

Poaching Museum Collections Using Digital 3D Technologies

Sarah Younan

Cardiff School of Art and Design,
Cardiff Metropolitan University,
Cardiff, UK

sayounan@cardiffmet.ac.uk

ABSTRACT

This paper investigates the creative engagement with digital 3D models of museum artefacts and gives insight into new uses of museum collections enabled by digital scanning, editing and 3D printing technologies. Digital 3D models of museum artefacts are malleable and increasingly easy to use. Additionally, freely available 3D software has made 3D scanning, editing and manufacturing possible for non-specialists. These technologies allow users to create new artworks through the creation and transformation of digital replicas of museum artefacts. Examples of creative works, taken from two case studies that involve the creative use of digital reproductions of museum artefacts are presented in this paper. These projects are illustrative of a larger trend: the digital ‘poaching’ of heritage artefacts. This paper examines how digital 3D technologies can foster creative forms of museum engagement, democratise access to museum collections and engage users with personal forms of museum experience.

KEYWORDS

Digital 3D technologies; Museum engagement; Reproductions; Artist intervention; Digital heritage.

1 | INTRODUCTION

3D scanning technologies offer the opportunity to capture the form of real objects, and to store them as digital files. 3D print technologies are swiftly bridging the gap between digital and physical objects: it is now possible to print physical objects directly from digital files.

Across the museum sector, research into the use of digital 3D technologies is focused on the implementation and support of core museum duties, including collection management, conservation, research and the interpretation of collections for the public (Parry, 2010). Much literature about museums “has been about learning and communication, and how best the museum space and its facilities can be manipulated to improve this” (Kavanagh, 2000, p. 148). This focus rests on an understanding that “knowledge is now well understood as the commodity that a museums offer” (Hooper-Greenhill, 1992, p. 2). However, ‘much more is happening within the (museum) visit than a quest for learning’ (Kavanagh, 2000, p. 149). A focus on knowledge-based and established museum practices risks ignoring more personal and subjective forms of museum experience, which can be explored through the use of digital

technologies. Museum artefacts can trigger internal associations of “fantasy, desire and anxiety in the mind of the viewer” (Annis, 1986, p. 169). Erik Davis argues, that digital media can open up similar fields of experience: “novel and protean spaces of possibility within social reality” (Davis, 2004, p. 216).

To explore how creative engagement with digital 3D models can open up new forms of museum experience and new ways of understanding museum collections this paper examines two projects that promote the creative use of digital 3D models of museum artefacts, the *(Im)material Artefacts* project, undertaken by the researcher in collaboration with the National Museum Cardiff, and *Lincoln 3D Scans*, a project by the artist Oliver Laric in collaboration with the Usher Gallery and The Collection in Lincoln.

2 | ‘POACHING’ THE MUSEUM ARTEFACT

Freely available photogrammetry [1] software has enabled museum visitors to create 3D models of museum artefacts using their digital cameras or mobile phones; “access to cheap, flexible tools removes many of the barriers to trying new things” (Shirky, 2010, p. 17). While “technology may provide a bridge to both physical and virtual access and eventually to a culture of social inclusion” (Leighton, 2007, p. 311), the mobility of digital tools of reproduction, such as camera phones also “increases the likelihood that it will be used for controversial purposes” (Nightingale, 2007, p. 291). In Māori belief and in other cultural belief systems the affective properties possessed by real artefacts are sometimes seen to “inhere in their digital surrogates” (Salmond, 2012, p. 217). Freely available photogrammetry software creates a possibility for museum artefacts to be digitally appropriated. When this happens to culturally sensitive materials it might be considered inappropriate or offensive by parties with a vested cultural interest. At the same time, it brings new opportunities to the engagement with museum artefacts.

