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SUPER MARIO (UN)MAKING:

TOWARDS THE PRESERVATION OF DIGITAL PLAY PRACTICES

by

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Ethics, Data and Copyright Statements

This study was conducted adhering to the ethical considerations relating to non-clinical

research framework provided by Bath Spa University. No human participants were involved

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Abstract

This thesis puts forward an approach to the preservation of videogames through a singular case study of Nintendo's *Super Mario Maker* (SMM) released exclusively for the Nintendo Wii U console in September 2015. Videogames are a significant part of our culture and our everyday lives. As with other popular cultural forms, there is an urgent need to think about how videogames are being remembered, documented and preserved. Yet herein lies the problem. For how does one preserve a practice? This thesis argues that attempts to preserve videogames as *playable* objects are, conversely, further contributing to their effacement. Videogame preservation appears to fixate on the technical object. Rather than attempt to approach SMM as a singular identifiable entity, this thesis considers videogames as discursive practices and/as sociotechnical assemblages. Its proposed method of study is to trace the contours of videogame play through the cultural records produced by those who play them. Its explicative method utilises the medium of video. Through tracing the multiple trajectories of SMM play, this study moves to highlight how dominant play styles (and, to this end, dominant players) shape our cultural memory. Whilst there is no "right" way to play

SMM, hegemonic discourses influence what kind of play is valorised and consequently,

whose histories of play are likely to remain.

Over the past 30 years, more than a billion people around the world have played a Nintendo game, and most of them have played as gaming's biggest star, Mario. From the music to the costumes to the characters, Super Mario isn't just Nintendo's mascot, there's a little piece of him—and certainly memories of his adventures—inside all of us.

—Reggie Fils-Aimé

Nintendo Direct E3 2015

Our bodies are burned along like flowing waters; every visible object accompanies time in its flight; of the things which we see, nothing is fixed. […]

This is just what Heraclitus says: "We go down twice into the same river, and yet into a different river." For the stream still keeps the same name, but the water has already flowed past.

—Seneca the Younger

Moral Letters to Lucilius, 58.22-3

(topostext.org/work/736#)

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Acknowledgements

Introduction

This thesis proposes an approach to preserving videogames that argues it is through paying attention to the play practices they engender that videogames can be saved. To remain in scope, this thesis uses a single case study. Released across all regions for the Nintendo Wii U console in September 2015, Nintendo's *Super Mario Maker* (hereafter SMM) has been carefully selected as the inherent complexities of videogames are most evident in games like SMM, built around the affordances of consoles and networked infrastructures to provide players with a means to create and share their own in-game content.

Through studying SMM, I draw two conclusions regarding videogame preservation practices that apply more broadly. First, the invaluable contribution content creators have already made to the preservation of videogame play. Second, how broader contexts shape the records of videogame play being produced. That is, records are not neutral; they embody the values and interests of those who produce them. To this end, this thesis argues it is important for preservationists to recognise how players are good at documenting certain aspects of videogame culture whilst ignoring other, just as crucial yet subbordinated, aspects which are not. Despite SMM being primarily about level creation, for example, evidence of the actual

level design process is surprisingly absent from the records remaining. Acknowledging some of the broader social and cultural influences that shape who gets to perform online, this thesis argues that simply paying attention to only the most prolific and prominent online content will result in a distorted image of what playing SMM actually looks like.

Videogames occupy a significant part of contemporary culture and our everyday lives. As with other popular media, how best to document and preserve videogames remains an ongoing concern. Treating videogames as a subset of other 'born digital' (Langley 2011) or 'complex digital objects' (Anderson and Janet 2013) has led to certain assumptions about what videogames are and how best to preserve them. Conversely, dominant preservation strategies continue to contribute to their further effacement prompting the need for alternative solutions to be found.

This thesis sets out one such alternative approach to videogame preservation. To shift focus away from the technological apparatus required to play videogames towards the material traces of play produced by their players. These *traces of play* hold significance as they articulate the presentation of cultural practices associated with the playing of—and playing with—videogames. Resisting understanding videogames as comprised of their technological apparatus alone, this thesis theorises how videogames comprise both objects and activities and hence are better understood as *unfinished* objects—always partial and incomplete, open-ended and emergent, and contingent on the very play practices they engender.

As already mentioned, paying attention to the material traces of SMM play reveals two things. First, how in-depth and technically minded many player-produced records are. This holds especially true when produced in the pursuit of expert knowledge and in gaining player expertise. Other game scholars have acknowledged this much already. Second, how

broader social and cultural issues influence the shape of content being captured online. Identifying what aspects of play are or are not being captured and documented in this manner forms part of this discussion. While there is no right way to play videogames, hegemonic practices and online discourse prescribe what (if not whose) activities get to be performed publicly online. To this end, the most prevalent online content fails to adequately account for the range of practices that videogames engender. Consequently, fundamental aspects of videogame play are being omitted from our cultural records.

Finally, to conclude, I provide a brief summary of my main takeaways, a call to action for preservationists and a call for closer collaboration between memory workers and scholars, leading to an outline of future work that can be done.

Beyond preservation literature, this thesis draws upon games studies and digital media studies. In terms of methodology, it is both critical of and aims to contribute to the subdisciplines of platform studies and media archaeology. Both draw much-needed attention to the *material specificity* of digital media objects yet risk reducing our understanding of digital media to its technical componentry alone. This thesis argues videogame preservationists are in danger of doing the same by essentialising the videogame apparatus over the activities they engender (cf Guttenbrunner, Becker & Rauber 2010; Rieger et al 2015; Rosenthal 2015).

My argument develops over two parts. First, a written component situates this argument within digital cultural heritage and videogames within digital cultural studies more generally. Second, to continue explication through a series of video essay presentations: a mode of presentation selected specifically to reflect my proposed method of study. That is, to study videogames by attending to the records of videogame play produced by their players. To study SMM in this manner is to study one of the many contemporary videogames

similarly embedded within network culture. As such, this thesis provides a demonstrative case study in support of preserving videogames through/and/as digital play practices. In short, towards the preservation of digital play practices.

Chapters Overview

This thesis comprises two parts: a written component spread over two chapters plus a conclusion and a video component split into four. The four video presentations are hosted on YouTube and can be accessed via this playlist: https://bit.ly/SMM-PhD. Digital copies of the video files are also stored on the USB drive provided.

My first written chapter establishes what is at stake, the issues videogame preservationists face and how dominant approaches appear ill-equipped to deal with their complexity, calling for a more nuanced approach. The first section provides a broad overview of the problems videogames pose to traditional memory institutions, highlighting some work fans and enthusiasts have already done to mitigate against further loss and how existing fan work has already begun to influence institutional responses. I conclude this section by asking what it might mean to preserve videogames *without* access to digital artefacts. The second section draws upon extant literature on digital cultural preservation to assert how dominant approaches to videogame preservation are, paradoxically, further contributing to their erasure. Instead, I propose an alternative methodological approach that attends to the multivalent ways videogame play is recorded and documented. In support of this proposal and third, I demonstrate how the contemporary landscape of videogame development necessitates a shift in how we think about videogames and what it might mean to preserve them. Under my proposed approach, videogames are better understood as *unfinished* objects rather than as fixed technological artefacts.

My second chapter moves from the particulars of preserving videogames to a broader discussion on issues pertaining to digital and videogame culture more generally. Running across five topics, each topic affords me the opportunity to explain further why I chose SMM as my case study while further advancing theoretical and methodological concerns.

Section one, *Thirty Years in The Making of*, situates SMM at the point of convergence between two divergent Mario-making practices. Practices that led to Nintendo's official canon of 2D Mario works alongside those performed by its players: noncanonical or derivative works created by its players. It asserts how both sides contribute to SMM's reception and ongoing development as SMM continues to evolve after its initial release.

This sets the scene for section two, *Web 2.0, Participatory Culture and Produsage*, which situates SMM play within digital media cultural practices more generally describing how contemporary videogames operate within networked culture.

Third, *Modding, Cocreation and Kinaesthesia*, describes how cultural production works within videogame player contexts. A brief introduction to modding leads to a fuller discussion on cocreativity: how players use in-game and third-party tools to modify and extend videogames on the one hand, and how players are imbricated into the unfolding of the game as cocreators of the gameplay experience on the other. Recognising the visceral and kinaesthetic pleasures associated with videogame play leads to a discussion on spectatorship setting the scene for the fourth section.

Livestreaming, Esports and Sports Death outlines how videogames have often been favourably compared to competitive sports acknowledging how displays of skill, mastery and technical proficiency continue to drive engagement within livestreaming contexts. Herein, I express concern over the performative and ephemeral nature of livestreaming and the records of SMM play that are produced as a result.

Finally and fifth, *Materiality, Platform (An)archeology and Media Speleology*, concludes my methodological concerns and sets the scene for moving on to the video preservations.

My first video presentation, 'Behind the Code', is split into four sections. First, through Matthew Kirschenbaum's (2008) 'forensic imagination', I suggest it is by paying attention to evidence of 'whenever process collapses into product' (2008, 253) that my video analysis should begin. Second, the practices associated with ROM hacking and tool-assisted superplay (TAS) are discussed to situate SMM at a point of convergence between canonical and noncanonical works and practices. Third, I resist giving any straightforward answer to the deceptively simple question: *who are the makers of Mario?* Indeed, Nintendo positions SMM as an extension of its legacy and yet, by the same token, ignores, if not actively tries to erase, records of its alternative fanmade histories and practices. Finally, I present how SMM evolves through planned and unforeseen updates and how changes to the game and its governance have real-world consequences for its players.

In my second video presentation entitled 'Beyond the Screen', I begin by drawing upon Barry Atkins' (2006) concept of the 'gamer's gaze' to situate player action at the loci of the gameplay experience. For Atkins, the gaze of the gamer is set on the future possibility of action, ensuring both the player and the game are imbricated in what appears onscreen. Second, I use a case study to demonstrate how software emulation can be used analytically, setting the scene for third. Knowledge about the inner workings of videogame systems can be used to advance play, which can also mean gaining a strategic advantage. Adopting the term *framedata*, I acknowledge how playing in certain high-performance contexts requires players to develop an acute sense of timing and how such demands manifest in SMM play contexts. It is not just advanced player techniques that shape SMM, however. In the final part of this

presentation, I reveal how in-depth knowledge of SMM's internal workings and item behaviour led to the construction of complex contraptions, allowing players to establish new challenges.

In my third video presentation, 'Friend Mario', I make a case for how designing playful activities is always already a social activity. Wilson and Sicart's (2010) 'abusive game design', reframed as dialogic game design, asserts how gameplay can be likened to a conversation between designers and players. Dialogic game design reminds us that playing a videogame does not begin and end with us sitting at a computer or console. Connecting Wilson and Sicart's ideas to that of play philosopher Bernie De Koven (2013), I acknowledge how trust, empathy and a sense of community are involved in playing well together and how "the game" exceeds the formal systems imposed by videogame technologies. To this end, I conclude my third video by lamenting how woefully inadequate a preservation strategy built to save only the technical apparatus would be. Unable to maintain a sense of the social and interpersonal aspects of play fundamental to how we engage with, understand and appreciate videogames and their cultural significance.

My fourth and final video presentation, entitled 'Traces of Play', aims to appraise the video content shared on video-sharing platforms such as Nico Nico and YouTube. It considers not only *whose* play gets performed in these spaces but also *what* types of play are captured and, hence, what records of play are most likely to remain. While some commentators bemoaned the onslaught of "badly" designed user-created levels clogging up the SMM servers, others celebrated these "failed" attempts as a sign that SMM, as a democratising game design tool, was working as intended. Finally, I draw upon De Kosnik's (2016) 'Rogue Archives' to remind us that despite the mass proliferation of publicly available video content of SMM play online and despite their significance as expressions of cultural

practice, 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. Hence, in

my final written conclusion, I acknowledge further intervention is required, noting future

work that could be done.

Chapter One

Videogames as Unfinished Objects

Videogame Preservation

This chapter develops over three sections. In the first section, I challenge the dominant

assumption that videogame preservation solely involves maintaining playable versions. I

argue for acknowledging the limitations of this approach and for exploring alternative

strategies that prioritise the act of playing and the diverse ways players interact with

videogames. I advocate for a shift in videogames preservation from a focus on playable

objects to a broader understanding of games as lived experiences. This includes capturing not

just the code and hardware but also the traces of play left behind by players, ultimately

providing a more nuanced description of videogames and their cultural impact and

significance.

In the second section, I outline the challenges of preserving "functionally intact"

videogames. I argue that software preservation alone is insufficient to capture the full

experience of videogames. Following suggestions put forward by Lowood (2004) and

Newman (2012), I propose an approach that focuses on documenting the social, cultural, and

material contexts of playing videogames. This shift is necessary to preserve the rich and

dynamic history of videogames as they are actually experienced by players.

The third section furthers my argument, challenging the notion that videogames are ever "finished" products and that industry practices lead to knowledge loss, further hindering preservation efforts. Suggesting that videogames are inherently *unfinished*, I draw upon Guins' (2014) afterlife framework to move us beyond static object analysis to consider the dynamic relationships between objects and their contexts.

Videogames

This first section contains three subsections. First, I introduce some of the problems videogame preservationists face, how fans are uniquely positioned to act quickly to negate them, and how existing fan work has already influenced institutional responses. As Raiford Guins (2014, 8) reminds us, '[...t]o study video games critically is to be indebted to preservation because our objects of study are available to us by virtue of having been preserved'. Challenging the assumption that videogame preservation means maintaining *playable* versions of videogames, in the second subsection, I go on to describe how existing preservation practices are inadvertently further contributing to erasing our past. In the third, I consider what it might mean instead to preserve videogames *without* access to digital artefacts or their source code.

Videogames make up a significant part of our contemporary media landscape. As with other popular media forms, preserving videogames should be a primary concern. However, what does it mean to preserve videogames? Videogame systems are inherently complex and often rely on other technical systems in order to work. Hence, the prospect of saving videogames is a complex and multifaceted issue.

As software, videogame data is often stored on physical media. Digital media formats such as magnetic and optical discs, cartridges and solid-state flash drives cannot escape the

entropic effects of 'bit rot' (Monnens 2009). Estimates suggest that magnetic and optical media have a surprisingly short life expectancy, anywhere between 10 to 30 years (Gilbert 1998; Shahani et al 2003).

Playing videogames requires compatible hardware and operating environments in order to run. Game consoles, controllers, cables and other peripherals (such as CRT televisions) are objects whose physical properties will all inevitably rot and decay. As hardware fails, entire software libraries are rendered unplayable. Such material concerns often go unchecked as digital media continues to be mistakenly thought of as providing more permanent storage (cf. Chun 2011). Yet, as physical objects, all will eventually fall into disarray.

Videogames that feature online modes of play must connect to online services maintained by publishers or console manufacturers. The discontinuation of any required service can seriously and permanently affect how a videogame plays. For example, nine years after its launch, Nintendo's Wi-Fi Connection service (Nintendo WFC) was terminated on 20 May 2014, meaning all Nintendo DS and Wii titles would lose their online features (Nintendo.com 2014). For popular titles such as *MarioKart Wii* and *MarioKart DS*, this meant no longer being able to race against other players online, which was a huge part of their appeal.

Given the immense popularity of Nintendo and its following, the withdrawal of the official Nintendo WFC service did not mean the end of online play, however. Several fanmade and community-ran services took its place, continuing to provide online support for

a number of Wii and DS titles.[1] Whilst unsanctioned and less straightforward to use,[2] players can continue to play popular Nintendo Wii and DS titles online due mainly to the concerted efforts of technically-minded fans who had the capacity and foresight to resurrect what ordinarily would become a "defunct" and obsolete service.

Efforts to reestablish discontinued services cannot reinstate content that has already been lost or displaced, however. One of the most significantly impaired titles affected by the discontinuation of Nintendo WFC was *WarioWare: D.I.Y.* (or *WarioWare: Do It Yourself* in PAL regions). Released in 2009 for the Nintendo DS, *WarioWare* gives players a platform and tools to create, play and share their own microgames with other connected players online. While locally saved data was unaffected (meaning players could still access their own save files, hence saved games), the discontinuation of Nintendo WFC resulted in all online content being unceremoniously withdrawn from circulation. Not only removing part of Nintendo's own history (as many additional microgames had subsequently been uploaded to its servers) but also the great swathe of player-produced content created by its players. Players that Nintendo had gone to great lengths to cultivate. As part of a multipronged promotional activity running between April 2009 and May 2011, Nintendo hosted several *WarioWare* design challenges, with the winning entries being added for download for a limited time. Concurrently, Nintendo also released a number of additional microgames created by other prominent game developers and television personalities (mariowiki.com n.d.). The discontinuation of Nintendo WFC meant all online content would no longer be accessible. Or, at least, no longer accessible via officially supported means.

1. See, for example, wiimmfi.de which reports support for over 100 titles (accessed 13 May 2019).

2. Players must install additional homebrew software (Corriea 2014).

WarioWare's story does not end here, however. Like the fan-enabled continuation of the Nintendo WFC service, Nintendo's popularity, combined with the cult following *WarioWare* had garnered from digital artist groups such as glorioustrainwrecks.com, ensured that its microgames were saved as a downloadable archive.[3] Whilst installing the files requires users to first "unlock" their DS consoles in order to accept flashcarts[4] or else resort to software emulation[5], intrepid players can still access, install and play these ostensibly "lost" *WarioWare* microgames.

Whilst far from exhaustive, both examples bring to light some of the prevailing issues facing videogame preservationists, along with some of the strategies fans have developed in order to save them. However, the assumption here is that the goal of preservation is to maintain *playable* versions of videogames. If this is the case, then videogame preservation means not only do we need to retain bit-perfect copies of the videogame's data, but also a means to execute it in accordance with the hardware specifications it was designed to run on. Videogames featuring online play also need to remain connected to online services, further compounding the issues faced whilst highlighting the contingent nature of videogame play and its inherent complexities.

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3. See, for example, https://archive.org/details/WarioWareDIYWarehouse uploaded by Larsenv, 10 July 2018.

4. A flashcart or flash cartridge is a rewritable cartridge that contains flash memory and operates in much the same way as a USB flash drive. For a breakdown of the different (recommended) flashcarts available, see https://www.reddit.com/r/flashcarts/comments/6u7fuu/which_flashcart_do_i_want_start_here/ (accessed 22 May 2019).

5. For an overview of this process see, for example, the comments section on this forum post: https://www.glorioustrainwrecks.com/node/7105 (accessed 22 May 2019).

Significantly, both examples also foreground some of the significant achievements and advancements made by fans towards preserving playable artefacts. Yet does maintaining a playable game constitute preservation? Before I provide I response to that question, it should come as no surprise to learn videogame historians have already acknowledged the valuable contribution fans and enthusiasts have made to preserving our videogaming past.

