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Museum Digitisations and Emerging Curatorial Agencies Online

Vikings in the Digital Age

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Bodil Axelsson
Linköping University
Norrköping, Sweden

Fiona R. Cameron
Western Sydney University
Sydney, NSW, Australia

Katherine Hauptman
The Swedish History Museum
Stockholm, Sweden

Sheenagh Pietrobruno
Saint Paul University
Ottawa, ON, Canada

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About the Authors

Bodil Axelsson is Professor of Cultural Heritage at Linköping University, Sweden. She researches across the fields of critical heritage studies, digital media and museology, and she has led and coordinated a series of research projects within these fields. She is head of research at Tema Culture and Society, Linköping University, and the coordinator of LiU Humanities.

Fiona R. Cameron is Associate Professor, Principal Research Fellow, Contemporary Museologies at the Institute for Culture and Society, Western Sydney University. Cameron is a pioneering figure in digital heritage studies, museum theory and museum engagement with controversial topics and climate action. Cameron has published eighty-three books and articles with leading publishers on these topics.

Katherine Hauptman , Director at the Swedish History Museum, holds a PhD in Archaeology and has a wide portfolio of experience in museum studies, education, governmental assignments and exhibition production. She has authored articles on Nordic and public archaeology, heritage studies including gender perspectives, the uses of history and inclusive museums and so on, which have appeared in many publications.

Sheenagh Pietrobruno is Associate Professor of Social Communication at Saint Paul University/University of Ottawa, Canada. She has held fellowships in England, Canada, Sweden and Austria in media, performance and heritage research. European Commission (2019) and G20 Italian Presidency (2021) invitations to present her pioneering work in digital (intangible) heritage have impacted policy.

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CHAPTER 1

Introduction

Bodil Axelsson, Fiona R. Cameron, Katherine Hauptman, and Sheenagh Pietrobruno

Abstract Curatorial agency is situated in the introduction via an elaboration of the intersection between the mission of public museums to care for collections and their increased reliance on digital capitalism's social, technical and material infrastructures for the circulation of digitisations, narratives and new research findings. We explain how this book approaches curatorial agency in four individually authored chapters, each taking its own approach to museum knowledge and curatorial agency in regard to the junction of humanistic interpretations and new materialist and posthuman frameworks. Moreover, we explain how each chapter acts as a case study that tracks objects from the Swedish History Museum's Viking Age collection to distinct technological spheres: Swedish discussion forums, YouTube, Pinterest and the vast infrastructures and destructive processes of Technospheric curation.

Keywords Museums • Collections • Digitisations • Digital capitalism • Curatorial agency • Technospheric curation • Viking Age

Museums as collecting institutions are curatorial entities. As a consequence of digitisation policies that seek to democratise culture and challenge the traditional authority of the museum, billions of images of objects and artworks from museum collections now circulate on the Internet for which

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the act of curating multiplies in many different forms. Mobilising the concept and practice of curatorial agency as a point of departure, this book develops a novel understanding of how digital mediation changes the conditions for the circulation of museum knowledge. This multi-authored book sets out to investigate curatorial actions when digitisations, commonly understood as digital images of collection items, born digital objects, narratives and research findings, circulate in global computational spaces beyond the physical confines of museums. These new curatorial agencies involve the control over the circulation of collection images as well as the power to interpret and frame historical knowledge in multifarious ways. Orbiting around objects from the Scandinavian Viking Age housed in the Swedish History Museum, the book observes how discussion forums, search engines, machine learning models and eco-systemic processes affect the circulation of museum knowledge. Because of its transnational popular appeal, its role in nationalistic agendas and its interest in new archaeological research, the Viking Age is ideal to shed light on emerging forms of curatorial agency.

We approach curatorial agency in four individually authored chapters, each taking its own approach to curatorial alliances and their objects comprising many different kinds of actors and actions that impinge on our understanding of history, museum authority and indeed how we think about collections and museum knowledge in an online environment. Taking account of the complexities of cultural, technical, economic and material forces, this book adds knowledge on curatorial operations such as collecting, categorising, selecting, displaying and knowledge-making in an era of computation and big data, and what this means for the future role of museums as knowledge producers. Furthermore, the book contributes to the development of online methods for the study of culture in global computational spaces where cultural, social and material entities are in constant flux.

We like to emphasise that the aim of the book is not to suggest an overarching theory or method for understanding curatorial agency. Rather the authors present four different approaches, or as Fiona Cameron (2019, 2021) argues, analytical/interpretative cuts as a series of humanist and more-than-human ontological figurations into an emergent field of study.

The second chapter by Katherine Hauptman is based on the author's experience of working as a pedagogue, researcher and of late as the head of the Swedish History Museum. Hauptman's method resembles an archaeological excavation of arguments in discussion forums where research on the museum's Viking Age collections is debated. Multiple

human agents present and dispute research or steer the discursive flow by what in the broadest sense can be referred to as content moderation. As archaeological research distributes across many Internet forums and media, research starts to disperse globally and curatorial agency as an exclusive domain for museum professionals becomes increasingly precarious.

Sheenagh Pietrobruno's chapter explores how Google's personalisation of searches through its use of location and language influences the narratives associated with Viking helmets on YouTube. To incorporate personalisation in the analysis, Pietrobruno conducted, in set time frames, one search on a computer set up on the Google Chrome browser that features results produced through personalisation via a constant IP address fixed to one location. A second search took place on another computer via the Tor Browser, which shifts the search site to changing locations in order to resist personalisation and identification with a given IP address and constant geographical site (Pietrobruno 2021). YouTube's helmet stories obtained via this method are then interpreted through the prism of fieldwork exploring the Viking exhibition at the Swedish History Museum, the museums' touring exhibition "We Call Them Vikings" at France's Historical Museum of Nantes as well as scholarship on the Viking Age. The methodological revision of joining two media forms exposes similar hermeneutic processes of conveying the meanings of museum objects in exhibitions and in digital objects on Search Engines Result Pages even though the first derives from the curatorial agency of human museum curators and the latter emerges via the interplay of user-generated content, algorithmic automation (including personalisation) and the platform's business models, which together produce the continuously updated streamed display.

The axis of human-machinic curation is further explored in Bodil Axelsson's chapter by the method of a long-term interaction with the content curation platform Pinterest. Its analytical framework suggests that curatorial agency is performative and shared between culturally situated humans, digitisations and the platform's machine learning models. The manifestation of this shared curatorial agency is analysed through collections of what is commonly referred to as Viking jewellery. In the collection management systems of individual museums, digitisations are compartmentalised in collections of local significance. When sourced to the content-sharing platform Pinterest, they recontextualise and move between contexts thanks to the ways in which the platform encourages its

users to link images from all over the Internet to express personal, social and cultural taste. On Pinterest, Thor's hammers, oval brooches, a pearl on a gold wire and a jewellery display recontextualise in collections of Norse Culture, Viking reenactment and collections of antique and contemporary jewellery. Key to how digitisations of jewellery attributed to Vikings mix with images from many different sources are the shapes and ornamentations of the objects as conveyed on the screen and in abstract mathematical space, acted on by the two fundamentally different faculties of human meaning-making and machine learning models' computational operations.

In the fifth chapter, Fiona Cameron presents a new materialist and more-than-human framework to theorise digitisations as ecological and compositional, and curatorial agency in novel ways, in which the latter is formulated in the very broadest sense as acting in the world involving a vastly expanded field of coordinates. In this refiguration, digitisations become more-than-digital and are distributed, non-linear, self-organising and often unpredictable and unknowable, and subject to the eco-systemic processes in which they are bound (Cameron 2019, 2021). Hence, curatorial agency is seen as executed across multiple locations and scales at times simultaneously by a diverse range of humans but also more-than-human and other-than-human actants from software, automated processes to elemental chemicals, rare-earth minerals, electrical currents and data centres and cables. The chapter argues that digitisations therefore become planetary in extent, lack any inherent framing and are so dispersed, non-identical and dynamic that they can no longer be thought of as coherent objects even though they might appear that way on an interface (cf. Cameron 2019, 63). Furthermore, digitisations become ecological compositions embedded in planetary processes intimately connected to ecological crises and climate change as Technospheric heritage (Cameron 2021). Consequently, human meaning-making, commonly theorised in terms of hermeneutics, narratives and semiotic contextualisations, are viewed as humanist ontological forms of curatorial agency and become only one form of interpretation among many possible manifestations of curatorial agency. With digital and technological advancement, the notion of the curatorial and agency becomes greatly expanded through which their histories complexify, encompassing the deep time of inter-galactic and geological formation to far futures in technofossil deposits.

Approaching Curatorial Agency

This book's explorations of curatorial agency both narrow down and broaden previous research on curatorial agency in global computational spaces. A useful starting point for positioning the scope of the research is Nanna Bonde Thylstrup's exploration of mass digitisation, which is the large-scale transformation of analogue culture into digital formats that alliances cultural memory institutions with digital capitalism. Thylstrup theorises mass digitisation in terms of complex assemblages of cultural, economic, legal and political processes. These assemblages decentre human curatorship as well as the authority of institutions and the cultural sovereignty of nation-states (Thylstrup 2018).

One effect of mass digitisation is that many museums now operate in tandem with private market-oriented corporations to mediate knowledge of cultural artefacts and experiences (Axelsson 2019a, b; Cameron 2019, 2021; Drotner and Schrøder 2013; Hylland 2017; Thylstrup 2018). In this book, Sheenagh Pietrobruno and Bodil Axelsson delve deeper into two platforms that are essentially profitmaking corporations—YouTube and Pinterest respectively—to investigate in more detail how each platform contributes to the circulation of digitisations and museum knowledge. The notion of platform, as adopted by the American tech industry, refers to digital spaces in which software is executed to steer user interaction in line with specific business models to create and capture economic value (cf. van Dijk et al. 2018, 7–26). The effects of these platforms for memory institutions (Thylstrup 2018) and for public institutions and public values in general raise many questions regarding information asymmetry, as the platforms both steer the data flows and own the data that stems from these flows, and how the platforms' automated ranking and personalisation impact on democratic processes, accuracy and accountability (Pietrobruno 2018; van Dijk et al. 2018, 137–146). The situation becomes even more complicated as the operations of single platforms entangle with other platforms through the sharing of data as the platforms are joined in an ecosystem owned by American-based supranational media companies, which operate across Europe, Northern America, Africa, Latin America, Australia and South East Asia (van Dijk et al. 2018, 26). This ecosystem is commonly theorised in terms of social and technical infrastructures, but in her chapter, Fiona Cameron argues that these infrastructures or social-ecological systems also need to be considered as a vast

planetary-scale system which produces geological imprints on a global scale (Cameron 2021, cf. Parikka 2015).

The effects of the operations of digital capitalisms' social and technical infrastructures for curatorial agency have been exposed and reflected upon by contemporary art curators (Lowry 2020). In the contemporary art scene, the notion of curatorial agency specifically refers to critical, creative and often collaborative interventions in culture, science and politics (Martinon 2013). Within this expanding and diverse field, the rise of networking platforms and their ubiquity in everyday life has prompted both interventions and theoretical discussions founded on the observation that curatorial actions became more widely distributed, not only between multiple humans but also between humans and machinic agents such as software automating selection and display (Cameron 2008; Dekker and Tedone 2019; Krysa 2013; Tedone 2019; Tyzlik-Carver 2016).

Undeniably, the all-pervasive reach of digital media reconfigures what curatorial agency implies today. Yet when discussing these reconfigurations in relation to museums, it is essential to bring up the history of curation in this domain. Even if museums are a diverse group of institutions varying in terms of the nature of their collections, mission, history, size and policy environment, they do have in common that they store, study and display collections of material and immaterial heritage for the benefit of the society. Historically, curation was associated with the custodial function of museums. Curators were the caretakers of collections. In this sense, the word curation retained some of the meaning in its etymological origin in Latin "curare", to look after, and also its connection to how the word then was associated with the overseeing of public infrastructures in Ancient Rome (Buckley and Conomos 2020, xxvi). In contemporary museums, curatorial agency may encompass a broad range of tasks, such as selecting and displaying artefacts to convey meaning, evoke a response or facilitate discussions. Curatorial actions may also involve securing funding for exhibitions, doing research and orchestrating collaboration within and outside the museum. Notably, curatorial agency is embedded in specific institutional histories and context-bound contemporary cultural policies (Norton-Westbrook 2015), as well as under the influence of international organisations such as the International Council of Museums (ICOM) and its conception of museums' relation to society.

The Confluence of Museums and Societies

Often the relation between museums and their societies is conceptualised in terms of a development from authoritative institutions educating and civilising populations to become national citizens, to the more inclusive or multi-vocal new museology with socially motivated and inclusive museums (cf. Robinson 2020). However, in ICOM's museum definition and the organisation's ethical codes, museums' dual commitments seem to coexist as two intertwined epistemologies that have implications for the ways in which curatorial agency emerges.

The first epistemological position is the notion of the autonomy of scholarly approaches. Curatorial agency, in terms of developing knowledge on collections from an institutional point of view, should ideally be based on specialist knowledge of museum disciplines such as archaeology, ethnology and art history. Preferably, curation in the sense of knowledge-based caring for collections also includes professional knowledge on safe storage conditions, ethical and legal issues regarding culturally contentious collections, copyright legislations and safety regulations for hazardous materials (cf. ICOM Code of Ethics for Museums). Important for the topic of this book, the care of collections on a professional basis includes digital registration, which increasingly involves adhering to information standards that allow for machinic processing and cultural dissemination of images and documents beyond the individual cultural memory institution (Thylstrup 2018).

The second epistemological position is the notion of the relevance of museums depending on the intertwined structures of museums and their communities. This standpoint is based on the values of equal human rights, freedom of speech and mutual understanding, as well as the need for ethical approaches concerning cultural heritage. Since the 1980s this democratising imperative of museums has been adapted and realised by the many museums that work strategically within a "new museology" framework (cf. Vergo 1989). From this vantage point, curatorial agency should ideally be shared with stakeholder communities and grassroots movements, not previously represented in museums (Robinson 2020, 472). One of the major motivations for reconfiguring curatorial agency in this direction came from the quest for the rights of indigenous communities in regard to collections with colonial or imperial legacies held by museums of ethnography and anthropology. The ongoing, complex processes of museum decolonisation have been immensely influential for

rethinking the curatorial as a relational process with stakeholders (Harrison et al. 2013; Schorch and McCarthy 2019, 7–8), raising profound questions regarding what kind of knowledge and whose knowledge is engendered by digital access to collections (Agostinho 2019, 145). As Bernadette Lynch (2020) points out, the reconfiguring of curatorial agency as shared and relational has tested the human rights–based museum practice to the limits and exposed the difficulties for museum professionals to establish inclusive relations that bridge educational, economic, class-related and racial divides.

Today many contestations of museums' authority and power take place in digital spaces such as social media and blogs in which museums find their displays and interpretations challenged, for example, by gender or decolonial activists (Giannini 2019). Actually, the advent of Web 2.0 and social media turned into a significant inspiration for rethinking museums' curatorial agency. Taking inspiration from the emergence of a participatory and social digital sphere, Nina Simon launched "the participatory museum", a manifesto for rethinking curation and a practical guide for museums to invite the public to develop new ideas around collections (Simon 2010). In the 2010s, open collection management systems and social media platforms like Facebook promised to support a more democratic museum culture (Kelly and Russo 2010; Russo 2012). The rationality for digitising collections and distributing images on multiple platforms rested on a notion that audiences outside the museum had agency in terms of being active, creative producers of knowledge when they collect, archive and share digitisation in peer-to-peer networks (Russo 2012, 152; Sanderhoff 2014, 23). Museums in the Global North that have had the economic resources to launch digitisation programmes now seem to be at a point when they see their audiences in terms of individuals or "actants" (Parry 2019). Collections are digitised and interfaces are designed to encourage users to create personal, social and economic values out of museum collections (Parry 2019). This means that collection-based knowledge is open for multifarious interpretations, the imagining of all sorts of communities through objects as well as the creation of economic value, for example, by using museum objects as models for new products.

The sharing of curatorial agency by museums thus has multiple and sometimes competing origins and philosophies. Importantly, curatorial agency is tied to the care of collections and is highly dependent on the nature of the collection, its age, the historical value it has accrued over time and not least how it connects the museum to society.

Caring for a Collection Attributed to Vikings

In this book we deal with the Swedish History Museum's collection of Viking Age objects and especially with digitisations, born digital objects and knowledge actualised by new research on old finds. For the museum, the care, study and display of a collection commonly attributed to Vikings pose particular challenges, many of which relate to the popularity of the phenomena and its historical and contemporary use to legitimise national sentiments or even extremist beliefs regarding indigeneity in Europe. Today the phenomenon of Vikings has turned into a catch-all phrase to denote all sorts of stories and symbolic meanings attached to the diverse group that populated Scandinavia in the late Iron Age, even if many archaeologists now recognise that, at the time, the word "viking" was probably limited to its grammatical use as a verb to refer to embarking on trading and raiding expeditions or to the actions of the small minority of people living in Scandinavia at the time who went on these journeys (Andersson 2016, 13–14; Driscoll 2019).

Stories of Vikings have long been part of a complex traffic between museum exhibitions, archaeological research, literature, art, tourism and various strands of popular culture (Williams and Clarke 2020). Today there is a steady rise of documentaries and fictional series on globally spanning commercial pay television networks—HBO's *The Vikings* is probably the prime example—and books on Norse mythology are bestsellers. Viking symbolism and the ways of life associated with the Viking Age are also used for branding both places and products (Birkett and Dale 2019). In addition to museum exhibitions that evolve around original archaeological artefacts, there is an abundance of Viking-themed heritage centres in Scandinavia, Poland, Russia, the UK and Ireland that evoke the period with reconstructed buildings and ships, inviting both visitors and reenactment societies to relive the Viking Age (Halewood and Hannam 2001; Karpińska 2019).

Since the Viking Age is perhaps the most researched period by archaeologists in Scandinavia during the more than 150-year history of professional archaeology, finds have been imbricated in subsequent analysis of artefacts as evidence of spatial and temporal patterns of diffusion or as clues to social roles (Trigger 2006). The discipline's knowledge of the Viking Age develops from contextualising interpretations of excavations and finds of material objects and human remains, taking account also of written sources such as runes, the Icelandic Sagas and literary sources such

as Ahmad ibn Fadlan's encounter with Vikings in the Muslim world (Andersson 2016). Archaeological knowledge has been part of creating many of the nationalist and gendered tropes that inform the popular understanding of Vikings today. In the midst of nation-building processes, nineteenth-century Scandinavian archaeologists contributed to the establishment of the Viking Age as a distinct phase in three different national histories, whose principal citizens were Danes, Swedes and Norwegians (Svanberg 2003, 50). In addition, generations of archaeologists have attached modernity's two-sex binary and its associated division of labour to archaeological finds (Moen 2019, 87), for example, by the ways in which gender gets mapped onto and articulated through tropes such as the male warrior and the female domestic leader.

The latest contributions to research tend to reframe former truth claims about national myths of origin, trading patterns and the gendered division of work during the Viking Age. This reframing of research often draws from scientific analysis of ancient DNA (Margaryan et al. 2020), stereoscopic scanning of material objects (Wärmländer et al. 2015) and genomic analysis of human remains (Hedenstierna-Jonson et al. 2017). Due to the popularity of the Viking Age, it is not uncommon for new archaeological research on these topics to go viral in intricate connections between publications in prestigious scientific journals, university press releases, websites for science news, traditional media outlets, social media and Internet forums (Källén et al. 2019). There seems to be a hyper-circulation of archaeological knowledge in digital space, especially when research findings tie into questions regarding the myths of origins and ancestry in late-modern diverse societies (Bonacchi and Krzyzanska 2021). Consequently, it is highly relevant to develop theories and methods to understand online engagement with archaeological topics (Bonacchi and Krzyzanska 2019; Richardson 2019) and the circulation of digitisations and born digital objects (Zuanni 2017, 2020).

Together, the four chapters in this book approach the dispersal of archaeological knowledge through the tracking of research findings, narratives, born digital objects and digitisations from the Swedish context via American platforms to the vast Technosphere. In this way this book casts light on the ways in which curatorial agency and its objects—tools, weapons and other artefacts, the Viking helmet, jewellery and the Allah ring—usurp, reconfigure and qualify museum epistemologies of authority and democratisation to both reinforce established cultural meanings and produce new emergent interpretive paradigms for these collections.

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CHAPTER 2

Curatorial Challenges: Discussion Forums and Fragmented Narratives

Katherine Hauptman

Abstract This chapter explores discussions surrounding research on the Swedish History Museum's collection of Viking Age objects on Internet forums, blogs and digital news media during the period 2004–2020. It argues that there has been a clear escalation of questioning, confrontational and antagonistic reactions directed at research that brings into question issues of nationhood and stereotypes of gender roles and power. The discussions evolve around disagreements that focus on details rather than historical synthesis and quickly escalate into hostility, personal attacks and distrust in academic expertise. The debates cast light on the pedagogical challenges the museum face to synthesise and contextualise research to nuance conversations and fulfil its governmentally assigned task to promote knowledge and interest in history.

Keywords Museum • Collections • Research • Antagonistic • Distrust • Pedagogy • Female warrior

The Swedish History Museum (SHM) in Stockholm, Sweden, has repeatedly been the subject of opinions, debates and value judgements (Bergström and Edman 2005; Hegardt 2012; Svensson 2014). Along with several other museums, the SHM is presently under the aegis of an

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agency tasked with promoting knowledge and interest in Sweden's history as a matter for all people in society. The collections area of the SHM includes archaeological material and ecclesiastical art history. For the past fifteen years, the museum has had the stated ambition to engage in dialogue over its collections and exhibitions, for example, within the field of public archaeology (cf. Hauptman and Svanberg 2008; Hauptman 2015).

Meanwhile, many colleagues have noted changes and constraints in their professional roles in daily operations. More common is the aggression directed at new research, and particularly noticeable with regard to the research on the Viking Age that brings into question past stereotypes of gender roles, sexuality, power and violence (Hauptman 2014). Other controversial themes include Scandinavian contacts with the Islamic world and issues of nationhood and Swedishness (Svanberg 2016b). The situation at the SHM can be attributed to the broader, increasingly polarised discourse on the value of heritage and the functions of museums in contemporary Sweden (cf. Zabalueva 2019). This polarisation has led to it becoming more difficult to live up to the museum's ideal of ensuring space for the multiple voices, complex conditions and disagreements over interpretations of archaeological evidence, that is, granting the museum a civic or "congregant space" that can bring communities together, even as opinions diverge (Gurian 2006). This polarisation can be linked to broader societal changes in the field of cultural heritage that have escalated after the entry in 2010 of the Swedish Democrats (SD) into parliament. Aligning with right-wing movements in Europe and the Nordic countries, SD advanced culture in terms of an inherited, distinctly national way of life that is under threat from immigration, integration policies and intellectuals advocating multiculturalism (Gustafsson & Karlsson 2011; Niklasson and Hølleland 2018).

Against this background, this chapter explores the discussions surrounding research in the SHM's area of expertise and its collections on Internet forums, blogs and digital news media. It is grounded in the practical work at the museum and the observation that the dynamics of digital conversations have shifted over a fifteen-year period. This also follows the development of societal debates, in which antagonistic confrontations appear to be on the rise, all the while the conditions for the advancement of dialoguing are decreasing.

In this chapter, I will give examples of the appeals, opinions, discussions and debates that mainly concern the Viking Age and that have ties to the SHM during the period 2004–2020. My purpose is to draw attention to the curatorial challenges a museum may face when archaeological knowledge becomes a force in an increasingly polarised public debate. The focus

is on the contexts in which interaction or dialogue occurs. The analysis does not delve further into the issues themselves but concentrates on patterns of communication.

In following an extended period of changes in the digital discussions over the Viking Age, I have chosen a method that might even be compared to an archaeological investigation. I dig up examples, look for keywords and arguments, or, if you like, fragments and clues, to interpret the context of the discussions and how the actors involved curate the theme through their interactions. The text reproduces only a few quotes, in part because they are in Swedish; in part so as not to repeat sexist, misogynistic or discriminatory language; and in part to maintain anonymity for the contributors (cf. the discussion about ethical challenges in digital spaces, see Richardson 2018).