Internet communities with the focus of sharing photogrammetric models are emerging and online collections house a diverse range of digital 3D models, including 3D models of historical artefacts from museums [2]. The creation and collection of photogrammetric models is emerging as a new

hobby; it has the potential to change our understanding because it changes our relationship with objects. Photogrammetric software applications look set to popularise the automatic production of three-dimensional models of objects. A parallel to this situation can be found in the rise of photography in the nineteenth century. In 1859 Oliver Wendell Holmes forewarned that, with their cameras “men will hunt all curious, beautiful, grand objects, as they hunt the cattle in South America, for their skins, and leave the carcasses as of little worth (Holmes, 1859, p. 747). To take this analogy further, photogrammetry now allows the digital ‘poaching’ of objects, and the propping up the photogrammetric ‘skin’ on a digital wireframe model.

In his seminal work *The Practise of Everyday Life* (first published in 1984), Michel de Certeau compares the creative appropriation of cultural artefacts to poaching; illegally hunting or catching game or fish on land that is not one’s territory (Certeau and Rendall, 2002). De Certeau and Rendall proposes, that human consumption is itself a creative act. During consumption, he argues, users recontextualise products, alter them and find unexpected uses for them. ‘Assimilating’ does not necessarily mean ‘to become similar to’; by assimilating something the consumer appropriates or reappropriates it (Certeau and Rendall, 2002). Photogrammetry is a digital form of cultural poaching, which harnesses “the participatory potential of the Internet and typifies modern popular culture” (Marwick, 2013, p. 13). Cultural institutions are mostly absent from these practices (Sabiescu et al., 2015) and may even be unaware that they are a source of material for poachers. These poached artefacts can take on new meanings, thus challenging institutional control and mediation of historical cultural materials.

3 | (IM)MATERIAL ARTEFACTS

For this research the *(Im)material Artefacts* project was undertaken in collaboration with the National Museum Cardiff. A number of artefacts from the ceramics collections at the National Museum Cardiff were selected for 3D scanning, and the resulting digital 3D models (Figure 1) were made accessible to participating artists online. Participants were recruited online to remix the digital scans. The project culminated in an exhibition at the National Museum



Figure 1 | Digitally rendered image of 3D scans of museum artefacts from the National Museum Cardiff.

Cardiff, during which the participants' screen based and 3D printed submissions were displayed with the original artefacts (Figure 2).

4 | LINCOLN 3D SCANS

The Lincoln 3D Scans project by the artist Oliver Laric in collaboration with the Usher Gallery and The Collection in Lincoln was also investigated as part of this research. The project started in 2012, when Laric was invited by the Usher Gallery and The Collection in Lincoln to propose an idea for the Contemporary Art Society's Annual Award for museums. Laric's proposal to 3D scan the museum collections and subsequently publish all data for free was chosen as the winning project.

This proposal led to the creation of the Lincoln 3D Scans website [3], where 3D models can be downloaded as STL files in order to be used without copyright restrictions. The Lincoln 3D Scans website includes a 'gallery', where the public can share images of the artworks they have created from the 3D



Figure 2 | Part of the (Im)material Artefacts display at the National Museum Cardiff.

scans. Users of the website are invited to treat the digital 3D models as starting points for new works and have the possibility of sharing their creative responses to the 3D models via the online gallery.

Lincoln 3D Scans is an on-going project; users are able to access the 3D scans and submit their creative responses to the Lincoln 3D Scans online gallery, remixed artworks continue to be added to the website.

5 | ARTWORKS

Overarching themes emerge from the analysis of (Im)material Artefacts and Lincoln 3D Scans. The chief personal use for digital 3D models of heritage artefacts, created by users or accessed online, is 3D printing.

The size and material of home 3D printing is often limited by the capacity of tabletop 3D printers. Most commonly, privately manufactured 3D prints take the form of miniatures executed in plastic (Figure 3). These 3D printed miniatures resemble souvenirs. While most souvenirs are bought during a tourist visit, the digital 3D models can be downloaded from the Internet. They are accessible anywhere at anytime and are no longer necessarily connected to the experience of visiting a place or seeing an original object. They are souvenirs of visits not experienced but substituted through surrogate engagement with the digital reproductions. In one sense they offer nothing but



Figure 3 | 3D Print, ScanTheWorld, from the Lincoln 3D Scans online gallery.



