and thus relatively easily verifiable through behavioural

accuracy. This has so far only been attributed to non-player characters as a means to increase the space's realism, but the emphasis here is to allow the players themselves to perform such rituals through narratively consistent gameplay.

- Speculative cultural heritage interaction represents a historian's perspective on intangible heritage where, lacking supporting documentation to describe how spaces and artefacts were used, comparison with contemporary cultures and conjectures gives rise to plausible performances that could fit within such spaces leading to narratively cohesive[3] gameplay.

- Repurposed cultural heritage interaction refers to gameplay imported from other genres and made to fit, to some extent, with the digital space. Useful in order to acclimatise ludic immigrants, it may however fail to reach the educational outcomes expected from such experiences.

These three levels have been described in relation to a case study involving a Neolithic-age underground hypogeum whose fragile environment invites its representation and exploration using digital heritage. Different perspectives on enacting gameplay within this space have also been presented, namely via the curator's suggestion of excavation mechanics, the historian's speculative suggestion of rituals such as *oneiromancy*, and the game design workshop with target audience representatives that resulted in repurposed gameplay.

It is hoped that this paper promotes collaborations between game designers and the digital heritage community in developing games that afford performances of intangible heritage.

ENDNOTES
[1] http://www.chessexperience.eu/
[2] https://www.youtube.com/watch?v=50jtJA3jCKk
[3] By narrative consistency and cohesion, reference is made to the author's Narrative Consistency Scale which compares narrative experience as a result of gameplay with traditional narrative media (Barbara, 2015).

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