In order to indicate the trends developing over time, the investigation will start on the Archaeology Forum, where discussions about the Viking Age and the SHM have been given voice in the form of an exchange between professionals and informed, interested amateurs. Visible traces of posts that have been moderated and references to events beyond the current thread also turn up here. This type of forum is preserved like archaeological relics that have been permanently abandoned but which have an afterlife, as people return to understand them in their previous contexts. The method is also comparable with netnography, ethnographic observations of digital communities and conversations through their generated material in order to interpret social interaction (Kozinets 2010; Pink et al. 2016). Some of the dynamics in the discussions can be traced through posts, replies and references to moderation; it is also possible to follow how the conversations have changed during the forum's active time between 2004 and 2015.

In the period 2010–2015, discussions about the Viking Age shifted to different types of digital spaces, often distinguished from one another by participant, ideology and content focus. The analysis in later parts of this chapter, therefore, turns to the SHM blog about the Viking city of Birka and the museum's digital Birka portal, both containing extensive material on the Viking Age. This is followed by discussions on the Archaeology Forum from the last years before closing in 2015 (Swedish: Arkeologiforum). This is placed in relation to the extensive discussions about the Viking Age and the SHM on ultranationalist news sites and posts on Flashback, one of the largest digital forums in Sweden. To cast light on the developments in recent years, an extensive debate that flared up in 2017 over a research article about a Viking Age grave at Birka is discussed.

Archaeology Forum, 2004–2009

May 2015 marked the closing of the digital Archaeology Forum, which for eleven years had functioned as a non-profit discussion forum for members (Arkeologiforum in the References). The forum then held 78,730 posts on 5954 topics written by 2608 members. Archaeology Forum can still be read in open guest mode, but no new posts can be entered since 8 May 2015.

The language of the forum was Swedish and in some cases Norwegian or Danish. In practice, significantly fewer than the number of registered members has been actively authoring their own posts. The forum is still often visited for reading more than five years after closing, although posting or membership is no longer possible. According to the site's counters, the greatest number of users, namely 513, to be simultaneously online occurred on 1 December 2019.

The theme Iron Age/Viking Age has far more posts and views than other topics on the Archaeology Forum. Many of these were written in relation to excavations and new finds, while others were more generally about events related to societal changes, nationhood or mythology. Between 2004 and 2009, many of the posts disclose the museum and profession to which the writer belongs or has experience from, or whether the student analyses specific archaeological or osteological materials. In some cases, members are totally open with their identities and sign posts with their names. Some are slightly anonymised, but details from their everyday lives remain, such as that they explicitly state that they are women (while men do not divulge their gender in the same way), that they are part of a certain work group or that they are students in a particular academic environment. Other members are informed, interested amateurs, which some divulge in their posts and in connection with questions to which they want professional answers.

During this period, the Archaeology Forum acted as a semi-professional environment that captured themes of interest in the broader context of society and the museum sector. Especially during the forum's first year, there were discussions about museums, exhibitions and digital resources, something that then decreased or disappeared completely. None of the museum threads among the forum were livelier, but questions about digital resources, exhibitions, programme items, management and working environment at museums occurred.

Separate Forums: Different Viking Ages, 2010–2015

In the years 2010–2015, the debate climate on the Archaeology Forum hardened (Arkeologiforum). In the same period the SHM's then-new blog about the Viking city of Birka generated only the occasional comment. Meanwhile, full-blown aggressions were voiced on ultranationalist sites, such as Avpixlat, or in forums that marketed themselves as "safeguarding free speech, and actively defending freedom of opinion and expression", such as Flashback.

We begin where many archaeologists and discussions about the Viking Age have begun. The proto-urban community Birka, on the island of Björkö in Lake Mälaren, Sweden, is one of the most iconic sites dating from the Scandinavian Viking Age. The place was densely populated and characterised by extensive craft and trade activities, encounters and knowledge exchanges between people and cultures, as well as with warlike and defence-related elements. There are also manifestations of power and vast burial grounds with thousands of buried people who had various social roles and multiple geographical connections (Andersson 2016).

Objects from Birka are among the most in demand in the SHM collections. There is a long tradition of differing interpretations and debates about Birka; indeed, interest has not diminished over the years. The SHM Viking Age collection contains extensive material from Birka in particular, in part because some of the ancient remains on Björkö were excavated as early as the nineteenth century. Many of them have formed the SHM basic exhibitions for decades. They have also been lent to other museums, published in countless scientific and popular science works and used in films and documentaries about the Viking Age.

Much work has been done to care for older excavations and to create a context from the materials there. In line with this, the Birka Project at the SHM was launched 2011. The project lasted for several years and included, among other things, an archaeological investigation of a grave at Birka, which yielded new findings showing that older investigations were often incomplete, as well as a digital portal to all Birka material (Birkaportalen). Started in November 2011, the project's blog has been accessed several thousand times but has garnered few comments, mostly from colleagues (Birkabloggen). Thus, the blog remained essentially a one-way conversation. This is probably due to the posts describing the project's activities, rather than discussing the new research findings. The project also communicated via social media. At the time of research only a handful of posts on #birkabloggen were traceable on Twitter and Facebook. They all had

the purpose of directing readers to the blog, the text conveying a tone of inviting everyone to join in. None resulted in comments, but they were shared a few times and received some likes. This is an example of how information and discussion respectively have been split onto different spaces, making it difficult to follow the complexity of the reception of a research theme. The results of the Birka project are further discussed in academic contexts and not linked to its digital spaces, which were used for informative purposes during the active project period, rather than for connecting to other Birka discourses.

Let us now return to the Archaeology Forum during the same period. In its last year, the voices that had previously written posts and replies in their professional roles were silenced. Professionals were probably still involved in the discussions, but references that place members in organisations and special projects were reduced and almost completely eliminated. This could be construed partly as the development of other channels for more personalised semi-professional exchange on Facebook, for example, partly because there would be a shift where the organisations communicate more officially on social platforms, requiring a clearer division between what is said privately and professionally, respectively. During the same period, discussions on the Archaeology Forum became harsher in tone. It was also no longer possible to identify any women who authored posts. Probably women still participated, but they no longer stated their gender or revealed details about their identity in other ways.

In a discussion thread on the Archaeology Forum from 2009 to 2010, an increasingly antagonistic attitude to established museums and, to some extent, researchers emerged. The thread included several misogynistic posts focusing on gender and gender issues (man, woman or Odin in women's clothing?). The debate was sparked by a silver figurine, two centimetres high, which shortly beforehand had been found in Lejre, Denmark. Wearing a robe, the figurine has a pearl set around its neck and sits on a throne flanked by two birds (Fig. 2.1). Archaeologists interpreted the figure as Odin, one of the Æsir gods. The thread discussed the question, "Man, woman or Odin in women's clothing?" Writers on the Archaeology Forum disagree or were unsure whether it was Odin, Freya, Frigg or an unnamed man or woman. They proffered detailed factual arguments, comparisons with other objects, including some from Birka, and references to what different archaeologists believed. Despite the disagreement, the posts initially stuck to the issues but were skewed because the figure is a woman. Nevertheless, even when someone's tone was a little

Fig. 2.1 Odin from Lejre, 900 CE, Roskilde Museum. Licensed under the Creative Commons Attribution-Share Alike 3.0 Unported license. https://commons.wikimedia.org/wiki/File:Odin_fra_Lejre.jpg

too harsh, the thread was kept clean from personal attacks. However, the longer the discussion, the further it distanced itself from the figure.

For reply #55, the moderator has gone in and altered something, but it is not possible to track exactly what this is, and the discussion continues. Reply #156 shared the link to a lecture at the SHM, "Odin, a god in dress and other ancient transgressors". The reference to the SHM was met directly by reply #157 which stated, "Sounds very queer and PK." The same thing happened to reply #167, with someone informing about a "Danish" interpretation that seemed to be supported by both the Roskilde Museum and the National Museum in Copenhagen. This was met with

antagonistic comments in reply #169, "Which then clearly shows that some have interpretive precedence, a very serious scientific deficiency … here maybe the gender perspectivists could win a couple of points!" and reply #170, "Hair-raising Danish interpretation."

Here, a clear dividing line emerges between the forum discussion's own framework, whose community granted space for different interpretations between the members, and the distrust of what public institutions and established researchers convey. Several commenters testified to the need to downplay academic credibility.

At this time, employees at the SHM were not participating on the Archaeology Forum and most did not yet have particularly active accounts on social media, although these began to be launched more widely in 2009 and 2010. This was the time that some debates about the SHM flared up on another digital forum, Flashback. Flashback was long Sweden's largest digital forum, whose topics spanned from gossip, sex, private investigation, conspiracy theories, politics, spirituality, culture and media to history, science and technology. Flashback has many times been criticised for the aggressive tone in its posts and for spreading hate speech (Bjurwald 2013; Svanberg 2016a). From time to time, the site has been shut down for violating Swedish law. It is currently partly located in the USA and the UK, but according to its own sources seeks to be run in its entirety from Sweden. The forum stands out by the ways it allows for diametrically different opinions and interests, and despite its now old-fashioned functionality and design, it remains active.

On 1 August 2011, the thread "The Swedish History Museum: a thousand years ago there were no Swedes" was started on Flashback and the introductory post generated 208 replies in four days. The starter refers to an article on the ultra-national site Nationell.nu that raged against the sign introducing the SHM exhibition Vikings. The article on Nationell.nu tried to rouse hateful, racist and sexist call-outs, implicit and explicit, of the museum and its staff. Nationell.nu was closed down and resurfaced a few times, but it no longer exists. A quote from the original article still on Flashback reads, "Further into the exhibition, we saw a black woman in Viking clothes, texts about multiculturalism and an opportunity to 'confront our prejudices' regarding starting a family and learn that a 'family can look any way'" (The Swedish History Museum: a thousand years ago there were no Swedes, 1 August 2011). These words led to a long stream of posts that could be deemed racist and sexist. In the thread's discussion of the initial question regarding the name of groups of people during the

Viking Age, a time when there was no nation called Sweden, there are some more nuanced posts, which try to argue around the substantive issues of societal change and nationhood.

Issues of Swedish nationhood often kick-start antagonistic discussions. On the Archaeology Forum, a thread started in 2012 on "Viking history and nationalism" to discuss a new book on the subject. The thread has 162 replies and has been read 30,340 times. In reply #27, the moderator intervenes, writing:

> I have now weeded out the most obvious off-topic posts in this thread. Immigration policy, etc. must naturally be discussed, but there are plenty of places on the Internet where this can happen. Let's stick to archaeology and history here. Of course, the boundaries can be blurred, but let us at least try to stay on the right side of the boundary. Anyone who wants to discuss this moderation is welcome to contact me via PM. (Viking history and nationalism, 21 September 2012)

In the discussion thread, anger is directed at how the Swedish National Heritage Board and the visitor destination Birka Museum have worked with inclusive perspectives along with the then active multicultural magazine *Gringo*. The collaboration concerned an exhibition that posed the question, "Is the Viking alive?" The exhibition addressed stereotypes about the Viking Age from a use-of-history perspective, an approach welcomed by some researchers but controversial to others. In a review in the popular science magazine *Forskning & Framsteg*, strong criticism was levelled at the exhibition (Höjer 2006). The review was used several years later, among others by Nationell.nu and Flashback in their ultranationalist, antagonistic texts. It emphasised how cultural heritage institutions systematically aim to eradicate Swedish identity through their work with history. Thus, opinions took a turn that based directly on people's desire for a unified identity and a traceable origin today. The critique of pluralistic interpretations of Viking Age societies is not believed to be founded on the demonstrable conditions in the past but on present-day associations. From around 2012, this is clear not only in various opinion forums but also in the concrete lines of reasoning around research on the Viking Age.

The Viking Age has long had links to ultranationalist environments and their traditions of ideas. Fredrik Svanberg has analysed these issues based on comments in connection with the article "Propaganda Hostile to Sweden at the Swedish History Museum's Viking Exhibition" (Svanberg

2016a which refers to Avpixlat 2013-03-29). The comment thread on Avpixlat was filled at a rapid pace with 843 posts, most of which had hateful, discriminatory content (Svanberg 2016a). The article dealt with the same ultranationalist issues as the above-mentioned Flashback thread. Here, however, were a few comments that tried to put forward factual arguments and correct inaccuracies in the thread. It had a temporary dampening effect on hatred, but these comments were also met with harsh personal attacks, and the antagonistic posts continued.

Before about 2015, there was a significant difference in comments on right-wing extremist channels and what was written in the mainstream media, on semi-professional forums, or in the Swedish History Museum's digital channels. Hateful and aggressive posts appeared, but you often had to look them up on specific platforms.

The thread that would be the Archaeology Forum's last clearly illustrates a development over several years that signifies a hardening debate climate and increased workload for the administrators, as discussion threads were increasingly filled with antagonistic and discriminatory posts. The administrator's post one month before the closing date explains their decision:

> After a long period of reflection and discussion, we have made the decision to close down the Archaeology Forum. The forum has been around for 11 years and we have always been an active forum, which of course is positive in itself. In recent years, however, the forum, for us, has mostly been a source of negative energy and too many conflicts…. As for us who run the forum full-time, we will instead spend our spare time on something that creates positive energy. Sometimes you simply have to choose what is best for you, so we ask for your understanding. (Archaeology Forum closes, 6 April 2015)

The thread received 106 posts, which have been read over 44,000 times. Some understanding of the decision was expressed by several members who chose to reply in the thread. One wrote that they "now have decided to leave the forum just because of these elements" (reply #5), which indicates that several users have perceived the same hardening conversational climate as the administrators. The same member expressed a desire for tougher moderation to "avoid 'private moderators', who have abused the forum, ridiculed dissenters and of late slowly destroyed it". The member also made suggestions for how moderation could work with warnings and suspensions (reply #47), but also expressed some concerns

about opinion registration on other forums, which they had now turned to (reply #60).

In reply #15, an antagonistic question about hidden agendas appeared for the first time. Here the writer wondered whether there are economic reasons behind the shutdown, or if it is the "cultural policy issues" that are controversial. This led to a response from the administrator which made it clear that they have run the forum non-profit and that the economy has not been a factor (reply #19). The same post stated that the administrators would not pass the forum on to someone else to continue running the discussion threads. This is because at present there was no one to entrust it to. Meanwhile, one member submitted the proposal that those who want to can continue the discussions at the Scandinavian Archaeology Forum, something that several announced they would (Swedish: Skandinaviskt Arkeologiforum). Afterwards, the discussions moved to the Scandinavian Archaeology Forum, where the moderation and rules are described as tougher.

A number of usernames on the Scandinavian Archaeology Forum are the same as on the Archaeology Forum and the exchanges between them are recognisable, but the texts are more restrained, probably due to the stricter regulations for what may be published (Skandinaviskt Arkeologiforum in the References). There is a special thread under the heading "Tinget", where "warned" and "prosecuted" are published along with the alias in question, but without the detailed arguments and evidence according to the forum's rules. This is an example of an arena with clear regulations for how the members should behave in the discussions, which is common for forums and websites with comment functions.

Antagonistic Argumentation, 2016–2020

Topics such as power during the Viking Age, its ideals of war, the roles of women and men, and transnational mobility and influences between cultures and traditions have been the focus of antagonistic debates since the 2010s. This is now noticeable both in museums' own channels and in forum threads and mainstream media. Museums in Sweden are more publicised than ever. This applies certainly to other phenomena, as research, reports and opinion articles are widely circulated in the daily press on the Internet. Their presence in the news service strengthens the museums' roles in current societal issues and certainly calls for more debate, which many museums have long demanded. However, few museums and staff

have been prepared for the kind of antagonistic input that has grown increasingly common.

To provide context, this section deals very briefly with a museum debate that was conducted in the media and mainly on editorial and debate pages in Sweden during 2016–2017. It elucidates a break in the public discourse in Sweden, in accusing museums and research of being run according to hidden agendas. This is not reducible to reviews on how museums communicate about art, history and society, but criticism that they are perceived to push political issues.

The dynamic in the so-called museum idea debate was antagonistic. There were few posts that explained the contexts of museum development or nuanced the background of the museum operations that were now criticised for working with inclusive perspectives, gender research and norm criticism, human rights and minority groups. It was repeatedly implied that the museums' purpose is to influence party politics or that the museums are so governed by the current government policy that the credibility of independent research has been eroded (Högberg 2016; Bernsand and Narvselius 2018; Gustavsson 2018; Zabalueva 2019).

This debate concerned physical museums but was conducted digitally. Several of the debaters referred to digital information about exhibitions that they themselves had not visited or to anecdotal comparisons between various kinds of cultural operations. Although the arguments were often about the importance of academic knowledge, the debate was not always conducted with first-hand experience of all the conditions described (Högberg 2016). It also became clear in retrospect that the debate may not have been as fired up as it seemed. Many posts were written by individual debaters or rewrites between newspapers in the same group of owners. The articles that tried to fit the work of museums into a history of research and argued that more perspectives generated more knowledge or suggested that the museums' problems were more about economic conditions than lack of expertise were shared to a much lesser extent than the articles that questioned museum operations.

Debating Female Warriors

In archaeology, graves containing weapons have been hotly debated over the years, as has the presence of female warriors. Interpretations differ. How exactly should a warrior be defined and what objects are indicative of belligerence rather than labour, craft or power symbolism? Traditionally,

sex, gender patterns and social roles have been interpreted on the basis of relationships between grave's form or superstructure, the human remains, the buried person's personal objects and clothing, grave gifts and traces of the rituals performed (Fig. 2.2). Although extensive archaeological gender research (e.g. Gero and Conkey 1991; Stig Sørensen 2000) has drawn attention to the need for revisiting preconceptions about gender roles in the Viking Age, traditional paradigms remain active.

Based on the known material, the warrior role has been interpreted as primarily belonging to male spheres. At the same time, women carry weapons in the Old Norse sagas, giving reason to problematise archaeological gender assessments based on grave goods. On the Archaeology Forum, this topic was discussed in the threads "Female warriors in Ireland and in the Nordic countries?" in 2011 (42 replies) and in "Female 'warrior graves'—what do they mean?" in 2014 (127 replies). A thread from the period 2007–2008 has only five replies: "Shield-maiden, myth or truth?" A post in this thread recommends a visit to the exhibition "Prehistories" at the Swedish History Museum, which problematises stereotypical gender assessments based on archaeological objects.

Themes concerning women's roles in connection with weapons and warrior equipment during the Viking Age have attracted attention in many

Fig. 2.2 Personal belongings and/or grave goods in grave Bj. 581 at Birka, as they were exhibited in the exhibition "We Call Them Vikings". SHM. Licenced under Creative Commons CC BY 2.0

contexts without being further explored or particulary debated. But when an article entitled "A Female Viking Warrior Confirmed by Genomics" was published in the *Journal of Biological Anthropology* (Hedenstierna-Jonson et al. 2017), something changed, and the title immediately went viral (Källén et al. 2019; Williams 2017). Posts on social media and brief rewrites about the results were often accompanied by a line drawing of the grave from the article, which was republished in many media across large parts of the world. Researchers, as well as media houses and the general public, shared articles and notices that refer to the researchers' new findings. After the first days, those who quickly engaged split into two camps: those who welcomed and applauded the news, often with reference to feminist points of view, and those who were critical and questioned the results, from either a research or a political perspective.

The self-assured article title probably plays an important role in how the news was communicated in wide circles internationally. The statement is easily accessible and clear but avoids the complexity both in determining gender and in the concept of warrior (Källén et al. 2019). The article presents scientific analyses in a journal of biological anthropology and with a long line of authors for a short text that mainly reports laboratory results (Hedenstierna-Jonson et al. 2017). The cultural-historical syntheses are less elaborated, but the results were publicly translated into far-reaching interpretations that deal with societal roles, status and ideals in Viking Age society. These conditions are probably some of the things that provoked well-known archaeologists to criticise the study with great force (e.g. Jesch 2017; Williams 2017).

One factor that seems important for the large and critically held commitment to the article is that it concerns an iconic grave. The original excavation was carried out by Hjalmar Stolpe in the nineteenth century, an archaeologist and ethnographer who examined many graves that have provided important material for the SHM collections.

The dramaturgy of how the article "A Female Viking Warrior Confirmed by Genomics" was received can be divided into three waves. The terms "female" and "warrior" were in focus, but often without direct references to gender studies. First, the news flew around the world in the daily press as a positive sensation (news articles, shares on Twitter and Facebook) and then came criticism from research colleagues (e.g. blogs) over the lack of problematisation, as well as aggressive questioning of results and casting suspicion on the intentions of the research group from trolls and right-wing extremists (websites, forums and sharing on social media). The third wave also includes a number of positively held drama documentaries to

bring warring women to life, often with dramatised parts interspersed with interviews, which obscures the boundaries between fiction and research. In the last two years, the SHM has received numerous requests from filmmakers in different countries to gain access to the material from grave Bj 581 and to comment on the various interpretations.

Several archaeologists authored posts in their own social media with arguments that questioned the results of the published article, while others commented in the media. It can be noted that few entered the debate in order to support the research group's arguments and the published article—this follows the paradigm of the above-mentioned museum debate that took place in Sweden.

Stockholm University published a film on its website and on social media to make the results more accessible and to provide answers to some of the critical questions that have arisen (Fig. 2.3). The film's teaser was entitled "The Birka Warrior Was a Woman" in Swedish and "An Officer and a Gentlewoman from the Viking Army in Birka" in English. The Swedish ingress states, "The study is the first of its kind that can show genetic evidence that the warrior profession was open to women during the Viking Age." The text also describes the woman as an officer. The film begins with dramatised scenes that show Vikings attacking from ships, with the text "The fierce Viking Warrior—a role always assumed to have been for men. But new research has determined that one Viking Warrior grave did not belong to a man."

This is followed by a research interview with Hedenstierna-Jonson, who in many ways deflates the far-reaching images from the introduction.

> The facts are that it's a richly furnished grave, it contains a complete weapon set, and within this grave, and very central in this grave, a woman is placed, in a dress that is not typically female. By her feet there are two horses. These are the facts. Then comes our interpretation. (Hedenstierna-Jonson 2018)

However, the title and the details of the introduction have a much greater impact than the attempts to distinguish between material evidence and interpretation in the interview. In sum, communication is contradictory. On the one hand, the implication of the warrior role would be that it could also be held by women. On the other hand, it is made clear that the study is only on one grave. In terms of communicating the research, it is therefore unclear.

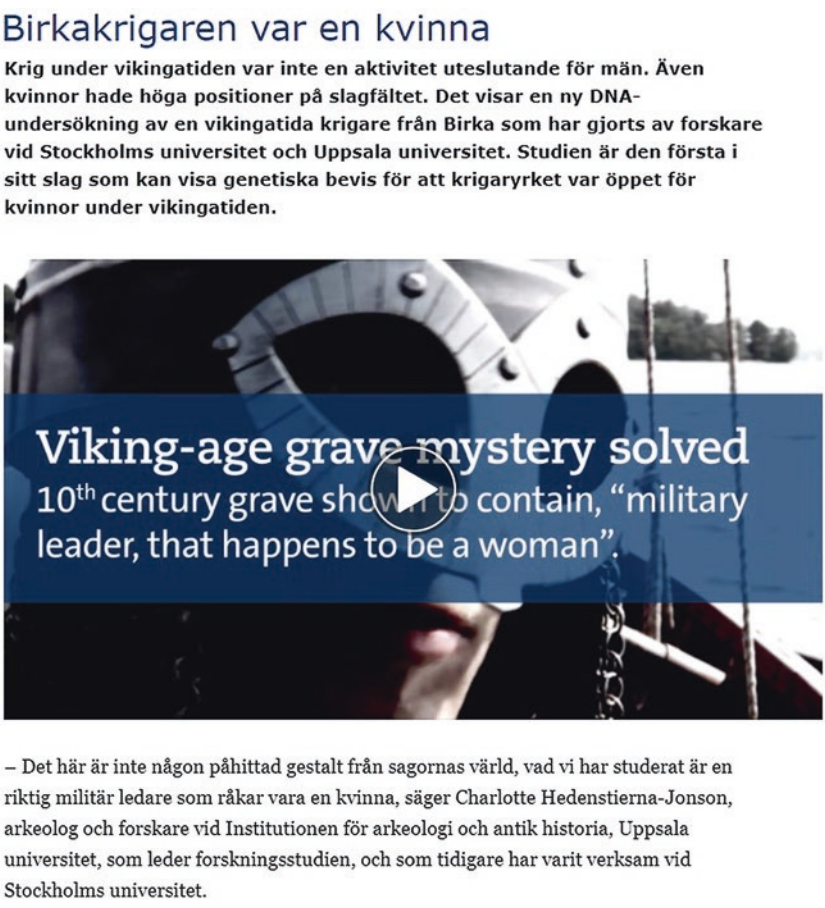

Fig. 2.3 The Viking warrior was a woman. Screenshot from the website of Stockholm University. https://www.su.se/2.1275/profilomr%C3%A5den/kulturarv-historiska-artefakter-processer/birkakrigaren-var-en-kvinna-1.346138

Several further discussions can be traced to the blog post "Let's Debate Female Viking Warriors Yet Again" published by researcher Judith Jesch (2017). Jesch has written extensively about women's various roles and power during the Viking Age, even in popular science contexts (Jesch 2019a, b). However, she holds several critical views on the concept of

female warriors, on the ancient DNA (aDNA) analysis of skeletal parts from grave Bj 581 and on the interpretations of the contexts of the grave.