For example, Raiford Guins (2014) calls our attention to the ensemble of gaming paraphernalia already amassed by 'various cultural institutions, *including the labor of private collectors and committed game enthusiasts*.' (2014, 22; emphasis added). Part of Guins' call for a more 'critical historical studies' (2014, 21) is a call for scholars to step outside the confines of GLAM institutions (Galleries, Libraries, Archives, and Museums) and instead engage more empirically with other sites of abandoned player activity—to rummage through drawers in disused arcades or, even, to excavate landfills.[6] Current-day researchers are already indebted to the concerted efforts of fans and enthusiasts empathetic enough to not only gather together game-related materials but to do so with the foresight to attempt to provide long-term access to them. As such, our current epoch of historical studies can be 'exemplified by [the] assorted documentation, archival, display, preservation, conservation, and restoration practices at cultural institutions such as libraries, museums, and universities, *as well as itinerant exhibitions, private collections, and information repositories produced by the gaming community*.' (Guins 2014, 25; emphasis added).

Among the most notable are long-running fan sites such as lemon64.com and worldofspectrum.org, which have managed to keep their content available and operational. This is remarkable considering the sheer amount of content accrued and the highly specialist

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6. See Guins' (2014) introduction and chapters three and five, respectively.

knowledge required to maintain it (Stuckey et al 2013). Yet these, along with the many other fansites, operate outside of formal institutions, leading some to question their long-term viability as cultural resources. For, as Jerome McDonough notes, '[t]he life span of a webpage is about six months while libraries and archives are good at creating stable long-term infrastructure where that stuff could go and live.' (McDonough quoted in Guins 2014, 78). Despite their many achievements, fansites should not have to compensate for the lack of heritage sector activity (Newman 2012a, 26). Operating without proper financial or institutional support, '[t]he hobbyist nature of the work done [by fans] also means that the community is vulnerable to skill loss, erratic decision making and basic loss of interest among participants.' (Gooding and Terras 2008, 23). Inevitably, at some point and to some extent, all will be in need of further preservation.

With that said, and despite many difficulties, the ability of fansites to accrue content and maintain working knowledge has already begun to influence how the broader cultural heritage sector approaches digital preservation. An illustrative example can be found in the Australasian-based *Play It Again* project dedicated to documenting Australasian-made games from the 1980s (Stuckey et al 2013). The emergent Australian and New Zealand game development scene at the time helped pave the way for much of the global game industry, yet, historically, has often been overlooked (Swalwell 2009). The *Play it Again* team developed the Popular Memory Archive (PMA) website as an online portal to capture a local, culturally-specific game history collecting together the 'memories of those who lived and played their way through this period' (Stuckey et al 2013). Critically, the PMA was modelled after extant fan communities with a publicly-facing website aimed at disseminating prior research and eliciting responses from willing participants about their own experiences playing—if not developing—games during this period. In doing so, the PMA team suggest

'[…s]ites such as these—built around digitally native content by a digitally literate community—can provide memory institutions with a blueprint for what sites seeking to elicit popular memories about games might look like.' (Stuckey et al 2015).

Traces of Play

Despite the many advancements and achievements fans have already made towards preserving videogame artefacts, the videogame industry thus far has shown little interest in preserving its own history (Donahue 2009). Yet, this apparent disinterest is not born of ignorance or oversight. As Newman (2012a, 46) notes, the games industry goes to great lengths to ensure we, the consumers, are oriented towards the future of videogames by presenting a consumable image of videogaming's past.

Consumer-focused gaming expositions, or gaming expos, play an important role in the commodification of videogames. Gaming expos, like the multi-sited and immensely popular Penny Arcade Expo or PAX, provide consumers with hands-on exposure to future releases whilst, at the same time, constructing a popular image of our gaming past. With their promise of exclusivity, vast audiences get to play new and forthcoming titles whilst simultaneously being presented with a highly curated view of its past. Whilst each event will differ in scale and magnitude catering for large corporate displays, indie booths, and merchandise retailers, nearly all will feature a section devoted to "classic" gaming presenting an array of "past" (and prototypical) videogames in the form of arcade cabinets, pinball machines, microcomputers, and "out-moded" home videogame consoles. By imbricating the old with the new and the past with the present, gaming events such as PAX provide audiences with a means to *assess* the future of videogames against an often overly nostalgic and narrow view of its past. As Ashton notes:

Past technologies are selectively remembered and recovered as part of the foundations for future success. This is a tension, that can be unpacked in a number of ways, across current industry transformations and strategies that potentially erase the past whilst simultaneously seeking to recover it as part of an evidence-base for future development.

(Ashton 2008)

Not only do events such as these produce a selective and distorted image of our past, but they also impart *how* videogames are to be remembered.

To illustrate further, I turn now to look at how the organisers and curators of the Classic Gaming section at PAX Australia 2017, held 27-29 October at the Melbourne Convention and Exhibition Centre in Melbourne, Australia, chose to exhibit "past" videogames. I argue that what these exhibitors share in common with digital media preservationists is an overriding desire to retain *working* versions of videogames. This will lead to a discussion on how those privileging the *playable* object over the *acts* of play—the object over its activities—are in danger of obscuring our view of what *actual* videogame play looks like.

The popular Australian retro gamer e-zine website ausretrogamer.com ran an article that included a number of photographs taken at the classing gaming section (ausretrogamer.com 2017). As you entered through the opening between the showroom floor dividers, on the right stood a row of glass display cabinets containing a selection of "rarer" gaming artefacts. These included a number of Amstrad microcomputers, a Creative Labs 3DO Blaster compatibility card, and an assortment of other curiosities, including Atari pin badges and patches and even an Atari-branded baseball.

Considered either too valuable or fragile to be (mis)handled, these items displayed behind glass appear in much the same way as objects displayed in traditional museums. Yet its main event and draw was designed to provide visitors with a different kind of hands-on experience.

Two rows of back-to-back collapsible tables ran parallel to the display cabinets on the left. A home console on each table was plugged in, powered up, and connected to a modern LCD display. Attendees could play by picking up the controller or watch while others played on. Behind these, in the largest and often busiest section, stood a number of arcade cabinets and pinball machines. Each machine set to free-play mode so attendees could repeatedly play without paying. Each unit presented in full working order, as with the home consoles.

It is clear that the organisers behind the classic gaming section intended for patrons to experience playing these games firsthand. According to Alex Boz, co-founder of ausretrogamer.com, one of the biggest draws of the classic gaming section is the opportunity for the public to play them:

> […] *as they were intended to be played*, just as motoring enthusiasts love to see classic cars back on the road […]. There are plenty of ways to play [these games] on modern smartphones and consoles, […but] you can't completely capture the *look and feel* of the *original* gaming experience.
>
> *(Boz quoted in Turner 2017; emphasis added)*

There are a number of reasons I pull this quote in particular. First, not only does Boz recognise how formative play is to our experiences of videogames, he does so emphasising its experiential qualities meaning how a videogame *looks* and *feels* to play is formative of those experiences. Second, drawing a comparison between driving a car and playing a game implies that the goal for classic gaming exhibitors is to achieve the "look and feel" of the

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"original" experience. Therefore, restoring and repairing machines to their original manufactured condition and keeping consoles in good working order is the shared goal that unites retro gaming enthusiasts and exhibitors alike. It would appear that this desire to 'capture the look and feel of the original' also underpins and informs how many approach videogame preservation.

It is not the playing (or not playing) of videogames that concerns me here, however. Certainly, I, too, enjoy attending these events, mingling with other like-minded souls, and playing the range of games on offer. Often, I, too, do so critically. Like Boz, my attention is drawn to *how* a particular game feels to play within this context (although perhaps I am more cognisant of how contexts shape my overall experience, which is a point I shall return to below). It is not playing that matters in this instance. Rather, the long-term and irreversible consequences restoration practices have on impeding our ability to interpret the past.

As it is for the fanwork mentioned earlier, it is not without considerable effort and expertise that such complex and intricate machines remain playable at all. Yet restoration practices deliberately efface evidence of the *friction* of play, that is, the traces of play inscribed upon them by their players. Or, as Cat DeSpira (2019) describes it:

> *Pac-Man* is more of a driving game than a maze game. As you're playing, you're jamming that joystick left and right, up and down, movements that shifts your right shoulder forward and back, rocking your body side to side. When the going gets tough, and the ghosts start closing in, all of this rocking motion compels you to lean into the game and, whether you realize you're doing it or not, you're going to *grab onto the game*. […Y]ou're going to grab the side of the game and hold on tight. You have to or you'll lose your balance.
>
> *(DeSpira 2019; original emphasis)*

Significantly, this balance "problem" draws attention to how all videogames are designed to respond to our bodily actions and, in turn, how our actions are a response to them. That is, the game exists by virtue of being *acted upon* by the player (and vice versa, which is a point I shall return to again in chapter two). For DeSpira, wear patterns etched on the lefthand side of the cabinet (as most people are right-handed) form a part of *Pac-Man*'s holistic design and legacy. Inscriptions made by the great number of hands that have, quite literally, held onto the cabinet whilst playing the game. Inscriptions that testify to the very act of playing itself. As such, collectors returning arcade cabinets to their original manufactured condition are subsequentially effacing traces of our past play experiences, as DeSpira laments:

> *Pac-Man*'s worn left-side is part of the game's provenance. It's unique only to *Pac-Man* games, including *Ms. Pac-Man*. It's evidence left by "Pac-Mania" and also evidence of how the game was really played. It's a time signature left by a generation of the first gamers. It's history that should be preserved intact.

(DeSpira 2019)

Given the potential resale value of refurbished machines, it is perhaps understandable why DeSpira berates those putting profit before provenance. Yet restoration's profit margins concern me less than the restrictive effect restorative practices have on our ability to interpret the past. Whilst I agree with DeSpira that arcade restorers may want to rethink their approach, I think the same also applies to digital preservationists. That is, to relearn to appraise wear and tear as evidence worth saving, not as damage in need of repair. This desire to return something to its original state continues to plague digital preservation strategies as much as it drives restoration practices. Maybe it is time to rethink our approach to videogame preservation.

Before I move on, however, I wish to clarify two points.

First, it is not the effacement of *physical* traces that concerns me the most. Rather, if we are to accept that changes to the physical appearance of an arcade cabinet evidence our past player activity, then a useful analogy here is to consider how videogame play can similarly be traced through recourse to its digital equivalent. Further, it is not simply that these traces of play reveal past player activities, but rather that our activities are themselves *coconstitutive* of the game itself. That is, these traces are not simply a disinterested record running parallel to the "real" game but are, in fact, evidence of the game as it exists at that exact moment in spacetime. Because videogames tend to efface evidence of their past selves, as they are versioned, patched and updated, preservationists must attempt to trace *how* videogames evolve before it is too late.[7] Videogames do not sit still. They are elusive and shapeshift further supporting why it is these material traces of play that are our videogames worth saving.

Second, it is also worth noting that not all exhibitors are the same, nor should we equate all exhibitor activities to the vast range of other activities performed by collectors, enthusiasts, archivists, and preservationists. Indeed, it is precisely because of the heterogeneity of situations, peoples, interests, values and approaches (if not also, conversely, because of the lack of intervening governing bodies and/or best practices) that such a broad range of gaming artefacts and related paraphernalia remain accessible at all.

So, let me be clear. My concern here is that ongoing efforts to retain *playable* videogames are further contributing to erasing our past. It appears this desire to return videogames to their "original" playable state unites exhibitors of classic videogames and

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7. An earlier version of this argument as it relates to mobile games can be found in Manning (2017).

videogame preservationists. Evidence of this desire runs deep, as its expression resurfaces again in response to a new technological horizon emerging. A future based on streaming technologies where transient flows of information replace physical data and where videogames exist but only fleetingly as instantiations of data decoded, interpreted and rendered perceptible as residual traces of light and sound dancing across our screens. Within this possible future, the limitations of extant approaches to videogame preservation, which rely upon access to verifiable game code, can be most usefully exposed.

Cloud Gaming

Held annually in San Fransisco, the Game Developers Conference (GDC) is the world's largest videogame developer's convention attracting many major gaming platforms and publishers to take the stage and GDC 2019 was no exception. Held in March of that year, technology giant Google announced the imminent launch of its cloud-based game streaming service, Stadia, due for public launch later that year (Klepek 2019). Whilst cloud-based gaming is nothing new,[8] Google's proposed subscription-based service promised to provide high definition gaming streamed directly to any internet-enabled device. Not having to purchase expensive hardware upfront nor having to download, install and update content featured as part of its value proposition. What wasn't revealed was how streaming services ensure data remains in the hands of the distributors and developers. As Kuchera (2019) notes, 'You don't "touch" the game code at all locally [… as e]verything is kept under Google's control.'

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8. See Bode (2019) for a brief overview of earlier, failed attempts at cloud-based gaming, most notably OnLive in 2010.

Not being able to install the game code locally has multiple ramifications for both players and preservationists alike. Not being able to alter the underlying code restricts players' ability to customise or modify their experiences. For Kuchera (2019), not being able to tinker with the code may have longer-lasting consequences, limiting the opportunity for aspirational game developers to develop the requisite programming and design skills.

Prohibited access to code also restricts access to our past. As Whitehouse (2019) suggests, 'There is so much more history to a video game than the playable end result conveys.' Rummaging through data files and, ostensibly, reverse engineering games through its code is an important part of piecing together otherwise obfuscated design processes. Whilst it is possible to conceive of a cloud-based solution where some data is stored locally, it is also possible to imagine a scenario where all the requisite data is processed remotely. Given the latter, it is only the resultant audiovisual signal that is transmitted to the end user rendering it nigh impossible to parse the *actual* data and computational process involved. This is an alarming prospect for preservationists fixated on retaining the code.

In a future based on streaming videogames, digital content remains in the hands of its distributors, not its end users. For Andrew Borman, Digital Games Curator at the Strong Museum of Play, losing access to the code means '[o]ther than video, […] there is no record of the game. We can't see the files and the elements of the game including art and story. We have no means to revive the game so that it can be played not just now, but decades from now.' (quoted in Kocurek 2019). Similarly, as Judd Ruggill, co-director of the Learning Games Initiative Research Archive, suggests, 'We're trying to imagine how to save games in the past, […] but going forward, when there's no material object, it's [going to be] really tough.' (quoted in Kocurek 2019).

I share much sympathy with those concerned with the future of gaming's past. Yet such concerns reveal a number of underlying assumptions about what videogames are and how best to preserve them.

First, it reduces our understanding of videogames to nothing more than the datasets and technological apparatus required to play them. If this is true, then no wonder the prospect of losing access to their code is so worrying. As Borman laments, without code, there is no game. It is also quite understandable how envisioning a preservation strategy *without* a physical artefact to preserve is such an inconceivable task, as Ruggill makes clear. Yet second, and critically, if *playing* videogames is so integral to our experiences of them, then saving videogames must surely mean ensuring they remain *playable,* as without being able to play a videogame, what has even been preserved?

In what follows, I tackle these assumptions head-on. Being able to play past videogames should not be the end or only goal of videogame preservation. Extant approaches to videogame preservation tend to elide the ways videogames are actually being played. DeSpiria's concerns emerge from the loss of physical inscriptions—the scratches, scuffs, marks and bumps on cabinets and controllers alike. My concerns emerge from the potential of *not* being able to access their virtual equivalent. That is, from not being able to attend to the *digital* traces of play that emerge as a concomitant part of the play practices videogames engender.

Object-Centred Culture

Traditional memory institutions, such as galleries, libraries, archives and museums, exist as 'part of an object-centred culture.' (Swade 2002, 227). Built to resist the effects of change, traditional preservation strategies take for granted that an object's physical and material properties are fixed and self-evident. Traditional institutions find the impermanent characteristics of digital information troubling. As Kenneth Thibodeau (2012, 15) notes, software shape shifts and is polymorphic, thus creating 'an inherent tension between digital information, which does not stay still, and digital preservation, which quintessentially seeks to keep things in place, without significant change.'

The polymorphic, shapeshifting nature of software is critical to its operation. Videogames are often designed to capitalise on the plasticity of their codebase. The release of id software's *DOOM* in 1993, for example, ushered in a new cultural economy of game modding (Lowood 2004). Distributed via shareware with a built-in level editor, *DOOM* encouraged players to be inspired by playing through the authored content to want to create and distribute their own (Lowood 2006). Modding practices are only possible because code is, at least to some degree, always modular, malleable and extensile.

As already discussed, if the goal of software preservation is to maintain *working* versions of software applications, then running software requires a compatible hardware and operating environment to run within. As Doron Swade (2002) observes:

> The requirement for *functional intactness* of software not only entails the maintenance of bit-perfect records but also implies the provision at some time of operational contemporary hardware or a *functional equivalent*. Neither the provision of contemporary hardware or a functional equivalent is trivial.
>
> *(Swade 2002, 232; emphasis added)*

Both Swade and Thibodeau see software emulation as a promising preservation solution. Software emulation refers to software that has been created to provide an equivalent shell or operating environment within which the original software application can be made to run. As its name suggests, this shell is software-based, designed to execute coded instructions according to the same operating parameters as the original hardware. Hence, software emulation enables programs to run even when the original hardware ceases to remain operational.

Using software emulation as a preservation strategy is not a trivial matter. It places new demands on memory institutions to retain long-term access to software as well as maintain their requisite emulated environments. As contemporary computer systems are upgraded, so too may emulators require updating. Maintaining software preservation practices requires highly technical specialist knowledge and considerable ongoing investment to ensure they remain operational.

This issue is further compounded when facing the challenge of preserving videogames. For what does it mean for a videogame to remain *functionally intact*? If, as retrogaming enthusiast Alex Boz mentioned earlier, the "look and feel" of a game is so

important to our experiences of it, then how do we reconcile the fact that games played under software emulation are unable to reproduce the same "look and feel" as its original?

Rather than see these experiential discrepancies as a problem to overcome, however, my suggestion would be to consider them an expected and conditional outcome of using software emulation (see also Hedstrom et al 2006). Not only because of the significant contextual differences between, for example, playing on an arcade machine in a crowded room to playing at home alone on a laptop computer, but because *how* a game performs under emulation is contingent on a myriad of other technical factors which include the host computer's ability to run the emulator effectively and the accuracy of the emulator itself, for instance (Newman 2012b, 138). Moreover, simply increasing an emulator's accuracy (meaning the emulator's ability to output the same computational results as its equivalent hardware) may resolve some of these issues but may also cause other, less desirable side effects to occur. Increasing an emulator's accuracy at the cost of increasing processing power may reduce visual artefacting (e.g. graphical glitches) yet may also cause input lag (Emulation accuracy n.d.). Whilst not all games demand split-second timing, oftentimes these undesirable side effects can and do have a detrimental effect on the overall player's experience.[9]

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9. Not all emulators are designed with accuracy in mind, however, as increasing accuracy may produce less authentic player experiences. For an overview of the accuracy versus authenticity debate, see "Emulation accuracy" (n.d.). For a comprehensive list of the range of emulators available for different consoles and platforms, see https:// emulation.gametechwiki.com/.