Figure 4 | Postcards from Mexico, Jason Rouse, screenshot from gam and overview of game map.

virtual superficiality, but in another sense they can artificially widen the user's experience of and engagement with heritage. After all, museum exhibitions are also simulations; substitutes for understanding and experiencing heritage in its original, historical context.

Unlike souvenirs, digital 3D models of heritage artefacts can be edited and personalised. With the necessary editing skill users are able to turn digital 3D models of heritage artefacts into 'souvenirs' of their own real and imagined experiences. Jason Rouse's video game *Postcards from Mexico*, for example, blends the artist's memories of Mexico with the digital 3D model of a Teotihuacan artefact (Figure 4).

Postcards from Mexico was created for (Im)material Artefacts, a playable version of the game is available for download online [4]. The game transforms the 3D scan of a Mexican mask into a navigable virtual island. Rouse drew on memories of a recent visit to Mexico, as well as on a long-standing fascination with pre-Hispanic Mexican culture to design the game.

For (Im)material Artefacts the Mexican artist Padilla created *Cantli* (Figure 5) using a digital 3D model of the same Mexican mask. He experienced this as a way of taking ownership of his cultural heritage: "I have a cultural relation with it, I feel like I am keeping

something going." Padilla felt connected to the digital model through his National Identity. He argued that even though the original artefact is now held by the National Museum Cardiff his engagement with its digital reproduction was a form of repatriation of the piece to its country and culture of origin. Since the archives at the National Museum Cardiff provided scarce information on the background of the piece Padilla undertook his own research. He approached experts from the National Museum in Mexico, and discovered that the mask is likely to have been the head of a Teotihuacan figurine, rather than a 'mask', as it is described in the museum archives. In response, he created an artwork that resembles the shape of Teotihuacan figures (Figure 5). Padilla's research led to a clearer understanding of the original artefact and his findings were recorded in the archives at the National Museum Cardiff.

Panama-born artist Ian Cooke Tapia chose to work with the 3D model of a teapot from the National Museum Cardiff, which he turned into a steam-engine toy train (Figure 6). The architectural ridge around the top of the teapot reminded Tapia of the architecture or towers and castles. By building structures around the teapot model, adding cannons, wheels, and towers Tapia turned the teapot into a fortified castle on wheels, reminiscent of the toys he would construct as a boy; "It was almost like a flashback; as a kid I would always take old items or kitchen utensils, and make them into toys." As well as paying reverence to childhood memories, Tapia's piece also draws from his lived everyday experience; he drew a connection between his teapot train and the fact that he lived "next to train tracks" at the time of its creation.

As well as paying reference to memories from the



Figure 5 | *Cantli*, Mario Padilla, 3D printed model and original artefact from the National Museum Cardiff.



Figure 6 | *Teapot Trainfortress*, Ian Cooke Tapia, 3D printed model and original artefact from the National Museum Cardiff.

past and present day experiences, artists also used the 3D models to reflect about the future. Prehistoric Poltergeist (Figure 7) for example shows a 3D model of a Homo Heidelbergensis effigy rotating in front of the snowstorm of a static television display, surrounded by flying smartphones. This short animation was created for Lincoln 3D Scans by Tom Pounder. Through it, Pounder reflects on the effects of consumer culture on the future:

It asks: in our bloated middle age, will we laugh like old software billionaires at our impoverished early experiments in simulation? Will we spot our smartphones and peripherals in the survivor's hand cart, covered in grime, in the darkness, relics from a distant era, repurposed as bat, blunt instrument, spade?