On Flashback, as of 9 September 2017, the thread "The Birka warrior—a prominent woman" was started by someone who is positive about the news. It appears from the post that the person has some archaeological training. The discussion becomes immediately mixed with misogynistic comments and scepticism over the results of the research, but it also contains reasoning about battles, injuries and who may have which roles in different societies. Reply #46 mentions that the researcher Judith Jesch has detailed criticism of the article about the female warrior, but interestingly, few use her original blog to strengthen their own resistance to the fact that a woman during the Viking Age could have the role of a warrior. Jesch emphasises, for example, that the article's interpretations go far beyond the concrete study that is presented and reproduces several concepts around what an officer means, the importance of strategy games and the importance of weapons (Jesch 2017).

The posts in the Flashback thread give the impression that the writers seem to be satisfied that a researcher can stand on their side. Despite this, they seem to have more faith in the arguments in posts on Flashback. Among other things, several posters in the thread emphasise that they themselves have archaeological training and therefore know what they are talking about. It can be noted that some of the thread's combatants do not really disagree on substance but that they still write antagonistically with offensive personal attacks, misogynistic statements and clear markings against what they call a politically correct elite. The impression is that the debate is not really about research results or historiography but mostly about discrediting those who stand up for new findings and nuances of archaeological interpretations and do so by asserting their own interpretations of the past.

The research group behind the article "A Female Viking Warrior…" eventually followed up the debates in new articles and lectures (Hedenstierna-Jonson 2018; Price et al. 2019). Many parts of the media coverage of the two articles have been analysed and summarised by Howard Williams on the blog Archaeodeath. He states that there is not as much interest in debating the second article as the first and that it is the first article's clear conclusion about a female warrior that persists—despite all the discussion. Williams lends nuance to certain criticisms that have been made and at the same time devotes much of his own space to questioning the conclusions of the articles. He also goes through the need for

problematising the issues of sex and gender during the Viking Age. In total, there are ten posts on the blog Archaeodeath (Williams 2017).

Perhaps the interpretations of the female warrior are approaching discussions in which the opposing parties display mutual respect, but until now the antagonistic positions seem to persist. The aDNA results are still not anchored in societal terms and mainly translated directly to biological women and men in the debate, although a later article efrom the research group emphasises that we cannot know how the woman in the grave was perceived in gender terms during her own time (Price et al. 2019). Varying interpretations of warrior roles, officerhood or how funerals are staged and communicated are not given sufficient space in the discussion. In this dramaturgy, the argumentation returns to traditional and stereotypical descriptions of the Viking Age.

Curatorial Challenges

During the period 2004–2020, one can notice a clear escalation of increasingly questioning, confrontational and aggressive reactions to museums' operations. Precisely on digital forums, antagonistic and threatening interactions leave traces through explicit moderation, and those who participate with content or views refer to how they are treated or announce that they choose to refrain from participating in certain contexts.

The hopes that archaeology and history as subjects, and that museums as arenas, would be unifying forces in society have not been fulfilled since the interactions between users and museums has intensified. Instead, many situations indicate that antagonistic encounters are growing more common. Noticeable over time is that the debates that engage and become antagonistic converge across digital spaces, while the knowledge of previous discussions and contexts is obscured. Referencing general opinions, popular science and the mainstream media, any user can now bring into question new archaeological interpretations. Researchers also continue to debate on these same platforms, and so the arguments get mixed. Thereafter, it can be difficult to distinguish an expressed opinion from the various layers of knowledge based in research. New ethical challenges are clearly developing on digital platforms where archaeologists want to communicate with the public (Richardson 2018). But lacking in-depth knowledge about how discourse works when people meet in digital spaces, there is a risk of losing stringency in the public debate.

Elaine Heumann Gurian raised concerns about this course of development in the introduction to her collected works, where she comments and reflects on thirty-five years of changes in the museum sector. She advocates

museums as a kind of "congregant space" that should be able to gather communities even as opinions differ. She warns of the political pressure imposed on museums on behalf of a society in which there is a constant competition over right and wrong, instead of efforts to understand the value of the one little word "and" (Gurian 2006: 1ff). Today, Gurian's conclusions are more relevant than ever. There are many indications that the authority of the museum and the researcher is no longer perceived as an obvious measure of insight into a subject, while the museums have not been as inclusive as they once might have thought.

Academic digital forums and blogs are frequented by people who know or know about each other well. Conversation becomes a hybrid of seminar room and anonymous comments. But there are always many more people reading than participating. Most people are not likely to have a deep knowledge of the subject and so quickly form opinions that are cemented and become difficult to re-evaluate. Alliances between parties who do not usually agree contribute to conveying credibility to detached details. The impression of broad consent with arguments that are not established among the main group of researchers of the topic often encourages more antagonistic posts online. The situation indicates a distrust of established institutions and of those in power who work with inclusive perspectives.

The impression is that the SHM has regarded these digital interactions as tracks parallel with the museum but not integrated into its core operations. Only when object information and marketing have converged, the critical points of view hit home and affect the museum's work. The situation probably also leads to some ambiguity in the museum's curatorial agency in terms of professional roles and the framing of objects in displays and online.

Engagement in the museums' operations is widespread, which is noticeable in lively media discussions about their position in society. Many of the interactions express evaluative judgements. It is perhaps also the clearest invitation to use the museum that the visitor receives: they are encouraged to rate their experience and also recommend the museum to others (cf. Gronemann et al. 2015). Therefore, it is an expected development that digital comments about museums' content, lectures or exhibitions are about opinions, sometimes supportive, sometimes critical and questioning.

Five aspects stand out when a topic is debated and engaging for those who participate: (1) the struggle for interpretations of different kinds of sources, (2) the focus on detail at the expense of syntheses, (3) questioning people's credibility and personal attacks, (4) hastily connecting to contemporary politics rather than valuing relationships between data and interpretations and (5) an immediately aggressive tone in the posts.

On digital forums, different types of applicants for a homogeneous national cultural heritage appear. A few years ago, such perspectives were presented mainly by ultranationalist and right-wing extremist movements (cf. Gustafsson and Karlsson 2011; Niklasson and Hølleland 2018). Today, there is a broader foundation in searching for origins and anchoring people's identities in history. Above all, detached arguments from scholarly discussions are used to substantiate the nationalist practice of history. Blog posts and comments by researchers and writers who want to deepen and problematise the topic of the war grave from Birka are shared, for example, by right-wing extremist groups or others who seem to show support for opposition to feminism, pluralism and inclusive perspectives. The desire to define complex contexts in simple binary oppositions is reinforced by the dramaturgy of comment threads. Opinions come first, and evidential knowledge either is added much later or is more difficult to summarise in short posts.

As can be seen from the anthology *The Digital Turn: User's Practices and Cultural Transformations*, the asymmetries between institution and public, between official and unofficial cultural heritage, do not disappear when databases and source material are made digitally available (Runnel et al. 2013). Digital curation should have the whole world at its feet but often seems to get caught up in details or miss the point. One way is for museums to focus on context, synthesis and understanding of different societies and cultures. It would help to build knowledge, nuance conversations and enter into dialogue instead of competing for limited factual information and truth claims. Through their pedagogical competence, museums can take greater initiatives to curate readily accessible analyses, questions and conclusions within their subjects. Museums can generally become more proactive in raising themes and issues that contribute to understanding complex historical and cultural contexts.

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CHAPTER 3

Tales of the Viking Helmet: Narrative Shifts from Museum Exhibitions to Personalised Search Requests

Sheenagh Pietrobruno

Abstract The stories of museum objects on YouTube can counter and support those advanced by museums. How the narratives of the Viking helmet on YouTube reflect or differ from those put forward by the Swedish History Museum's Viking exhibitions is approached through a previous methodological study that investigated the issue of location in the personalisation of historical narratives of museum objects on YouTube search engine result pages (SERPs) (Pietrobruno 2021). This revised method combining language with location brings together two media forms—actual museum exhibitions and personalised YouTube SERPs. The philosophy behind their interconnection is rooted in how the personalised content of SERPs produce meaning and museum exhibitions employ forms of individual customisation to generate meaning by enabling visitors to personalise their exhibition experience.

Keywords Viking helmet • Museum exhibitions • Museum narratives • YouTube • Search engines • Personalisation algorithms • Thumbnails • Scrolling

B. Axelsson et al., *Museum Digitisations and Emerging Curatorial Agencies Online*, https://doi.org/10.1007/978-3-030-80646-0_3

With targeted search terms, users can scroll streams of thumbnail images depicting Viking objects on YouTube Search Engine Result Pages (SERPs). Viking helmet thumbnails index the content of their respective videos, which often glorify brutal, White, male warriors and their conquests. Emblematised by the helmet, this take on Vikings clashes with the narrativising of this object by the Swedish History Museum (SHM) in relation to the everyday, non-warring lives of the people living in Scandinavia during the Viking Age (793–1066 CE). How the meanings of museum objects on social media differ from those put forward by museums is approached through the prism of a previous methodological study examining the role of location in the personalisation of historical narratives of museum objects on YouTube SERPs (Pietrobruno 2021). This method is reconfigured here to consider both location and language in the personalisation of YouTube SERPs and their connection to historical narratives. The approach outlined here tracks the stories of the Viking helmet obtained using French-language keywords on personalised SERPs and compares them with those generated by non-personalised, anonymous SERPs. The narratives in French are matched to those obtained with the same keywords translated into English (Pietrobruno 2021). A key concern is whether the Viking helmet on French-language SERPs is radicalised by far-right politics as it was in the previous English-language study (Pietrobruno 2021). The role of language and location is demonstrated through the correlation of these narratives with the preferred historical narratives of the SHM.

This methodological revision is contextualised through the intersection of media theory, narratives and museums. Similar processes of display convey the meanings of museum objects in exhibitions and in digital objects on SERPs. This hermeneutic process is reflective of a given object's position within the exhibition space of the actual museum or within the social network space of SERPs. The stories forged from a museum object are derived from the work of a curator or curatorial team who assume responsibility for its concept and content (Kaplan 1994, 39). On YouTube, the "curation" of meaning emerges out of the interplay of user-generated content, algorithmic automation (including personalisation) and the platform's business models, which together produce the content of personalised SERPs and hence their continuously updated streamed display. The philosophy behind the methodological revision of joining two media forms—actual museum exhibitions and personalised YouTube SERPs—is grounded in the way that museum display can also employ forms of individual customisation to generate meaning by allowing visitors to personalise their exhibition experience. In the curation of meaning in both actual and online exhibitions, personalised

search technology is breaking ground. This development of a methodological approach showcasing how YouTube SERPs personalise historical narratives through both location and language for customising meaning generation is significant for museum studies, as personalising meaning via participatory practices in online exhibitions may take precedence in the curation of museum objects in the future. In its focus on the personalisation of content on YouTube, this research is distinct from current scholarly work that addresses the relation between YouTube videos and archaeological and museum narratives (Williams and Clarke 2020; Zuanni and Price 2018).

Exhibitions, Search Engine Result Pages and Media

The production of meaning in museum exhibitions converges with its production in the display of content on YouTube SERPs through their shared status as media forms. Exhibitions use media to tell their stories through the integration of a range of objects with architectural elements, sound, seating, film, video, slide projection, computers, simulation and live elements (Kaplan 1995, 40). Museum exhibitions not only showcase individual objects but also bring them together through narrative sequencing. In this process, exhibitions emulate the task of media (Silverstone 1988, 236–237). Stephen Bann (1984) demonstrates how museum period rooms, popular in the late nineteenth and early twentieth centuries, would freeze a moment in time, echoing the development of photography in that era (see also Ernst 2005, 597; and Henning 2020a, 12). Roger Silverstone (1988, 232, 234) shows that the display language of the museum emulates television specifically through its documentary format, which creates a discursive balance between entertainment and information. The fragmented structure of exhibitions that combine reality and fantasy through the interplay between "real" archaeological objects and imagined visions of the past emulates how television documentaries tantalise their audiences by embedding historical "facts" within fun and fanciful modes of delivery (ibid., 233). Mike Jones (2005, 37) argues that meaning creation in museum exhibitions with objects gathered from diverse historical times and geographies parallels the generation of meaning in cinematic montage, which juxtaposes visual moments in space and time. Mieke Bal (2007, 77–78) also equates the production of narratives through juxtaposed museum objects with cinematic montage. She likens cinematic close-ups, which briefly distance the audience from linear storytelling, to instances of exhibition design that compel audiences to focus on a

particular object while stalling their movement through the exhibition and its narrative. She envisions museumgoers as performing an exhibition as though it were a film and engaging with its cinematic "meaning-producing sequentiality" as they walk through it (ibid., 73, 89). Moreover, for Jones (2005, 36), neither the museum objects in an exhibition nor the discrete shots in a film have any innate meaning. Rather, it is through the combination of exhibition objects and film images that a specific object or image can be interpreted (ibid., 37).

Juxtaposition of content lies at the core of the production of meaning in the networked structure of YouTube SERPs. Social media emulates how contrast and comparison of content are crucial to meaning generation in television, cinema and museums. YouTube further aligns with museum exhibitions through the ways that its SERPs feature and distribute representations of museum objects. SERPs function as digital exhibitions, in which the meaning of a museum object is ascertained through its intersection with a mesh of content, including keywords, metadata, thumbnail images and video content (Pietrobruno 2021). The narratives of a given museum object produced in relation to its networked context on YouTube are fragmented and open-ended. They are not classic stories with firmly established beginnings, middles and endings (Georgakopoulou 2016, 266). YouTube SERPs shift in accordance with constantly updated user-generated content, algorithms (including personalisation) and the platform's business models. The narratives of museum objects displayed by SERPs are in flux and always in the middle of their storytelling. Neil Sadler (2017, 3277) has articulated the instability of narratives based on the fluctuating content on social media in the context of Twitter: "[T]he interpretations of individual readers may change greatly as the narrative wholes within which individual tweets are positioned shift and change."

This theorisation of juxtaposition in generating museum object stories on YouTube's fluctuating SERPs taps into meaning creation through the integration of diverse elements on websites (Bolter and Grusin 2000, 35), YouTube (Pietrobruno 2018), Twitter (Murthy 2011, 786; Sadler 2017, 3277) and Instagram (Bainotti et al. 2020, 2). Content on a SERP is juxtaposed as combinations of algorithmic automation and user-generated human intervention (Latour 2005). Search engine results are impelled by algorithms that are not fundamentally machine learning algorithms (Burrell 2016, 3). Rather, search engines make use of machine learning for particular tasks, including ranking items and hierarchising requests in accordance with user location (ibid.). As Jacob Ørmen (2016, 110) notes

in his work on Google search, language and location are leading factors in personalisation, alongside a user's address, gender, age and search history. Personalisation algorithms can access the location, address, gender and age of a given user when this user is logged in. If a user is not logged in, these identity markers can be inferred by the algorithms via the IP address, search history and similarly connected devices or via saved content, including passwords and contacts. This latter mode to access user information for the algorithms is less precise, as users can manipulate their IP address, including hiding it via a virtual private network (VPN) or via the Tor browser (Bischoff 2021). These personalisation signals, known to the algorithms through various channels, are potentially employed by YouTube's search engine. Although conceived and produced by humans, algorithms can yield results that are not always predictable by humans (Kitchin 2017, 19). Yet algorithms are also created by humans, who inherit social biases, including racism and sexism (Noble 2018, 1–2, 9). Inherent problematics and unpredictability reinforce the "agency" of personalisation algorithms that employ machine learning to rank content on Google and YouTube. This algorithmic "agency" combines non-human with human intervention. Self-learning algorithms in the context of personalisation technology that incorporates machine learning can learn only in relation to the content and to the manner in which they were programmed to learn (Klinger and Svensson 2018, 4658). Furthermore, personalisation technology is impacted by search engine optimisation (SEO) implementations by content uploaders that can exert an influence in gaming personalisation algorithms. These SEO strategies include limiting the length of the video to an optimal duration of roughly ten minutes, using online tools to find the most effective keyword or keywords to identify a specific video, integrating the keyword or keywords into the video file, as well as into the video's title, description and tags, and choosing a compelling thumbnail for the video (Buckle 2021). The work of personalisation technology combining human and machine intervention is part of how the platform's SERPs "curate" the meaning of museum objects through juxtapositions.

The Swedish History Museum, the Viking Helmet and Media

Juxtaposition of content produces the semiotic values of the Viking helmet both in the former Viking exhibition (2001–2019) at the SHM and on YouTube's shifting SERPs. The narratives produced in these contexts are rooted in the myths projected onto the Viking helmet, which do not necessarily reflect the ways helmets were used in the pre-Viking (c. 550–792 CE) and Viking (793–1066 CE) Ages. Such a disconnect emerges in part from the historical and archaeological uncertainty of the role of helmets in these eras. Notably, the Viking helmet, particularly its horned version, has served as a stand-in for the male, White warrior since the nineteenth century. Yet archaeological evidence does not support its widespread use with or without horns for combat or pillage during the Viking Age. Archaeological sources from this era have yielded just two images of horned helmets. One appears on the Oseburg "tapestry" that was part of the archaeological finds, along with a Viking ship burial mound, in a 1903 excavation in Oseburg, Norway (Djupdræt 2016, 191; Bloch-Nakkerud 2018, 18). The second was found on a ninth-century coin from Munich (Djupdræt 2016, 191). Drawing conclusions from these two finds, archaeologists and historians propose that the horned helmet might have been worn on special occasions only (ibid.). Archaeologists further contend that wearing helmets without horns during the Viking Age was an uncommon, if conceivable, occurrence (Ward 2001), as only one such object has been discovered from this era. Excavated on Gjermundbu farm close to Oslo, the reconstruction of this archaeological find, referred to as the Gjermundbu helmet, is exhibited at the Museum of Cultural History at the University of Oslo. The SHM has a copy of this helmet (Djupdræt 2016, 191) (Fig. 3.1).

Several helmets dating from the pre-Viking Age, known as the Vendel Period, were found in the nineteenth century in ship burials at Vendel in Uppland, Sweden. Among the helmets featured in the SHM prehistory exhibition is the seventh-century ornate Vendel helmet, reconstructed in the 1940s by archaeologist Sune Lundqvist (Fig. 3.2).

Questions remain unanswered about whether this reconstruction reflects its original design and whether helmets from the Vendel Period were used in battle or for ceremonial purposes only (Andersson 2013, 74).

The section on the Viking helmet at the SHM was integrated into the former permanent Viking exhibition in 2009 by curator Petter Ljunggren

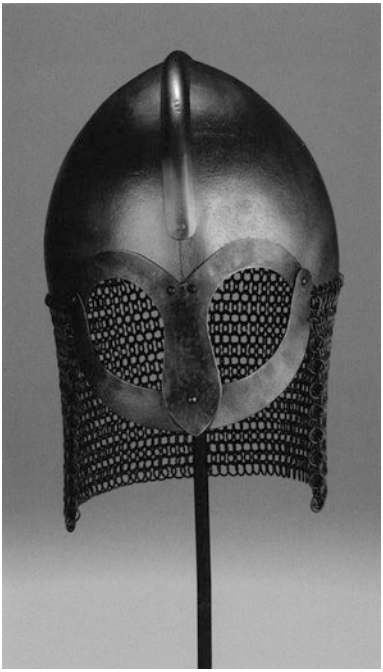

Fig. 3.1 Copy of the Gjermundbu helmet. Photo: Christer Åhlin SHM. Licenced under Creative Commons CC BY 2.0

in collaboration with Fredrik Svanberg. This section produces Viking helmet narratives through the juxtaposition of its objects, captions and texts. Meaning is then curated using techniques that mirror meaning production in cinematic montage. The display of helmet-themed objects juxtaposes images, material culture and texts related to the iconography of the helmet from the early nineteenth century to the 2000s. These juxtapositions convey the myths that have been bestowed upon the helmet in different times and spaces. Political uses of the Viking helmet in distinct eras and places are set against the object's incorporation into children's toys, films and artworks fashioned in diverse temporalities and geographies. This heterogeneous display produces hermeneutic fragments that contrast fantasy with reality, evoking the narrative production of television documentaries and the contrasting elements of cinematic montage.

In accordance with the exhibition's preferred path of viewing the helmet section, the first image is a photograph of Swedish sculptor Bengt Erland Fogelberg's 1866 gigantic statue of Odin, the Norse god of war

Fig. 3.2 The Vendel helmet (Decorated helmet). Photo: Christer Åhlin SHM. Licenced under Creative Commons CC BY 2.0

and death. Donning a helmet with birds perched on its side to resemble a winged helmet, Odin is associated with violence. The second image is a poster of Swedish artist Mårten Eskil Winge's painting of Thor, the Norse god of thunder, entitled *Thor's Fight with the Giants* (1872), which characterises the god as a powerful blond-haired warrior. This depiction marks how Viking lore was used by Nazi Germany to promote the myth of Aryan racial superiority that justified the regime's far-right nationalist politics. The third is a poster entitled "SS-Day 1943, 14–15 August, in Oslo German SS Norway" (English translation), which portrays a Schutzstaffel (SS) soldier in Nazi-occupied Norway dressed as a helmeted Viking. The image that follows is a promotional poster for the American film *Pathfinder* (2007), which features a colossal Viking warrior in a helmet with frightful horns. This advertisement reveals how warriors in Viking helmets are used in popular entertainment and culture. Next is an object illustrating the extent of Viking helmet imagery into the commercial realm of children's toys. Displayed in a cabinet is the German company Playmobil's 777 Viking Family toy from 2006, in which the father figure sports a

diminutive horned helmet. The final image addresses contemporary political nationalist deployments of Viking helmets while coating its serious message in a light-hearted veneer. Above the cabinet hangs a portrait of a young Swedish woman with long brown hair and brown eyes donning a novelty Viking helmet with horns. In its representation of an ethnic identity, not traditionally identified with the Vikings, this final photograph challenges the conservative political use of Viking imagery to represent the stereotype of the male, blond, White warrior (Pietrobruno 2021). With the growth of nationalism in the 1990s, Swedish nationalist politicians, specifically the Swedish Democrats in 2003–2004, have been deploying Viking symbols to further their political aims (Bureychak 2013, 234; Pietrobruno 2021). This image hints at more extreme uses of Viking symbolism outlined in the museum's communication materials. Fredrik Svanberg (2016, 16) discloses the troubling adoption of Viking symbolism by contemporary far-right extremist groups.

The significance of the Viking helmet in the permanent exhibition is hammered home through the temporal juxtaposition of the helmet section and the rest of the exhibition. The Viking helmet's lack of relevance to the everyday lives of the people of the times is made apparent by the section's proximity to the archaeological objects displayed in the exhibition. The narratives forged since the nineteenth century about Vikings and their helmets collide with stories surrounding the archaeological objects, which date back over 1000 years. The majority of these archaeological finds betoken everyday activities, including those pertaining to dress and adornment; cooking, drinking and eating; and personal hygiene. The warring aspects of the Viking Age are not overlooked, for the exhibition also displays martial objects, including swords for combat, fetters used for enslavement and silver hoards either obtained during pillaging or handed over as tribute to prevent further attacks (Andersson 2016a, 150–151). Nonetheless, the overriding narrative relates that most people in the Viking Age were peasants who spent their days labouring to survive. The meanings related to archaeological objects in the permanent exhibition erode the stereotypical representation of Viking society, exemplified by the male warrior, in which power was held only by men and obtained solely through violence. For instance, the featured display of symbolic keys provides evidence of women's domestic rule and counters the absolute dominance of male authority. These keys, worn by affluent women over their clothes, signified their governance of the home and its extensive households (Andersson 2016c, 31). Other archaeological jewellery finds,

including the permanent exhibition's signature large twin oblong brooches, are testaments to wealthy women in the Viking Age holding high-status ranks.