Moreover, pinpointing which version of a game constitutes its "original" is not always a straightforward task. According to James Newman (2012b), videogames are *unstable* objects. Using the 16-bit release of *Sonic the Hedgehog* as his example, Newman demonstrates how, at the level of their code, multiple versions of *Sonic* exist 'depending on the time of purchase, platform, the territory, [and] the number of updates and patches applied' (2012b, 140). *Sonic* is unstable because even in its "original" 16-bit incarnation, each version alters the very 'fabric of the game' (2012b, 136), causing each to perform differently during runtime. This multiplicity further compounds emulation issues. Any attempt to reproduce the "look and feel" of *Sonic* would depend upon which version of *Sonic* is being emulated, as each would produce experientially different results.

Despite these concerns, however, my overall point is *not* to suggest software emulation is inadequate when it comes to maintaining the 'functional intactness' of software. In fact, emulators are extremely well suited to providing long-term access to playable versions of videogames, especially when recourse to their "original" hardware is no longer achievable.[10] Moreover, as exemplary epistemological tools, software emulators hold an even greater historical and educational purpose. By substituting one component for another, emulators allow us to intervene in and interrogate videogames at the level of their code, which can not only help generate knowledge about how these systems work but also remind us of how ordinarily obfuscated the internal workings of computational media are in our everyday use situations. (The significance of using emulators to crack open the black box of computational media is a critical point I return to in chapter two and expand upon within my first and second video presentations.)

10. Which is to acknowledge that playing a game through emulation is not the same as playing the game in a different context.

I do not wish to diminish the relevance of using software emulation as a means to maintain functioning software. This is its purpose. Rather, my intent here is to call into question whether maintaining 'functional intactness' should be the *only* goal of videogame preservation. Being able to play a videogame in the future is not a trivial accomplishment nor an insignificant or unworthy task. Yet, it is a mistake to conflate our being able to continue to play a videogame as evidence of how the "same" game was played in the past. Each playing exists within its own sociohistorical context. Moreover, as maintaining working versions of software is such a resource-hungry, technically demanding and time-consuming task, I fear expending all of our preservation energy on software preservation alone risks missing out on preserving evidence of *how* videogames are being played in our present.

Thankfully, I am not alone in expressing these concerns.

One redress expressed by Henry Lowood (2004) encourages preservationists to step beyond software preservation. To expand their archival horizons to include material evidence of how videogames are actually being experienced by players (and designers alike) in their archives. Critical to Lowood's proposition is an understanding that videogames comprise of both artefact and activity:

> Games exist somewhere between the text and the experience, confounding
> preservation strategies that rely on notions of content fixity taken from other media.
> Hardware and software objects alone cannot document the medium of the computer
> game. What is saved by preserving consoles, hardware, and software alone, without
> recording game play?
>
> *(Lowood 2004, 8)*

Lowood urges archivists to capture in their archival practices evidence of how games are being designed—e.g. build ancillary archives that include design documents, source code, art

assets, marketing materials, etc.—as well as how videogames are actually being played in the form of a 'game performance archive' (2004, 15). The critical word here is performance. As I go on to stress, performance archives provide critical contextual information. Information which cannot be deduced from reenactment alone. Lowood is, therefore, right to question what is saved without saving evidence of gameplay.

To support Lowood's argument, many key game scholars approach studying videogames as the act of studying videogames *in and at play*. Drawing from sociological and anthropological methods, united in their insistence that gameplay is an irreducible concept, these scholars maintain that videogames must be studied as materially situated practices and lived experiences.

For example, Giddings and Kennedy (2008, 15) put forward a case for studying '[…] the "event" of gameplay, the synchronic moment of specific players and game in a particular time and space.' Thomas Malaby (2007, 104) adopts a 'processual approach' that 'recognizes as a first principle that games are, like many social processes, dynamic and recursive, largely reproducing their form through time but always containing the possibility of emergent change.' Each enactment or instantiation of the game is 'always brought about by a set of cultural processes' (Dovey and Kennedy 2006, loc 1049). For Markku Eskelinen (2001), playing videogames is a configurative act where our actions are *coconstitutive* of how we experience them. This coming together of the player and the game is what Constance Steinkuehler (2006) refers to as the 'mangle of play'; for Brendan Keogh (2014), where bodies and worlds collide. Revisiting Eskelinen's (2001) configurative practice, Stuart Moulthrop's (2004) approach engages with 'not just immediate game elements, but also the game's social and material conditions […] and by extension, the conditions of other rule-systems such as work and citizenship'. To study videogames, then, is to study videogames in

context. That is, to recognise how videogame play is contextual, shaped by the social, temporal and material *specificities* of the game being played in context. Many of these points I will ruminate on further in my second chapter.

With regard to proposed preservation methods, James Newman (2012a) makes this point explicit. As indicated above, it is exactly because *play* is so essential to how we experience videogames that preserving a technology without reference to *how it is played* appears negligent, missing the point entirely. While emulation practices may allow us to play (a version of) videogames in the future, they do little to account for the multiple meanings, values, and contexts within which *playing* actually took place. As such, Newman's proposition appears most salient:

> If we consider that game and play are so intertwined and mutually dependent as to be essentially indivisible […] I want to suggest a preservation strategy focused on documenting games *in* and *at* play […as] a shift from game preservation to game*play* preservation.

(Newman 2012a, 38; original emphasis)

Preservation practices that draw a ring around the technological artefacts appear insufficient, unable to account for the multivalent ways in which videogames are played and experienced through, and by virtue of, our interactions with them. To shift towards game*play* preservation, then, is to shift towards not only capturing what is materially present during each encounter (e.g. hardware, operating system, software, controllers, screens, players, audiences, etc.) but also what becomes materially evident as a result of a game being played. That is, to attend to the various material traces players produce as a result of playing videogames alongside the various meanings, values and identities evident in the discourses that also emerge alongside

them. As this thesis demonstrates, these are the material traces of play that are our videogames worth saving.

The issues of preservation raised so far become even more pronounced when cast within a contemporary videogame development landscape. Videogames are far less likely to be released as a shelved boxed product. With the normalisation of digital distribution models and high(er) internet speeds came a new era of game development where videogames being updated post their initial release is no longer the exception; it simply happens all the time. Moreover, many developers have sought to capitalise on *not* releasing videogames by distributing a game as a sequence of "soft" releases enabling them to respond and adapt to perceived player feedback.

Both large and small-scale studios have benefitted from adopting more open development practices. Following the success of the subscription-based model popularised by Blizzard Entertainment's *World of Warcraft*, large, open-world survival games such as Studio Wildcard's *Ark: Survival Evolved* and Bohemia Interactive's *DayZ* are two surviving examples. Australian-based studio Auran effectively cocreated *Trainz* in collaboration with its players (Banks 2013). Games made by smaller studios, such as Vlambeer's *Nuclear Throne*, League of Geeks' *Armello* and Spiderling Studios' *Besiege*, also benefitted from cultivating a small but invested community of players throughout their open(-ended) development cycles.

The normalisation of digital distribution has prompted many developers to explore alternative business models. Many games essentially hit the marketplace "fully formed" only to be transformed through continual and ongoing "live" development. Spurred partly by the normalisation of in-game purchases as a source of constant income (Plunkett 2020b) despite how unethical some of these practices have become (see Neely 2019). Blizzard's *Overwatch*, released as a paid-for product in 2015, was designed from the ground up to include in-game

purchases in the form of loot boxes, enabling the developers to release new cosmetic items, characters and modes of play oftentimes to coincide with real-world events such as public holidays. Free-to-play, online multiplayer games such as Respawn Entertainment's *Apex Legends*, Psyonix's *Rocket League* and Epic Games' *Fortnite Battle Royale* all generate revenue by offering new content via microtransactions or through season passes (or both).

All in all, broader shifts in digital consumer practices have seen videogames increasingly being developed as a service, most notably within the mobile games sector (Macgregor 2019). Even then, single-player, story-driven games such as Rockstar's *Grand Theft Auto V,* initially released in 2013 on Playstation 3 and Xbox 360, continue to "live on" as an amalgam of *GTAV* and its online variant *GTA Online,* which was also developed initially as a standalone product (Weaver 2013). Since then, repackaged, remastered and rereleased on Playstation 4, Xbox One and Windows PC, *GTAV* is now scheduled for a further rerelease on Playstation 5 and Xbox Series X/S in 2021, having outlasted a whole console generation (Plunkett 2020a).

Unfinished Objects

Whilst indicative of broader trends within the games industry, I want to further problematise

the assumption that videogames are ever released as "finished" products at all. Videogames

are knowingly shipped incomplete as industrial practices collude to ensure videogames are

kept in a state of 'permanent beta' (Neff and Stark 2004, 175). Taking up a nonessentialist

view of material objects, I then move to reconsider the stability of videogames from a more

philosophical perspective. This chapter concludes by proposing how preserving videogames

cannot be achieved without including records of videogame play and the contexts within

which playing occurs.

First, as mentioned above, videogames always ship unfinished and incomplete.

Videogame development, like other forms of software development, usually includes some

form of user testing or quality assurance (QA). This includes rigorous playtesting, where

testers repeatedly play through the entire or specific sections of a game to identify errors

during gameplay. Any bugs or anomalies are documented and ranked according to severity

(Bates 2004, 178-9). As you can imagine, this is a very repetitive and time-consuming task.

Consequent fixes must also be tested, as any changes to the code may produce unexpected

behaviour elsewhere. Assessing each bug in terms of its game-breaking potential means that whilst not all bugs will be discovered, budget and time constraints mean not all bugs will be fixed (Maiberg 2016).

From the consumers' perspective, this practice may sound troubling. Players should be able to expect a game to be released in a playable state (e.g. Hamilton 2013). Yet the reality is that given the quick turnaround, size and complexity of modern videogames and their codependence on live services working as intended (e.g. Hamilton 2013), most will ship with known issues, referred to in the trade as 'known shippable[s]' (Ronie 2015), or else labelled '"wnf" (meaning "will not fix")' (Maiberg 2016). According to Rod Fergusson, head of game development studio The Coalition, '"[a]t the end of the day, the reality of software development is you never *finish* a game. You abandon it"' (quoted in Maiberg 2016; emphasis added).

Second, to further complicate matters, the mainstream US-Japanese-centric videogame industry has a long history of purposely effacing its own development practices. As Nintendo entered the post-crash US videogame market in 1985, a number of regulatory systems were introduced that came to define the future of mainstream console videogame development practices (O'Donnell 2014). With the release of the Nintendo Entertainment System (NES), America's version of the highly commercially successful Japanese Famicom, came a number of modifications to the system, including the '10NES chip' (O'Donnell 2014, 195) installed to protect against the use of foreign imported or illegally obtained game cartridges. This patented hardware lock and key technology also ensured third-party developers would need to obtain a licensing agreement from Nintendo in order to release games onto the system, which also legally prevented them from disclosing their work to others (O' Donnell 2014, 200-5).

According to Casey O'Donnell (2014, 206), non-disclosure agreements or NDAs became emblematic of the videogame industry's 'foundational memory-loss system', where highly specialised skills go undocumented and unarticulated. Workers internalising non-disclosure gave rise to a prevailing culture of secrecy that allowed poor labour practices and quality of life issues to persist. This led to high employee turnover, with over one-third of workers expecting to leave the industry within five years and over half within ten (IGDA 2014).

Knowledge retention issues are further compounded by videogame development's 'general lack of formality' (O'Donnell 2014, 39). This is a double-edged sword. The haphazard nature of videogame development creates space for experimentation, allowing individuals to work concurrently and independently of each other. Yet unmethodological processes built to respond to unknowables require constant retooling reliant on makeshift fixes and workarounds (O'Donnell 2014, 137-40). Videogame development pipelines and workflows grow organically as they mutate out of necessity. As protean systems, where tools are obscured and pipelines evolve, the unsystematic nature of videogame development ensures development practices have no past. With no records of the skills acquired being retained, the '(in)ability for game developers to learn and share information about game production practices severely limits the capacity for the industry to mature.' (O'Donnell 2014, 210).

The incomplete release(s) of videogames and the institutionalised memory loss associated with their development practices already provide a compelling case for describing videogames as unfinished. Yet there is another way I wish to conceive of *unfinishedness,* which has less to do with videogames *per se* and more with how we make sense of the material properties of objects. To do so, I return to Raiford Guins' (2014) book-length study

on the *afterlife* of videogames in which he proposes a nonhierarchical framework to study videogames within their various "life" situations. Taking up a similar theoretical position to that shared by Lowood and Newman, Guins contends that videogames do not contain fixed, innate properties that carry the same meanings across different use contexts. Rather, it is during each use context or gameplay event that the conditions under which properties can emerge, which, in turn, take on different meanings and significance depending upon the particulars of each use context. It is through Guins that I find my final defence for adopting the term *unfinished,* as it is the 'total trajectory' (Appadurai 1986) of an object (which includes its possible future uses) that I hope to convey by doing so.

Guins puts forward a theoretical approach that finds it difficult to describe videogames as fixed, knowable objects. Drawing upon Don Ihde's (1990) concept of 'multistability', Guins describes how objects can signify multiple things all at once when he writes:

> Ihde […] demonstrates the need to think less in terms of the "thing-in-itself," something with fixed hermeneutic, intrinsic properties, confident ontological value, and predetermined uses over time, than of "things in contexts, and contexts are multiple." Objects are not stable but "multistable," Ihde maintains. […] Properties of any object are not deemed irrelevant when examining a specific "use context." Context provides access or helps to generate an understanding of those very properties. […T]his is the business of the afterlife framework, it aims to understand any prominent use as always contingent upon temporal and contextual biases.
>
> *(Guins 2014, 12)*

Here, Guins urges us to pay attention to the temporal, contextual and material *specificities* of our encounters with objects and how each provides us access to the properties that emerge as

a result of our encounters with them. Objects are multistable because each use can produce varying results. For Guins (2014, 13), '[…] is a *Space Invaders* coin-op arcade cabinet positioned behind glass in a museum the "same thing" as one that accepts quarters at the Casino Arcade on the Santa Cruz Beach Boardwalk? No, it is not.'

Guins' afterlife framework invites us to move away from examining videogames as a 'thing-in-itself' and instead to place the observer's actions inside the system of knowledge production. That is, to recognise the role our actions and proclivities play in how we are able to make sense of the material properties that emerge due to our encounters with videogames. (A point that strongly resonates with the methods proposed by the aforementioned game scholars.) Rather than attempt to study videogames in the abstract or somehow ahistorically, Guins rightly 'emphasize[s] the importance of recognizing shifting situations, along with the multiple shifts in meaning that occur as a result' (2014, 13). To further his argument, Guins borrows from Arjun Appadurai's (1986) 'social life of things' model to contend that:

> In place of viewing the identity, meaning, and uses of any object as fixed and static, […t]heir histories, or what Arjun Appadurai regards as a thing's "total trajectory," are a composite of phases or situations—shifts in context—that determine a thing's value, function, and possible meanings. Appadurai's social life model is nonessentialist, designed to dissolve positivist conceptualizations of the commodity as "being a certain kind of thing" so that instead of resting an analysis on whether a commodity is "one kind of thing rather than another" we direct such questions to a specific phase or situation in the life history of a thing. In other words, no single situation exhausts the total trajectory or biography of a particular thing and questions of values—economic or otherwise—are context dependent.

(Guins 2014, 9)

Important here is to recognise how an object's 'total trajectory' is non-exhaustive, extending far beyond its commercial lifespan or, as Appadurai (1986, 13) prefers, 'commodity situation'. Object histories are multiple, composed of various situations that include their conceptual, design and development phases as well as their continued existence long after they have fallen out of commercial or everyday use (Guins 2014, 10). Although far from totalising, an object's total life trajectory far exceeds that of any arbitrarily imposed commercial lifespan or setting. It is the *afterlife* of videogames that, for Guins (2014, 12), forms 'the basis upon which video game history is written.'

Guins' afterlife framework reminds us of the importance of studying objects—including videogames—*in situ.* That is, not as things in themselves but as things composed of materially situated practices 'that determine a thing's value, function, and possible meanings.' (Guins 2014, 9).

Guins' afterlife framework reminds us that for gameplay to exist, it requires both the player and the game. Videogames are *unfinished* because, as systems, they rely upon our interactions in order for us to make sense of them. To study videogames is to study videogames in and at play—to recognise how the social, temporal and material *specificities* of each event contribute to its meanings and the potential they hold for other meanings to occur in different use contexts.

It is Guins' afterlife framework that draws attention to how each videogame encounter is an *intervention* in the total life trajectory of a videogame.[11] That is, a videogame is not a

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11. I borrow this idea of an intervention from Matthew Kirschenbaum's (2008) discussion on data inscriptions, which is a point I shall pick up on again in my first video presentation.

product of any singular event which is always partial and incomplete. Rather, its total life trajectory is a composite of all possible interventions where questions of meanings and values are always context-dependent.

Chapter Summary

As noted at the beginning of this chapter, historians are indebted to the sustained efforts of those who preceded them in their attempts to gather, preserve, and maintain traces of play. Without such efforts, writing videogame history would not be possible.

I consider my study to be one such preservation effort—to provide a demonstrative case study for approaching videogame preservation through recourse to the material traces of play produced by its players.

This chapter developed over three sections. In the first section, I challenged the dominant assumption that videogame preservation solely involves maintaining playable versions of videogames. I argued for acknowledging the limitations of this approach and for exploring alternative strategies that prioritise the act of playing and the diverse ways players interact with videogames. I advocated for a shift in videogames preservation from a focus on playable objects to a broader understanding of games as lived experiences. This includes capturing not just the code and hardware but also the traces of play left behind by players, ultimately providing a more nuanced and multifaceted account of videogames and their cultural impact and significance.

In the second section, I outlined the challenges of preserving "functionally intact" videogames. I argued that software preservation alone is insufficient to capture the full experience of videogames. Following suggestions put forward by Lowood (2004) and Newman (2012), I proposed an approach that focuses on documenting the social, cultural,

and material *contexts* surrounding videogame play. This shift is necessary to preserve the rich and dynamic history of videogames as they are actually played and experienced by players.

The third section furthered my argument, challenging the notion that videogames are ever "finished" products and that industry practices lead to knowledge loss, further hindering preservation efforts. Suggesting that videogames are inherently *unfinished*, I draw upon Guins' (2014) afterlife framework to move us beyond static object analysis to instead consider the dynamic relationships between objects and their contexts.