Monaghan's animation Alien Fanfare (Figure 8) presents a similarly dystopian vision of the future. The animated video, created for (Im)material Artefacts, includes 3D models from the National Museum Cardiff, alongside a spacecraft and everyday objects such as satellite dishes, a giant observation camera and a Mercedes star, referencing contemporary anxieties concerning consumerism and mass surveillance.

Monaghan's animation also blurs conceptual divisions between the organic and the inorganic. His spacecraft has biological features, such as a large gaping mouth and whip-like tail. Today, science and technology are moving towards bionic states. Researchers are developing manufactured body parts, computer chip implants, genetically engineered organs, and digital technologies, which link human brains with computers (Soper, 2003, p. 99). By including cyborg creatures and digital surveillance technologies in his animation, Monaghan taps into contemporary anxieties about

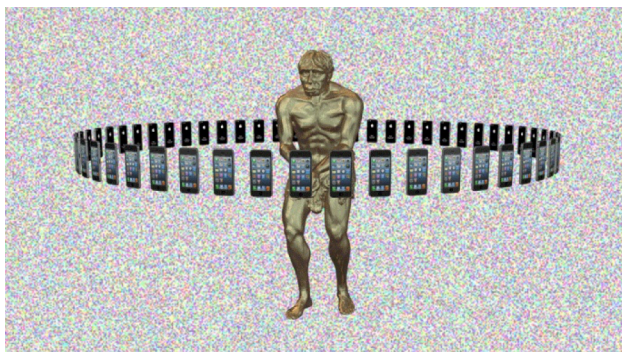


Figure 7 | Prehistoric Poltergeist, Tom Pounder, still image from animation.

where developments in digital technologies might lead. His animation uses digital 3D models of museum artefacts to create a surreal vision of the future; "I am thinking about how technology is changing us, as a society, but also as a species."

7 | DISCUSSION

During the projects discussed in this paper artists explored their relationship to the past, present and future, personal memories and associations and the relationships between technology and culture through the creation of derivative works based on digital 3D reproductions of museum artefacts. They also explored personal memories, narratives and associations through the creative transformation of digital replicas of museum objects. Participants poached and recontextualised the digital 3D models. To use a somewhat tried trope they used them as 'palimpsests' and invested them with new meaning. While this new content was often inspired by or in some form related to the aesthetic and cultural characteristics of the original artefacts, the digital artworks strayed far from their institutional interpretations. The digital 3D models remained associated with the public sphere of the museum, while at the same time moving beyond its scope and becoming connected to the private and intimate sphere of individuals. Fantasy and the imagination play an important role in recalling the past:

Past, present and future co-exist in patterns of continuity and discontinuity within the experiential manifold (...) that what has been taken over from the past is continually being revised in order to accommodate an open and continually unfolding future. (Keightley and Pickering, 2012, p. 7)



Figure 8 | Alien Fanfare, Jonathan Monaghan, still image from animation.

The creative transformation of digital heritage communicates this ever-changing nature of our interpretation of the past. It reveals the importance of fantasy and the imagination and encourages a questioning stance towards circulated images and narratives.

The trajectory of the digital 3D models used for (Im)material Artefacts and Lincoln 3D Scans has continued to extend online beyond the scope of the respective projects. 3D models from both projects were re-shared via online repositories [5]. One user who re-shared content from Lincoln 3D Scans explained that he hoped to enable other people to use the scans as a resource: "it was merely a way to show people that there were some great models online and I chose a few to edit for them to download and print."

Digital 3D imaging and 3D printing technologies, especially DIY (Do It Yourself) and open source tools, are strongly tied into digital maker culture and the free culture movement. 3D scanning, editing and printing tools and the knowledge of how to use them are part of a set of digital tools and skills which are described as 'digital craft' by Malcolm McCullough in his seminal book *Abstracting Craft: The Practiced Digital Hand* (1996). Today, the digital maker movement is a digital technology oriented extension of DIY culture and has roots in the Arts and Crafts movement of the late nineteenth and early twentieth century (Gonzalez, 2015). Through these channels, digital content has the potential to be shared widely online and can encourage imitation, creativity and exchange. Online repositories of digital 3D forms have given rise to a growing community of digital 3D enthusiasts, made up of both professional and hobbyist users.