The SHM permanent exhibition is expanded into two international versions entitled *We Call Them Vikings*, which toured the world from spring 2012 to summer 2019. The two exhibitions were identical in regard to their design, thematic content and textual references. The objects exhibited in both were mainly original artefacts that were similar but not identical. Consequently, the texts pertaining to these objects differed in each exhibition. The first touring exhibition opened in Europe at the Drents Museum in the Netherlands on 1 May 2012. With more bookings coming from overseas a few years later, the Swedish History Museum decided to dedicate this first exhibition to Australia and North America and produced the second version to tour in Europe. In lieu of the Viking helmet section outlined above, the touring exhibitions featured an interactive, hand-operated, mechanical device demonstrating the mythical origins of the horns on Viking helmets. This device is composed of a remake of the chain-mailed Gjermundbu helmet with eye holes in which two horns, attached together, are featured below the helmet. As museum visitors lift these horns, a shadow of a horned helmet appears on a screened backdrop (Ljunggren and Li 2016, 203) (Fig. 3.3)

This ephemeral, visitor-generated image stands in contrast to the touring exhibitions' archaeological finds, which do not feature horned helmets (Pietrobruno 2021). The touring exhibitions were accompanied by a book claiming that the stereotyped martialism of the Viking Age was just one aspect of life during this era (Price 2016, 174). Available for purchase at the SHM bookstore, this book, entitled *We Call Them Vikings* (Andersson 2016b), also serves to contextualise the display of helmets and other Viking and pre-Viking objects at the museum.

Personalisation, Museum Curation and Search Engine Result Pages

The meanings associated with the helmet section ascertained through its juxtaposition with the archaeological finds in the SHM permanent exhibition and international exhibitions convey the museum's dominant message: the representation of Vikings as violent male warriors who wore helmets in battle is a stereotype that cannot be supported by

Fig. 3.3 Mythical horned helmet device for the SHM international touring exhibitions, *We Call Them Vikings*. Photo: Lasse Hedman/SHM. Licenced under Creative Commons CC BY 2.0

archaeological evidence. Creating an overriding narrative that connects disparate objects on display through juxtaposition is a tactic that designers use to give exhibitions an overall understanding of the objects that is congruous and consistent (Henning 2020b, xli). Designers depend on the museum visitors to complete the narrative in order to ascertain the preferred meaning of the exhibition (ibid.; den Oudsten 2012, 21). Audiences may, however, interpret a museum exhibition—in this case, the juxtaposition of the Viking helmet in relation to the diverse elements of the permanent exhibition—in ways that differ from the preferred narrative of the designers and curators (Jones 2005, 36). This shift in meaning can also occur since museumgoers are not compelled to follow the preferred viewing path that the museum designer directs them to take. The overall meaning conveyed in an exhibition has the potential to change according to the way that museum spectators move through a particular exhibition or between exhibitions. As museumgoers personalise their viewing path, they reassemble the organisation of museum objects, creating new juxtapositions that forge narratives that can diverge from the objects' sanctioned meanings. The exhibition's centralised curation of meaning through the processes of juxtaposition, which parallel cinematic montage, is challenged if viewers do not follow the set path, but instead choose their own route and customise their visit. Stephen Greenberg (2005, 230) notes that "because the exhibition is conceived as a 'film in space' rather than a film in two dimensions, each visitor can explore and edit at their own pace and in their creative space" (cited in Higgins 2020, 316).

The shift of meaning via the customised viewing sequences of museumgoers is heightened when museum objects circulate on personalised SERPs. The established interpretations given to objects within specific exhibitions, as the case of the Viking helmet illustrates, are displaced from the museum's control and curated by YouTube's algorithms, including its technologies of personalisation (Pietrobruno 2021). Search engine results on YouTube featuring images of Viking helmets in thumbnails and in video content are constantly fluctuating as streams of videos are personalised to individual users. Although it is the emerging media form of the present age, the personalised shifting SERP has not substantially impacted the way that the Viking helmet at the SHM has been displayed. Yet developments in exhibition design are beginning to emulate this medium. Citing Peter Higgins (2020, 322), Michelle Henning (2020b, xliv) identifies this recent trend: "From an exhibition design perspective, the potential of new media seems very exciting, with 'individual profiling' increasing

the possibility of personalised content." As outlined by John Bell and Jon Ippolito (2020, 487), that the self-organised museum involves curation to nurture the meaning of a disparate set of objects reflects the malleability of communication within the network and in turn counters a traditional format that generally utilises a single assemblage of materials. The content of online exhibitions might be regularly modified in accordance with user-centric practices. In discussing the future applications of a study on the relation between online collection portals and serendipitous exploration, John Coburn (2016) proposes, for instance, that online exhibitions could be more adeptly curated by employing user data to focus on those objects that are shown to receive prolonged user sessions and hence increased attention.

SERP Method

SERP personalisation not only evokes the agency of museumgoers who customise their chosen exhibition paths but also resonates with the self-organisation of curation in the diffused museum and with the potential for the exhibition of objects to shift in response to user data in future curation. Yet this process on SERPs is distinct, for it is produced through the constant interplay between user-generated content and the way that the platform's personalisation algorithms target and integrate user communication and behaviour to monetise them. YouTube's personalised SERPs take shape through the algorithmic deployment of users' data accessed via their IP addresses. This information is also sold to third parties by Google for corporate profit. In light of the specific function and purpose of platform personalisation, the following method is used here to compare the established narratives of the helmet in the SHM exhibitions with the potential meanings that this object garners on fluctuating YouTube personalised SERPs. This method analyses SERPs as streams of content listed under a given search term (Pietrobruno 2021). Previous methods have concentrated only on the first three to five entries of SERPs in order to focus on the eye-tracking architecture, which influences where users cast their attention (Rogers 2013; Rieder et al. 2018). Recent research proposes that viewers often search farther down a SERP from the top results (Rogers 2018, 5). Infinite scrolling could be a factor in this shift in user attention (Pietrobruno 2021). Without pagination breaks, undivided searching through constant scrolling allows users to view hundreds of video thumbnails on a given SERP at the touch of a finger. As one of

YouTube's business-related technological models introduced in 2017, infinite scrolling further monetises user experience and communication. Google implemented this function aiming to ensure steady user engagement. Endless scrolls incite users to keep searching for a listing that they really want to look at and ensure that they will spend more time rummaging through a site (Sulleyman 2017). The importance of scrolling for monetising user preferences is further substantiated by a 2019 tweak in YouTube's ranking algorithms that grants more weight to videos clicked by users that are tabulated farther down a SERP, which necessitates scrolling to access them (Hao 2019). The medium that serves as an index to capture the attention of user-scrolling eyes and fingers is the video thumbnail. This miniature image plays a pivotal role in the attention economy by enabling users to preview content (Thylstrup and Teilmann-Lock 2017). This method therefore analyses SERPs as ever-shifting streams composed of metadata and thumbnails, which are configured as navigational images in order to attract users to their corresponding videos (Pietrobruno 2021).

The method employed here is grounded in the way that the thumbnail stream of a given SERP becomes a medium in itself. To compare the historical narratives and meanings associated with the Viking helmet on personalised French-language YouTube SERPs with those put forward by the SHM, the following steps were undertaken. The French keywords "Musée historique de Suède et les Vikings"—which translate as "Swedish History Museum and Vikings", the keywords used in the previous English-language study (Pietrobruno 2021)—establish a connection between the Viking helmet narratives at the SHM and those on French-language YouTube SERPs. Besides these selected keywords, no further customisation of YouTube search filters was used, such as upload date, view count or length of video. This methodology and its concomitant results are based upon a simple YouTube search rather than an advanced one. The streams of content from the French keywords were scanned to select static and animated thumbnails depicting helmets in the Graphics Interchange Format (GIF). The thumbnail images featuring helmets on the SERPs obtained via the designated keywords were monitored at 3:00 p.m. from 4 March to 4 April 2020 on two computers: one employing the Google Chrome browser to personalise the search findings to my home office IP address in order to target my customised data set as the main researcher and the other running the Tor Browser, which constantly relocates the search site to different IP locations. The Tor Browser anonymises users' web traffic by repeatedly resituating their communication around a

distributed network of relays administered by volunteers positioned throughout the globe, in order that the geographic site of users obtained via their IP addresses cannot be determined. Establishing a correlation between the Tor Browser and the personalised browser enabled a comparison between the results to ascertain how SERPs personalise historical narratives. Narratives gathered on each browser were generated through a close analysis of the identified thumbnails. Stories from the SERPs of each browser were shaped by the juxtaposition of each thumbnail's helmet-related iconography with its corresponding video content. The narratives that were yielded on each browser are compared here to those pitched by the SHM.

The YouTube helmet stories obtained by this method are interpreted through the prism of fieldwork conducted at the SHM in 2018, which included intermittent visits to the permanent exhibition and discussions with the head of the museum, Katherine Hauptman. The narratives that were gleaned are also interpreted through fieldwork that was conducted from 23 to 29 October 2018 on the touring exhibition at France's Historical Museum of Nantes in the Château des ducs de Bretagne, held from 16 June to 18 November 2018. This work involved guided and personal visits to the touring exhibition, as well as meetings and discussions with participants of its communication plan, including the head of communications, Marie Lefevre. This fieldwork is interpreted here through historical and archaeological scholarship on the Viking Age.

Research Results: The Tor Browser

This list of videos featuring Viking helmet thumbnails tracked on 4 April 2020 at 3:00 p.m. serves as an example of the method used to compare the personalisation of historical narratives of the helmet on YouTube SERPs with their preferred narratives at the SHM. The following is a tabulation of videos with helmet thumbnails using the Tor Browser, which is not personalised to my IP address. Sixty videos were tracked to coincide with the same number of videos identified in the earlier study undertaken with English-language keywords (Pietrobruno 2021). The listed video numbers refer to the individual rank of thirteen videos with Viking helmet thumbnails from the top of a SERP stream of sixty videos obtained using the previously noted keywords. (Table 3.1)

Below is a description of the Viking helmet thumbnail of each numbered video tabulated above.

Table 3.1 Tor Browser

Video Number	*Video SERP Rank*	*Video Title (French)*	*Video Title (English Translation)*	*Video Channel*	*Date of Upload*
1	2	Les Vikings à Nantes	The Vikings in Nantes	Astraer	2018
2	3	L'âge des Vikings (avec nota bene)	The age of the Vikings (with Nota Bene)	L'histoire par les cartes	2016
3	5	Ils ont changé le monde—Les Vikings	They changed the world—The Vikings	n4v08k5	2017
4	7	Vikings au Musée canadien de l'histoire [1]	Vikings at the Canadian Museum of History [1]	Musée canadien de l'histoire	2015
5	17	Au Coeur de l'histoire: Les Vikings (récit intégral)	At the heart of history: The Vikings (full story)	Europe 1	2018
6	18	Les secrets des Vikings—Premier raid en Angleterre	The secrets of the Vikings—First raid in England	Documentaire Monde	2018
7	19	Documentaire français—La conversion des Vikings	French documentary—The conversion of the Vikings	Documentary HD	2018
8	20	7 faits insolites sur les VIKINGS	7 unusual facts about the VIKINGS	Doc Seven	2017
9	22	Norvège, Iles Lofoten, le musée Viking à Borg, Ile de Vestvagy	Norway, Lofoten Islands, the Viking museum in Borg, Vestvagy Island	joelyvon	2016
10	28	Nantes : Les Vikings, une exposition inédite en France loin des clichés	Nantes: The Vikings, an unprecedented exhibition in France far from clichés	France 3 Pays de la Loire	2018
11	32	La vraie nature des Vikings : Mythe ou réalité no. 4	The true nature of the Vikings: Myth or reality no. 4	Musée canadien de l'histoire	2015
12	33	Vikings au Musée canadien de l'histoire [2]	Vikings at the Canadian Museum of History [2]	Musée canadien de l'histoire	2015
13	41	La vraie nature des Vikings: Mythe ou réalité no. 3	The true nature of the Vikings: Myth or reality no. 3	Musée canadien de l'histoire	2015

1. The thumbnail of "The Vikings in Nantes" by Astraer (2018), a French-language cultural channel, features a map of Nantes as the background while foregrounding a Viking dragon ship on one side. On the other is a segment from the Nantes Cathedral's 1852 painting by Edouard Jolin entitled *The Martyrdom of St. Gohard (Le Martyr de St. Gohard)*, which portrays a Viking warrior in a helmet ready to kill the Bishop of St Gohard during the Norsemen attack of Nantes in 843 CE.
2. The second image of the thumbnail GIF of "The Age of the Vikings (with Nota Bene)" by L'histoire par les cartes (2016), a user-generated animated cartographic channel of historical subjects, depicts the SHM Vendel helmet above an axe on the left side, fur, amber and a slave fetter in the top right corner, and the dragon head of a Viking ship in the lower right corner, all set against a backdrop of a map of Scandinavia.
3. The second image of the animated thumbnail GIF of "They Changed the World—The Vikings" by n4v08k5 (2017), a history documentary channel affiliated with *Science Grand Format*, a popular science programme broadcast on the public television channel France 5, reenacts Vikings in battle gear, including helmets, attacking the monastery at Lindisfarne (England) in 793 CE, the first Viking attack in the Anglo-Saxon world.
4. The thumbnail of "Vikings at the Canadian Museum of History [1]" by the Musée canadien de l'histoire (2015c) features, against the backdrop of falling snow, a blue-eyed male Viking warrior in a fur-collared cape wearing a nasal metal helmet with a projecting nose-protection bar and holding a staff (Fig. 3.4).

This representation served as the promotional poster for one of the SHM international touring exhibitions, *We Call Them Vikings* at the Canadian Museum of History from 3 December 2015 to 17 April 2016.

5. The thumbnail of "At the Heart of History: The Vikings (Full Story)" by Europe 1 (2018), a private radio station in France, depicts on the right the Norse explorer Erik the Red (c. 950–1003 CE), founder of the first settlement in Iceland, in anachronistic European battle gear, including a helmet taken from the woodcut frontispiece of Icelandic scholar Arngrímur Jónsson's (1568–1648) book *Gronlandia*

Fig 3.4 Vikings at the Canadian Museum of History, uploaded by the YouTube channel, Canadian Museum of History (courtesy of the Canadian Museum of History)

(Greenland) (1688), and on the left a photograph of Franck Ferrand, a French writer and radio personality specialising in history.

6. The second image of the thumbnail GIF of "The Secrets of the Vikings—First Raid in England," produced by the French television channel RMC Découverte and uploaded by the channel Documentaire monde (2018), features a historical reenactment of the Viking raid of 793 CE on the Lindisfarne monastery by helmet-clad warriors carrying shields and axes.
7. The first thumbnail of "French Documentary—The Conversion of the Vikings" by Documentary HD (2018), a user-generated documentary channel, features a gigantic male Viking warrior flanked by two others in helmets and battle gear. The central figure holds his helmet in one arm and a huge axe in the other. The second animated thumbnail showcases a helmet-clad Viking warrior with a sword and shield as he charges in the video's reconstruction of the attack of 793 CE on the Lindisfarne monastery.
8. The thumbnail of "7 Unusual Facts about the VIKINGS" by Doc Seven (2017), a fun educational channel, foregrounds the cartoon

male figure of Doc Seven against the background of two Viking ships and an ominous armour-clad warrior with a shield and helmet.

9. The thumbnail of "Norway, Lofoten Islands, the Viking Museum in Borg, Vestvagy Island" by joelyvon (2016), a user-generated travel slideshow channel, features on the left a promotional Viking reconstruction photograph by Svein Spjelkavik of a sinister warrior in a chain-mailed helmet with a front guard protecting the face and on the right the exact photo featured in a promotional poster used to advertise the Lofotr Viking Museum's interactive exhibition *Meet the Vikings*.
10. The thumbnail of "Nantes: The Vikings, an Unprecedented Exhibition in France Far from the Clichés" by France 3 Pays de la Loire (2018), a Nantes-based branch of the national public programme company France Télévisions, depicts the previously described interactive mechanical device in the SHM touring exhibition consisting of a remake of the copy of the Gjermundbu helmet with two prominent horns on either side of it. The thumbnail of this device is an image taken from the SHM touring exhibition held at the Historical Museum of Nantes in the Château des ducs de Bretagne from 16 June to 18 November 2018.
11. The thumbnail of "The True Nature of the Vikings: Myth or Reality No. 4", produced by Musée canadien de l'histoire (2015b) for the SHM touring exhibition, features a historical reconstruction of a Viking couple in which a woman stands next to a seated virile man. Dressed in a purple and gold shirt, he dons a remake of the SHM copy of the Gjermundbu helmet. Dressed in Viking style, she wears necklaces containing ornate oblong twin brooches fastened to her clothing.
12. The thumbnail of "Vikings at the Canadian Museum of History [2]", produced by Musée canadien de l'histoire (2015d) for the SHM touring exhibition, features a fierce warrior dressed in battle gear, including a grim helmet with a face mask, who is standing on a ship against the backdrop of a dark sky and a threatening sea. Close-ups of the vessel in the video emphasise its Viking signature dragon figurehead.
13. The thumbnail of "The True Nature of the Vikings: Myth or Reality No. 3", produced by Musée canadien de l'histoire (2015a) for the SHM touring exhibition, features a historical-reconstructed image of a broad-chested man dressed as a Viking warrior in a remake of the SHM copy of the Gjermundbu helmet.

When the helmet thumbnails above are analysed in correspondence with their videos, an overall narrative of the selected content of the given SERP emerges. First, an in-depth reading of each video and its thumbnail conveys how its narrative structure reflects the television documentary's integration of fantasy and reality, as well as the mismatch of time periods that are integral to the Viking helmet section and its relation to the archaeological objects in the permanent exhibition. All thirteen videos combine historical and archaeological "facts" about Vikings with contemporary imagined and fanciful depictions of Vikings in their thumbnail images. For example, "The True Nature of the Vikings: Myth or Reality No. 3" (Musée canadien de l'histoire 2015a) features in its static thumbnail and fifteen-second video a historically reconstructed scene of a broad-chested man dressed as a Viking warrior in a remake of the SHM copy of the Gjermundbu helmet. The male voiceover notes that the supposedly "rough", "slovenly" and "savage" (my translation) Vikings were in fact known for their excellent hygiene. To challenge the misconceptions that Viking men were crude and unkempt, this video playfully reenacts a male Viking combing his beard and announces that combs and razors were found in archaeological excavations. These finds are displayed in the permanent and touring exhibitions.

An in-depth reading of each video in juxtaposition with its thumbnail also highlights the way that the featured historical narratives can be viewed in relation to the SHM preferred narratives. The thirteen videos listed above can be grouped into two categories. In Category 1 are three videos that present the Vikings as merely brutal male warriors, which is contrary to the SHM depiction: "The Vikings in Nantes" (Astraer 2018); "The Age of the Vikings (with Nota Bene)" (L'histoire par les cartes 2016); and "7 Unusual Facts about the VIKINGS" (Doc Seven 2017). For instance, "The Age of the Vikings (with Nota Bene)" is a historical account of the military conquests of the Vikings and their looting, colonising and trading, including their slave trade. From its opening description of the Vikings as "dreaded warriors" (my translation), this video focuses exclusively on the conquering side of the Vikings, diverging from the SHM depiction.

In Category 2 are the remaining ten videos, which share the common trait of offering a more comprehensive depiction of each video's correspondence to archaeological and historical evidence. These videos provide a richer perspective on Viking life than that proposed in their thumbnails, which portray Vikings as brutal, White, male warriors. In this way, the videos in this category align to a certain extent with the SHM established

narrative of the Viking Age. For instance, "The Secrets of the Vikings—First Raid in England" (Documentaire Monde 2018) does not seek to glorify the brutality of the Viking raids. The featured scholar, Neil Price, states in an interview that "there is nothing to admire" (my translation) about the Vikings. This pronouncement reiterates the overriding message of Price's (2016, 175) chapter in the SHM exhibition book, where he stresses the destructive impact of Viking conquests. At the same time, the SHM perspective is countered by the animated thumbnails depicting helmet-wearing warriors and by the video's sensationalising of Viking brutality through violent historically reconstructed battle scenes.

The other nine videos in Category 2 align with the SHM perspective by tempering to varying degrees their thumbnail stereotyping of Vikings as male warriors through an exploration of everyday peaceful and non-martial activities. For example, brief moments in "They Changed the World—The Vikings" (n4v08k5 2017) intersect with the SHM position. These instances spotlight how Vikings rarely wore helmets, and never horned ones, and emphasise that in their homelands they mostly lived not as warriors, but as fishermen, farmers and craftspeople. Yet the dominant message conveyed throughout this fifty-minute video and its thumbnail is a glorification of the combative and exploratory spirit of Viking expansion on the continent of Europe through battle, trade and expedition. Most of this video clearly runs counter to the SHM narrative.

Significantly, five videos in Category 2 counter the stereotype of Vikings as male warriors, exemplified by their thumbnails, by highlighting in varied ways the role of women in Viking society. These videos include "Vikings at the Canadian Museum of History [1]" (Musée canadien de l'histoire 2015c); "At the Heart of History: The Vikings (Full Story)" (Europe 1 2018); "French Documentary—The Conversion of Vikings" (Documentary HD 2018); "Nantes: The Vikings, an Unprecedented Exhibition in France Far from the Clichés" (France 3 Pays de la Loire 2018); and "The True Nature of the Vikings: Myth or Reality No. 4" (Musée canadien de l'histoire 2015b).

The SHM narrative of the role of women is reflected, for example, in "Nantes: The Vikings, an Unprecedented Exhibition in France Far from the Clichés" (France 3 Pays de la Loire 2018), a review of the SHM touring exhibition *We Call Them Vikings* held at the Historical Museum of Nantes in the Château des ducs de Bretagne from 16 June to 18 November 2018. This video challenges the characterisation of Vikings as barbarous, violent, male warriors, claiming that most people in the North were

farmers. Male dominance is undercut by information obtained from the archaeological evidence that women accompanied men on sea journeys and managed homes. Women's domestic leadership role is supported by their rank as guardian and wearer of the symbolic key, displayed in a close-up from the exhibition. This gendered portrayal reflects the marketing of the Historical Museum of Nantes' mounting of the touring exhibition, which sought to sidestep the stereotyping of Viking society through the trope of a male warrior. The Nantes exhibition used as its signature image a lone slender Viking warrior, photographed from the back, who dons a helmet (without horns), armour and layered clothing. These visual details (Fig. 3.5) render the biological sex of the human figure indiscernible (personal communication with Marie Lefevre, 24 October 2018). The construction of Vikings as male warriors who wore horns on their helmets is nonetheless reinforced by the thumbnail of the touring exhibition's mechanical horned-helmet device and by the video itself, which fails to mention that this object is designed to show visitors that horned helmets are essentially mythical objects.

Research Results: The Personalised Browser and the Impact of Language and Location

In this method, a comparison is drawn between the SERP accessed at 3:00 p.m. on 4 April 2020 on the Tor Browser with one obtained simultaneously with the same keywords on the Chrome browser, personalised to my Ottawa-based IP address, illustrating the impact of personalisation in search queries. The following is a tabulation obtained via the personalised browser. The listed video numbers refer to the individual rank of fifteen videos with Viking helmet thumbnails from the top of a SERP stream of sixty videos obtained using the previously cited keywords (Table 3.2).