To approach videogames as *unfinished* objects recognises how each trace of play(er activity) is always a product of someone else's life situation. That is, a product of both the player and the game (system) working in tandem, ruling out the possibility for videogame preservationists to limit their preservation activity to solely preserving technological artefacts. Approaching videogames as unfinished objects recognises how documents of play are contingently shaped by the contexts within which they are created. Whilst significant in their own right, recordings of gameplay footage—the outputted audiovisual signal performed by the player/game, if you will—again appear insufficient, unable to account for the *contexts* in which playing occurs.

Therefore, it is also necessary to attend to the interconnected network of discourses and practices that shape a game's meaning and trajectory over time, including the *contexts* under which each record is created. Recognising videogame play as a product of culture means being cognisant of how social and cultural forces shape the records—and recordings— being produced. Captured gameplay footage is always a product of someone else's activity. To take the preservation of videogame play seriously, then, is to attend to the various *life situations* surrounding each performance or gameplay event. To ascertain *how* such records came to be—who captured, performed and recorded them for which audiences serving what

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purpose, etc.—is to move towards the preservation of digital play practices. An undertaking that necessitates a 'thick description' (Geertz 1973) of playing *in context*. Without retaining such evidence, what really are we even saving?

As my study will go on to demonstrate, not all forms of play (or players) are being equally documented, nor is each recording considered worth saving. Whilst such distinctions can always be drawn between 'lived' and 'documented' culture (Williams 1998), it is imperative that any effort to preserve practices begins to ask *why* certain content remains whilst others do not. As I go on to problematise in my next chapter, whilst there is certainly much to celebrate about the insight expert players provide and especially how their activities dig beneath the surface of computational media, limiting attention to only the most prominent actors risks producing a distorted image of what play for many actually looks like. To document videogame play in its broadest sense, then, requires more than just documenting the most recurrent inscriptions surfacing within chat rooms, across forums, and on video-on-demand platforms (which is a point I shall return to explore in my last video presentation highlighting some of the difficulties faced when attempting to do so.)

Before that, the purpose of my second chapter is to rationalise why I chose SMM as my case study and exemplar. As mentioned earlier, the inherent complexities of videogames are most evident in games like SMM, built to capitalise on the affordances of videogame technologies and networked infrastructures to provide players with a means to manufacture and distribute their own in-game content. Moving from the particulars of preserving videogames to a broader engagement with digital and videogame culture more generally, the following chapter engages with a number of topics, each serving the dual purpose of further cementing why I chose SMM as my exemplar while at the same time further advancing my theoretical principles and methodological concerns.

Chapter Two

Why Super Mario Maker?

The purpose of this chapter is two-fold: to provide a rationale for choosing *Super Mario Maker* (SMM) as my case study and to further advance my theoretical foundations and methodological concerns. My argument evolves over five sections.

The first section, *Thirty Years in the Making of*, begins with an introduction to the historical development and cultural significance of Mario games. It challenges traditional historiographies that focus solely on mainstream commercial aspects, calling for a more nuanced understanding. The role of players as cocreators in the Mario franchise is emphasised. My choice of SMM as a case study is introduced, focusing on its release coinciding with the 30th anniversary of the Super Mario franchise and the rise of livestreaming practices.

In *Web 2.0, Participatory Culture, and Produsage*, this section explores the concept of participatory culture and produsage within the context of SMM. Drawing on the ideas of Henry Jenkins and Alex Bruns, the discussion highlights the continuum between production and consumption in user-led content creation contexts. The focus is on how players, even

those not actively creating content, contribute significantly to the overall gaming experience through their participation.

Modding, Cocreation, and Kinaesthesia delves into modding practices in videogames, emphasising the collaborative nature of game development involving both players and developers. The term "cocreation" is introduced to highlight how players and developers share responsibility for the emerging game. The discussion extends to kinaesthetic pleasure, exploring how players learn to move within videogame spaces and experience pleasure from depictions of movement. The section reiterates the importance of considering the embodied dimensions of play in preservation strategies.

In *Livestreaming, Esports and Sports Death*, the notion of SMM as a sport is discussed, drawing parallels between professional videogame play and traditional sports. SMM's Clear Rate system and difficulty categorisation are examined, illustrating the game's evolution to accommodate player-generated challenges. Sherry Turkle's concept of "sports death" and Casey O'Donnell's idea of "instrumental work/play" are introduced, emphasising the shared desire among game developers and high-performance players to explore and optimise systems. The section concludes by hinting at the exploration of digital media analysis through understanding media via internal systems.

The final section, *Materiality, Platform (An)archaeology and Media Speleology*, begins by highlighting the material turn within game studies. Platform studies, in particular, focuses on the materiality and affordances of gaming platforms, examining the relationship between the computer and cultural layers. Apperley and Parikka's concept of "Platform (An)archaeology" critiques the historical stability of platforms in platform studies, proposing a more inclusive approach that incorporates player-produced content. Nooney's "Media Speleology" offers an alternative media archaeological method that reemphasises the

researcher's subjective role, navigating through fragmented evidence. Both approaches align

with my own methodological stance, emphasising the exploration of player-produced content

and recognising the subjective and incomplete nature of my investigation.

Thirty Years in The Making of

It is hard to overstate the ubiquity of Mario. As the mascot for Nintendo Co., Ltd., one of the world's longest-running manufacturers and developers of videogames and electronic gaming equipment, Mario is undoubtedly one of gaming's most prominent and globally recognisable figures—the Mickey Mouse of videogames. Whether drawn in pixels or polygons, his moustachioed, overall-clad cap-wearing appearance is a familiar sight to many players, both young and old. Throughout his 30-year-long career as a star and performer, Mario has featured centrally in many of gaming's most memorable videogame series, franchises and spin-offs. Mario is iconic: emblematic of videogames themselves.

Here, I do not wish to recite familiar tales of Nintendo's meteoric rise and subsequent influence shaping the "global" games industry (e.g. Sheff 1993; Kline et al 2003; Ryan 2011). These tales have already been written and will undoubtedly continue to echo around the internet. Yet, as Therrien and Picard (2014) observe, this "first wave" of historiographies can be characterised as overly celebrant and limited in scope, accounting for only the mainstream commercial (often US-Japan-centric) console-driven industrial end of videogame production. A pervasive 'techno-industrial celebration' (Therrien and Picard 2014) that risks reducing

history to nothing more than a chronological mapping of key technological markers tied to commercial success (see also Huhtamo 2005).

Subsequent calls for broader representation and, hence, more nuanced and localised histories can, in part, be attributed to being a reaction to the homogeneity of former "global" accounts (Wade and Webber 2016). Whilst arguably Tristian Donovan's (2010) account remains the outlier, providing a wide-ranging plurality of voices, Donovan's reliance on industry personnel is unlikely to have produced the most disinterested accounts. Therrien (2015), for example, critiques how Donovan and the other "first wave" historians are largely restricted to volunteerism and the availability of industry personnel willing to go on record. Whilst each contribution should not go discredited nor undervalued—for example, Hermann (1994), Kent (2001), and Donovan (2010) each draw extensively on interviewees whose stories would otherwise remain untold—it is worth noting how overly 'generous with words' (Therrien 2015) key personnel can be having a vested interest in how history will remember them.

Similarly, Dominic Arsenault (2017) is critical of extant accounts of Nintendo. What Arsenault calls a 'celebratory insider view' (2017, 10) is never going to provide an unbiased or neutral account. Nintendo's 'walled garden' approach to game development ensures only certain information would, permeate beyond its tightly controlled walls.

While popular accounts of Nintendo would credit Shigeru Miyamoto as the author, creator, and "inventor" of Super Mario, to give sole credit to Miyamoto is to miss a very important aspect true of all videogames. Not only are a number of personnel responsible for making a game during its development (many of whom often go uncredited; see Deuze et al 2007), but videogames are *cocreated* by both developers and players alike. For Sue Morris (2003), videogames are 'co-creative media'.

Issues surrounding cocreativity animate the remainder of this chapter, which, in turn, necessitates both a broader engagement with concerns pertaining to digital culture more generally as well as videogames in particular. Each topic aids me in my attempt to respond to the question of why I chose SMM as my exemplar and case study. Each discussion further advances my theoretical foundations and methodological concerns.

For now, what initially piqued my interest in choosing SMM can be inferred from something Reggie Fils-Aimé, former president and chief operating officer for Nintendo of America (NOA), alludes to during his closing address at E3 in 2015:

> Over the past 30 years, more than a billion people around the world have played a Nintendo game and most of them have played as gaming's biggest star, Mario. From the music, to the costumes, to the characters, Super Mario isn't just Nintendo's mascot, there's a little piece of him—and certainly memories of his adventures— inside all of us.

Reggie Fils-Aimé (Nintendo 2015a)

If indeed there is a little bit of Mario inside us all, then it is we, the Mario players, who actively participate in and are just as responsible for cultivating our understanding and appreciation of Mario as Nintendo. That is, contrary to what Nintendo's legal division may claim, Mario does not belong to nor is solely the property of Nintendo. Mario is not unique in this regard, as, arguably, the same applies to all media franchises. Yet our appreciation of the Super Mario franchise is as much a product of Nintendo's activities as it is a product of its fans'.

What is particularly interesting about SMM is that, from Nintendo's perspective, SMM was released to commemorate the 30th anniversary of Nintendo's Super Mario franchise, which also happens to coincide with the maturation and normalisation of

livestreaming practices—performers streaming live footage of themselves playing videogames and other activities online—and the growth and popularity of livestreaming platforms such as Twitch.tv. Important here is to recognise how both contexts project assertions about what SMM is and how it should be played. As we shall see, the official line emanating from Nintendo does not always align with the other, arguably more dominant, voices emanating from its most active and visible players performing SMM play online.

Nintendo's framing of SMM maintains that with its release, we, the general public, get to make our own Mario levels using Mario-making tools for the first time. Implicit here is that as players, we play in accordance with the rules and regulations set out in Nintendo's end-user licensing agreement and terms of service. Yet, these are not just contractual terms. Much of the necessary infrastructure required to play SMM is online and only accessible via Nintendo's proprietary service. The discrepancy between what SMM makes possible and what Nintendo deems admissible under their (loosely defined) terms led to much confusion and disheartenment amongst its players (a point I return to make more explicitly in my first video presentation).

Not only was this troubling for players, but also, critically, as all the levels players upload are stored on Nintendo-owned servers, means that it is highly unlikely public access to this content will outsurvive its commercial viability. The reality we are facing is not if, but *when* Nintendo deems SMM (or the Wii U console) no longer a viable commodity and discontinues its service meaning it is only a matter of time before all of these user-generated courses are likely to be removed from public circulation.

Nintendo's preview at E3 2015 presents SMM as a turning point and significant milestone in Super Mario's development. As Fils-Aimé goes on to explain: '[SMM] takes the next step in turning the essence of game creation over to you, our fans. Now players will

become creators as you build your own Mario levels that can be shared globally with friends.'

Recasting players as creators makes our implied role as (co)creators of Mario explicit. We, too, can now make Mario games. Yet asserting that SMM is the first time players get to create their own Mario levels belies the myriad of extant and unsolicited third-party tools already in popular use by fans and player history in the form of Mario ROM hacks. SMM's commercial success, even reviving sales of the Wii U console (McFerran 2015b), can partly be attributed to the momentum it gained from those transferring their vernacular knowledge and expertise gained from within ROM hacking communities. Many of the most visible SMM players were already household names, whereas others were able to capitalise on the extra exposure SMM provided, turning them into recognisable livestreaming microcelebrities in their own right.

Kaizo Mario

SMM provides players with the tools and platform for them to create their own custom levels. At its core, SMM operates much like Lego. Each building block is premade and modular allowing players to reorganise and remix common elements taken from four Super Mario titles: *Super Mario Bros.* (SMB) and *Super Mario Bros. 3* (SMB3) released for the NES/Famicom; *Super Mario World* (SMW) for the Super Nintendo/Famicom; and *New Super Mario Bros. U* (NSMBU) for the Wii U. Choosing which game to set your course within sets the overall "game style" with six different course themes to choose from: Ground, Underground, Underwater, Ghost House, Airship and Castle. This means players can mix and match content taken from across each course theme, e.g. place Goombas underwater, stack enemies into towers, turn cannons into item emitters, etc. Players are also able to change the behaviours of certain elements, e.g. enlarge enemies by giving them a Super Mushroom or grant them the ability to fly by giving them wings. Some elements are limited to each game

style. Yoshi, for example, only appears in the SMW and NSMBU styles and is replaced with

Goomba's Shoes in SMB and SMB3, respectively. Uniquely, within the SMB game style, a

Mystery Mushroom can be used to dress up Mario as characters taken from other Nintendo-

owned or adjacent franchises. Players are awarded additional Mario costumes by completing

100 Mario Challenges, scanning corresponding Amiibo figurines, or, once introduced, by

completing special Event Courses.

Players accustomed to prosaic Mario content may find this opportunity to remix

Mario as something new and unique. However, many player-created mods or modified

versions of Mario already exist in the form of ROM hacks. The ability for players to remix

Mario has long been a part and prominent feature of an arguably niche and highly technically

skilled ROM hacking scene.

Community-ran sites such as <u>romhacking.net</u>, along with more specialist sites such as

<u>SMWCentral.net</u> formed in 2006 (K.T.B. 20014), already host a myriad of player-created

Mario games and ROM hacking tools. As its name suggests, SMWCentral is the central

resource for all things relating to *Super Mario World* (SMW) ROM hacking. It hosts a

plethora of fanmade creations, including "vanilla" ROM hacks, which means the original

game's code remains unaltered, and "chocolate" ROM hacks, which refers to hacks that

include custom-made content such as changing sprites or item behaviours, for example. It

also provides a myriad of tools, applications and guides to help users hack, patch or otherwise

modify the original SMW game.

Amongst the most popular and fully featured tools available is FuSoYa's Lunar

Magic, first released in 2000 under a proprietary license and has since received multiple and

extensive updates ("Lunar Magic SMW Editor Introduction" n.d.). Designed specifically with

SMW ROM hacking in mind, it allows users not only to reconfigure existing data and create

new levels but also to add new content, including custom-made sprites, backgrounds, music, sound effects, and so on. In combination, Lunar Magic and SMWCentral provide a suite of Mario-making tools and a social hub for a community already highly attuned to reconfiguring Mario—a community of players and associated practices that predate the release of SMM by some 15 years.

One of the most prominent and influential ROM hack series to emerge is known simply as "Kaizo Mario World". Its popularity not only as a series of ROM hacks but, perhaps more importantly, as a series of video playthroughs, led to the term "Kaizo" becoming widely adopted within this scene. Taken from the full title of its videos entitled '自作の改造マリオ(スーパーマリオワールド)を友人にプレイさせる [Jisaku no Kaizō Mario (Super Mario World) o Yūjin ni Play Saseru]' which translates as 'Making my friend play through my Mario hack (Super Mario World)' (Take 2007), the word Kaizo has been adopted to refer to two things: the practice of ROM hacking itself (derived from the Japanese word Kaizō (改造) meaning to "reorganise", "restructure", or "reconstruct") and the subversive practice of game designing which deliberately sets out to frustrate and "abuse" their players (Wilson and Sicart 2010).

The significance of ROM hacking, Kaizo Mario and its associated abusive design practices I return to explore in great detail in my video presentations. At the beginning of my first video presentation, how pre-existing communities and practices shape the ways players engaged with SMM and influenced its development. In my third, how interrelationships between designers and players inform level design and the creative process. A reminder that in order to retain evidence of our past, we must retain evidence of the processes, practices *and* players involved in content creation, not just the end products.

Before then, it is important to recognise how sites such as SMWCentral provide a collaborative space to share resources, strategies, discoveries and technical expertise whilst imbricating players into larger circuits of knowledge production. To do so, situating SMM within broader digital contexts will prove instructive, beginning with participatory culture.

Web 2.0, Participatory Culture and Produsage

As already established, SMM is designed to encourage players to create, share and play courses created by other players. In this sense, SMM can be said to demonstrate what Henry Jenkins (2006) calls participatory culture. In short, participatory culture signals a shift in how media is produced and consumed, moving from mass media consumption to mass cultural production. That is, participatory culture explicitly recasts consumers as *active* participants in the production and circulation of media content.

Along the same lines, media scholar Alex Bruns (2008) coins the term *produsage*—a portmanteau of production and usage—to outline how theoretical models of industrial (mass) production fail to adequately account for the generative, continual and communal outputs circulated in 'user-led content creation' (2008, 1) contexts. A shift from an industrial to a post-industrial or information age of production (e.g. Kline et al 2003). Just as the traditional industrial model emerged from the prevailing material and intellectual conditions of the time, so too does produsage build directly upon the 'affordances of the technosocial framework of the networked environment' (Bruns 2008, 21). Despite Jenkins and Bruns mentioning

videogames within broader contexts—the media industries and the social web, respectively—Bruns' produsage framework provides three observations relevant to our discussion here.

First, rather than use an either/or dichotomy to separate production from consumption, produsage sees participation as an ongoing continuum where participants (produsers) move between active to more or less passive modes of engagement (Bruns 2008, 18). Important here is to recognise that within a networked information economy, passive modes of consumption are no longer possible (2008, 23). Even relatively prosaic acts of browsing the web, for example, generate data which can be subsequently used to affect our own and other users' experiences. Targeted advertising is perhaps the most prevalent, if not pervasive, example in this case.

Within the SMM complex, this also holds true. Connecting to Nintendo's propriety network service and agreeing to Nintendo's Network Agreement and Privacy Policy[12], even players with little interest in creating and sharing their own levels by virtue of simply playing the game online were, in fact, still produsing. Online player activity is tracked, monitored and displayed as aggregate datasets. Whilst mostly innocuous, data accumulated by the system could determine where or if a level would feature in Course World, the in-game level browser, affecting how others would see it. Even when *not* actively creating content, then, player activity contributed significantly to the play experiences of others.