Historically, whenever technologies evolve rapidly, access to and literacy in the new technologies become important aspects of social inclusion (Thompson, 2008). People who do not have access to the necessary digital tools or who do not know how to use them are excluded from processes that exploit these technologies. They are hampered in their ability to participate. Familiarity with digital media and tools is therefore important in personal as well as public matters. It is imperative that audiences and users are able to navigate the digital information they receive. As new social practices are emerging online, digital literacy has also become an important social skill,

which enables people to "engage in particular social practices, to assume appropriate social identities, and to form various social relationships" (Jones, 2012, p. 12). Creative engagement with digital 3D models of museum artefacts can promote digital literacy. On online 3D editing and printing theme boards and 3D file sharing websites users are able to share resources, tips and to communicate. When users begin to interact with each other 'communities of practice' can form; these can be viewed as social learning systems (Wenger, 2000). They provide a "shared repertoire of communal resources – language routines, sensibilities, artefacts, tools, stories, styles, etc." (Reeve et al., 2002, p. 164).

8 | CONCLUSION

One of the services of museums has long been to provide artists with rich material to inspire their art making. Digital 3D technologies have potential to support this function of museums. Through the creation and release of digital 3D models from their collections, museums can continue their role as sources of artistic inspiration in a digital arena.

3D models from (Im)material Artefacts and Lincoln 3D Scans continue to be downloaded, remixed, printed and shared, and thus continually engage users with digital heritage and promoting increased understanding both of the original historical artefacts and the digital materials. The investment of artists' and users' time, energy and focus in the creation of new work from these digital 3D models generates renewed interest in museum collections, attracts new audiences and confers 'on objects new value and appeal, and so is effectively a type of advertising' (Kosnik, 2012, p. 101).

The digital appropriation and transformation of heritage artefacts enables new forms of creative consumption of museum artefacts. While it engages with museums and the objects and knowledge they hold, it rejects institutional narratives and permanence in favour of personal interpretations and fluidity of meaning. While the resulting 'poached' artworks are not always of great aesthetic value, or in the best possible taste, they nonetheless engage with deeply challenging frameworks and concepts. Furthermore, they promote a critical understanding of digital heritage and increased digital literacy. Their creation

should be seen as an emancipatory, productive and critical way of engaging with heritage and a promising new method of creative museum engagement with positive repercussions for both museums and their audiences.

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ENDNOTES

[1] The term 'photogrammetry' describes the practice of creating digital 3D objects from photographic images. Due to increasingly user-friendly, freely available photogrammetric software physical access and technological insight are no longer required to create digital three-dimensional copies from photographs. See for example <http://www.123dapp.com/catch> (accessed 07.10.2015).

[2] See for example <http://www.123dapp.com/Gallery/museum/content> (accessed 07.10.2015).

[3] See <http://lincoln3dscans.co.uk> (accessed 07.10.2015).

[4] The video game can be downloaded for Windows and Mac at <http://www.jasonrouse.co.uk/#/mex/> (accessed 07.10.2015).

[5] See for example <http://www.thingiverse.com/thing:317004> (accessed 07.10.2015).

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BIOGRAPHICAL INFORMATION

Sarah Younan is a PhD student at Cardiff Metropolitan University, Cardiff School of Art and Design. She is due to complete her PhD in ceramics at Cardiff School of Art and Design in January 2017. Her research explores the potential of digital 3D technologies to foster new types of artistic engagement with museum collections. She works in close collaboration with the National Museum of Wales. The Arts and Humanities Research Council (AHRC) and the Welsh Institute for Research in Art and Design (WIRAD) fund her research.