All of the thirteen videos with Viking thumbnail images tabulated with the Tor Browser were featured on the SERP produced with the personalised browser, with the addition of two videos. This correlation in video content was also obtained in two previous studies contrasting the content of YouTube video streams ascertained through identical keyword search terms within these two browsers (Pietrobruno 2020, 2021). The research finding of similarity across browsers obtained in three studies overall suggests that different browsers produce generally similar streams of YouTube videos, with just a few variations, even if the ranking of the videos

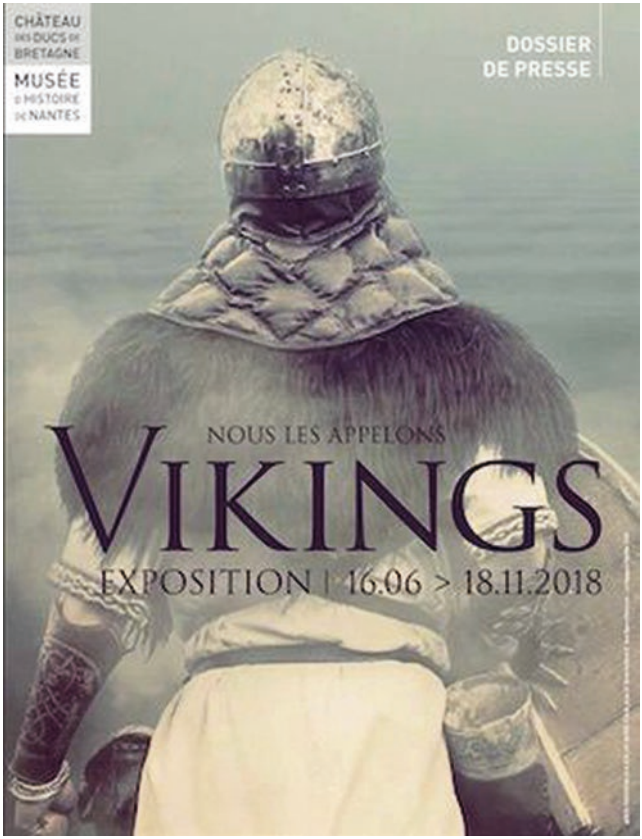

Fig. 3.5 Le Voyage à Nantes 2018 (The Journey to Nantes 2018) © Apapa Rosenthal & Atelier Shiroï—Photo: David Gallard & Tore Bjørn Stensrud

ascertained through each browser differs. This congruence in content could result from the platform's current deployment of infinite scrolling, which is pitched to provide different users with a close set of videos tabulated in varied rankings within video streams generated by comparative user search patterns (i.e. identical keywords).

One of the two videos not featured on the Tor Browser in this study (see Table 2, Video 11) is an animation entitled "The Incredible History of the Vikings" (DARKAM 2016), whose thumbnail showcases a helmeted Viking slaying a dragon. This video and its thumbnail fit into

Table 3.2 Personalised Browser

Video Number	*Video SERP Rank*	*Video Title (French)*	*Video Title (English Translation)*	*Video Channel*	*Date of Upload*
1	2	Les Vikings à Nantes	The Vikings in Nantes	Astraer	2018
2	3	Vikings au Musée canadien de l'histoire [1]	Vikings at the Canadian Museum of History [1]	Musée canadien de l'histoire	2015
3	4	L'âge des Vikings (avec nota bene)	The age of the Vikings (with Nota Bene)	L'histoire par les cartes	2016
4	11	Ils ont changé le monde—Les Vikings	They changed the world—The Vikings	n4v08k5	2017
5	15	Des Vikings au Canada (feat. Il était une fois)—Nota Bene #18	Vikings in Canada (feat. Once upon a time)—Nota Bene #18	Nota Bene	2016
6	21	Norvège, Iles Lofoten, le musée Viking à Borg, Ile de Vestvagy	Norway, Lofoten Islands, the Viking museum in Borg, Vestvagy Island	joelyvon	2016
7	24	La vraie nature des Vikings : Mythe ou réalité no. 4	The true nature of the Vikings: Myth or reality no. 4	Musée canadien de l'histoire	2015
8	25	Au Coeur de l'histoire: Les Vikings (récit intégral)	At the heart of history: The Vikings (full story)	Europe 1	2018
9	26	7 faits insolites sur les VIKINGS	7 unusual facts about the VIKINGS	Doc Seven	2017
10	28	Nantes : Les Vikings, une exposition inédite en France loin des clichés	Nantes: The Vikings, an unprecedented exhibition in France far from clichés	France 3 Pays de la Loire	2018
11	29	L'incroyable histoire de Vikings	The incredible history of the Vikings	DARKAM	2016
12	35	Vikings au Musée canadien de l'histoire [2]	Vikings at the Canadian Museum of History [2]	Musée canadien de l'histoire	2015

(*continued*)

Table 3.2 (continued)

Video Number	*Video SERP Rank*	*Video Title (French)*	*Video Title (English Translation)*	*Video Channel*	*Date of Upload*
13	37	Les secrets des Vikings—Premier raid en Angleterre	The secrets of the Vikings—First raid in England	Documentaire Monde	2018
14	38	La vraie nature des Vikings: Mythe ou réalité no. 3	The true nature of the Vikings: Myth or reality no. 3	Musée canadien de l'histoire	2015
15	42	Documentaire français—La conversion des Vikings	French documentary—The conversion of the Vikings	Documentary HD	2018

Category 2 ascertained with the Tor Browser. The images balance the stereotypical depiction of Vikings as "ruthless warriors" who "made Europe tremble with fear" (my translations), with a more nuanced depiction to illustrate that the majority of Vikings were farmers, artists and merchants. Women's leadership in managing extension farms is also highlighted. This video does not significantly distinguish the overall narrative of the personalised SERPs from that produced by the Tor Browser and the relation of these narratives to the one sanctioned by the SHM. The second video obtained exclusively through the personalised browser throughout the research month (see Table 2, Video 5), entitled "Vikings in Canada (Feat. Once Upon a Time)—Nota Bene #18" (Nota Bene 2016), focuses on the presence of Vikings in present-day Newfoundland a millennium ago. This video might have been exclusively targeted via personalisation algorithms to my Ottawa-based IP address because of its Canadian-related content. This last video shifts the narratives produced through the personalised browser to a certain, yet limited, degree by adding content that the algorithms may deem relevant to my Canadian-based IP address search as it relates to the link between Vikings and Canada. With the exception of this latter video, the narratives produced through the juxtaposition of content between personalised SERPs and the non-personalised Tor Browser are largely the same and were basically identical during the research month. Therefore, the narratives of these two browsers are almost parallel in how they relate to the SHM preferred story of the Vikings and the helmet.

A greater shift between the narratives ascertained by the two browsers did, however, result when this search was conducted with English-language keywords. The non-personalised or anonymous SERPs obtained via the Tor Browser produced a video that uses the Viking helmet as an emblem of its far-right political stance. This video did not appear on the personalised SERPs during the research period (Pietrobruno 2021). The relation between contemporary far-right individuals and groups and Viking symbolism did not surface in the tracking of Viking helmet thumbnails tabulated on YouTube personalised or anonymous SERPs ascertained through French-language keywords. This absence could be explained by the Viking helmet not being a part of the iconography used by the far-right in French-speaking locations in France and Quebec, where the SHM touring exhibitions were mounted and promoted on YouTube. With exceptions granted to the needs of a film, show or exhibition of a historical rendering, Article R645-1 of France's *Penal Code* bans the wearing or exhibiting in public of a uniform, badge or emblem worn by individuals and organisations declared to have committed crimes against humanity (Gouvernement de la République française 2021). This article prohibits the use of Nazi symbolism, including Nazi Germany's use of Viking imagery, as contemporary emblems for right-wing groups in France. The majority of far-right groups in Quebec do not use Viking symbolism. These groups include Atalante, La Meute, Storm Alliance and Fédération des Québécois de Souche (Morris 2018). The Soldiers of Odin, who use a horned Viking helmet as its emblem, do have a chapter in Quebec (Morris 2018). Founded in Finland in 2015, this anti-immigrant, White supremacist group has affiliated groups in Europe, Australia, the UK and various provinces in Canada (Wikipedia 2021). Therefore, the meaning and narratives of the helmet on YouTube SERPs, including its radicalisation, are impacted by the language in which the platform search is conducted and by the use of Viking iconography in the corresponding national or geographic context.

Conclusion

The SERP narratives of the Viking helmet, obtained through French keywords using the personalised browser and those accessed via the Tor Browser, may in time become more disparate, or more similar or more radical. SERPs are unstable media whose narratives are always in the process of becoming, as they have the potential to constantly transform and

alter in accordance with user-generated content, algorithms (including personalisation) and YouTube's business model. The tracking of the Viking helmet on YouTube conducted in French in combination with a previous study undertaken in English demonstrates that YouTube SERPs and their personalisation of historical narratives through language and location have the potential to continuously recontextualise museum objects depicted in thumbnails and videos. The display of objects in traditional museum exhibitions remains relatively constant over time, although visitors are free to self-curate their meaning through individualised viewing sequences. Museum curation is in the process of integrating the shifting nature of personalised search technology into exhibition designs. The link between museum display and contemporary search engine technology continues the tradition of museum exhibitions and their curation of meaning reproducing the media of their era. A future museum exhibition may be as unstable as the personalised SERPs of today's social media, which produce customised narratives that are open-ended and in flux. Social media personalisation is geared towards monetising users and realising the business aims of platform owners. Personalisation algorithms are not necessarily designed to convey histories of museum objects in order to promote social justice, a key goal of the SHM and the predominant mandate of museums in this digital era (Pietrobruno 2021). The increased integration of search request customisation in future museums could be based upon drawing vast amounts of personal data from audiences whose members may have no control over their use (Henning 2020b, xliv). This potential transfer of audience data could have legal ramifications with the General Data Protection Regulation (GDPR), a regulation in EU law dealing with data protection and privacy in the European Union. Ethical issues are also at stake if curators and designers blindly emulate the tactics of social media to individualise the visitor experience by personalising the historical narratives of museum objects.

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CHAPTER 4

Viking Jewellery on Pinterest: Drifting Digitisations and Shared Curatorial Agency

Bodil Axelsson

Abstract This chapter analyses the manifestations and operations of curatorial agency on the content-sharing platform Pinterest. While the manifestations of curatorial agency are explored through an analysis of the recontextualisations of museum digitisations of jewellery associated with the Viking Age in user-made collections, its operations are investigated through a long-term engagement with the platform's employment of machine learning models to select and display images in line with its business model. On Pinterest, museum digitisations take on a transnational and dispersed life as inspiration for historical imagination and craft, as well as for contemporary fashion. Due to the complexity of machine learning models, the politics of curatorial agency becomes a delicate issue to locate as it morphs between human and machinic forms of intelligence.

Keywords Curatorial agency • Pinterest • Museum digitisations • Viking • Jewellery • Craft • Machine learning • Machinic intelligence

Pinterest is a content-curating platform where infinite ephemeral collections of images evolve as one scrolls down the screen. More than 200 billion images are linked to the platform from around the Web by its monthly 400+

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million pinners, located mainly in North America and Europe, who are invited to the platform to find inspiration for things they love (Pinterest Newsroom). Pinners curate by providing images with brief descriptions and pinning them onto individual thematic boards. At its inception in 2010, Pinterest invited designers to set the aesthetics and strongly encouraged inspirational content related to fashion and home decoration. But in recent years, its content has diversified (Lui 2015), and major international museums employ the platform. The Swedish History Museum (SHM) does not publish digitisations on Pinterest; nonetheless, images of objects in its collection are numerous on the site. They are linked directly from the museum's open collection management system or from Flickr, which the museum used in conjunction with the travelling exhibitions *We Call Them Vikings*. But more often they have been linked to personal websites and blogs before being introduced into Pinterest's large bank of images (cf. Wilson 2016).

This chapter analyses curatorial agency as manifested in new contexts for digitisations on Pinterest from the SHM. It will offer an analytical framework that starts from the proposition that curatorial agency is performative and shared between digitisations, pinners and the platform's recommendation system. This entails a rethinking of Barbara Kirshenblatt-Gimblett's (1998) concept of "agency of display". Originally developed for analysing recontextualisations of objects and people in analogue exhibitions, the concept directs attention to the social and cultural ramifications of exhibitions as they manifest and transform in displays. Because the meaning of museum objects is dependent on these ramifications as well as interpretative labels and adjacent objects, their connotations change when reframed in subsequent displays (Kirshenblatt-Gimblett 1998, 21–23).

The application to Pinterest of the concept "agency of display" suggests certain ways in which it needs to be modified. The main implication for requalifying the concept in this chapter stems from the re-theorising of agency in actor-network theory (Latour 2005). In its various forms, actor-network theory zooms in on the entanglement of human and non-human actors and actants to trace agencies that make a difference in terms of altering a course of events (Latour 2005, 71). This chapter's analysis of the interaction of human agency and Pinterest's recommendation service brackets material agencies to explore agencies that change directions in human-machinic flows by acts of interpretation, choice and decision-making (cf. Hayles 2017, 115–141). During its course, the chapter addresses questions regarding human interpretation versus machinic decision-making.

The machinic agencies studied in this chapter operate under the auspices of platform capitalism. The notion of platform capitalism directs

attention to the employment of software, hardware and digital infrastructures to map and match users and cultural content in line with a designated business model (Langley and Leyshon 2017). These infrastructures are dependent on the content that users enter into the system and the preferences they disclose in searches (Velkova and Kaun 2019). This information is then processed by recommendation services designed by humans in a market context (Morris 2015). Bundles of algorithms, executing complex decisions from the available data (Kitchin 2017), operate as curatorial agents to archive, organise and display what is to be seen, known and consumed (Morris 2015; Tedone 2019). When the Artificial Intelligence branch Machine Learning is involved, as in the case of Pinterest, agency is increasingly delegated to machinic operations (Just and Latzer 2017, 252).

A significant body of literature has engaged with the blackboxing of algorithmic decision-making (Burrell 2016; Pasquale 2015), but Adrian Mackenzie and Anna Munster (2019) highlight another level of opacity, which they discuss in terms of platform seeing. The operations of machine learning–based models on images are never perceptible to humans. Rather, image flows are distributed across software, hardware and data streams and projected into neural networks and graphs to form ensembles. Distributed in such a manner, images temporarily lose referential meaning, such as indexicality and iconicity (Mackenzie and Munster 2019). Yet on the interface level, digitisations and other pins appear as images. What is of interest for this chapter are the ways in which machine learning models abstract image features to predict similarity and relevance based on relations within the available data to orient users towards specific modes of engagement (cf. Burrell 2016). They exceed humans in both their speed of decision-making (Hayles 2017) and their capacity to detect, learn and predict new patterns in large-scale data (Burrell 2016).

In this chapter, digitisations are defined as digital images of museum objects. Since the original purpose of these photos was to register objects, the photographic style is realistic (Kreiseler 2018). The immediacy of their display obscures both the informational and material complexity involved in their production (Drucker and Bishop 2019; Geismar 2018) and how machine learning models operate on them. Entangled in large image data sets they develop new and evolving relationships. As long as they carry a source link back to a museum database or a description that signals its origin, they may convey some of the meanings and values attributed to them in and beyond the museum context. What sets digitisations in motion is in part the shapes and decorative elements as they emerge in

digital images, in part textual annotations. As noted by Alfred Gell (1998), the decoration of objects functions as a technology of enchantment. Through semantically loaded styles, objects induce emotional reactions that prompt and channel human responses (Robb 2015).

Studying an Endless Flow of Pins

To investigate curatorial agency as manifested in new contexts for digitisations, this chapter combines an ethnographical approach with the computational method of topic modelling. An ethnographer by training, I acknowledge and work from my situated position. Hence, I recognise that both the creation and analysis of the data are intricately connected to my platform interaction, iterative interpretations and theoretical framing. In contrast to the majority of digital ethnographies, my approach did not involve observation of and interaction with online users (cf. Pink et al. 2016). Nor did it involve investigating the social life and symbolic use of archaeological knowledge by following users across platforms or into their offline activities (cf. Richardson 2019). Rather, I tracked digital images and investigated how their circulation depended on Pinterest's interface and technical architecture. To learn about the platform's technical architecture, and in particular its employment of machine learning, I turned to scientific papers and blogs written by engineers at Pinterest's labs. These texts provided me with clues as to how the different tasks of the platform's recommendation service were translated into machine learning models (cf. Kitchin 2017, 22).

Available as Web and app-based services, Pinterest presents an endless home feed of images or *pins*. Clicking on a pin enlarges it; if there is a description, this appears along with information on the pinner and the name of the board it is saved on. Beneath the enlarged pin, a feed of similar images appears, which may be clicked through to new pins. One can save an enlarged pin or click further to the website it is sourced from. It is also possible to navigate the site by using cell phone images as queries or the search bar at the top of the screen. In the latter case, the interface presents several options, including suggested topics. In all events, a new feed of pins appears.

Aiming to arrest the endless flow of pins, I entered the search phrase "Swedish History Museum". The recommendation service returned the topic "Viking jewellery". This topic is not a viable search term in the museum's collection management system, but on Pinterest it was. I

decided to use it as a shorthand for digitisations of pearls, necklaces, brooches and various types of metalwork. To localise boards displaying one or several digitisations from the SHM database, I browsed feeds and clicked through to boards. I also followed suggestions from the recommendation service's daily e-mail notifications with phrases such as "if you like Viking Jewellery [name of a board] you might also like". As the platform allows for saving other pinners' boards, I collected all in all 480 boards, including around 300,000 pins. This method of data collection was in part conditioned by my ability to recognise digitisations from SHM, in part by the anticipatory loops of the platform's recommendation system. It continued between March 2018 and October 2018 and came to a halt when the platform's recommendation service suggested boards I had already collected.

In order to get an overview of the new contexts for images of Viking Jewellery, the analysis proceeded by topic modelling of the brief descriptions provided by pinners. This method extracts patterns of co-occurring words in large amounts of text through the use of unsupervised machine learning. It might seem counterintuitive to study collections of images using a method for analysing texts. However, the availability of social media data for the analysis of online perceptions of archaeological knowledge is constrained by Application Program Interfaces (APIs) that regulate what can be accessed from platforms (Bonacchi and Krzyzanska 2019; Richardson 2019). Since Pinterest's API did not allow for downloading pins in the image format, a systematic overview had to rely on the annotations as they appeared when the data was accessed.

Due to the fact that topic modelling employs probabilistic assumptions from statistics to map and group co-occurring word units, without considering syntax and context, a solid employment of the method has to be based on prior knowledge of the corpus and critical engagement with each topic (Binder 2016; Schmidt 2012). For the next analytical step, I returned to Pinterest to inspect the most representative boards for each of the thirteen topics generated by the computational modelling of topics. I revisited the field notes and screenshots I took when generating the data to learn why these boards were chosen, inspected the boards' image grids and looked up source links. Furthermore, I traced the possible meanings of the thirty keywords for each topic in relation to boards as well as to conceptions of jewellery in archaeology and popular culture. A full analysis of all thirteen topics, technical details, data reduction, data cleaning procedures and reflections on the method is available in Axelsson et al.'s (2021) work.

This chapter's analysis is centred around contextualisations of Thor's hammer, oval brooches, a glass bead on a gold wire and an assemblage of necklaces. Due to ethical considerations, the chapter does not display screenshots of boards or images of people.

Thor's Hammers, Masculinity and Transnational Vikings

The items of original jewellery attributed to Vikings held by the SHM have all been found in the soil of the current Swedish nation-state and handed over to the museum in compliance with Swedish law. The museum then makes them available for exhibitions, iterative archaeological analysis in line with the latest development within the discipline and as digital records in the museum's open collection management system. The lure of these objects lies in their enigmatic character. They are found in graves or hoards and may be interpreted in terms of function, as representing regional styles, cross-cultural contacts or different phases of the Viking Age; as signifying cultural, social or gender status of the carrier; or as animated "things of quality" actioning relations between humans and gods (Myrberg Burström 2015).

Almost iconic, Thor's hammer, or mjollnir, is one of the most copied Viking Age objects, with a range of meanings in and beyond archaeology (Fig. 4.1). From plain iron items on amulet rings to richly ornamented single pendants in precious metals, diverse visualisations of Thor's hammers appear across many of the analysed boards. Some boards that display Thor's hammers are dedicated to digitisations of objects from Birka, a Swedish trading town of long-standing interest for archaeologists. A blog run by SHM that documents recent digs has given the site increased Internet presence (Birkabloggen). A second set of boards displays Thor's hammer adjacent to digitisations of material culture of late prehistoric and early medieval pagan pasts, attributed in the descriptions to Vikings, Celts, Saxons, Merovingians, Tenes, Gauls, Franks, Irish and Slavic-Kijevian. These categories are rooted in myths and historical narrations that create ethnic groups out of populations probably characterised by intercultural contacts across Eurasia (Geary 2003).

A significant context for Thor's hammers on Pinterest is those boards on which digitisations and other depictions of Thor's hammers are displayed among pins of swords, ships, runestones, helmets, shields and

Fig. 4.1 Thor's hammer. Photo: Garbriel Hildebrand SHM. Licensed under Creative Commons CC BY. http://mis.historiska.se/mis/sok/fid.asp?fid=108249

knives alongside images of open graves from archaeological digs, lush green landscapes, national monuments, household utensils and recreated buildings, such as festive halls. Saliently, the boards display Thor's hammers as part of a transnational Viking way of life, battle and belief.

The text below, displayed on a pin in the format of a picture meme, conveys how Thor's hammer might signify a spectrum of possible uptakes, from aesthetic appreciation to outright appropriation of White Northern masculinity:

> I do not wear these as a fashion symbol, a political statement, or because "it looks cool". It is not an indicator of my musical tastes. It is certainly not a symbol of hatred or exclusion. I wear this simply to honour my Gods, my Ancestors, my Folk who stand behind me in all that I do & all that I am.

The white text stands out on a black plate beneath Thor's hammer at the top. The style of the pin borders the ways in which Thor's hammer has been redefined as a symbol for hypermasculinity and violence within the complex subgenres of black metal (Ashby and Schofield 2015; Thompson 2019, 144–145). The style also alludes to the ways Thor's hammer evokes White supremacist messages (ibid.). Significantly, it testifies to nuances between and within subcultural practices, as the text differentiates between these contexts and a seemingly non-political ancestral link to Vikings and Norse mythology. On Pinterest, pins that demonstrate explicit right-wing politics are very rare. One possible exception is a cradle decorated like a Viking ship and accompanied by the text "parenting done right". The ambiguity of this pin challenges Pinterest's content moderation, the action that platforms take to remove harmful content. What is considered harmful is stated in each platform's community norms, and Pinterest's clearly states that the site prohibits support for White supremacy (Pinterest Community Guidelines).

In the larger picture on Pinterest, Thor's hammers seem to affirm an emotional attachment to a collective past, gravitating towards a revival of Nordic mythology, which also manifests in pins for Norse Mythology or tattoos inspired by Viking symbolism and decorative forms. Given the transnational imagery, it is relevant to interpret these contexts in terms of an imagined ancestry with a supranational attraction, similar to how Viking reenactments function as a bottom-up, subaltern heritage practice, partly overlapping with the ongoing institutionalisation of a pan-European heritage (cf. Narvselius 2016). However, in view of contemporary and historical appropriations of Vikings in ethno-nationalist movements, it is highly relevant to discuss adoptions of Norse symbolism as an orientation towards Whiteness. This point has been made in relation to genealogists in Scandinavia, the UK and North America who employ genetic ancestry tests to establish inheritance of historical Scandinavians (Strand and Källén 2021). As pointed out by Strand and Källén (2021), this does not necessarily imply xenophobic forms of nationalism with antagonistic boundaries between "us" and "them"; nevertheless, it has implications for prevailing orders of race and ethnicity. On Pinterest, the orientation towards Whiteness converges with feminine gender tropes as they have emerged within reenactment circles.

Jewellery Sets, Femininity and Reenactment

Reenactment societies recreate past events and cultures through realist aesthetics. As material culture is key to how reenactors immerse themselves in dynamic webs of sensuous experiences to produce a sense of authenticity (Holtorf 2013; Kobialka 2013), replicas link the past to the present (Daugbjerg 2013). Some reenactors manufacture their own gear after reconceiving archaeological knowledge and finds. Others lack a deeper knowledge, thus relying on manufacturers for their equipment (Karpińska 2019). Many boards on Pinterest point to Viking crafts having become commerce. There is a market for replicas, in a continuum from high-quality reproductions to kitschy copies for tourists, at both festivals and heritage sites (Halewood and Hannam 2001; Kobialka 2013).

The importance of archaeological objects as models for reenactment replicas manifests in boards that display Thor's hammers as single objects or as a pendant on amulet rings in the context of many types of jewellery, from simple round needle pins to decorated pendants, oval and trefoil middle brooches, finger rings, keys, Valkyrie pendants and other figurative objects with animalistic motives such as birds and dragons. The crucial visual context for Thor's hammers is here close-up images that reveal the forms, shapes and ornamental styles of personal dress items and amulets. Digitisations from a variety of museums and heritage centres in the Nordic countries commingle: the British Museum, the Metropolitan Museum of Art, a Tumblr account dedicated to Russian private collections. To these are added pins sourced from auction sites, web shops specialising in museum replicas or web pages that compile information about jewellery and clothing for reenactors. Hence, images of original objects mix with depictions of replicas. Words in pin descriptions such as cast, mount, gilded and twisted testify to an interest in techniques for manufacturing these types of objects.