Second, what produsage also makes clear is that in user-led content creation contexts, outputs are not "products" in the conventional sense of the word but rather better conceived

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12. These agreements are not universal but rather specific to each region. For example, in Australia, these legal documents are called NINTENDO NETWORK AGREEMENT and NINTENDO NETWORK PRIVATE POLICY (Nintendo Australia 2014).

of as cultural artefacts. Bruns (2008, 21-2) draws upon artist Brian Eno's description of cultural products, which retains relevance here:

> Think of cultural products, or art works, or the people who use them even, as being unfinished. *Permanently unfinished*. We come from a cultural heritage that says things have a "nature," and that this nature is fixed and describable. We find more and more that this idea is insupportable - the "nature" of something is not by any means singular, and depends on where and when you find it, and what you want it for. *The functional identity of things is a product of our interaction with them*. And our own identities are products of our interaction with everything else.
>
> *(Brian Eno quoted in Kelly 1995; emphasis added)*

Eno's description of cultural products and their 'functional identity' neatly aligns with the nonessentialist concepts I described earlier—that is, how an object's properties are a product of our interactions with them. For Bruns, it is the *process* of produsage—understood as probabilistic, heterarchical, incremental and communal (2008, 19-20)—that renders a product as only ever temporary: a snapshot of an otherwise ongoing and perpetual process. For Bruns, whether informational products such as software are packaged and sold as physical objects '[…] has more to do with the legacy of information distribution models from the industrial, pre-network age than it has with the inherent qualities of those "products".' (2008, 28). Here, again, it appears approaching videogames as *unfinished* objects seems appropriate. As Bruns describes:

> […] the 'products' of [produsage] are inherently incomplete, always evolving, modular, networked, and never finished. Their process of 'production' is a process of perpetual, ceaseless, continuous update, extension, and revision which operates not according to a predetermined blueprint or design, but is driven by the vagaries of

user-producer interest in and enthusiasm for fixing specific problems or extending

particular aspects of the project. Its outcomes are artefacts, not products.

(Bruns 2008, 22-3)

Bruns' cultural artefacts align with Jenkins' (1992, 279) earlier description of fan texts, which

'[…] like many folk texts, often do not achieve a standard version but exist only in process,

always open to revision and reappropriation; […] constantly being rewritten, parodied, and

amended in order to better facilitate the cultural interests of the fan community.' Rather than

attempting to study SMM as a singular entity, Jenkins and Bruns provide a compelling

theoretical framework for analysing SMM as a participatory cultural phenomenon that

recognises the role of players as active agents in shaping the game and its content.

Third, user-creation contexts necessitate a shift in how we understand and participate

in knowledge production. Bruns uses Wikipedia as his example of a 'new knowledge

space' (2008, 139). Rather than present a unified objective account of knowledge as truth,

Wikis provide space for simultaneous multivalent representations of knowledge to coexist,

remain subjective, and always open to future possibilities whilst, at the same time, denying

any definitive unyielding position to take up residence.

As with other popular videogame titles and franchises, many SMM community-run

knowledge spaces were created. For English-language speakers, amongst the most prominent

was r/MarioMaker, a subreddit channel dedicated to SMM content sharing and discussion.

For many, it became an important central hub and meeting ground. In true produserage

fashion, users organised daily events and level exchanges, facilitated lengthy discussion

topics, and held weekly level design competitions, all while gathering together resources

aligned with community-driven values. Given the limited search functionality and filtering

system built into SMM itself, Patricia Hernandez (2015) includes r/MarioMaker as one of the

best sources for discovering new and inspiring levels, helping to sort through the swathe of levels uploaded as a form of community curational practice.[13]

More generally, the long-established community-run Mario-related wiki Super Mario Wiki (mariowiki.com) provides a detailed account of its features, versions and iterations as SMM continues to be updated over a two-year period post its initial release. As already established, the release of SMM marked a significant point of convergence between corporate and community-created content. Therefore, ROM hacking website SMW Central (smwcentral.net) still remains a popular yet relatively niche site for discussing all things "Mario making" related, drawing upon its extensive back catalogue of concepts and practices pertaining to "best" level design principles and approaches.

As already noted, the prevailing development of expertise in highly technical pursuits such as ROM hacking and associated 'high-performance play' (Lowood 2006) practices prefigured how many chose to approach SMM. To this end, the most meticulously detailed knowledge space documenting SMM (and, consequentially, its sequel *Super Mario Maker 2*) is Kaizo Mario Maker Wiki (kaizomariomaker.fandom.com). Other SMM-related wikis exist, yet Kaizo Mario Maker serves expert players, documenting tricks, techniques and item behaviours in rich and emphatic detail. Numerous entries list some of the more obscure mechanics, glitches and item behaviours discovered by SMM players, often presented in highly meticulous and explicit detail alongside attempts to comprehend the underlying game system. Multi animated-gifs provide step-by-step instructions explaining how players can

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13. Another example is a megathread on the NeoGAF forum. Started by daydream (2015) in September 2015, it continued to receive posts for over two years, resulting in a discussion thread full of notable player-created levels and level design resources.

reproduce particular moves or tricks or how to recreate certain item behaviours. In this regard, Kaizo Mario Maker Wiki follows in the footsteps of other highly technically detailed accounts of player-produced expertise, such as those documented in the Game Resources section of TASVideos (TASvideos.org). A point I shall return to demonstrate in my second video presentation.

Special interest groups also formed to collectively deepen knowledge about specific aspects of SMM and to push the envelope of what is possible in SMM. For example, collectively listed on makerteams.net, *Team Shell* dedicated themselves to upping the ante by creating levels centred around the intricate use (if not abuse) of shell items; *Team Precision* and *Team 1F* to push players to perform pixel-perfect and frame-perfect inputs, respectively; *Team 0%* to clearing all yet-to-be-cleared levels (or else to report those that can no longer be cleared due to global patches).

To connect back with Bruns, what is common amongst these community-led projects is they are as much devout to creating content as they are to establishing and maintaining their own sense of community:

> […] in produsage projects, the object of the communal effort is almost always as much the development of social structures to support and sustain the shared project as it is the development of that project itself. […T]he object of such produsage is not simply information, but an information *commons*; in its full form, the information (knowledge, creative work) prodused by the community therefore exists not in abstraction from the social contexts of its development, as a stand-alone product, but exists only as directly embedded in such contexts, as a temporary artefact of continuing social process of developing, extending, negotiating, and evaluating this shared content.

(Bruns 2008, 23; original emphasis)

All in all, sites such as these not only provide players with a central resource and community hub to cultivate, share and acquire gaming knowledge but also imbricate players into the larger circuits of knowledge exchange that go beyond simply interfacing with the software itself (Apperley 2014).

Modding, Cocreation and Kinaesthesia

<u>Modding</u>

So far, I have drawn attention to the sites of information exchange that interweave players

into larger circuits of knowledge production and cultural development. This section moves to

consider how existing studies of modding and other (re)configurative practices provide

further evidence for how gameplay experiences are coconstructed by both the player and the

game. In other words, if my last section outlined some of the broader circuits of cultural

production, then here I turn inwards to consider the cybernetic circuitry of videogame play

itself.

Modding refers to the practice of creating "mods" or modified versions of preexisting

games. There are many ways players modify games. From using in-game tools provided by

developers and by using third-party applications. From relatively straightforward asset swaps

to reworking physics systems to more elaborate 'total conversions' (Nieborg 2005). Modding

practices have long been celebrated within PC gaming culture. Many of today's leading

industry stakeholders started out as modders themselves (Hong 2013; Nieborg and van der

Graaf 2008; Mactavish 2007). Studies of modding have almost exclusively focused on PC

gaming due to modding's influence over its development practices (e.g. Postigo 2003; Kücklich 2005; Nieborg 2005; cf Skot and Murphy 2017; Vanderhoef 2017).

Scholarly accounts of modding tend to approach the subject from a labour discourse perspective where players are unaware of the economic value they produce, essentially, for others to extract and exploit (e.g. Kücklich 2005). Yet, as Banks and Humphreys (2008, 406) rightly point out, peer production across social networks does not stand in opposition to market-based enterprises. As they demonstrate, participants in peer production did not consider themselves as exploited, viewing their activities in much the same way as hobbyists do rather than as unpaid labour (see also Benkler 2006). They also claim participants in *cocreative* practices are cognisant of just how their contributions create value—both symbolic and economic—for game developers and the player community (see also Banks 2013).

Cocreativity

From a production perspective, cocreation highlights how both the players and developers share responsibility for the resulting game. In Sue Morris' (2003) coinage of the term, 'games are "co-creative media"; neither developers nor player-creators can be solely responsible for production of the final assemblage regarded as "the game", it requires the input of both.' For Morris, input from both the developers and players constructs the array of tools and resources required to play videogames. When Morris says neither developer nor player can take sole responsibility for what emerges, it is because what emerges is a complex entanglement of distributed tools and resources *cocreated* by both amateurs and professionals, players and developers alike.

To move us beyond stating the obvious, SMM is, of course, cocreative in the same sense that Morris describes. At its most basic, SMM is a tool and repository designed for players to contribute to the overall game's content. Hence, in a simplistic sense, players, too, are just as responsible for the shape of the game (if not the continual shapeshifting of the game as new content emerges) as are the developers, Nintendo. Yet, it is not just what appears in-game that is cocreated by its players. Rather the network of distributed tools, resources and contexts within which SMM is embedded. What Morris alludes to is that our experience of playing the game is shaped by broader ancillary contexts and the community-generated content that emerges in response to and in support of player activity. Something not specifically created by Nintendo but rather a community response to and in support of furthering community-oriented goals and achievements.

To give an example, players wishing to make music levels could turn to a number of community-created resources for assistance. Within the first few days after release, GameFAQs user _Cole_ had already posted a visual guide and breakdown indicating how the vertical placement of Music Blocks corresponded to notes on a scale (_Cole_ 2015). Similarly, Reddit user ianmonroe had already compiled a comprehensive list of the different musical instrument sounds each in-game object makes when landing on a Music Block (ianmonroe 2015). Advanced users could, through the careful spatial arrangement of objects timed to land on Music Blocks placed at specific vertical and horizontal positions, compose their own musical melodies, especially when used in combination with the auto-scroll settings. However, it was Reddit user zing007 who provided the most comprehensive set of instructions, which included how to read and translate traditional sheet music (zing007 2015a) as well as how to convert MIDI files using a third-party application (zing007 2015b). GitHub user RasmusKarlsson went so far as to build a website designed to help convert

guitar tablature, mapping out exactly where to place Music Blocks in order to reproduce versions of preexisting compositions within SMM (Karlsson n.d.).

Whilst these community-created resources provide circumferential content, other more integrated tools were developed by and for its players.

One of the most popular and arguably seamlessly integrated services was Warp World: a free-to-use community-run service designed for streamers to connect their Nintendo Network account to their Twitch channel (warp.world). Taking full advantage of the newly added networked features introduced by Nintendo in the now-depreciated companion bookmarking website Super Mario Maker Bookmark (SMMB), Warp World granted streamers the ability for viewers to submit levels onstream via chat, which would then appear for them in-game as a bookmark. As such, Warp World became widely adopted by the SMM streaming community.

For the casual onlooker, differentiating between what features were Nintendo-produced and community-created is difficult to discern. In this instance, like with other customisations players make to their games, the line between what Nintendo provided and what the community provided becomes increasingly blurred. Warp World extends and expands the networked features provided by Nintendo, which, through Morris, we can understand as a recurring feature of videogames and/as cocreative media.

However, cocreativity has also been used within game studies to refer to what Seth Giddings and Helen Kennedy (2008, 15) call the gameplay event. That is, the momentary coming together of the player and the game during the *event* of gameplay. Relevant to our broader discussion about gameplay preservation is that Giddings and Kennedy do not privilege the players' actions nor grant sole agency to the players themselves. Rather, in a typical Latourian (2005) sense, they assign agency to both the human and nonhuman actors

as participants in the technosocial network. Therefore, to consider gameplay is to consider not only how our actions alter the game state but also how the game system pushes back. That is, how we are affected by the game just as much as how our actions have an effect on the game and so on.

Two key observations come from Giddings and Kennedy's articulation of the gameplay event. First, they consider how videogame play 'comes into being through a set of feedback loops between players, software, and hardware.' (2008, 21). Within game studies, many have already considered gameplay as a series of feedback loops or as some kind of cybernetic circuit (e.g. Friedman 1999; Eskelinen 2001; Salen and Zimmerman 2004). For example, Salen and Zimmerman (2004) discuss the designer's role in developing regulatory rule-based systems to respond directly to player actions, imbricating the player into the gameplay as it unfolds. However, Giddings and Kennedy urge us to go one step further by considering how our sense of self and our perceptions are extended and transformed during gameplay. That is, as Jon Dovey and Helen Kennedy (2006) usefully draw upon Donna Haraway's (1991) image of the cyborg to articulate how, during gameplay, a new subjectivity emerges:

This understanding of gameplay as a cybernetic loop in which player and game are inseparable for the duration of the game is a compelling literalization of the ontology of the cyborg - a subjectivity that depends precisely on this collapse of boundary between the human and the machine. […] The player is not outside the game and the game is not outside the player - both are part of a loop through which information and energy flows. […I]n gameplay there is only player *and* game, inseparable and irreducible.

Dovey and Kennedy (2006, loc 1723-36; original emphasis)

It is in this cybernetic coming together of 'wires, machines, code and flesh' (Dovey and Kennedy 2006, loc 1728) that, later, Giddings and Kennedy (2010) succinctly outline using phenomenological terms:

Phenomenology suggests some ways of thinking about how [games] demand particular modes of bodily perception and proprioception that go beyond the limits of any idea of a contained "subject" separate from a defined "game object." The playing body does not end at the skin but is extended into the space in front of and the space beyond the screen. The game itself is not contained by the edges of the screen but appears to spill out to fill an imagined but experientially real space between the screen and the player's body.

Giddings and Kennedy (2010, 174)

Understanding videogame play as a cybernetic circuit is useful as it helps to convey how (if only momentarily) both player and game object are agents in the *cocreation* of the gameplay event—this much I have established already in chapter one. If nothing else, their concept of a cybernetic circuit reinforces my argument that preserving the game object alone appears inadequate, unable to account for the rich and diverse range of experiences videogames engender.

Yet, second, what is most insightful about Giddings and Kennedy's (2008) observations is how gameplay is as much about our ability to act within the game system as it is about subjugating ourselves to its sensory pleasures. That is, how our actions have an effect on the game and how the game affects us. For Giddings and Kennedy, gameplay is about fluctuating between modes of engagement—between being able to act and being acted upon —where *giving into* the game, or what Melanie Swalwell (2008, 82; original emphasis) calls 'be[ing] *taken by*' the game as an object of surrender, is just as important as being able to act upon it. Rather than privilege one mode over the other, it is this oscillating between agency

and control—between acting and being acted upon, or what Diane Carr (2002, 175) calls a 'flux in agency'—that requires the player's attention to shift between modes of identification and agency, call and response, in accordance with the fluctuating demands of the game.

One of the key pleasures associated with playing platforming Mario games, then, is not so much our ability to play as Mario as it is about experiencing movement itself. Even a cursory glance at the genealogy of 2D Mario games reveals how each iteration was designed to accentuate movement. Each builds upon the last, adding greater degrees of freedom and new forms of manoeuvrability. From the comparatively rigid parabolic jump arcs of "Jumpman" in *Donkey Kong* to the physics-based momentum felt in *Super Mario Bros.* to the cape-wearing, Yoshi-riding, spin-jumping Mario we find in *Super Mario World*, for example. Each iteration not only increases the suite of available moves but also our expressive movement potential. Each new move requires us to learn new inputs, timing and button combinations, adding new ways for players to experience navigating the gameworld. Worlds which themselves have been carefully fashioned to encourage players to experiment with and reward them for mastering newly acquired movesets, often in combination with those already learned. Whilst it is usual to speak about in-game movement as something driven by the game engine or physics system, here I suggest it is also useful to acknowledge the experiential component of how players learn how to move through playing the game. And, in much the same way as one might attempt to describe how different cars *feel* to drive, each Mario game can also be described in terms of how it *feels* to move Mario—that is, how each Mario accelerates and decelerates, handles and behaves—as experienced *kinaesthetically* by playing the game.

Kinaesthetic Pleasure

Videogames are often a source of much kinaesthetic pleasure. The cybernetic circuitry of affect and effect that Giddings and Kennedy (2008) put forward provides a compelling way to describe how players learn how to navigate within a game. That is to say, 'players learn this feature of the game through their *kinaesthetic experience* of it — it is the nuances of positioning, virtual friction, and the removal and readopting of avatar control that is felt and learnt.' (2008, 21; emphasis added). Elsewhere, they draw affinity between David Sudnow's (2000 [1983]) account of himself becoming accustomed to playing early Atari videogames—configuring his bodily gestures in response and accordance with the particular rhythms and demands of the game—to their own observations and experiences: how Nintendo Wii console players too must learn how to (re)articulate their bodies in accordance to the 'proprioceptive regime' imposed by the relatively novel interface of the Wiimote controller (Giddings and Kennedy 2010, 177). Both accounts speak to how player bodies must be reconfigured through play.

Yet, players do not simply learn how to move so much as they learn *how* to move with grace and efficacy. There is, according to Melanie Swalwell (2008), a need to consider not just movement in terms of muscle memory or 'the development of a degree of automaticity, so that players only need to think about moving their avatar and it happens' but also 'the pleasure that players derive from manoeuvring *well, with a degree of elegance.*' (2008, 79; emphasis added). This performative quality, I suggest, is central to how *viewers,* as much as players, respond to the visceral qualities of gameplay. As Swalwell writes:

> At the start of *Grand Prix Legends*, [my informant] insisted I put headphones on. Featuring classic vehicle from 1967, the sound of twelve Ferrari engines warming up (actually *screaming* is more accurate) on the grid was exhilarating and intensely visceral. […] Then the race began and I found my body starting to move involuntarily

in response to the fuel-rich sound of "my" car's engine, anticipating and responding to its gear changes. This was a surprise to me; I hadn't *meant* to do anything.

(Swalwell 2008, 73; original emphasis)

Swalwell's argument builds from the sparse corpus of work in film studies on audience response to onscreen movement. What Anne Rutherford (2003) descriptively calls a 'cinema of embodied affect' to account for how cinema viewers often feel compelled to move in response to those movements depicted onscreen. Swalwell suggests videogame players can also be *taken by* the affect of onscreen movement, especially given the extent to which players invest time in playing:

> [...] in terms of the constant and demanding sensory engagement involved in playing; being so affected was understandable. [...] What particularly interests me is that [my informant] didn't report seeing the image, but *feeling the movement*, and feeling like he was making those movements.'

(Swalwell 2008, 81; emphasis added)

Swalwell (2008, 88) is keen to point out how this affect not only applies to 'movements that are familiar'—such as those performed by human actors—but also a 'kinaesthetic *responsiveness*' (original emphasis) to movement itself, whether performed by actors human or nonhuman. As such, the new subjectivity that Giddings and Kennedy identify through the appearance of our avatar onscreen can also be a source of kinaesthetic pleasure. A nonhuman source that, for Swalwell at least, allows players to improvise with movements that otherwise are impossible; 'not restricted to learned or planned ways of moving, [...] for impossible acts are possible [...which] stems from their otherness.' (2008, 88). Implicit in Swalwell's articulation here is the element of imagination required for one 'to imaginatively project

oneself inside other bodies, to experiment with what it is possible to do, be, and think.' (2008, 85).