The long-standing connection between Vikings and hypermasculinity has been challenged by research focusing on the life of women during the Viking Age (e.g. Coleman and Løkka 2014; Jesch 1991). The grave goods unearthed alongside the remains of female bodies have prompted research into female clothing and jewellery. For example, archaeological interpretations suggest that Thor's hammer pendants may have formed part of elaborate female jewellery assemblages (Kershaw 2013, 13). Inspired by archaeological research, Icelandic Sagas and popular culture, three female stereotypes have cropped up in reenactment circles: the strong

independent woman enjoying high societal status through her managing the household, the sorceress and the female warrior (Karpińska 2019). On Pinterest, the latter two are most often visible on boards associated with cosplay, larp or fantasy, genres for imagining the past that diverge from reenactment because they are indifferent to standards of reality. Instead, they connect to transmedial storyworlds, video games and television series (cf. Vu 2017).

For female reenactors, a pair of oval brooches, notably in jewellery sets with festoons of pearls and pendants, has become something of a signature style (Kobialka 2013) (Fig. 4.2). On Pinterest, digitisations of oval brooches not only appear on boards dedicated to Viking jewellery in general or brooches in particular, but also appear on large boards dedicated to reenactment. In these boards, female bodies are mostly displayed in tune with the ways in which femininity on Pinterest tends to be articulated in heterosexuality, Whiteness and caretaking labour (cf. Rossie 2019). The boards often evince a sense of sociality, playfulness and exposition. Numerous pins portray predominantly young women in long apron dresses decorated with brooches, pearl necklaces and strings with amulets.

Fig. 4.2 Oval brooches with a pearl necklace and an equal-armed relief brooch. Presentation image. Photo: Sören Hallgren SHM. Licensed under Creative Commons CC BY. http://mis.historiska.se/mis/sok/bild.asp?uid=18314

These pins mix with images of household utensils, patterns, hairstyles and not least scenes of women, men and children cooking, crafting, playing or just posing for the camera. Pin descriptions and board titles are in English, German, Russian and Scandinavian languages, testifying to the transnational character of reenactment and allure of jewellery associated with Vikings.

From Historical Evidence to Ethnic Fashion

This analysis will now turn to two digitisations that appear on boards both dedicated to aspects of the Viking Age and on those with non-Viking-related topics. Exquisite in its simplicity and noteworthy in its presence, the first digitisation appears in the context of jewellery associated with classical antiquity or contemporary jewellery design. It circulates with the description "Viking Age clear glass bead hanging on a gold wire—Birka Grave 523, Sweden" (Fig. 4.3). On boards dedicated to jewellery from the classical Mediterranean empires, the pin flanks elaborate artefacts, such as earrings, signet rings and cameos, in precious metals with engravings or inlaid gemstones. Their attraction lies in the beauty of their golden sheen and their association to craftsmanship. Pins are sourced from museums,

Fig 4.3 Viking Age clear glass bead hanging on a gold wire—Birka Grave 523, Sweden. Photo: Gabriel Hildebrand SHM. Licensed under Creative Commons CC BY. http://mis.historiska.se/mis/sok/fid.asp?fid=556524

auction houses and news sites. But as the links to the auction houses are broken, it is obvious that the significance of the pins springs from their aesthetics and efficacy as inspiration, rather than from their availability in the market. This role is highlighted by pins intended as tutorials for crafting jewellery. Boards dedicated to contemporary jewellery instead contextualise the pearl on the wire and other occasional SHM digitisations among jewellery pieces available for consumption. The focus is on what one can order, for example, from Etsy, an e-commerce site specialised in handmade jewellery, vintage items and craft supplies. The descriptions associate the pins with fashion styles, such as boho and vintage.

The second pin that appears outside of the Viking context, but sourced from the SHM, displays three crystal pendants on top of four necklaces (Fig. 4.4). The jewellery pieces are arranged to resemble grave goods, although the objects are indexed as loose finds from three different locations in the SHM database. An archaeologist might declare that these objects are doubly recontextualised: first, from their original contexts by their inclusion in the museum's collection and, second, as a photo bringing together non-related finds. On Pinterest, the digital depictions of the objects are further recontextualised on boards dedicated to contemporary practices related to Vikings, but also decidedly out of the context of Norse culture and reenactment of the Viking Age on a board dedicated to ancient tribal jewellery. Here, the digitisation appears among pins of pearls and multirow necklaces, attributed in the descriptions to locations in Asia and Africa, as well as to contemporary jewellery stores and workshops. Keywords in the descriptions, such as African trade and Venetian trade, associate the beads to colonial trading networks, as pearls produced in Venice were used as currency in exchange for African raw materials and slaves (trade beads, Victoria and Albert Museum). On Pinterest, these pearls appear in a fashion context that reaches back to the past as well as non-Western styles as sources of inspiration. Appearing in this context, the jewellery set from SHM gain a renewed efficacy with bearing on how jewellery pieces from the Viking Age may be interpreted within tropes of ethnic fashion, rather than as historical evidence of craft, social status or commercial and cultural networks during the late Iron Age.

Fig. 4.4 Three crystal pendants and four necklaces. Loose finds from three different find locations on Gotland. Presentation image. Photo: SHM Employee. Licensed under Creative Commons CC BY. http://mis.historiska.se/mis/sok/bild.asp?uid=16501&page=3&in=1

Machine Learning Models for Pins and Pinners

In the following sections, I turn to the ways in which Pinterest's recommendation system iteratively recontextualises pins and pinners in line with its business model. Pins and boards simultaneously act as visual displays and as data for training the platform's machine learning models (cf. Mackenzie and Munster 2019). Pinterest machine learning models are continually tweaked to improve their performance and new models are regularly introduced. Moreover, the opaqueness regarding the interaction

of the bundles of machine learning models is significant. Typically, the conference papers of Pinterest's engineers that form the basis of the analysis only address a particular problem, such as the modelling of pins or pinners.

During the period when data for this chapter was collected, the machine learning model PinSage proved its efficiency for recommending pins, and in the subsequent analysis it will be used as an example to shed light on Pinterest's machinic curation. One of the key tools for matching pins with pinners is the daily compilation of data into a bipartite graph, which reorganises pins and boards as separate yet interconnected sets. This structuring is built on the assumption that boards constitute the primary contexts for pins and that each pin can accrue multiple contexts. In addition to acting on the graph, PinSage employed image recognition technologies to process features and natural language processing tools to act on pin descriptions and board names (Ying et al. 2018).

Before its implementation, PinSage trained on positive and negative examples of pairs of pins deemed either similar/relevant or dissimilar/irrelevant from historical user engagement (Ying et al. 2018). Once training is complete, machine learning models like PinSage can be applied to new data and generate new unforeseen matches as they adapt, adjust and evolve according to new data input (Parisi 2019, 94). Because the model processes data in a graph convolutional neural network, the selection of pins proceeds iteratively through algorithms processing multiple layers of data. Given a pin as an input, an initial algorithm aggregates information to compute and connect neighbouring pins according to the similarity. The output of this layer produces the input for the following layer, which in turn produces more iterative layers. The key to the success of the model is the engineers' optimising of the outputs by adjusting weights, that is, applying statistic principles to select the best option from a set criterion (Mackenzie 2017, 103–124). For this process to work on billions of pins, the engineers introduced techniques for reduction and sampling (Ying et al. 2018).

Another aspect of the Pinterest recommendation system is its tracking and mapping of pinners' interactions with pins. Pinners are likewise subjected to machine learning models and projected into abstract, mathematical space. These models train on the positive actions of clicking, saving or buying an item. They weight pinners' short-term interests, as reflected by the interactions within an ongoing session, with actions evolving over an

extended period of time. Pinners' interests are updated within seconds and continuously logged as a record of historical pinner interaction. To meet the challenge of many pinners expressing several areas of interest, the platform has developed models to represent each pinner with multiple clusters for actions, each represented by a typical pin. Heavy users could be represented by up to a hundred clusters (Pal et al. 2020).

Given the fact that the platform processes pinners, pins and boards on a recurring basis, it is relevant to invoke Celia Lury's and Sophie Day's (2019) discussion of atypical individuation. The machine learning models that Pinterest employs for classifying pinners do not primarily rely on the logic of collaborative filtering, that is, "people like you like this". Neither do they rely solely on predetermined properties, such as demography, location or language. Rather, the models predict relevant pins based on individual users' previous actions on the platform, constantly creating pinners, pins and their relations anew. A pinner is always provisional, multidimensional and defined of her actions with different pins over time. Because the daily reprocessing of the bipartite graph iteratively recontextualises pins in line with new input from pinners, the context of a pin is, therefore, equally provisional, fragmented and only tangentially consistent with its specific descriptions and boards.

For one particular task, Pinterest models pinners as temporary collectives. While most social media platforms capitalise on user data through a combination of advertisement revenues, selling aggregated data to media analytic companies and financial valuation on the stock market (Andrejevic 2015), Pinterest's primary source of income is from promoted pins. Up until its introduction on the stock market in 2019, the Pinterest business model solely relied on businesses selecting their content, choosing the size of their audience, providing Pinterest with a seed list of existing customers and bidding on a campaign (deWet and Ou 2019). The platform then processes its data to find the set of pinners who are most similar to each business' set of seed users, so that promoted pins appear in similar pinners' feeds, camouflaged to mix with other pins (cf. Lui 2015). Viewed through the lens of political economy (Andrejevic 2015; Axelsson 2019; Fuchs 2012; Jones 2016), pinners that invest their time in sourcing and collecting pins labour for the platform's owners and stakeholders. The images and data provided by pinners about their preferences when spending time on the platform are perhaps the most essential assets for Pinterest, alongside the recommendation system that sets the images in motion.

Shared Curatorial Agency and Drifting Pins

Through a speculative analysis of the manner in which digitisations start to exhibit concept drift, this section parses curatorial agency among pinners, digitisations and the platform's recommendation service. But it will first turn to how the platform's interface and machine learning models define the space for curation and prompt humans to act upon the shapes and ornaments of objects as depicted in digitisations.

In certain aspects, human curatorial agency on Pinterest entails naming a board and selecting pins for it. But, organising these pins is highly dependent on the recommendation service, which tends to suggest grids of pins it considers as related. Unless a pinner decides to pin an image exterior to the platform, all choices are based on relations between images already on the platform. Sourcing a pin from outside the platform is creative and independent (Hall and Zarro 2012). Until early 2018, when the platform introduced the options to rearrange pins and create thematic sections within boards, pins were displayed in order of pinning. Consequently, many boards display clusters of similar pins. Another significant aspect is the platform's sign-up script, which encourages pinners to interact mainly through repinning and following boards. Curating is thus more important than community-building (Friz and Ghel 2016).

With a platform designed for discovery-based navigation, pinners can easily become enmeshed in the endless flow of images (Lui 2015). Accordingly, pinning is highly influenced by affects and emotions in the moment (Jones 2016). Within a second, an action on the platform prompts a new set of related images to appear. It is as if the platform's interface presupposes that the bulk of human reactions to the environment relies on what N. Katherine Hayles (2017) defines as nonconscious cognition. The emergent and infinite flow of images in home feeds and searches activates in-the-moment choices based on the sensory impressions of the colours, shapes and decorative elements of pins. The interface encourages intuitive decision-making founded on the similarity of pins, while the platform's ever-changing grid of images seems to provide a seamless abundance of possibilities. The best policy for steering the flow is to monitor carefully one's actions (D'Amore 2016), that is, to know and control one's own atypical individuation.

The machine learning models predict the relevance of pins, on the one hand, by a pinner's activities and, on the other, by the iterative contextualisation of pins on boards. Pinners' curation is a matter of human choice,

connoisseurship and interpretation, but under inducement of the complexity and variability of forms and decorations as they pass by in infinite image flows. Whereas human categorisation is highly sensitive to shifting contexts and cultural frameworks (Bechmann and Bowker 2019), machine learning algorithms classify in order to predict relevancy from patterns they recognise within the data. Their way of "seeing" in terms of making sense of images is both different from and invisible to humans (cf. Mackenzie and Munster 2019). As argued by Beatrice Fazi (2021), deep learning algorithms operate through abstractive functions from statistics and computer science, which are incommensurable with human interpretation. These models do not see like humans, but rather learn to classify and organise characteristics of data in their own distinct way. The non-linear nature of neural networks, combined with the compression and distribution of information over many variables, makes the predictions too complex, abstract and layered to be comprehended by, or even compared, to human meaning making (Fazi 2021, cf. Burrell 2016).

These two ontologically and epistemologically incommensurable modes of curation result in iterative overlaps and a variability of forms and decorations, particularly visible on large boards that conjure up digitisations from a wide range of museums under board titles such as Viking jewellery. These boards typically display a continuum of objects of various shapes and styles. Here, each pin normally shares one of several features with neighbouring pins. For example, a series of digitisations of Thor's hammer may be displayed side by side. The ornamental style of one might then be mirrored by adjacent digitisations of pendants of animal masks in a knotwork of ribbed or twisted bands. Subsequent digitisations may display a plain Thor's hammer on an amulet ring or in front of a pile of twisted rings. The ring shape is then picked up in adjacent displays of single twisted rings. Thereafter, animal or human masks reappear in subsequent displays of circular or trefoil brooches, which in turn may be displayed side by side with bird-shaped pendants that share the ways in which eyes bulge from the masks. Further down the feed, the ribbed, twisted or knotted bands may be picked up in the display of a series of oval brooches. In this way the board feeds iteratively display objects that are similar in one or several respects, with occasional insertions of pins that are related differently.

Many boards display these nested sets of relationships. Pins are related by subtle variations in forms and decorative elements drifting back and forth in image feeds. Thanks to the ways in which the machine learning

models relate pins to more than one board context, digitisations start to drift between human contextualisations. The digitisation of the pearl on the gold wire attributed to Birka may enhance the understanding of the drifting digitisations. Let us assume that this digitisation was first sourced to Pinterest onto a board displaying finds from Birka. Here it would probably be associated with topics such as jewellery and Vikings, due to the fact that finds from the trade city Birka often serve as models for Viking reenactors' jewellery replicas (Karpińska 2019). Once associated with Vikings, reenactment or jewellery, machine learning models would continue to recontextualise the digitisation in feeds displaying one or several of these themes. Once connected to the theme jewellery, the digitisation could drift into the image flows of pinners interacting with jewellery from other locations and time periods. Because the machine learning model for pin recommendations also acts on descriptions, the words gold and pearl would increase the possibility that the digitisation would be displayed adjacent to any category of jewellery described in those words.

The phenomenon of drifting could be further elaborated by turning to the pin that presents an assemblage of loose finds as a jewellery set of three crystal pendants and four necklaces. This pin appears on the platform with no description, which means that the algorithms have only the board contexts and the image features to act on. One assumption is that it has drifted from board themes such as Viking jewellery in a manner similar to the pearl on the gold wire. Another is that the technology for image recognition projects the pins' display of necklaces as resembling similar displays from a vast variety of contexts. A closer inspection of its placement on the board dedicated to ancient tribal jewellery suggests that the pinner or the image recognition technologies in this case must have picked up on the semicircular display of several necklaces and the shapes and colours of the pearls in one of them. The pin actually occurs twice on the board. Once, it is directly adjacent to a pin displaying a collection of jewellery attributed to Egypt, some of which are necklaces arranged in semicircles. The second time it appears, it is surrounded by a multitude of pins depicting multirow pearl necklaces in nuances of blue, green and red similar to those in one of its depicted necklaces. In spite of the visual similarities, the pin here appears significantly recontextualised. When sourced to Pinterest, jewellery takes on a transnational dispersed life in the shared curatorial agency of pins, pinners and the platform's recommendation system.

Conclusion

The shared curatorial agency on Pinterest manifests in the ways in which the forms and shapes of museum objects impel humans and machine learning models to interact. On the interface level, digitisations appear as analogous to both the original objects and its many occurrences in Pinterest's image flow. However, in abstract mathematical space, the platform's data model projects many instances of the digitisation as related to a wide range of pinner-created contexts, which in turn contributes to iterative recontextualisations on the interface level.

The analysis in this chapter has highlighted that Thor's hammers and other adornments come to matter as symbols for a transnational, imagined Norse culture. A second significant context for jewellery associated with Vikings is the gendered activities of reenactment communities in which the caretaking labour of empowered women stands out as a significant trope. It is difficult to establish the extent to which the cultural and gendered tropes addressed in the analysis are a consequence of the social values of pinners, the platform's machine learning algorithms, the topic modelling method used for finding patterns or the researcher's interpretative frames. What is known is the risk that machine learning algorithms, unless carefully modelled and applied, reflect or even reinforce socially and culturally accrued biases and stereotypes (Barocas et al. 2019, 1–28). This means that locating the operations of the politics involved in shared curatorial agency is a delicate task.

The platform's shared curatorial agency also supports the drifting of pins between human-made contexts and pinners localised all over Europe, North America and beyond. The result is that digitisations of jewellery attributed to Vikings find their way to collections of antique and contemporary jewellery, whose origins also lie outside the Global North. Common to all contexts is that Pinterest makes no distinctions between museum digitisations and digital images of jewellery originating in commercial contexts. In fact, the platform's machine learning models are trained to categorise and "see" objects as commodities. Consequently, Pinterest's display of Viking jewellery points to the role of museum digitisation as inspiration for craft, related to reenactment and contemporary fashion alike. As Hilary Jones points out, the platform encourages virtual hoarding of inspirational pins for future consumption and craft activities (cf. Jones 2016). Part of the efficacy of digitisations lies in the ways in which they convey eloquent design and craftwork. Hence, digitisations' decorative elements are

introduced into contemporary economic circuits when cultural-historical museums holding jewellery from the Viking Age, similar to museums for decorative arts, offer prototypes for new products and purchases (cf. Geismar 2018). The conditions for their circulation and availability for pinners are shaped by Pinterest's specific implementation of the platform economy's for-profit structure. When digitisations circulate on the platform, they contribute to its generation of revenue and financial value simply by being part of its attraction.

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CHAPTER 5

Technospheric Curation and the Swedish Allah Ring: Refiguring Digitisations and Curatorial Agency as Ecological Compositions, and Eco-curating as Planetary Inhabitations

Fiona R. Cameron

Abstract In this chapter I unravel human-centred understandings of digitisations working with the digitisation of a silver-alloy finger ring inscribed in Arabic Kufic writing with the words "il-la-lah" ("For/to Allah") and re-theorise it through a novel ontological, new-materialisms, posthuman, ecological mode of thinking (Cameron, Fiona R. 2018. Posthuman Museum Practices. In *The Posthuman Glossary*, ed. Rosi Braidotti and Maria Hlavajova, 349–352. London / New York: Bloomsbury Academic; Cameron, Fiona R. 2019. Theorizing Digitisations in Global Computational Infrastructures. In *The International Handbook of New Digital Practices in Galleries, Libraries, Archives, Museums and Heritage Sites*, ed. Hannah Lewi, Wally Smith, Steve Cooke, and Dirk vom Lehn, 55–67. London: Routledge). The ring is significant as evidence of interactions between Viking and Islamic worlds and as an artefact directed to promoting intercultural respect during the Syrian refugee crisis and the rise of far-right anti-Muslim sentiments. Significantly, the ring digitisation also becomes planetary in reach and

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distribution as an unruly, more-than-digital ecological composition in which curatorial agency is refigured as radical, eco-systemic processes involving the action and vitality of many different coordinates in their unfolding (Cameron, Fiona R. 2021. *The Future of Digital Data, Heritage and Curation in a More-Than-Human World*. Abington: Routledge., 129).

Keywords Digitisations • Digital cultural heritage • "Allah" finger ring • Eco-curatorial agency • Ecological compositions • Technosphere • More-than-human ontologies

In this chapter I unravel human-centred understandings of digitisations (commonly described as digital copies of museum collections) based on human agents, actions, narratives and object-centred forms of materiality, sociality and their accompanying social, cultural and technical frames of interpretation, as well as recent accounts focusing on digital materiality (Cameron 2021, 129; Cameron 2019, 55-56). This is because in the context of a radical expansion of data forms and types, infrastructures and technologies and their human, more-than-human and non-human aspects, digitisations become more-than-humanist forms of social and cultural expression, statements of identity or digital material substrates (Cameron 2021, 129; Cameron 2019; Cameron 2018; Cameron 2008).

In light of this, I theorise them through a novel ontological, new materialisms, posthuman and ecological mode of thinking (Cameron 2014; Cameron and Mengler 2015; Cameron 2018; Cameron 2019; Cameron 2021) by focusing on the digitisation of a high-grade silver-alloy finger ring with a violet soda-lime glass inset, inscribed in Arabic Kufic writing with the words "il-la-lah" ("For/to Allah"). Found in a woman's burial site in Birka, 25 km west of Stockholm (Wärmländer et al. 2015, 131), this artefact, known as the "Allah" ring, is the only example of its type with an Arabic inscription found on Swedish soil (Fig. 5.1). Carbon-dated to 850 CE, the ring is in the collection of the Swedish History Museum (SHM) in Stockholm (Wärmländer et al. 2015, 131). The archaeological excavations conducted in Birka revealed many other grave goods, such as silver coins (dirham) whose material composition, decorative design elements, inscriptions and crafting methods suggested an origin in a distant location. All these artefacts, many of which come from the silver mines of Panjshir, Afghanistan, alongside those containing crystal and carnelian, provide material evidence of the multiple connections between Vikings and Islam, through sojourns in Yemen, India, Asia Minor and the Caucasus some

Fig. 5.1 The Allah ring. Photo: Ola Myrin SHM. Licensed under Creative Commons CC BY

1300 years ago (Wärmländer et al. 2015, 132). Furthermore, all these artefacts point to the Birka's importance as a trading centre during the Viking era between 793 and 1066 CE (Wärmländer et al. 2015, 132).

Refiguring the Optics

In this chapter I refigure the Arabic finger ring, when digitised and uploaded to the Internet, as significant not only as evidence of interactions, analogous to its "real analog parent", between the Viking and Islamic worlds of the past; rather, it has also become planetary in its extent as a more-than-digital, unruly, ecological composition under the influence of radical, eco-systemic processes involving the action of many different types of coordinates and the vitality of their interrelatedness in their unfolding (Cameron 2021). The parent and its digitisation exhibit different notions of humanness and human culturing as different forms and processes (Cameron 2021, 234), comprising metals such as silver and copper used in digital infrastructures and those used in the crafting of the ring itself and its distribution.

Reading the digitisation of the ring through a more-than-human and eco-systemic, rather than a humanist, framework directs our investigation into how it is composed, conjoined and transformed by the co-evolving interrelatedness of a broad range of agents from people to technologies, algorithms, materials (metals, chemicals, rare-earth minerals), infrastructures, energetic systems, ideas and so forth (Cameron 2021, 130). It also alerts us to how this conation of human, more-than-human and other-than-human forces operates together in refiguring the Allah finger ring as more-than-digital, in both its constituted and constituting forms, and as

domains of influencing within the extended, distributed webs of intelligibility that comprise it as something other than a fixed representational image (Cameron 2021, 130-131).

First, such figurations of the more-than-digital Allah ring direct our attention to the unprecedented level of digitally and technologically complex innovation accomplished and emerging; how such innovations are accelerating exponentially; the novel types of relationships that are formed between human and non-human entities; and the new curatorial forms that are emerging, which I have defined as vastly expanded, distributed eco-curatorial processes and their non-linear and multifaceted domains of influencing of planetary extent wrought by these developments (Cameron 2021, 130). Second, these circumstances alert us to the emerging material, sensing and discursive manifestations of these eco-curating processes. Third, the type of knowledge that is produced through these new figurations is radically different from human narratives and at the same time is folded into all manner of entanglements and cognitive processes (Cameron 2021, 130). Feminist philosopher Rosi Braidotti (2019, 2-3) argues that these new types of knowledge, produced and distributed as a result of unprecedented technological developments involving multiple human and non-humans, emerge in a complex, posthuman convergence. Fourth, a consideration of the ring as comprising material agencies widens the interpretive potential of digital cultural heritage beyond its humanist, social constructivist and technical framing as more-than-digital (Cameron 2021, 130). It also acts as a lever to consider how the more-than-digital Allah finger ring might be conceived as imbricate material and performative indices in ecological crises (Cameron 2021, 130-131): that is, from the extraction of the geological substrates of the Earth itself in the service of the digital economy and capitalist accumulation through digital devices from computers to smartphones and infrastructures; the production of digital and electronic waste; and the burning of fossil fuel to drive global computational infrastructures, thereby leading to the contamination of terrestrial Earth and the atmospheric envelope; and the accompanying environmental destruction leading to biodiversity loss and extinctions (Cameron 2021, 248-253).

Fifth, the interpretation of digital data as heritage is not simply a case of how the Allah ring, for example, appears or is read differently by Swedish and Islamic archaeologists and historians, museum professionals and their respective communities through inclusion in plural heritage-interpretive frameworks (Cameron 2021, 130). By engaging digital cultural heritage and through the more-than-digital Allah ring example as different ways of thinking about and acting in the world that also takes account of the

accomplishments of non-humans and more-than-human entities or as different worldings rather than world views, we can move away from imposing pre-ascribed categories of material, aesthetics, form, mode of production, agency and associated points of view founded on person–thing (subject-object) relations, such as history, significance and object biographies (Cameron 2021, 130).

Digitisations as a Humanist Form

Digitisations are routinely viewed as immaterial, informational replicas of their parent, the "real analog object", and as networked human and machine subjectivities (Cameron 2007, 89; Cameron 2019, 55). In this scenario, connecting people who share information of the real object through its digitisation continues to be the primary concern (Cameron 2019, 55). The value of a digitisation derives from its role as a form of cultural communication alongside its potential to promote the radical democratisation of institutions in regard to access to and engagement with their collections (Cameron 2007). Accordingly, users are conceived as autonomous human agents in a global infosphere (Cameron 2019, 64-65).

While material heritage is founded on an artefactual notion of identity, digitisations are founded on an informational one (Owens 2018, 13-17). In this aspect, digitisation aims to carry the cultural information and aesthetic impression of its parent (Cameron 2019, 55; Cameron 2007, 89). Digitisations are also classified as informational in a software sense (Cameron 2021, 140).

Materiality is rendered less important or indeed irrelevant by the immaterial and informational discourses occasioned by computer code (Fuller 2005, 2). And since a digitisation is subordinate to these interpretations, it is tasked to authenticate its parent, rather than itself (Cameron 2021, 37). Put simply, the digitisation of the more-than-digital Allah ring is informational; the material object is its parent and the information of the parent is encoded into the digital, considered materially as the direct transfer of atomic matter into immaterial code. Like the parent, the digitisation becomes a unique object (Cameron 2007, 89), a heritage form, constituting direct evidence of interactions between Viking Scandinavia and the Islamic world. To this end, digitisations are subject to and judged on the basis of its similarity to its material parent (Cameron 2019, 56). In museum contexts, discourses of comparison and lack from a position of negative association are the primary criterion of value for a digitisation (Cameron 2019, 56-58). But in the case of the more-than-digital Allah ring, the

value of the digitisation does not come from a position of lack, but of enhancement through complementarity, even when it is read as its parent.

The museum and heritage sectors continue to align themselves closely with the computer revolution and the so-called information turn (Cameron 2019, 55-56). In addition, the focus on ICTs and social media has largely directed museums and their digital strategies towards the social interpretation of digital heritage collections and the management of that information as its technicity, rather than towards a sustained consideration of the other unique affordances of digital collections themselves (Cameron 2021, 139).

In an object-orientated museological culture, emphasis is placed on a digitisation's role as a social text and symbols from which sociocultural insights into the past might be garnered, much like other anthropological artefacts, as described by Liana Chua and Amiria Salmond (2012, 102). Digital code, a feature central to the digitisation's identity in current debates, operates as a literature, a mechanism, a spatial form and organisation and as a repository of social norms, values, patterns and processes. Furthermore, its programmability sets digitisations apart from other simulations, such as photography and film and indeed its parent.

Strikingly but also unsurprisingly, the more-than-digital Allah ring is defined within a single dimension and in accordance with the hierarchical relations of human subject-object, thereby acting as a passive invocation of the human and social. Accordingly, this sole focus on the human subject and our interpretive needs renders invisible other ontological alternatives of thing-being. Therefore, our engagement with digitisations such as that of the Allah ring is egocentric, borne out of the intent, needs and sensibilities of the human subject: as a means of understanding cultural significance as symbolic of identity; as a memory agent; as a platform for storytelling; as material evidence of past events; and as connections between diverse cultures. Here the role of the digitisation is seen simply in terms of its aesthetic, social, historical, material, scientific or affective term (Cameron 2019, 58-59).

We commonly use informational surrogates for art educational purposes, where photographs, slides and digitisations operate as artefactual stand-ins for identifying works and art trends (Owens 2018, 1-4). This is evident from the reproduction of the Allah ring and its eco-curatorial distribution across global computational space, and its use by media outlets, such as Al Jazeera, directed, as Diab (2015) avers, "to allay fear and fearmongering about the Islamisation of Europe in light of the refugee crisis".

Significantly, the visual, informational, rhetorical, technical and computational ecology that dominates our understanding of the more-than-digital Allah ring and its circulation obfuscates all other interpretations (Cameron 2019, 57).

The production of digitisations and discussions in this regard place a greater emphasis on the techniques of visualisation, whose role is to accurately represent the physical counterpart and, interestingly in regard to the Allah ring, to act forensically. The documentation of the ring in the museum database describes it as being of gilded silver, set with a violet amethyst inscribed with the word "Allah" in Arabic Kufic writing (Wärmländer et al. 2015, 131). These documented details of its origin, physical composition and inscription have become the subject of much conjecture. Subsequently, the visual examination of the ring and its technical analysis through non-destructive methods, as well as its 3D digitisation, were conducted to ascertain its material composition in an effort to resolve matters regarding its origin and material composition (Wärmländer et al. 2015, 131). The more-than-digital "Allah" ring as a 3D replicant sought to represent an accurate account of the material, analogue parent through multiple photographs from different angles using a digital SLR camera (Canon EOS 600D) and stitched together into a 3D model using Agisoft Metashape software (Wärmländer et al. 2015, 132). This 3D model aimed to achieve accurate scale renderings of its shape, size and details, such as the texture of the "real" Allah ring; its materials and how it was made; and enable the reading of the script etched into its glass surface. In this case, the 3D digitisation sought to amplify the parent's physical characteristics, elements and properties, not just in terms of their informational qualities but also materially and involved the augmentation of the marks of its crafting, thereby enabling its forensic investigation by bringing forth its fine-grained details many of which are indistinct to the eye. Combined with the analysis of the parent through its atomic composition based on SEM/EDS (Scanning Electron Microscopy with Energy Dispersive Spectroscopy) imaging and elemental analysis (Wärmländer et al. 2015, 132), both forms of forensic examination drew forth the aural characteristics of the parent. As a result, the replicant merged in both meaning and material with its parent. As a human-non-human interface, its humanness is etched into its fabric with respect to both its parent and the digitisation.

Therefore, the value of a digitisation of the Allah ring rests on its ability to materially replicate its parent and to forensically examine it. It is deeply fused in its representational mode and that of its parent's aesthetic, the

very thoughts that created its terrorist leanings. Therefore, rather than framing the Allah ring in these terms, I take a different route and interpret it in its many forms as multiple ecological compositions deeply embedded in the substrates of life itself and complicit in the very future habitability of the planet (Cameron 2021). Strikingly, and according to normative terms of reference, the ring's authenticity with respect to its digitisation is cast in terms of how accurately it represents the information of the original especially in its material properties, that is, its informational accuracy and its potential for scientific analysis. Here the digitisation emerges as authentic, but not on its own terms (Cameron 2019, 55-56). Accordingly, the cult of the replicant continues to play a defining role in the machinic distribution of the more-than-human-digital Allah ring.

Furthermore, the prevalence of systems of representation as a strategy for description and explanation within heritage and museum cultures potently illustrates and delimits the meanings and values that can be given to digitisations (Cameron 2007, 89; Cameron 2008). This applies to the more-than-digital Allah ring as historical document, as embodying the marks of its crafting, its material properties and functioning materials, and as semiotic text, rather than existing in its own right with its own set of attributes (Cameron 2019, 56). Clearly, the ring is disposed towards social constructivist and human-material significations through its parent.

The Digitisation of the Allah Ring as More-than-Human Ecological Compositions

With the development of multiple Internets, superfast Wi-Fi connections, Web 2.0, the semantic web, extensive social networks, sophisticated search queries, personalisation and mobile applications, the emergence of different types of mobile devices, digital platforms and media types such as Facebook, Twitter, Instagram and Pinterest, more and more complex forms of data production and connectivity have emerged (Cameron 2019, 56-60; Cameron 2021, 131). As technological capitalism has grown and the digital economy expanded amidst the complexity and disorderliness of planetary computational infrastructures, the rise of automation and algorithmic governance, energetic systems, cloud computing and storage, more complex platform, financial, governance and surveillance structures begin to cross sectors and disperse across scales (Cameron 2019, 59-60; Cameron 2021, 131-132). The destructive forces of data—through, for

example, the mining of vast quantities of rare-earths and metals (cobalt, gallium, indium, lithium, platinum, aluminium, tin, copper, palladium, silver) used in batteries, hard drives, displays, memory chips, electronic components and gold solvents used in connectors, contacts and wire bonding to enable rapid Internet connections, alongside toxic electronic waste dumps—have led to conflicts, resource depletion, environmental destruction across multiple life spans, and human rights violations (Reading and Notley 2015; Parikka 2015a; Cameron 2021, 132). As a consequence of coal and petroleum mining, fracking and carbon pollution through the burning of fossil fuels to drive the digital economy, climate change and the emergence of the Technosphere (a subsystem of the Anthropocene) were brought about by the evolution of technics, large-scale technology and media production which, argues media theorist Jussi Parikka (2015a, viii), become a question of geology.

The geological components in digital media devices include cobalt from Africa, zinc from Alaska extracted and refined into indium in Canada with other metals and minerals originating from Belgium, Russia, Peru, China, Congo, South Africa and Malaysia (Parikka 2015a, 46; Cameron 2021, 132). Here the non-human world previously described as Nature is enrolled in digital technical projects and infrastructures (Simondon 1989).

In a digital economy directed to the scientific understanding and economic exploitation of all living and non-living matter under the imperative of capital accumulation, these more-than-digital ecologies create new material, contaminating conditions in the ruins of digital consumption and obsolescence (Gabrys 2018, 108-109; Cameron 2021, 132). At the same time these developments are also reorganising social, geographical, economic and political life as new types of ecologically implicated conditions and blurring distinctions between humans, other species and earthly elements and processes (Bratton 2015; Parikka 2015b).

While it is acknowledged that computational infrastructures, media and data have always operated in an ecological way, I expanded on the notion of the ecological to construct a more radical and extensive account of digital cultural heritage within these ecological formations (Cameron 2021, 133).

As a result, an ever-expanding array of coordinates and subjects enters the field of things we call digital cultural heritage, both digitally born, and digitisations often mediated by AI, algorithmic culture and machine learning. Such intimate collaborations between digital media systems, technology, organic life and geological matter enlist a whole host of new

coordinates and forms of data and systems into the digital cultural heritage realm (Cameron 2021, 132). To this end, I advance new figurations for digitisations as multiple, disorderly, multi-scaled-forming ecological compositions comprising what I call thingness (the multi-scaled, extensive, radically interoperable webs of heterogeneous coordinates, forces and agencies that comprise them) that are at once complex, emergent and multivalent (Cameron 2018; Cameron 2019, 60-61; Cameron 2021, 139).

As a result, through an ecological optic that makes visible the expansive range of coordinates that comprise these productions, the human-centredness of digital cultural heritage collapses (Cameron 2021, 254). Instead, human users and digitisations operate within an ever-expanding field of coordinates and processes (Cameron 2019, 61).

The variable coordinates that make up the more-than-digital Allah ring are so extensive that they interpenetrate human and non-human life itself. The ring therefore becomes an extended and dispersed spatial and temporal composition made up of diverse, conjoined and interacting vital elements (Cameron 2019, 61). An ecological mode of thought draws our attention to environmental crises in which digital data and digital media, and consequently the more-than-digital Allah ring, are implicated.

Here the more-than-digital Allah ring and its unique coordinates are embedded, extended and distributed, interpenetrating human and non-human life itself from deep time through the geological and material substrates in which the raw minerals used in the making of hardware and smartphones are embedded in the exploitative labour practices and global supply chains from which they are made and remade (Cameron 2021, 135).

Accordingly, digital data and, by implication, the more-than-digital Allah ring can no longer be thought of as originating from a singular source in the same way we erroneously refer to the "real". The ring is made up of diverse elements from many geographical regions. Through the extraction, harnessing and culturing of the vital, immanent qualities of metals, minerals and chemicals, in computational design and infrastructures originating from many different geographical and spatial locations, the more-than-digital Allah ring is drawn into vast, deeper and more complex ecologies of an inter-galactic scale to the Earth's strata and life itself (Cameron 2021, 134). Similarly, the real Allah ring never had one point of origin in the Islamic world, because it is made up of many different elements from fire, sand used in the making of soda-lime glass to Afghani silver. It is the outcome of multiple processes of crafting and composing

often rooted in human and other-than-human agencies and histories of deep time.

Given all this, the more-than-digital Allah ring originates in multiple geographical locations and arises out of many influences. This array of coordinates includes the authors of its software and the designers of its many different forms of hardware; the materials from which they are made; the global logistics and supply chains of materials and electronic waste in which it circulates and is embedded and their repurposing as scrap metals in an obsolescent afterlife to its unique domain addresses, text files, code and electrical signals, and from the highly mobile particles that comprise their energetic circuits of interoperability, user inputs and multifarious interpretations (Cameron 2019, 61). Identifying, sourcing and capturing the so-called essence of a digitisation is thus an impossible task because of the radical interconnectedness and interoperability of all these coordinates and processes, the addition of new inputs, functionalities and capabilities as it circulates across vast scales, all of which make it possible and active (Cameron 2019, 61-62).

Here the coordinates that comprise the more-than-digital Allah ring are not just networks of discrete things, digital code, graphical interfaces, file formats, computers and discursive, disciplinary perspectives. My notion of thingness is post-relational (Cameron 2018; Cameron 2019, 61), that is, it incorporates different types of relatedness and embodied vitalities generated by the interoperability of digitisations. Thingness operates as the conation of the agencies of human, more-than-human, more-than-machinic and non-human bodies, and the vitality of organic and inorganic elements and technologies (Cameron 2019, 61-62).

In this light, the more-than-digital Allah ring is made operable through the machine mediated by its own set of interactions and the processing of information; through user inputs and narratives; through algorithms; through energetic fields; through smart materials, chemical and material agencies; and through vast planetary computational systems (Cameron 2019, 65). The SHM image on the Internet of the Allah ring, therefore, becomes open to and takes part in the world as it circulates across planetary scales in which these processes come together at multiple points and on many devices simultaneously through which it is distributed: by Al Jazeera, Archaeology.com, CNN, Discovery Channel, Science News, Tech Times, *The Washington Post* or *The Independent*. Curating, as I will describe later, must take account of these dispersed points of emergence, how this process is achieved and by what entities.

The digitisation as thingness and its gatherings as temporal-social-material-political-technical compositions operate as a lively federation of entangled agents and multifarious temporalities, spatialities and intra-active entities and their affordances as emergent compositions constantly forming and reforming (Cameron 2019, 60).

Through thingness, it is difficult to categorise the more-than-digital Allah ring and its unique coordinates as either distinctly humanly conceptual or ideational, technological, biological or mineral, for example, because they are radically interoperable as a sprawling web of force fields, in which none has an independent existence, and therefore cannot be extracted into discrete things or objects (Cameron 2021, 138). The use of thingness progresses a renewed consideration of the coordinates hidden from view or rendered discursively invisible, such as computational cognition (Cameron 2019, 61-63).

The concept of thingness as it applies to the more-than-digital Allah ring most importantly acknowledges it as a programmable thing: capturing its multiple dispersed and non-identical character, extended provenance and multiple locational politics and at the same time its heterogeneous interdependent coordinates, multiple networked modalities, its emergence as multivalent compositions, its transmedial, non-linear character and its changing forms and combinations on multiple devices (Cameron 2019, 61-63). Digitisations, especially those on the Internet, lack any inherent framing and are so dispersed, non-identical and dynamic that they can no longer be thought of as a coherent object or a thing, even though they might appear that way on an interface (Cameron 2019, 63).

Refiguring Curatorial Agency as Dynamic, More-than-Human, Eco-curating Processes

Influenced by Alfred Gell's (1998) notion of art and agency as a system of action directed towards changing the world, the term curatorial agency arose as a concept to promote a critical rethinking of contemporary art curation in culture and society. No longer merely viewed as an author or presenter of pre-existing artistic concepts, the curator, according to Suzana Milevska (2013, 69), is viewed as an "active social agent who contributes to cross-referential understandings of art between different artistic, cultural, ethnic, class, gender groups for the betterment of society".

Furthermore, in regard to digital cultural heritage, curating is generally viewed as an act of human, and more recently human-machine, agency (Cameron 2021, 140). Tasks are directed to data capture, that is, processes that seek to add value to digital data by assigning administrative, descriptive, structural and technical archival metadata to them and storing them as software, hardware and bits. As a result, the curatorial interpretation of digital data conforms to the notion of the informational object and its social constructivist and representational frames of understanding.

As new types of ecological compositions, curating and curatorial agency (denoting acting in the world through selecting, organising and influencing) take on a different meaning (Cameron 2019, 64). Curating is no longer authorial in the conventional sense of a series of actions by humans or automated systems—it is also the result of the vitalities of more-than-human and other-than-human coordinates together emerging as forms of eco-systemic curating (Cameron 2019, 65-66; Cameron 2021, 140). Here the production of curatorial knowledge and the act of curatorial authorship by humans operate in collaboration with all manner of vital coordinates forming intermeshed alliances with them as a new type of curatorial eco-logic (Cameron 2021, 140).

In three recent publications and my recent monograph, *The Future of Digital Data, Heritage and Curation in a More-Than-Human World*, I refigure curation as dynamic, eco-curatorial agencies (Cameron 2018; Cameron 2019, 64-65; Cameron 2021, 139-140). Curating is enacted through diverse eco-curatorial agencies often achieved through indeterminate acts of immanent or interdependent processing in formation made actionable through the interrelatedness and interoperability between, and performed by, a wider range of its coordinates (Cameron 2021, 140): that is, from software, programming languages, mathematical equations, machine learning and automated processes embedded in algorithms and bots to networks, infrastructures and calculative storage processes, to elemental chemicals embedded in computational capacities; from bitstreams and data to data centres, to planetary computational infrastructures and the electromagnetic forms of transmission that pass through data centres, and to the rare-earth minerals that serve as conductors of electricity (Cameron 2019, 65; Cameron 2021, 140-141). All these things produce their own eco-curatorial aggregations, different patterns of material, form and performative affects. Their generative capacities also constitute extended spatial-temporal structures and material durational processes of self-assembly (Cameron 2021, 141).

Together, all these eco-systemic processes contribute to the formation of an ecological composition's concrescence (the visual rendering of the Allah ring as a composition on the interface as opposed to a vision of concreteness as an emerging solid form) or act as an entry point to enact certain roles and actions (Cameron 2021, 141).

The extensive, broadened range of coordinates made possible through new computational design, through data processing to algorithms, to infrastructural expansion, for example, has distributed curating on a much larger and more expansive scale than we have ever seen before (Cameron 2021, 142). In contrast to the metal and mineral composition, mobility and physical distribution of the analogue, the digitisation is made and remade and distributed in a way mobilised by the eco-curating of metals and minerals, in which the analogue and the digital converge as elements embedded in deep ecological time. Such ecological webs and curating processes gesture to and make possible the extended reach and influencing capabilities of human actors across vast scales (as illustrated by the analysis of Donald Trump's tweets in my monograph), their distribution, the more-than-human domains of influencing (Cameron 2021) and, similarly, the more-than-digital Allah ring.

Curatorial agency is actionable by the interrelatedness between and performed by a wider range of actants from algorithms to bots to data centres, automated systems, human and machine subjectivities, code and the rare-earth minerals conducting electricity (Cameron 2019, 64-65; Cameron 2021, 140). Since non-human curating is a feature of such compositions, a different relational sense-culture emerges not just through technical or machine learning, but also through the curating activities of all its coordinates.

Further, curating as forming ecological alliances occurs simultaneously across multiple locations and scales—it is never completed or fixed; rather, it is vast, infinite, uneven and chaotic (Cameron 2021, 154). Within these ecologies, human curatorial agency and its subjectivities are subverted and made mutable and rhizomic through becoming curatorial ecological alliances emerging as multiple subjectivities with unpredictable, surprising or alarming effects (Cameron 2019, 63).

Curatorial agency and the production of knowledge, therefore, comprise multiple subjectivities as the affordances borne out the federation of actants operating within these extended, ecological, emergent compositions. Clearly, many actants, including non-human (what I call coordinates), are curating agencies if we view curation in the broadest sense as

acting in the world and at the same time looking beyond our limited view of online curation as acts by human curators and more recently algorithmic and machinic processes (Cameron 2019, 64-66).

So here we can no longer track curatorial authorship solely as a human act back to an origin or location as with conventional curating; rather, it is iterative, chaotic, distributed and extended (Cameron 2019, 64).

New eco-curating agencies are constantly enrolled in the emerging and mutating more-than-digital Allah ring ecological composition as it moves, extends and composes itself. The addition of new user inputs and algorithmic processing, the expansion of infrastructures through the laying of cables, the development of platforms, the enlargement of cloud storage, the ecological composition's appearance on multiple interfaces, devices and screens, and the ever-multiplying practices of copying and distribution by all manner of agents, all involve thousands of different eco-curatorial processes and temporalities (Cameron 2021, 220).

As ecological compositions, digital cultural heritage also self-curates in multifarious ways. These self-curating processes occur, for example, through the behavioural capacities of machine learning and calculations made possible by the biophysical properties of its coordinates, as well as through the contingency of environmental factors and through curatorial and user interactions in which they are enmeshed across and through its extended composition (Cameron 2021, 142).

Curating in an ecological sense can never be fully determined, due to the nature of its complexity, its inconsistencies in interactions and the indeterminacy of its calculations made through machine learning. Eco-curatorial actions never perform the same set of interactions and are therefore never identical and cannot be replicated (Cameron 2019, 64-66).

The making of the Allah ring's digitisation and its emergence as an ecological composition comprise a mesh of human, more-than-human and other-than-human acts of eco-systemic curating (Cameron 2021, 146). Its emergence involves human acts of composing particular fields of interrelatedness, including the capturing strategy and scanning technology involved, decisions about lighting, colour, size, scale, the texture of its surface, the illumination of its violet soda glass inset and script, the post-production composition and the choice of software for viewing and editing (Cameron 2021, 146).

Akin to techniques of pastiche, these acts of eco-curation are mediated by all manner of coordinates (Cameron 2021, 146). These processes include digital cameras, the location of their making through the scanning

equipment involved and through measurements, mathematical equations, laser beams, patterns of light, particles, electromagnetic waves, sensors, the data sets used for 3D images and pixels, and the analogue as its prototype. It is these inputs, alongside the creator's visual and conceptual engagement with the process, that bring its interfacial image into a visual approximation with its analogue to replicate the informational, aesthetic and political effects of its source (Cameron 2021, 146).

The more-than-digital Allah ring in active process and its emergence as an interfacial image are curated by its coordinates through their interoperability; they comprise a series of tight interdependencies, aggregations and sequences, each with their own variable temporalities, duration and presence (Cameron 2019, 64-65). Some coordinates and eco-curating processes, such as technical components, are more critical to its process of composing than others. The thingness aggregations and eco-curation processes that enable the more-than-digital Allah ring to be made operable include particles and fields, the mediation of silicon and metal, circuit boards, operating systems, binary code and signals generated by the values of voltage and the operation of logic gates (Cameron 2019, 64-65). At the level of programming, they are text files, algorithms, electromagnetic fields, media elements, bitstreams, images, shapes and behaviours represented as collections of discrete samples (pixels, polygons, voxels, characters and scripts) composed into larger-scale compositions through database logics and transactional metadata interactions, computer graphical user interfaces and platforms, and automation dynamically generated by user-defined queries, pre-programmed interactions and software agents (Cameron 2019, 60-61). Their reach, effects and complexity are scaled up when launched on the Internet. For example, interactions with digital devices and computational processes that enable the more-than-digital Allah ring to appear also comprise the interoperability of calculable and predictive entities, such as sensors, robots, algorithmic automations, Internet domains, cables, data centres, server farms and electronic circuits, and between the storable data and rare-earth minerals that conduct electronic devices, such as computers and smartphones (Cameron 2019, 60). Their state of concrescence as readable through the interface by human and machine alike, alongside heritage categorisations, cultural perspectives and emotive responses, is also powerful coordinates central to their emergence (Cameron 2019, 60-61).