What I find so compelling about Swalwell's account of videogame play as a source of kinaesthetic pleasure is that this imaginative act can also translate to another's point of view. That is, visceral kinaesthetic responses to videogame actions can be similarly felt by viewing audiences. If cinema audiences can *feel* movement, then, of course, videogame audiences too can *feel* movement, irrespective of whether they have played—or ever desire to play—with controllers in hand. This explains why Swalwell feels so compelled to will horses to jump over fences, to sympathise with migrating birds, or to swim with the fishes: 'I never wanted to be a fish or thought I was one, but loved swimming with them as if I were one' (2008, 80-1). And it is through Swalwell that a passage taken from David Sudnow (2000, 22) can take on new meaning: 'As you watch the cursor move, your look appreciates the sight with thumbs in mind'. That is, I, too, can watch a cursor move with *my* thumbs in mind when watching someone else play videogames—a point I develop further in the following section.

In this section, I introduced modding as a cocreative practice. Drawing from Sue Morris' coinage of the term 'cocreative media', I highlighted how modding practices blur the line between players and developers sharing responsibility for the overall shape of a game's content and features.

I developed the term cocreativity to emphasise the inseparable nature of the player and the game during gameplay. In light of Dovey and Kennedy's 'cybernetic circuitry' reiterating how gameplay operates as a circuit of effect and affect, I reasserted how simply preserving the game object appears insufficient, unable to account for the gameplay experience emerging from the dynamic interaction between player, software, and hardware.

Players not only learn to move within videogame spaces but also experience kinaesthetic pleasure from depictions of movement itself. Applying Swalwell's concept of 'kinaesthetic responsiveness' to viewers suggests that even those watching gameplay can experience visceral reactions and imaginary embodiment, emphasising the potential audiences hold for understanding and appreciating the embodied dimensions of play. Preservation strategies that do not include evidence of the embodied dimensions of play again feel inadequate, as the physical and sensory experiences are crucial components in the overall gameplay experience.

In my next section, I turn my gaze towards livestreaming practices to further develop how spectators are imbricated in this player/game cybernetic circuitry. Framing videogames as sport enables me to explore how livestreaming practices affect our cultural memory, especially if we only have recourse to the images produced by our most accomplished players.

Livestreaming, Esports and Sports Death

Livestreaming

According to Abigail De Kosnik (2016), cultural memory has gone rogue. In her

consideration of archival practices and cultural memory in the digital age, De Kosnik (2016,

35) suggests cultural memory is no longer a product of the ruling elite but rather *performed*

through our acts of engaging with the 'archives of mass media'. Fan archive sites are of

particular interest to De Kosnik (2016, 18-9), as 'fan fiction communities have a long history

of archive building, and their primary modes of cultural production are remixing and

appropriation, making fans exemplary digital memory workers at the level of content

production as well as content preservation.'

Cultural production can be understood in much the same way as Bruns' (2008)

cultural artefacts in that content and meaning are continually remixed and reappropriated in

different use contexts. By drawing attention to the *act* of content production and preservation,

De Kosnik reminds us of the role archivists—or, in this case, fans—play in shaping cultural

records. Rather than see archives as impartial containers or static carriers of information and

meaning, De Kosnik adopts the term 'archontic production' (2016, 34) to stress how our

encounters with archives—or, following Jacques Derrida (1995), our *archivising* of the archive—reproduces its content giving shape and meaning to the events they record (see also Manning 2017). It is by emphasising the acts of transfer or 'repertoire' (Taylor 2003) that De Kosnik (2016, 8-9) convincingly argues how understanding digital archives requires we move away from the logic of print—fixed inscriptions—towards the logic of performance. By evoking performance studies, De Kosnik stresses not only how producing and reproducing content within our archives requires human labour but also how reliant archives' continual existence is on the "digital memory workers" who build and maintain them. Questioning the durability and persistence of any digital record, De Kosnik (2016, 41) notes, '[n]etworked digital culture is "saved" for future generations, not primarily through any automated operations, but through the labors of human actors.'

The reason I invoke De Kosnik here is as much as this section is about livestreaming, it is specifically the cultural record that livestreamers produce that forms my initial point of interest. Given the rise, proclivity and popularity of livestreaming—the live broadcast of video content over the internet—it is no longer exceptional to find oodles of gameplay footage streamed online. Yet, despite the tens of thousands of concurrent streams performed every second on popular livestreaming platforms such as Twitch.tv (Shen 2017), the vast majority of content isn't being recorded (or at least not in the traditional sense of recording digital video content). That is, content is being streamed "live" and *not* necessarily recorded.

This fact should not be surprising at all. Live events are social events encouraging audiences to invest in the action depicted onstream and the communal aspects associated with common shared experiences (Cheung and Huang 2011, 768). As such, watching a broadcast *post* its event loses some of its appeal, retaining a short viewing lifespan where 84% of total views happen within the first 14 days and exponentially decrease after that (Shear 2014).

According to Emmett Shear (2014), this lack of viewer retention led Twitch to introduce its Highlights feature, encouraging performers to edit highlights from their past livestreams instead. However, Twitch is not interested in *saving* content. It is not a video archiving service. Rather, as a commercial entity, its interests lie in enabling performers to attract and retain large audiences through building their reputation as *live* performers (as a form of 'self branding' Senft, 2013).

For the many performers of SMM on Twitch, the modus operandi for creating cultural records—what Postigo (2016, 341) calls 'making gameplay'—is to edit past broadcasts into approximately 45-minute "episodes" and upload them onto YouTube. Burgess and Green (2009, 88) speculate on the potential, unintended nature of YouTube becoming 'effectively a living archive of contemporary culture from a large and diverse range of sources' yet are quick to concede there is little permanence to any video uploaded with no obligation for YouTube to keep anything beyond it servicing commercial—rather than public—interests. That being said, it is exactly because of the amount of cultural content uploaded (if only temporarily) to video-sharing platforms such as YouTube that I am able to carry out this type of research at all. First, I wish to explain how public displays of SMM play influence the content other players aspire to create and, second, to speculate on what evidence of SMM play would remain if streamed content is all we had access to.

Esther MacCallum-Stewart's (2013) account of The Yogscast, a popular YouTube channel devoted to *Minecraft*, provides a useful case in point. Not only did its cast members manage to provide a much sought-after voice for its player community, but their on-screen antics helped to model "correct" player behaviour '[…] as they reinscribe the genre from positions beyond the game, and encourage their fans to do the same.' (2013, 177). By

establishing the expectation that players will also invest in producing and sharing their own content, the act of play itself 'became a feedback loop in and of itself.' (2013, 172).

Second, De Kosnik's account of digital cultural memory proves most instructive. If we are for a moment to accept that, as Burgess and Green suggest, YouTube operates as a "living archive of contemporary culture", then it is important to consider whose records it maintains and, therein, what type of records are being produced. Despite the variety of SMM streamers, personalities and agendas, the most prominent way for performers to memorialise their efforts is in a Clear Video showcasing moments when they finally managed to beat or clear a level. Given how routinely particularly challenging levels could take many tens if not hundreds of hours to clear, the fact these videos are edited is hardly surprising. Yet, by the same token, what is often lost in the edit is evidence of the particularities and idiosyncrasies involved, as well as evidence of the sheer amount of rote learning involved in developing the skills required to perform at this level.

There are some exceptions, however, as I go on to demonstrate in my third video presentation, where different editing styles produce different narrativising effects. Yet, what remains clear is that Clear Videos are products of a culture of competition that values player competency and efficacy, where currency is accrued through being able to create and clear the most demanding SMM levels. With Clear Videos in mind, the remainder of this section explores how dominant livestreaming practices, personalities and media outlets conspire to produce a cultural record infused with the same hegemonic values and interests as those associated with competitive sports.

Clear Videos

Clear videos provide compelling viewing, whether you understand the particulars of their undertaking or not. Each clear video is an exemplar of what Lowood (2013, 69) would call a 'beautiful play' that is '[…] about graceful movement, creativity, improvisation and joy.' Lowood's definition of impressive play casts the 'player as performer' (2013, 70), gameplay as their performance, and the game as their stage. Part of the appeal of watching people play sports *and* videogames derives from our capacity to appreciate "the play" as a moment that exists outside and quite separate from its outcome—win or lose, the play remains the same. In Lowood's (2013, 70-1) example, basketball star Micheal Jordan's 'magical grace', 'athletic beauty' and ability to make dunking from the free-throw line look so effortless can be appreciated irrespective of who ends up winning or losing.

What exceptional athletes like Micheal Jordan elide by making effort look so *effortless* is the inordinate amount of practice and athletic conditioning required to perform them. In terms of SMM, clearing a Super Expert level can take up to tens or, in some cases, even hundreds of hours. A feat only achievable by the most accomplished—hence practised —players. What clear videos lack, therefore, is evidence of the inordinate amount of time and effort. That is, while some clear videos capture the amount of time or number of attempts it takes to clear it—either etched into the video image itself or affixed within its description— the effort involved is only ever expressed in quantified, discrete (hence comparable) numerical terms. Clear videos, therefore, also elide exactly what they pertain to reveal.

Clear videos are severely *edited* videos. They comprise select footage taken from the many recorded hours of repeat attempts. Some include post-event celebrations or a compilation of the most exhilarating failed attempts to foreshadow and build tension towards the final denouement. Rather than attempt in any abject way to convey the often tedious and repetitive nature of each marathon attempt, the edited nature of these videos only serves to

further exalt and venerate the player. These are, after all, highlights, not lowlights. Not a record of the journey but in celebration of the end result.

Framing the extraordinary feats of the most ardent SMM players offers a familiar narrative hook—triumph over adversity. That popular gaming media outlets choose to feature these exceptional gaming moments and adulate the players who achieved them is as predictable here as it is in sports journalism more generally. Patricia Hernandez (2015c; 2015e; 2015f; 2015g; 2015h), for example, over a series of articles written for the popular gaming website Kotaku, fashions a compelling narrative casting PangeaPanga as their central performer and instigator of a friendly rivalry between their peers and fellow streamers. Panga, alongside CarlSagan42 and mitchflowerpower, are caught up in what Hernandez (2015f) calls an 'arms race' intent on being the one to upload the most difficult or "impossible" to clear level.

Spotlighting achievements further aggrandises each performer's subcultural celebrity status. In this context, clear videos facilitate the same function as sporting highlights, becoming 'the first draft of history', as Raymond Gamache writes:

> If journalism is indeed the first draft of history, then highlights are a kind of shorthand used to distill that history into something memorable. Memory built with sports highlights offers a shared past, constituted in time and space, that facilitates an ability to establish identity for not only the individual, but also, more importantly, for the collective. Armed with the knowledge of what constitutes the most important sports achievements, sports journalists and consumers can more easily attend to those representations of sports and athletes that fit within the mythology and collective memory, validating themselves as well as the memories they invoke.
>
> *(Gamache 2010, 198)*

Connecting Ganache's observations to Lowood's (2013) beautiful or impressive play recognises the spectator's role in shaping our collective memory. By definition, an impressive play must leave its impression on its audience. An impression that '[…] depends equally on the knowledge, gaze, and engagement of the viewer' (Lowood 2013, 75). That is, for a play to be impressive requires both action and observation. The spectacle itself—the athleticism, spontaneity and creativity of its players—and an audience's ability to receive and appreciate it. As such, Lowood (2013, 82) draws upon Brand and Brand (2007) to differentiate between casual onlookers and knowledgable viewers, where the latter are able to draw upon their deeper understanding of a game to infer player intent. As Brand and Brand (2007) suggest, fans are certainly far better equipped to recognise 'what's going on in the players' heads, not just their bodies' (quoted in Lowood 2013, 82) than a casual onlooker.

Regardless of the immediate reaction of the audience to a play, it is those retold that will leave its most enduring impression. As '[t]he statement made by a beautiful play is necessarily reconfigured in memory and narrative […] and perhaps also made more accessible to those who did not immediately grasp the creativity in the original play.' (Lowood 2013, 83-4).

Clear videos are our records of impressive play. Of moments already turned monumental. Already mythologised, repackaged and retold as stories of exceptionalism— about exceptional people performing exceptional things pushing the envelope of what is both humanly and technical possible--shared widely amongst fans and casuals alike. A form of play which, as I argue below, reiterates and retains the same values as those already long associated with competitive sports further cultivated within the arcade era of videogames.

Mario as Sport

T L Taylor (2012) observes how professionalised videogame play organises along similar social, cultural and economic vectors as professionalised sports. Stressing the confluence between sport, media and technology, Taylor (2012, 210) acknowledges '[…t]here is no actual performance of e-sport outside of computation and media […]. It is co-constructed through human and machine action.'

For Stephanie Boluk and Patrick LeMieux (2017, 243), all sports are already esports. They go as far as to claim all sports are already digital when they write:

> […] the precondition for sports is the digitization of analog action—the conversion of continuous motion into discrete metrics for scoring and judging. […] As much as videogames may be sport, all sports are also videogames. Indifferentiated and irreducible physical fields, material equipment, human bodies, and other forms of play are reduced to a calculation, a score, a cut.
>
> *(Boluk and LeMieux 2017, 243-4)*

Drawing on McKenzie Wark's (2007, 79) bold statement that '[a]ll games are digital. Without exception. They all come down to a strict decision: out or in, foul or fair, goal or no goal.' (quoted in Boluk and LeMieux 2017, 226) Boluk and LeMieux maintain being able to "cut" or differentiate between winners and losers is a necessary precondition of games. To be able to *cut*, therefore, not only renders undifferentiated material into comparable units but is in itself a precondition of competitive play.[14]

Through tracing a history of early coin-operated arcades in the United States during the 1970s and early 1980s, Carly Kocurek (2015) demonstrates how the formation of

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14. It is worth noting Boluk and LeMieux (2017) further extend their ideas to interrogate what they argue as the most violent of cuts: capital.

videogames and gaming culture became interwoven with idealised visions of youth, masculinity, athleticism and technical competency. Amongst these were competitive sports, already codified as a wholesome 'all-American pastime' (2015, 56) and gender-segregated. In essence, arcades became the new enclaves for boys to prove themselves within and, by extension, videogaming as a predominately masculine pursuit. As Kocurek writes:

> The gendering of gaming […] resulted from a constellation of factors: the greater relative freedom of young boys to move through and participate in public culture; the alignment of computer and video game technologies with both military interests and *competitive male-dominated sports*; the subsequent affiliation of video gaming with violent thematic content; and the ongoing association of technological skill with masculinity.

> *(Kocurek 2015 xiii; emphasis added)*

For Kocurek, it is images and articles in the popular press, such as *Life* magazine's portrayal of 'gaming's gold medalists' (Kocurek 2015, 37), that have helped to further cement videogaming as a competitive sport and masculine pursuit.[15] Dominant and persistent images continue to narrativise our cultural memory of the coin-operated arcades. As Kocurek points out, recollections of the arcade era invariably remember them as 'a kind of technoplayground for boys' (2015, 182), whereas actual records show arcades were far from exclusively male-dominated. Kocurek describes how men, when tasked with recalling memories of their past

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15. Here, Kocurek is referring specifically to the photograph that appeared in Life magazine's 1982 "Year in Pictures" edition, depicting twelve young men leaning over arcade cabinets, posed in a way reminiscent of athletic team sports. Kocurek draws our attention to how male power is being constructed through the invocation of sporting imagery.

experiences, tend to conform to masculine stereotypes which limit the kind of sentimentality they are willing to perform and, thereby, what experiences they are likely to recall when she writes:

> To long for a hypermasculinized, hypercompetitive environment would minimize men's potential for gender transgression when engaging in nostalgia. The masculinization of the arcade in cultural memory may have to do with the desire to have a childhood site that is a safe subject of nostalgia for men.

(Kocurek 2015, 184)

It is important to recognise how dominant media representations continue to shape our understanding and collective memory of videogames. As noted above, mainstream media coverage of SMM focused almost exclusively on the exceptional player achievements of those players who, we could argue, have already turned SMM into a competitive sport. As detailed below, not only does SMM reinforce competitive behaviours by providing players with a way to "cut" or rank players and their creations, but SMM also evolves to deepen player engagement with agonistic forms of play, if not in part, in response to them.

During the arcade era of competitive sports, player achievement was measured in points—scores accrued from eating fruits, jumping barrels, shooting enemies, clearing levels, etc.—displayed on highscore tables and leaderboards. Despite a numerical score appearing in Mario games, they rarely provide a useful metric for measuring player achievement. This remains true in SMM, where the score indicator appearing in the top-right of the screen signifies little more than a tradition—a relic from a bygone era. Instead, SMM measures achievement as a percentage: a ratio achieved by dividing the number of successful clears by the number of attempts called the Clear Rate.

SMM categorises courses by difficulty. Before the 1.40 version update (9 March 2016), courses were sorted into three categories: Easy, Normal and Expert. Version 1.40 introduced Super Expert (Nintendo 2016). In addition to being able to select individual levels to play from within Course World, the in-game course browser, playing the 100 Mario Challenge game mode would grant players 100 lives or attempts to clear a set number of randomly selected courses: eight on Easy; sixteen on Normal and Expert; and, from version 1.40 onwards and only after being able clear Expert difficulty, six on Super Expert (mariowiki.com n.d.). Whilst Clear Rates alone do not determine which difficulty level a course appeared in,[16] before the 1.40 update, playing on Expert mode would draw from a pool of courses which could include next-to-impossible very low clear rate levels. The difference between playing a 0.1% and 0.01% clear rate was significant. Hence, Nintendo added further granularity to the low end of the Clear Rate spectrum by introducing Super Expert mode. Not only did this help alleviate the problem, but by introducing an additional difficulty tier, SMM evolved in order to better accommodate players pushing SMM to its absolute limits.

As with many other videogames, the 100 Mario Challenge presents the player with a challenge—a way to test their abilities and competency. For devout players like Syun_N, who pride themselves on completing "skipless" runs of 100 Mario Challenge on Expert and Super

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16. Importantly, and a source of much community consideration, the difficulty rating system takes into account the average number of deaths per player and is therefore not derived solely from Clear Rates alone. So, for example, any single player struggling to complete a level will not automatically result in a level being ranked as more difficult unless multiple players also struggle (PengiPengo 2015).

Expert mode, recording the time it takes for them to clear a particularly demanding level also appears significant—another measure of their achievements. (Skipless simply refers to a self-imposed house rule to choose not to skip past a level, further upping the ante.)

Syun_N's mastery of SMM is self-documented in a number of ways. The most striking of these are the clear videos taken from their livestream uploaded onto YouTube. In addition, Syun_N tallies their achievements on a publicly accessible Google spreadsheet (Syun_N 2018). Each entry includes a number of details: a link to the course and its creator, the total amount of time it took to clear it, the Clear Rate at the time of clearing, their rank in terms of how many players had beaten the level before them, along with a subjective difficulty rating and occasional play notes.