The more-than-digital Allah ring in its composing mode is enabled by the flows of materials, minerals, chemicals embedded in computational

design, electromagnetic fields and information mediated through infrastructures, such as cables and data centres. Therefore, the ring, like other forms of digital cultural heritage, is part ideological, part textual, part technological, part narrative, part thought, part flesh, part mineral, part chemical, part computer code, part cultural interpretation, part geographical, part elemental process, part infrastructure, part archaeological and part heritage (Cameron 2021, 147).

For example, these processes become entangled with the subjectivities of the "real" ring and its significance as bridge between the Viking and Muslim worlds, as cultural symbol, as marker of identity and origin, and in debates over its historical interpretation. Here the more-than-digital Allah ring illustrates the non-linear experience of human thought, memory and history as a jostling of enunciations (Cameron 2019, 58): for example, from how the Viking and Islamic worlds became intertwined, or from theories of how the ring arrived in Sweden, from speculative accounts of the ring as war spoils, as a gift, as indicative of the buried woman's conversion to Islam further suggested by her body being buried rather than cremated and her interment in traditional Viking attire (Nizamoglu and Yassir-Deane 2016). The more-than-digital Allah ring and its distribution made manifest struggles over the interpretation of the Muslim world both in medieval times and in contemporary political debates in Sweden over the Syrian refugee crisis. The ring's analysis and its refiguration in connection with these events as contemporaneous were a convergence of its technical analysis and the publication of the findings on 23 February 2015 in the open-access journal *Scanning*. Although discovered in the late nineteenth century, the analysis of the ring's material composition and design confirmed its inscription as Arabic Kufic and therefore its connection with the Caliphate. For Muslim historians, the ring and its digitisation were tasked to challenge historical amnesia in regard to the deep and ongoing connections between these two cultures evident through Arabic scripts and material culture, in fostering understandings of these complex, deeply entwined histories, and as an object that could promote cultural understanding and intercultural respect in the evolving refugee crisis in which such interactions and inhabitations had a historical precedent (Nizamoglu and Yassir-Deane 2016). All these are coordinates unique to each more-than-digital Allah ring acting as a dynamic composition in itself in which subjectivities and the cultural, political and aesthetic cues and fears and concerns that drive them are at times

indistinguishable from those gathering around their parent. The eco-curatorial distribution and dispersal of sources and research noted in the 2015 paper interpenetrated the Muslim world and brought diverse perspectives together with those of Swedish archaeologists, citizens and politicians.

Here the more-than-digital Allah ring accrues a post-object status as multiple ecological compositions of thingness (Cameron 2019, 60-61; Cameron 2021, 148). This digitisation is therefore no longer solely sociological, nor does it share a common technical constitution. Each time the more-than-digital ring emerges in its form-like concrescence, it reproduces itself as unique patterns of resemblance and variation. The more-than-digital ring appears in different locations and on different devices through different routing, hardware, software and infrastructures, travelling across and through other coordinates mediated by cables, data centres, particles and energetic impulses (Cameron 2021, 147). When it is active rather than at rest, the ring operates as continuous processes of interoperability that may never be completed or circumscribed beforehand (Cameron 2021, 147). The journeying of the ring becomes planetary in its extensiveness.

In examining artefacts, structures and all manner of materials found in the field, archaeologist Ian Hodder (2012, 5) argues that biologies, technologies, societies, cultures, psychologies and cognition all flow "from the past, often the deep past". With respect to digital cultural heritage as ecological compositions, its coordinates, humanness and human agency, the technologies we use, the societies and cultures that we inhabit, our psychological dispositions and cognitive processes alongside the non-human material, chemicals, energetic fields embedded in computational design—all emerge from multifarious pasts and deep geological times (Cameron 2021, 149). All of the digital and analogue Allah ring coordinates, those they share and also their own, embody memory traces like genetic instructions, human and non-human histories embedded into its DNA that replicates and changes, and they all operate together through multiple, non-linear, enfolding and unfolding temporalities.

The shared memory traces embedded in the analogue and the more-than-digital Allah ring include the native silver found in the Earth's crust in its pure, free elemental form as an alloy with gold and other metals and minerals such as argentite and chlorargyrite; the invention of metallurgy, material processing and silversmithing in prehistory; the discovery of their geological affordances; the development of mining technology and the

mining and processing of minerals such as copper long buried and emerging in geological time. Other convergent histories in the making of the more-than-digital Allah ring include the invention of computers, the culturing of light for creating images, cameras and the writing of digital code, emerging digital infrastructures, algorithmic systems and so forth. Here the histories of the more-than-digital Allah ring extend and unfold in multiple forms, temporalities and processes.

As ecological compositions, the digital and the parent represent a mixture of coordinates that are not only historically and spatially distant and prior but also future oriented in their emergence (Cameron 2021, 149). For example, their respective meshes of thingness extend into the future as forms of material evidence of past and emerging relations and enjoined cultural histories between (Viking) Sweden and the Muslim world. That is, from debates in regard to Syrian refugees and an intent to dispel commonly held negative attitudes and perceptions about them, the role of Islam in building other cultures, critiques of the Western writing of history, the promotion of a shared global cultural heritage and intercultural respect through these convergent histories (Nizamoglu and Yassir-Deane 2016). The making of the more-than-digital Allah ring and its circulation, rather than being viewed as a digital capacity located in human thought, action and semiotics, power becomes distributed across the ecological composition's heterogeneous field as dense eco-systemic and curating processes of interrelatedness and interoperability in which these subjectivities are embedded (Cameron 2019, 60). Strikingly, digitisations as thingness comprise the interoperability of their immediate technicities and locales, but their coordinates are extended through their addressability across multiple, multivalent layers in planetary computational infrastructures (Cameron 2021, 140).

Importantly, digitisations have both a human and a deep-learning aesthetic (Cameron 2019, 61-62). The ring as operational image inflects a human aesthetic—an appreciation of the beauty of its crafting, the awe invoked by its connections between the Viking and Islamic worlds through its Kufic inscription, and the vibrancy of its violet inset glass previously believed to be amethyst. Accordingly, digitisations are judged on the basis of and to the degree to which they resemble the human aesthetic of their real parent (Cameron 2007). On the other hand, the more-than-digital Allah ring reflects the operations behind it as its own automated aesthetics, a result of its machine capacities comprising a deep network of neural layers (Cameron 2019, 62). Here an aesthetic emerges of what data does—a

neural aesthetics of computational processes that is not human. They appear as images but emerge as a result of processes that are deeply entwined within their neural, machinic ecologies (Krizhevsky et al. 2012; Cameron 2019, 62). Here the image as automation has an inherent ability to exert forces on itself and humans alike, as illustrated by discussions on the meaning and significance of the Allah finger ring (Cameron 2019, 63). Code, for example, is not a simple and pre-determined set of logical instructions as might appear on a computer screen; rather, it is performative and continually produced within computational processes, as what media theorist Luciana Parisi calls an operative mode of thinking (Parisi 2011; Cameron 2021, 63).

The More-than-Digital Allah Ring as Technospheric Heritage

Digitisations are also complicit in what Peter Haff calls the Technosphere. The Technosphere is a subsystem of the Anthropocene brought about by the evolution of technics in which large-scale technology becomes a question of the geology on which humans depend (Haff 2012, 149-156; Haff 2013, 395; Cameron 2019, 62). Digitisations and digital heritagisation more generally operate as part of what Eric Hörl (2016, 2017) calls a new sense-culture comprising a machinic and relational constitution of sense operating within complex socio-technical ecologies and complicit in technological semi-autonomous systems that lead to environmental exhaustion (Cameron 2019, 62). Their complicity in the Technosphere is through the mining of rare-earth minerals, the use of non-renewable energy to drive the digital economy and the vast amounts of data that are produced, stored and unsustainable in the long run (Cameron 2019, 62-63).

When imagined as an ecological composition, the more-than-digital Allah ring will appear a technological fossil in the archaeological record (Cameron 2019, 62). These fossil traces are most likely to be the hard parts of digital technologies: the data centre buildings; the rare-earth minerals that comprise them; the metal, the wires, the plastic and so forth (Cameron 2019, 62). This is a different type of fossil than the ring recovered from the archaeological record, with both subject to decomposition in which they share minerals and metal traces.

The conceptualisation of the more-than-digital Allah ring as a series of non-identical, sprawling, unruly ecologies and its curation as ecological processes of radical interoperability made actionable by the multifarious

affordances of its thingness (Cameron 2019, 62-63) can be illustrated through a series of surprising events. The Internet operates as multiple meta-territorial domains of infinite reach and depth populated by diverse actants of the human, more-than-human and non-human kind mobilising all manner of social, economic and political possibilities, frictions and resistances (Cameron 2021, 47).

Digitisations on the Internet are subject to a series of uneven and chaotic interactions of the type that Benjamin Bratton (2015, 69) terms "machinic jurisdictions". Through their rhizomic lines of flight, these disrupt and transcend supposedly ordered local, national and global geographies (Cameron 2021, 152).

One example of a cosmopolitical line of flight in which the more-than-digital Allah ring is implicated is its role as a signifier of Muslim cultural identity in which it was mobilised to counter negative representations of the Islamic world. To this end, the interfacial images of the more-than-digital ring operated through their machinic eco-circulation as indisputable facts of Muslim sophistication and prowess and at the same time became matters of concern for contemporary relations with Syrian refugees. These machinic, more-than-human and other-than-human infrastructures brought these concerns and stakeholders together (Cameron 2008).

The digitisation's politics is not only the human, but also the more-than-human and other-than-human (Cameron 2019, 63). The political capacities of digitisations occur at the very moment they are made machine and human readable appearing as visible "objects" and therefore able to accrue power. Here, more-than-data ecologies were used to articulate political questions such as Muslim identity and place in history. The conditions of possibility that enabled Muslim historians to become involved in the debates over the Allah ring and to make cultural claims were borne out through the agential relatedness promulgated by computational infrastructures; language and programming; and code, algorithms, non-human agencies and the people involved, such as software designers.

Data politics is not only of the more-than-human kind; it is also borne out by what media theorist Luciana Parisi (2011) calls "soft thought". The subjectivities of soft thought involve not simply the execution of instructions, explains Parisi (2011, 10), "but develop its own algorithmic modalities where the sequence of instructions changes according to the way the machine orders data" (Cameron 2021). Here we see the techno-extension of cognition into the world (Parisi 2011, 10), based on machine learning and emerging as strikingly new coordinates in digitisation

ecologies (Cameron 2019, 63). Novel forms of digital communication and machinic automated thoughts and memory emerge out of the quantification of data from which new capacities for power and manipulation arise. Machine logic also signals the end of the notion of reasoning and truth (Majaca and Parisi 2016) that we so value in the heritage work based on human cognition. Instead, new forms of computational thinking and subjectivities emerge around and within more-than-digital compositions (Cameron 2019, 63-64).

Critically, thingness as a concept in which machine learning is now a coordinate opens a space to consider the more-than-digital Allah ring akin to what Deleuze and Guattari (1987) call "bodies without organs", that is, a composition or a plane of consistency that concretely ties together heterogeneous coordinates with no underlying organisational principles or "bodily" structure that can be known in advance (Cameron 2019, 63). Here the Deleuzian notion of "body without organs" also best describes how digitisations as thingness are curated in these dense ecologies (Cameron 2019, 62-63).

In these circumstances and contexts, human users as participants in interactions with the Allah ring digitisation and its subjectivities operate as becoming more-than-human and other-than-human intersubjective alliances with switches, robots, codes, algorithms, sensors and organic and non-organic things (Cameron 2019, 64-65). The notion of the museum user as an autonomous agent is therefore technically defunct (Cameron 2019, 65). When users operate within these ecological alliances, they become part of the thingness of the more-than-digital Allah ring (Cameron 2019, 64-65).

Concluding Remarks

While digitisations can be explored through multiple optics, here I choose to move from a normative semiotic and representational reading of the digitisation grounded in a humanist informational and computational paradigm to embrace a broader range of coordinates that represent their expanded, ecological and machinic involvement in the world. A digitisation is no longer solely a visual symbol or digital object; rather, it is part and parcel of a sprawling, machinic ecology of human, more-than-human and other-than-human actors, historical events, entanglements and emergent possibilities (Cameron 2019, 66). All digitisations acquire thingness and as things-in-themselves, they are non-identical; having their own

history, each is technically and processually unique, embodying a different type of computational aesthetic and individuated human and machine politics (Cameron 2019, 65).

Within this new, extended ecologic, digitisations are therefore no longer solely informational, nationally situated, geographically located, human centred or apolitical; rather, in crossing multiple national territories, they are subject to machinic jurisdictions within global computational infrastructures, due to the automations of search engines and social media sites (Cameron 2019, 65).

Viewing digitisations through an ecological optic enables us to widen the circle of what we consider human, to rethink subjective and human positions in digital cultural heritage practices and to frame new collectives that encompass a wider range of more-than-human, machinic and other-than-human things (Cameron 2019, 65). Critically, the locational politics of the human—the user, curator and collections manager—is decentred and even displaced in these more-than-digital and other-than-digital ecologies (Cameron 2019, 64-65). Here the thingness we call digital heritage is codesigned by its coordinates and their conative agencies.

On a final note, digitisation as a descriptor identifying itself as a copy alongside its charge as a terror suspect is no longer tenable. It has never been identical to its parent, nor to itself. It never was a copy and never will be a copy, nor is it solely digital based on material descriptors. It is a novelty, constantly changing, remaking and curating itself (Cameron 2019, 65).

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CHAPTER 6

Conclusion

Bodil Axelsson, Fiona R. Cameron, Katherine Hauptman, and Sheenagh Pietrobruno

Abstract In this conclusion, we revisit some of the key findings of this book's analytical/interpretative cuts into the online circulation of museum collections. The pedagogical challenges museums face when collection knowledge is appropriated by groups whose political aims threaten social solidarity and democratic values are discussed. Highlighted are the ways in which collection knowledge is both customised and open-ended when digitisations, narratives and research findings flow between multiple platforms and are transmitted through interfaces including home feeds or lists. We conclude that curatorial agency simultaneously becomes humanist and subjective; machinic and computational; and imbricated in more-than-human ontological formations that insert digitisations and museum knowledge in multi-scalar geographies and temporalities extending from deep geological time into unforeseen futures.

Keywords Museum collections • Curatorial agency • Digitisations • Humanist • Computational • More-than-human

The diverse research presented in this multi-authored book demonstrates how recent global computational mediation changes the conditions for the circulation of digitisations, born digital objects, narratives and research

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findings of what is popularly referred to as the Viking Age. Archaeological knowledge of the Viking collections held in the Swedish History Museum (SHM), other museums in Scandinavia and elsewhere have long been reinterpreted and transformed in multiple, different contexts and through a variety of media. When mediated through the Internet, this archaeological knowledge and its concomitant interpretations and revisions flow, connect and disrupt in new and unexpected ways, all of which are enabled by new curatorial agential strategies for the distribution, selection, ranking and sorting of museum collections. The book sheds light on how museum knowledge is affected in various ways by new understandings, applications and complex figurations of curatorial agency, from the Swedish context via American-based platforms to the vast Technospheric conditions of life. In these concluding comments we revisit some of the key findings from the book's analytical/interpretative cuts as novel interventions into an emergent field of study.

The human, machinic and more-than-human agencies of the Internet enable the circulation of museum knowledge far beyond the local communities that museums normally serve. The observed potential of the distributive and circulatory mechanisms of the Internet and its many social media platforms has been one of the driving forces for many institutional digitisation initiatives. In the book, each of the authors reflected on how collections dislodge from their local contexts to take on transnational dispersed lives often unpredictable in scope and extent. This new curating context opens up diverse possibilities of reimagining the relationship between communities and cultures as well as the very assumptions of what digitising collections comes to mean. However, the digitisation and the transnational accessibility of collections also raise ethical, political and ownership questions, surfacing from the provenance of collection items, their subsequent framings by research and exhibitions as well as the meaning ascribed to them in local contexts external to museums. Thus, when widely distributed, each collection presents its own challenges in terms of what kind of knowledge and whose knowledge is produced in the course of widening accessibility and, then, also the likelihood of contestation.

In the Swedish context, the SHM collection of Viking Age objects presents the museum with the challenge of conveying knowledge about a collection that is claimed by individuals and groups in Sweden who express a longing for, imaginary yet passionately desired, traditional gender roles and a homogenous national culture with a distinct way of living understood as more historically anchored than contemporary culture(s). In its most extreme form, some groups speak about culture as an "inherited essence" (Niklasson and Hølleland 2018, 125). These claims are,

however, at odds with the museum's display of the Viking Age objects through human-centred narratives of everyday life and religion that are grounded in the current state of knowledge regarding gender roles, racial and ethnic identities and mobility during the Viking Age and, consequently, with the museum's efforts to deconstruct the national myths attached to the Viking Age.

These tensions and disagreements around the meanings and "truths" that arc around museum objects are sharpened by the current populist surge in Europe and Sweden with new controversies flaring up regularly around memories, monuments, symbols, statues and their historical and political significance. For the SHM, the situation creates a dilemma in their combining of two important epistemological imperatives detailed in International Council of Museums (ICOM) ethical codes. On the one hand, museums are increasingly required to share curatorial agency by collaborating with the communities they serve; on the other hand, they are tasked with the communication of knowledge about their collections in tune with established academic practices. In this case, conveying knowledge in line with academic practice also entails acknowledging the political nature of archaeology and the ways in which the discipline's current state of knowledge regarding gender roles and mobility during the Viking Age challenge simplistic, essentialist notions of gender, race, ethnicity and culture. Moreover, such knowledge is established through multiple sources and methods in the intersection between subsequent interpretations of artefacts, small samples of ancient DNA and interpretations of a few patchy sources of written evidence of the period.

The pedagogical challenges that these points bring into view on Swedish Internet forums are investigated in Katherine Hauptman's chapter. A conclusion Hauptman draws from these developments is that museums, through their pedagogical competence, can take greater initiatives to synthesise and contextualise research to nuance conversations and enter into dialogue with publics. Hauptman thus calls for a more cautious framing of research to prevent potentially the bolstering of communities and political fractions, whose politics in the long run threaten social solidarity and democratic values.

Yet, there are obvious limits to museums' pedagogical reach and their caring for collections' relation to communities, especially when objects are included in touring exhibitions and are posted on image-sharing platforms. A distinct feature of the Internet since the early 2000s is the multifarious ways in which data flows between multiple platforms to curate

digitisations, narratives and research findings through platform-specific interfaces such as home feeds or lists (Pietrobruno 2014). Prompted by subsequent queries or actions by the human in front of the screen, these feeds are continuously renewed in line with platform-specific ways of capturing data for generating revenue for the sake of the imperative of capital accumulation, a central feature of the digital economy. As discussed in Sheenagh Pietrobruno's chapter on YouTube that builds upon a previous study (Pietrobruno 2021), such feeds are personalised. Via their IP addresses, users receive in their feeds an assembled flow of narratives, which is based upon the platform's specific ways of curating by employing algorithms and configuring data about the relations between users, as well as between their interests, geographical location and personal configuration of privacy settings. Bodil Axelsson discusses in her chapter how the flow of images on Pinterest, in a similar yet different way, changes with each subsequent click by the human in front of the screen in interaction with the ways in which the platform's machine learning models predict relevant images based on her previous actions, the features of the images and the iterative recontextualisation of the images on the platform.

Thus, platforms such as YouTube and Pinterest tend to support individualised connections to collections and museum knowledge, operations that are highlighted also by Pietrobruno's and Axelsson's methods. Moreover, because YouTube's juxtaposition of multiple narratives of a given museum object is in flux on the platform's Search Engine Result Pages, its framing of museum objects is fragmented and open-ended. Similarly, on Pinterest, any given digitisation is recontextualised multiple times to take on different meanings. The result is, at first sight, that machine-managed curation resembles the whispering game, yet where no one remembers or has access to the original phrase.

The operation of platforms is not necessarily designed to pursue public values for the benefit of the society. Rather, the platforms that operate under the auspices of platform capitalism pursue economic interest by monetising the spaces they provide for people to self-organise (cf. van Van Dijk et al. 2018, 22–23). On one hand, the ways in which museum collections circulate on and in between platforms promise to fulfil democratic goals of access to collections by multiplying the interpretations of digitisations and knowledge; on the other hand, the data generated by the flows of digitisations, born digital images, narratives and research findings is owned by the platforms. These platforms consequently hold vast amounts of data that potentially can be employed to map users and their many

diverging interpretations of museum collections beyond the control of both users and museums (Axelsson 2019). In Pietrobruno's concluding comments she highlights the ethical issues that arise if museum curators and designers uncritically emulate the strategies of social media to customise the visitor experience by personalising the historical narratives of museum objects in interactive exhibitions.

Furthermore, another significant feature of platforms is that even though museum collections engender unexpected meanings and accrue a range of interpretations, such as the unanticipated use of the SHM collection of jewellery on Pinterest as inspiration for contemporary fashion and craft, many of the racialised and gendered tropes attached to them are recontextualised. As pointed out in Axelsson's chapter, these may even be reinforced by the ways in which machine learning models reflect and reproduce historically accrued stereotypes that are present in the data used for training the models (Barocas et al. 2019, 1–28). Pietrobruno further shows that YouTube's algorithmic personalisation of historical narratives related to the helmet can support and also counter the age-old stereotype of the White, male Viking warrior.

As highlighted in Axelsson's chapter, to locate the politics of machinic curatorial agency is a delicate task. For example, the machine learning models that connect users and content are designed by humans, trained on data and models produced by software designers, yet they operate independently in abstract mathematical space. One of the main challenges of comprehending the machinic curatorial agency of algorithms and machine learning models from a humanist point of view stems from the complexity of the mathematical functions and statistical formulas that are employed in their operations. One may even ask if it is possible to compare their operations to human meaning-making and interpretation Fazi (2021). Furthermore, algorithms and machine learning models are continuously tweaked to enhance the performance of the platforms to attend to the interest of users and investors. They operate both within and across platforms. A user, for example, may enter the Internet from a variety of platforms, each time modelled anew by platform-specific personalisation models that also may include captured personal data from other platforms as well as including the individual user in aggregated classes with others. Similarly, digitisations, born digital objects and archaeological interpretations may be uploaded to a variety of platforms. On the level of the interface, they may look identical, but when multiplied, they accrue data and context from a variety of platform-specific models for classification.

Platforms thus curate by iteratively calibrating relations between individuals, digitisations, born digital objects and archaeological research.

In her chapter, Fiona Cameron invites us to widen our perception of both human and machinic curatorial agency to consider their part in sprawling eco-curatorial or Technospheric processes (Cameron 2019, 2021). Critically, the human—the user, curator and collections manager—and the machinic jurisdictions of digital capitalism are decentred when digitisations become deeply embedded in all manner of planetary, both human and non-human, processes. The new materialist and more-than-human framework presented in Cameron's chapter entails re-theorising digitisations both as contemporary multiple simultaneous events across the Technosphere and as more-than-digital compositions extended in time. Using the Allah ring as an example, Cameron argues that each time a digitisation appears on the screen it is a unique event in which ecological processing, computational aesthetics, machinic distribution and individuated and localised human perception and intent come together to form the "more-than-digital" Allah ring. At the same time, the "more-than-digital" Allah ring extends and unfolds in multiple temporalities and processes, ranging from the development of mining and processing of minerals, metals and glass that were the prerequisites for the production of the material ring to the invention and employment of contemporary technologies and rare-earth minerals enabling its contemporary eco-systemic and Technospheric curation. Through its contemporary distribution, the "more-than-digital" Allah ring also becomes embedded in humanist subjective and political ontologies mobilised through the publication of the research findings of its material composition and originating contexts in relation to the Syrian refugee crisis in Sweden, as an instrument for the promotion of intercultural dialogue. Curatorial agency, thus, simultaneously becomes humanist and subjective, machinic, and imbricated in more-than-human ontological formations.

The new materialist and more-than-human framework presented by Cameron invites us to look beyond the ethical, identity and political issues that arise at specific locations and at any given moment in time, to also consider the ways in which museum collections are part of multi-layered and multi-scalar geographies and temporalities extending from deep geological time into unforeseen futures such as the climate crisis and environmental destruction.

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