Other attempts to quantify how difficult a level is, derived from datasets provided by SMM or generated via other means, fuel a significant part of community discourse. Debates over who are the most competent players, who has created the most difficult level, and how best to interpret the data collected appear to animate much of the discussion. Significantly, in terms of the cultural records being produced, creators of "impossible" courses feature heavily in how SMM is being documented and the discourse it engenders.

Many players attempted to quantify difficulty using the datasets readily available. Version 1.30 (21 December 2015) introduced Super Mario Maker Bookmark, a companion website that provided inquisitive players a new way to collate and compare data. For example, by brute-forcing the URL search query parameters, Reddit user electricmaster23 posted a list of the top ten hardest levels ranked by Clear Rate (electricmaster23 2016). Version 1.30 also introduced new data points and features. Each course would now list player profiles of recent players and recent clears. Two prominent profiles added the current World Record holder, the fastest player to clear the level, alongside the First Clear holder being the

first player to successfully manage to clear the level (although the latter would not be applied retrospectively). By introducing more points of articulation around which player rivalry and competition could be formed, Nintendo furthered SMM as a competitive sport.

So far, in this section, I have shown how the discourse surrounding top-tier players serves to unite SMM audiences in much the same way as it does fans of traditional sports. Each provides its own forms of statistical analysis—halls of fame, star players, accolades, achievements and leaderboards. For Boluk and LeMieux, being able to differentiate between indiscrete actions is a precondition of being able to play games. Being able to compare and contrast player achievements is just as centrally organising for fans of SMM as it is for fans of other competitive scenes. Resultant discussions contribute to the myth-making of its players, further aggrandising their accolades and achievements, forming "the first draft of history" that defines our collective memory.

But this is not the full picture. The willingness of players to subjugate themselves to the rigours of performing at these extreme levels can be traced back to the early adopters of computing technology.

Sports Death

Writing about the rise of computer culture and counterculture in the late 1970s and early 80s, Sherry Turkle (2005 [1984], 193-4) adopts the term 'sports death' to invoke the level of subjugation a cohort of early adopters of computing technology were willing to subject themselves to. Likening early computer "hackers" to the first generation of astronauts, Turkle describes how addicting pushing the envelope of what is humanly and technically possible—both at the edges of our atmosphere and in the depths of computational systems—and how intoxicating it can be when she writes:

People are not "addicted" to test piloting or race-car driving or computer

programming. They are addicted to playing with the issue of control. And playing

with it means constantly walking that narrow line between having it and losing it.

Computer programming offers this kind of play and it is part of the hacker culture.

MIT hackers call this "sport death"—pushing mind and body beyond their limits,

punishing the body until it can barely support mind and then demanding more of the

mind than you believe it could possibly deliver.

(Turkle 2005, 193-4)

Pushing the limits of what is achievable, 'walking that narrow line between having it and

losing it', which, elsewhere, Turkle describes as 'walking near the edge of a cliff' (2005,

165), became a central organising feature around which the hacker aesthetic developed. To

push the limits (of control) requires an in-depth knowledge of how a system works and a

mindset willing to embrace uncertainty, go out on a limb and relish in producing

unpredictable results. To exhibit mastery over a system meant "improving" the system

according to self-determined goals and aesthetics (2005, 196-7). Within hacker culture,

prestige was assigned to those able to increase the challenge by making the system even more

complex or else by discovering new ways to elicit unexpected results via unassuming means

(2005, 207). To this end, hackers do not play *by* the rules but rather *with* them.

T L Taylor's (2009) definition of a 'power gamer' describes a similar attitude towards

playing with systems. For power gamers, learning how to play videogames means figuring

out how a videogame works in order to play *optimally*. As Taylor (2009, 72) observes: 'There

are several qualities to their approach that emerged: a focus on efficiency and instrumental

orientation (particularly rational or goal-oriented), dynamic goal setting, a commitment to

understanding the underlying game systems/structures, and technical and skill proficiency.'

Self-determination, defining one's own goals and striving to achieve them, is characteristically an act of a power gamer. A form of 'boundary-pushing' (2009, 78) where 'power gamers often push systems to their limit by trying to "break" them or find points at which the game architecture is internally contradictory or malleable.' Casey O'Donnell extends Taylor's observations to suggest both power gamers and game developers exhibit the same 'desire to know the structure of the system within which they work [which] has led to an almost instrumental or "power gamer" approach to work/play' (O'Donnell 2014, 60). Rather than draw a clear line between work/play or designer/player, O'Donnell's concept of 'instrumental work/play' (2014, 61) includes any player who 'strategically change[s] their play based on knowledge of the underlying system [which] is precisely the kind of instrumental rationality and sensitivity for the underlying game mechanics that are so crucial for game developers.' (2014, 63). Crucial for game developers because they wish to "bump" into the constraints imposed by software and hardware in order to establish where its so-called "bottom" lies:

> There is a kind of continual seeking for the "bottom" where the rubber treads of software systems laden with design data and artistic assets meet the road of computer system hardware. [...] Despite the construction of rigid specifications, games are based on something that must be felt out and determined by the players. Eventually developers run into the limits of electrons and silicon. Specifications are made, but they are not made up; they're the result of a negotiated process, which is frequently the product of instrumental play.
>
> *(O'Donnell 2014, 60-2)*

To 'run into the limits of electrons and silicon' suggests there is a hard bottom to the system, a limit to what it is technically possible to achieve within the limits imposed by the physical

properties and material specifications computational systems are currently built from. But this fact obscures a greater truth that specifications are 'felt out and determined by the players' as 'the result of a negotiated process', which ties us back to Guins' nonessentialist definition of material objects. O'Donnell goes on to claim there is, in fact, no "bottom" as such, or at least '[…] no claim to the irreducible or absolute. In fact, instrumental play would continue to probe into the structures of what is considered irreducible' (2014, 63). That is:

> Instrumental play is about searching out associations, analogies, and relationships, […] but it makes no assumptions about the absolute character of those suppositions. This is where the "play" component of instrumental play is crucial. […] Put another way, instrumental work/play is what pushes […developers] to attempt creations that strain their understandings, no matter the extent to which that […] understanding appears to be "reality." There is always a time and place to question the […] system that one has constructed in an effort to pull off a new feat of creative work.
>
> *(O'Donnell 2014, 63-4)*

Parallels here can be drawn between O'Donnell's (2014, 62) 'push and pull' in search for the supposed limits of software and hardware, Taylor's (2009, 78) 'boundary-pushing' power gamer, and the hacker's commitment to 'pushing the outer edge of the envelope' (Turkle 2005, 193). For O'Donnell (2014, 64), the desire of game developers 'to push [their] tools to the brink and pull off "risky" moves, doing what others have thus been unable to do' aligns with Turkle's (2005) definition of the hacker aesthetic, which similarly recognises the desire to discover optimal ways of doing things, to approach work and/as play instrumentally, and to outperform all others.

In this section, I have described how certain players and designers share similar attitudes towards (re)configuring systems in order to achieve self-determined goals. United

by a desire to seek the "bottom" of videogame systems—to delve "under the hood" and to explore the internal operations and mechanisms of computational systems—can be likened to other forms of digital media analysis that similarly seek to understand media through exploring and documenting systems from within, which I turn to describe next.

Materiality, Platform (An)archaeology and Media Speleology

Platform Studies

Thomas Apperley and Darshana Jayemanne (2012) identify a material turn within game

studies. Broadly speaking, they describe three overlapping areas of complementary research:

ethnographic lines of enquiry, examining games and play within specific cultural contexts

and as lived experiences; *platform studies,* drawing specific attention to the materiality and

affordances of gaming platforms; and *the political economy* which addresses the real-world

consequences of videogame production, industry and labour practices. While not united in

ambition nor method, they do, however, all share a common understanding of videogames

being 'enacted and produced in strikingly visceral […] ways' (Apperley and Jayemanne

2012, 15).

   With attention drawn to the materiality of players'/labourers' bodies and their

contexts, all three appear relevant. Yet, it is platform studies that draws specific attention to

the technological assemblages of videogames. If ethnographic lines of enquiry study

videogames from the player's perspective—from the outside in—then platform studies study

videogames 'from the inside out' (Bogost and Montfort 2009). Rather than attempt to

separate technology from its culturally embedded contexts[17], platform studies aim to articulate what Lev Manovich (2001, 63-4) describes as the dual 'cultural' and 'computer' layers of new media. As such, platform studies are 'entirely focused on thinking through the relation between the computer and cultural layers by examining how the material computational limits of the platform shape and influence design decisions and consequently player experience.' (Apperley and Jayemanne 2012, 11).

Platform studies focus on creativity and the creative uses of technology. As Montfort and Bogost insist in their series foreword, despite many differences, platform studies share common features. In particular, '[…] an awareness of […] how computing platforms exist in a context of culture and society, being developed based on cultural concepts and then contributing to culture in a variety of ways' (e.g. Montfort and Bogost 2009, viii). This cyclic understanding is important. The feed-forward and feedback mechanisms circulating within and across new media cultures are duly emphasised. It also implies a focus on human ingenuity—moments of creative, if not innovative, genius—where creative solutions working around material constraints are unearthed and celebrated.

In its ambition to dig beneath the surface of digital objects, platform studies can be favourably compared to other digital humanities projects such as media archaeology (e.g. Parikka 2012) and software studies (e.g. Fuller 2008; Waldrip-Fruin 2009). Each highlights the act of exploring and uncovering the material affordances of technological assemblages and in performing alternative readings of computational media from *within*. Not only to examine the *visible* traces that appear on the surfaces of digital media—its representational content—but also its underlying 'operational logics' (Waldrip-Fruin 2009, 13). To move

17. A frequent point of criticism that Bogost and Montfort (2009) refute.

beyond what Nick Montfort (2004) describes as 'screen essentialism' appears to be a significant and unifying motif. Or, as Wolfgang Ernst (2011) expresses, all three disciplines are united by their commitment to rendering '[…] the epistemological conditions in which the commands, executions and operations take place […] hidden in the physical and logical layers of media machines'.

Apperley and Jayemanne (2012, 11) contend a major strength of platform studies as a method for studying videogames is that it enables researchers to temporarily stabilise what would ordinarily appear nebulous and untethered: 'The genius of platform studies is to locate the platform as the stable object within this complex, unfolding entanglement, allowing it to perform the role of a centre around which other relationships may be traced and examined.'

Platform (An)archaeology

This strength, however, is also its potential weakness. In Thomas Apperley and Jussi Parikka's (2015) critique of platform studies, they question how a platform becomes a historically stable object and, second, expose how limited platform studies' conception of creativity is. Combining platform studies with media archaeological methods, Apperley and Parikka propose an alternative method for doing platform studies called 'platform anarchaeology' (2015, 11).

Bogost and Montfort (2009) avoid defining what constitutes a platform to instead focus on what platforms enable their users to do. They warn against conflating their idea of a platform with any specific hardware or console. Instead, as demonstrated in Salter and Murray's (2014) examination of Flash, a platform studies approach can be used to place software at its centre, allowing the evolution of a multimedia software application and its

formative role in shaping internet aesthetics during the desktop era to be traced (2014, 7). The critical point here is that despite a platform's ability to evolve—e.g., when components are replaced, firmware is upgraded, or software is updated, etc.—platform studies seeks to secure a stable platform around which other social and cultural issues can be performed by examining hardware through its software applications or even as software itself (Apperley and Parikka 2015, 6).

Platforms are not historically stable, unified or consistent objects. Hence, stability is not an inherent feature of a platform, rather it is produced *during the process* of studying it: '[…] that platforms are not recalled and rediscovered through platform studies, rather *in the process of "doing" platform studies, a uniform platform is produced.*' (Apperley and Parikka 2015, 4-5; original emphasis). This performative account describes how carrying out a study of a platform produces a kind of '*material doubling*' (2015, 6; original emphasis) where secondary materials (e.g. technical manuals, marketing materials, developer interviews, media coverage, etc.) can be used to secure "the platform" at the centre of materially grounded discourse which *doubles-up* to produce the bind required to achieve the desired stabilising effect.

One of the consequences of *doing* platform studies, then, is that it establishes an 'epistemic threshold' (Apperley and Parikka 2015, 6). That is, following Thomas Elsaesser (2004), the nature of the archival materials available informs our understanding of historical events. Whilst secondary materials may be potentially incongruent and contradictory, they need only be sufficient in quantity to shore up the platform as a historically stable object, implying that a platform must first have been commercially successful enough to have generated enough materials. If commercial success overly determines how useful platform studies is as a historical method, can platform studies be used to study lesser-known, "failed",

or even minor platforms?[18] Apperley and Parikka's proposed 'platform anarchaeology' provides an alternative method engaging more directly with a platform's everyday use contexts and, importantly, player-produced content that:

> […] record and archive unofficial histories of the material production of digital games and gaming cultures that provide myriad perspectives on individual and collective encounters and may support reconceptualizations of the platform informed by an assemblage of experiences characterized both by correspondence and by difference.

> *(Apperley and Parikka 2015, 7)*

This reconceptualisation of the platform, as constituted through player-produced content, informs the first part of their proposed 'platform anarchaeological' approach, which can also reveal their second: platform studies' limited concept of creativity.

As already mentioned, platform studies have tended to focus on the innovations and innovators of technology—the engineers and designers of commercial products—rather than the everyday uses and creative practices of individuals and communities. Apperley and Parikka (2015, 13) argue that platform studies' tendency to seek out creative genius is in danger of falling into the same footsteps as other celebratory (and therefore uncritical) videogame histories (e.g. King and Borland 2003; Kushner 2004). To this end, platform studies tend to advance the same "hero designer" narratives as do other accounts, retrospectively recognising individuals for their creative ingenuity and contribution to a field (see also Arsenault 2017; MacKenzie and Wajcman 1985, 10). Thus, by focusing solely on commercial innovations, platform studies risk overlooking the myriad of other 'use contexts' (Guins 2014) videogames exist within, including the multifarious ways videogames

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18. For an excellent study of minor platforms, see Nicoll (2019).

continue to evolve and create meaning in both commercial and noncommercial settings. What platform studies risks ignoring, then, is the creativity and ingenuity of its *players*.

While there are some exceptions, both Maher's (2012) account of the Commodore Amiga and Salter and Murray's (2014) account of Flash emphasise the role hobbyists played in shaping each platform, yet they, too, veer into becoming overly prophetical. For instance, Maher (2012, 8-9) argues the 'superior technical specifications' of the Commodore Amiga lay dormant until unleashed by its users, who became the 'pioneers' and 'visionaries' who 'saw the potential in the hardware and made it sing.' To avoid solely focusing on commercial practices, Apperley and Parikka invoke Siegfried Zielinski's (2006) media anarchaeological approach as a way to compensate for such 'techno-industrial celebration' (Theirren and Picard 2014).

Key to Zielinski's (2006) anarchaeological approach is a broadening of our conception of media to include potential and imaginary forms alongside those actual and implemented (see also Kluitenberg 2006). As such, Zielinski (2006, 27) attempts to distance himself from conventional archaeological practices, which only seek to give order and governance to the ancient and original, to propose instead an *anarchaeological* approach to the study of media objects, '[…] which privileges a sense of their multifarious possibilities over their realities in the form of products.' By adopting Zielinski's take on creativity, Apperley and Parikka (2015, 14) propose a media archaeologically informed platform studies approach which involves '[…] opening the platform, digging behind the interface, and unearthing the assembled components of the technology.'

Media Speleology

It is worth reminding ourselves that despite the technological instrumentation and

mechanisms involved in digging beneath the surface of digital media, any investigation is, of

course, a human endeavour. Inspired by new materialism (e.g. Coole and Frost 2010), Liane

Nooney (2013) suggests an alternative mode of *doing* media archaeology that avoids

dehumanising the process called 'media speleology'. Taking a similar issue with the

implications of using the term archaeology as Zelinski does, Nooney invokes the figure of the

researcher as a speleologist reasserting the individual subjects' involvement in navigating

through the labyrinthine cave systems of media objects, which can only ever lead to partial

and fragmentary accounts. As Nooney writes:

> Media "archaeology" implies an excavation that brings objects into the light of
>
> knowledge, constructing a larger skeleton from the wreckage of bones scattered
>
> across the historical field. Spelunking, in contrast, is a *phenomenologically imprecise*
>
> *encounter* — I can only see so much at any one time. The shape I hollow out here
>
> relies on non-continuity and the inability to apprehend the historical field in its
>
> wholeness.

(Nooney 2013; emphasis added)

Acknowledging our 'phenomenologically imprecise encounter' avoids attempts to exhaust

the site of investigation—be it a cave or digital media object—to recognise instead our role in

piecing together the evidence. Elsewhere, Nooney (2014, 70) similarly stresses how

technological objects always operate within sociomaterial contexts and hence cannot be

studied somehow from magically outside of them. To this point, taking particular issue with

Wolfgang Ernst's assertion that '[media] archaeology, as opposed to history, refers to *what is*

actually there: what has remained from the past in the present like archaeological

layers' (2011, 241; emphasis added), fails to account for how remains from our past our

products of materially grounded practices that not only created them but also allowed for them to persist into the present. This point becomes particularly pertinent when I consider the incidental archives of player-produced content infused with their own interests, intentions and embodied actions.

To this end, Nooney's (2013; 2014) media speleology and Apperley and Parikka's (2015) platform anarchaeology strongly influence my own methodological approach. For I too am interested in excavating what lies beneath, albeit perhaps more accurately, by proxy. Rather than conduct my own anarchaeological investigation, however, my excavations turn instead to the incidental "archives" of media content contrived by players who have, by and large, already carried out their own anarchaeological investigations. Investigations that do not attempt to survey digital objects in their entirety (as O'Donnell 2014 reminds us, there is no "bottom" to computational media) but rather seek out their margins and affordances in an attempt to discover new ways to play—if not play *with*—videogames as digital artefacts and as computational systems.

Herein, I also recognise my own positionality and subjectivity in carrying out my enquiry. An imprecise encounter that can only ever lead to a fragmentary, partial and incomplete account. Not to make assumptions about "what is actually there" but rather to trace SMM's contours and trajectories through recourse to its discursive practices—if not 'discourses *as* practices' (Goddard 2015, 1768; my emphasis)—that exist online before it's too late.

To this end, Matthew Kirschenbaum's (2008) notion of the forensic imagination as a 'deeply humanistic way of knowing' (2008, 23) manages to capture our desire to make sense of the past through objects remaining in the present. Kirschenbaum's (2008, 23) insistence that 'new media cannot be studied apart from individual instances of inscription, object, and

code as they propagate on, across, and through specific storage devices, operating systems, software environments, and network protocols' follows a similar trajectory to that of archaeologically informed platform studies approach highlighting the importance of studying inscription. Whilst Kirschenbaum focuses more on the reading and writing mechanisms of digital media storage as 'textual machines' (Gitelman 1999), it is the textual practices associated with our utilisation of, interactions with, and interventions in the operating logics of digital media objects that animates the beginning of my video presentations. By paying attention to 'whenever process collapses into product' (Kirschenbaum 2008, 253), the forensic imagination can begin—a form of making sense of the past by examining the materiality of digital objects in our present.

Chapter Summary

This chapter was split into five sections. It aims to provide a rationale for why I chose SMM as my case study as well as to further my theoretical and methodological concerns.

In *Thirty Years in the Making of*, this chapter begins with an introduction to the historical development and cultural significance of Mario games. It challenges traditional historiographies that focus solely on mainstream commercial aspects, calling for a more nuanced understanding. The role of players as cocreators in the Mario franchise is emphasised. My choice of SMM as a case study is introduced, focusing on its release coinciding with the 30th anniversary of the Super Mario franchise and the rise of livestreaming practices.

This section describes the activity of ROM hacking, emphasising its existence prior to SMM and its role in shaping player expectations. The "Kaizo Mario" series is highlighted as a significant ROM hack and series of video playthroughs known for its challenging and

subversive design practices, setting the stage for further exploration in the upcoming video presentations.

In *Web 2.0, Participatory Culture, and Produsage*, this section explores the concept of participatory culture and produsage within the context of SMM. Drawing on the ideas of Henry Jenkins and Alex Bruns, the discussion highlights the continuum between production and consumption in user-led content creation contexts. It emphasizes the shift from traditional industrial models to post-industrial, networked environments. The focus is on how players, even those not actively creating content, contribute significantly to the overall gaming experience through their participation.

Modding, Cocreation, and Kinaesthesia delves into modding practices in videogames, emphasising the collaborative nature of game development involving both players and developers. The term "cocreation" is introduced to highlight how players and developers share responsibility for the emerging game. The discussion extends to kinaesthetic pleasure, exploring how players learn to move within videogame spaces and experience pleasure from depictions of movement. The section reiterates the importance of considering the embodied dimensions of play in preservation strategies.

In *Livestreaming, Esports and Sports Death*, the notion of SMM as a sport is discussed, drawing parallels between professional videogame play and traditional sports. The history of coin-operated arcades is explored, emphasising their impact on the perception of video gaming as a competitive and masculine pursuit. SMM's Clear Rate system and difficulty categorisation are examined, illustrating the game's evolution to accommodate player-generated challenges.

Sherry Turkle's concept of "sports death" is introduced, highlighting the willingness of early computing enthusiasts to push the limits of human and technical capabilities. This

aligns with the hacker aesthetic, where players and developers seek to understand and surpass the boundaries of videogame systems. Casey O'Donnell's idea of "instrumental work/play" is introduced, emphasising the shared desire among game developers and high-performance players to explore and optimise systems. The section concludes by hinting at the exploration of digital media analysis through understanding media via internal systems.

The final section, *Materiality, Platform (An)archaeology and Media Speleology*, begins by highlighting the material turn within game studies. Platform studies, in particular, focuses on the materiality and affordances of gaming platforms, examining the relationship between the computer and cultural layers. Apperley and Parikka's concept of "Platform (An)archaeology" critiques the historical stability of platforms in platform studies, proposing a more inclusive approach that incorporates player-produced content. Nooney's "Media Speleology" offers an alternative media archaeological method that reemphasises the researcher's subjective role, navigating through fragmented evidence. Both approaches align with my own methodological stance, emphasising the exploration of player-produced content and recognising the subjective and incomplete nature of my investigation.

Video Presentations

Drawing inspiration from Apperley & Parikka's (2015) platform anarchaeology and Nooney's (2013) media speleology, I propose a multifaceted approach to interpreting SMM beyond traditional textual analysis. Platform anarchaeology shifts the focus away from official histories and celebrates the creative ingenuity of players and communities who actively push the boundaries of a platform's affordances. Media speleology, on the other hand, encourages us to embrace the subjectivity and incompleteness of our exploration as well as recognise the imprecise encounters of others. Media speleology acknowledges the fragmentary nature of historical traces and that the meaning of SMM is continually reshaped through its ongoing use and reinterpretation.

This combined approach allows me to engage directly with the rich tapestry of player-generated content available online. Examining player practices through the lens of platform anarchaeology reveals how they hack, tweak, and repurpose a platform's tools and affordances to achieve novel and unexpected gameplay experiences. Adopting a speleological perspective foregrounds my and others' subjectivity in exploring the interconnected network of discourses and practices that shape the game's meaning and trajectory over time.

In the video chapters that follow, I will put these methodological principles into practice. By critically examining specific examples of player-generated content, I aim to, on the one hand, illuminate the diverse and dynamic ways in which SMM is constantly being reimagined and reinvented. On the other hand, I hope to provide a demonstrative case study for preserving videogames through recourse to the materials players produce as a way to account for the subjective and embodied experiences of play that videogames engender.

It is also worth noting here that De Kosnik's (2016) understanding of digital archives as performative—content is reproduced through our acts of inscription and retrieval—by undertaking this type of work, I too am *reproducing* the archive. Not only a reminder that my own positionality and subjectivity give shape to its meaning but also how, by reproducing the work of others, my intervention allows them to persist at all. Given the ephemeral nature of digital content, it is not surprising to discover some of the content I refer to in my video presentations has already been removed or taken down from its source. A reminder that in order to maintain evidence of player activity requires ongoing future work.

For now, this discussion continues over four video presentations accessed via this YouTube playlist: https://bit.ly/SMM-PhD. Digital copies of the video files are also stored on the USB drive provided.

Conclusion

This thesis argues that dominant approaches to videogame preservation are conversely

contributing to their further effacement. By fixating on the digital artefact, videogame

preservation has tended to omit the *contexts* in which videogames are played from their

records. Considering gameplay as an irreducible concept, maintaining evidence of these

contexts is important as neither the digital artefact nor the player(s) can take sole

responsibility for what emerges during gameplay.

Describing play as a creative practice and players as cocreators, this thesis argues that

without recourse to player activity, future historians will struggle to account for the myriad

ways videogames are encountered and interpreted by their players as well as how they evolve

in response to player activities. As such, this thesis puts forward an approach that considers

what it might mean instead to move towards the preservation of digital play practices.

Evidence of how videogames are played can be traced through the cultural records

produced by their players. These *traces of play* take on many forms, most of which are

textual—gameplay videos, forum posts, walkthroughs, wiki sites, etc. Preservationists must

incorporate these cultural materials into their archives. Shifting focus away from preserving digital artefacts towards the play practices they engender ensures future historians are better equipped to account for the multivalent ways videogames are played, the contexts within which playing occurs, and some of the meanings and values associated with playing (with) videogames.

Shifting from preserving objects to preserving practices introduces a new set of challenges for preservationists. No longer does preserving videogames mean retaining working versions of videogames. Preserving videogame *play* is to document *how* videogames are played. To this end, player-produced materials describing and documenting play become the records worth keeping.

That said, it is nonsensical to suggest that *all* online content can be archived or is even archivable. Archivists use appraisal methods to decide which artefacts enter the archive. This thesis problematises using popularity as an indicator of cultural significance. Adopting such appraisal methods would risk omitting marginal, unique and diverse forms of play from the archive, calling for a more nuanced approach.

Recognising online content is a product of culture acknowledges how content persisting online is shaped by and reflects the values of those in charge of performing, capturing, and disseminating it. Many social, economic and political factors shape content production, and, in this sense, SMM is not unique. Deep-seated values long associated with agonistic and highly technical forms of play—such as the displays of technical prowess and player expertise cultivated within the ROM hacking and speedrunning communities—came to dominate the play style SMM players were expected to adopt. Despite how SMM was marketed as a democratising creation tool for inexperienced players, the persistent online messaging emerging from livestreamers and social commentators alike told a different story.

According to them, the point of SMM was not simply to enjoy creating levels but to compete in creating and clearing the most complex and challenging levels.

Despite the vast array of public recordings of SMM play available, most embody the attitudes and aspirations of an elite set of players. Evidence of players completing Expert or Super Expert levels far exceeds records of everyday play performed by ordinary players. Archivists must avoid attending to only the most popular video content, as doing so would result in a distorted image of what playing SMM actually looks like.

Call to Action

To this end, this thesis outlines a two-step call to action for preservationists to adopt.

Step one. *For future historians to be able to better account for past play experiences, the goal of videogame preservation must expand to incorporate prevailing paratextual materials into the archives*.

Convincingly, prior game scholars have already argued this point. Yet, as outlined in chapter one, the prospect of being unable to access videogame code still plagues videogame preservationists.

Capturing player-produced materials promotes further questions to be asked about *whose* activities and play cultures are reflected in the content available. As already noted, many social, political and economic factors shape the production and availability of online content. Persistent images are unlikely to represent the full spectrum of player activity evenly.

Therefore, step two. *Preservationists must attune themselves to the contexts of content creation*.

Asking why something remains online and how it is shaped by broader cultural forces such as class, race, and gender are especially important. It is also critical to, on a more

localised level, appreciate how online discourse, dominant attitudes, aspirations, and audience expectations shape the prevailing record. As noted, filtering content according to popularity risks reproducing hegemonic effects, ensuring that only the most dominant play cultures get archived. To this end, to consider the contexts within which content is being created is an important step to ensure a record of the broadest subset of player activity is captured. The goal here is to preserve the rich and dynamic history of videogames as they are actually being played and experienced by players, providing a more nuanced description of videogames, their cultural impact and significance.

Observations

Studying SMM in this manner has enabled me to make five observations about the types of play that are being recorded and documented online.

First, to place front and centre the extent to which players explore and document videogames with a forensic level of detail. This fact should not go understated. The level of insight and analysis performed by players is significant. Not just in terms of how it feeds back into and supports communal activity advancing player expertise, but also as rich and detailed documents of videogames in and at play. To acknowledge how videogames evolve is to acknowledge how player activity actively extends the play space afforded by videogame technology. Recognising how players constantly and creatively intervene in the evolution of SMM illuminates the diverse and dynamic ways in which SMM is constantly being reimagined and reinvented and that the meaning of SMM is continually reshaped through its ongoing use and reinterpretation. Again, this integral fact should not go understated.

Second, despite SMM being so much *about* level creation, online records of the actual crafting process remain remarkably scarce.

This stands in stark contrast to the immense amount of time and effort streamers devote to their many attempts at designing, clearing and uploading extremely complex and brutally challenging levels. Many streamers chose to forego retaining recordings of their entire performances. After the live event, full records of past performances attracted little to no repeat viewings. In livestreaming contexts, viewership is important, tied to visibility and income. As such, streamers developed more direct and digestible ways to showcase their exceptional skills and talents in the form of Clear Videos. Clear Videos were edited to either capture the successful run or else compiled in such a way as to build tension leading up to the final completion.

Many streamers model their public persona on showcasing their exceptional talents. Choosing to save highlights, not lowlights, is completely understandable. Iterative design practices are, after all, incremental and highly repetitive. Yet, viewed from a preservation perspective, for a game built around level creating, the fact that most online content does not contain evidence of this process should be of concern.

Third, also notably absent from online records, is evidence of everyday play performed by everyday players.

In livestreaming and video-sharing ecosystems, viewership matters where personality and displays of player competency attract larger viewing audiences. As indicated above, most online content showcases players clearing Expert and Super Expert levels. Lesser feats of gaming prowess, such as playthroughs of Easy or Normal levels, are few and far between. The fact that most online content features exceptional talent and feats performed by the most famous, if not infamous, players is to be expected—a reflection of the culture of competition and currency of competency long associated with playing videogames.

SMM's accessible toolset and approachable demeanour encouraged inexperienced creators to turn their hand to crafting levels without the pressure to conform to industry standards and "good" level design practices. Some commentators lamented the glut of "poorly" designed levels that resulted, whilst others saw the abundance of "badly-made" levels uploaded by inexperienced or unexceptional players as a sign of a healthy democratising tool working as intended. In this regard, bad levels were good.

This deep well of nonstandard content had another knock-on effect in livestreaming contexts. "Poorly" designed levels that did not adhere to standard design practices posed a rather unique and unpredictable challenge. Unable to rely upon tried and tested formulas, many elite players embraced the opportunity to play through these unorthodox levels as their struggles made for compelling viewing. Completing the 100 Mario Challenge, for example, forced players to clear a set number of levels chosen at random within a finite number of attempts, leading many to be challenged by some of these more oblique and obtuse levels. The consequence of such is that there are a number of video recordings of players attempting to complete 100 Mario Challenge runs, which incidentally contain attempted playthroughs of these "poorly" designed levels.

Fourth, creators sharing content that did not conform to viewer expectations encountered online resistance. As noted in the case of Nintendo Thumb, posting unedited footage of their playthroughs was considered by some viewers to be unwatchable. Nintendo Thumb's stated desire to archive their playthroughs in full without editing was unlikely to satisfy viewers trained on more heavily curated content. Yet, from an archival perspective, such recordings are invaluable precisely because of how *unexceptional* they are as they more closely resemble play performed by ordinary players. Learning how to navigate through each section through repeat trial and error, committing to muscle memory the precise sequence of

actions and intricate timings involved, far more accuracy depicts what playing SMM actually looks like for the averagely skilled player.

Which leads to fifth. Serial players such as Nintendo Thumb managed to capture the state of the game at the time footage was recorded. As SMM was incrementally patched and updated, Nintendo Thumb's regular posting schedule *chronicles* how changes to the game's codebase affected the game's performance. That is to say, Nintendo Thumb's videos manage to capture evidence of versions of SMM that can no longer be accessed. A notable example is when the Miiverse-enabled commentary system was patched out during the version 1.47 update (7 November 2017).

In an ecosystem that prioritises topical and attention-grabbing content, Nintendo Thumb provides an antidote featuring playthroughs of levels rarely captured elsewhere. Yet despite its size, it too provides only a partial record of SMM levels unlikely to contain footage of any of the lowest-ranking courses nor any of its most challenging.

Future Work

As I hope I have demonstrated, in order to move towards the preservation of digital play practices requires additional cultural work to be done. This is not to suggest that such work should burden preservationists alone, however. Instead, consider this a call for closer collaboration between archivists, preservationists, exhibitors, curators, historians, cultural theorists, and game scholars. With this collaborative spirit in mind, I hereby conclude with an indication of future work that could be done.

One practical way to assess the value of this study is through envisioning a public exhibition focusing on the living history of *Super Mario Maker*. Comprising five rooms or sections, each section would reflect a different facet of how players took to playing SMM.

The first room would introduce visitors to SMM's release and prerelease build-up. It would showcase content made or sanctioned by Nintendo, including trailers and footage taken from the game's many appearances at gaming expositions, press releases and developer interviews, such as the behind-the-scenes exposé and interview with Mario's creators, Miyamoto and Tezuka (IGN 2015). Further evidence of Mario's 30th-anniversary celebrations, including footage from the resurrected Nintendo World Championships event, would help locate SMM's release within a sociohistorical context.

The second room would then juxtapose the first by introducing visitors to the unofficial or unsanctioned player-produced Mario-making that predates the release of SMM. Drawing mainly from the ROM hacking scene, this would include footage of ShadowDragon's TAS of Panga's *Item Abuse 3* (shadowdragon121TASer 2015) alongside SethBling's Credits Warp (SethBling 2015a; 2015b; 2015c), for instance. If the opportunity to commission new work arose, it would prove instructive to offer visitors a hands-on encounter with Mario hacking practices. Something like paperkettle's spacetime organ (paperkettle 2012) would provide an approachable, tactile and expressive way for visitors to experience the effects of ROM hacking without first needing to learn the technicalities involved. Important here would be to ensure all visitors—including those unsure, unwilling or otherwise unable to engage—could experience the results of hacking Mario regardless.

The third and perhaps smallest room, corridor or section would walk visitors through a timeline of SMM's incremental updates. Visitors would be invited to compare Nintendo's framing of each update as an improvement—introducing new content and features—with the real-world consequences of forcing players to accept new terms of engagement. Whilst most were innocuous, sometimes an update had a serious knock-on effect rendering some user-

created levels unplayable. How software evolves is an important part of its total life trajectory and history.

The fourth room would be devoted to Kaizo Mario content—a space to showcase the exceptional feats and talents of its most experienced players alongside their community-building activities. Failstream's (2017) Final Flight clear video would feature alongside playthroughs of other top-tier players' levels. Important here would be to include extracts from Takemoto's original video series as well as to showcase community-building aspects. CarlSagan42's (2016c) "Soshell Studies" shell trick tutorial level video taken from his Kaizo College series would be a good example of a how-to video alongside other video breakdowns, such as BarbarousKing's (2019) homage to the greatest SMM players. Further step-by-step instructions could be taken from the Kaizo Mario Maker Wiki. The point here would be not just to showcase exceptional feats but also to acknowledge the community and knowledge-building activities that support and underpin the development of such practices.

The fifth and final area would focus on creativity and the level creation process. The aforementioned IGN interview with Tezuka and Miyamoto could be used to highlight the dialogic nature of game design alongside videos showcasing the level design process (e.g. usgamernet 2015a; Polygon 2015). Some of the more elaborate Rube Goldberg-inspired auto-levels (e.g. CarlSagan 2018) and item contraptions (e.g. Ceave Gaming 2017) would help convey player creativity. If possible, this area could include playable consoles running offline disk-installed versions of SMM, yet the crucial point here is not to offer a hands-on experience but rather to inspire creativity. To this end, commissioned work could include visual design prompts and blueprints for contraptions rather than anything else. In fact, repurposing pages taken from the ideas booklet that accompanied the physical release of SMM (McWhertor 2015) would suffice. To this end, including a space for visitors to create

something tangible—a physical space for sketching out ideas or else building something from prefabricated blocks—aligns far more with my ambitions for this room.

Whether or not such an exhibition is feasible or even desirable is something I wish to pursue further to discover what opportunities there might be to exhibit SMM in this or a similar manner. Either way, further dissemination of this work feels important.

My thesis was delivered in two parts. First, a written component situated my argument within digital cultural heritage and videogames within digital cultural studies more generally. Second, to continue explication through a series of video essay presentations: a mode of presentation selected specifically to reflect my proposed method of study. By critically examining specific examples of player-generated content, I aimed to, on the one hand, illuminate the diverse and dynamic ways in which SMM was constantly being reimagined and reinvented. On the other hand, I hoped to provide a demonstrative case study for preserving videogames through recourse to the materials players produce as a way to account for the subjective and embodied experiences of play that videogames engender.

To study SMM in this manner is to study one of the many contemporary videogames similarly embedded within network culture. As such, this thesis provides a demonstrative case study in support of preserving videogames through/and/as digital play practices. In short, towards the preservation of digital play practices.

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