Authenticity and Meaningful Futures for Museums: the Role of 3D Printing

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AUTHENTICITY AND MEANINGFUL FUTURES FOR MUSEUMS:

THE ROLE OF 3D PRINTING

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This article uses the COVID –19 crisis to re –evaluate the importance of reproductions – 3D prints – for art's authenticity, and their significance in keeping art museums meaningful in a rapidly changing world. The fixation on 'auratic experiences', inherent to artworks' materiality is integral to contemporary art theory and museum practice, resulting in a rejection of reproductions. However, the inaccessibility to engage with physical artworks due to the coronacrisis would suggest a loss of art's significance and the museum's importance. Yet, the opposite is happening, as engaging with artworks happened via anti-authentic: reproductions. Dennis Dutton's analysis of authenticity helps unfolding the various values an artwork can have beyond its physicality. Additionally, Henry Jenkins' convergence theory helps seeing our relationship with artworks as dispersed over mixed media, reaching beyond materiality. By considering museums as multifaceted mediums themselves, it becomes possible to understand the dynamics of authenticity in museums without physical borders. Authenticity is not static; it is a social construct allowing various perceptions that change over time, resulting in shifting appreciations of both artworks and 3D prints. Finally, ways are proposed in which reproductions can attribute to developing meaningful narratives that can take place with limited or no engagement with artworks or museums' physicality.

INTRODUCTION

Since the beginning of 2020, the COVID –19 virus has changed the cultural landscape as we know it beyond recognition. As all public activities ceased or were delayed and there is an obligation for everyone to stay at home as much as possible and to keep a 1.5 –meter distance, museums have been faced with major challenges: the majority have closed their doors or restricted their opening hours, projects are delayed and exhibitions have been canceled, plus there is no indication of how long these restrictions are going to last. Right now, unable to visit museums, many have found themselves at home searching the internet for encounters with artworks outside the museum's walls and without the original artwork's materiality, via anti –authentic – namely digital – reproductions. Ever since German sociologist Walter Benjamin (1936 [2008]) described how reproduction (in his case photography) changes artworks' historic value – in Benjamin's words: 'aura' – into one of exhibition value, losing its artistic relevance and connections to the past, contemporary Western society has been highly fixated on the breath –taking encounter with the physical original artwork. [1] Moreover, we are nowadays capable of creating art reproductions beyond Benjamin's imagination as 3D printing has made its entrance into the art world. After a scan of a painting is made using a non –invasive photographic method, 3D printing uses the layering of hardening (ultraviolet) light –sensitive plastics and inkjet printing to make a one –on –one reproduction of any painting possible.[2] In contrast to other reproduction techniques (e.g. photography and digital methods such as augmented reality), 3D printing not only replicates the whole three –dimensional object including its colour but most of its material, aesthetic and physical details: its topography, colour, glossiness, and – to some extent – transparency can be closely mimicked. With just one click of a button, a painting can be reproduced at high quality in just a matter of hours.[3] However, 3D printing still faces some limitations: printing large complex structures and closely mimicking a painting's material appearance are still challenging. Furthermore, the technology is quite costly and requires specific

1 Walter Benjamin and Jim A. Underwood, *The work of art in the age of mechanical reproduction*, (London: Penguin Books, 2008).

2 Liselore N M Tissen et al., "Using 3D Scanning to support Conservation Treatments for Paintings," *Materials Science and Engineering* 949 (2020), 9.

3 Liselore N M. Tissen, "Authenticity vs 3D Reproduction," *Arts in Society. Academic Rhapsodies*, (2020).

technological knowledge. Nonetheless, although the technology needs some improvement, it is a promising vehicle for the art field and it is undeniably going to influence our perception of art and museum practice.

Despite our familiarity with reproductions as we see them everywhere on our phones, on billboards, or via our computers, Benjamin's focus on the divide between authenticity and replication has not diminished. On the contrary, sociologist Hillel Schwartz (1997) shows that the 'material turn' in the humanities and social sciences from the mid –1960s onwards has made us "obsessed" with an individual artwork's materiality as the ultimate proof of a historical connection.[4] Simultaneously, due to "stunning facsimiles", the increasing quality of copies, modern Western society's anxiety about "the real" is continuously growing. This is especially the case with 3D prints, as they are almost indistinguishable from their original counterpart, both visually and physically. Moreover, In museum practice, this means that safeguarding an artwork's materiality providing Benjamin's 'aura' has become a top priority of museums. This has resulted in a contemporary exhibition model in which the largely self –funded museum is largely dependent on the public's direct engagement with the 'real' physical artwork through organized blockbuster exhibitions, mass –tourism, attracting large groups of visitors and the organization of educational programs on location as ways to generate income. It is undeniable that visitor numbers will suffer due to capacity restrictions and a general concern about crowded indoor spaces, putting pressure on our no longer sustainable contemporary exhibition model.

As we are no longer able to see the original artwork, all opportunities of immersing ourselves in the original artwork's 'aura' – the quality of an artwork that stimulates a personal bond between the artwork and the beholder. This connection can only be provided by its unique material manifestation in time and space, protected within the walls of the museum as the guardians of the 'real' or 'genuine' experience have been entirely or partially eliminated. In the

4 Hillel Schwartz, *The Culture of the Copy: Striking Likenesses, Unreasonable Facsimiles*, (Princeton: Zone Books, 2014)

context of Benjamin's theory, this would mean the end of art's significance, a cultural catastrophe: only in the presence of the artwork can a connection between the artwork and the beholder be forged, something no reproduction will ever be capable of achieving. Yet, it appears that the opposite is happening: the Dutch Museum Association's (*Museumvereniging*) yearly National Museum Research (*Nationaal Museum Onderzoek*) shows that despite and maybe even because of the virus and, consequently, the lack of engagement with the original artwork, the involvement with objects of museum collections is increasing.[5] Digital platforms such as *Google Arts & Culture* have helped provide a museum experience in COVID times and could also be a way to bring art into your home.[6] Yet, in my personal case, I did not have to rely on digital reproduction methods alone as I spent my lockdown at home with a physical 3D print of Carel Fabritius' *The Goldfinch* (1654) (Figure 1, 2 & 3.). Being with the 3D printed

5 De Museumvereniging, "Het Nationaal Museumonderzoek 2020," *De Museumvereniging*, accessed November 2020, https://www.museumvereniging.nl/media/nmo_2020_-_persbericht.pdf
De Museumvereniging, "Er Is Een Breed En Groeiend Draagvlak Voor Musea,", *De Museumvereniging*, accessed November 2020, https://www.museumvereniging.nl/er-is-een-breed-en-groeiend-draagvlak-voor-musea

6 Google Arts & Culture, accessed May 2021 https://artsandculture.google.com/

Fig. 1. The Goldfinch
Carolus Fabritius, 1654, 33,5 x 22,8 cm, Oil on panel
The Mauritshuis, The Hague, 605.

version strengthened the realization that the bond with the original artwork, its significance, importance and its 'aura' is still present even though I am not directly in its physical surroundings. To me, the 3D print has become the embodiment of the artwork that has experienced these confusing times with me – it became my 'corona buddy'. That way, the 3D print – a different material from the original artwork yet aesthetically identical – has provided me with a meaningful connection or value to the 'auratic' artwork safely stored at the Mauritshuis in The Hague.

Fig. 2. 3D print of The Goldfinch on my living room wall printed by Canon Production Printing B.V. Venlo.

Fig. 3. Close up of the 3D print of The Goldfinch

This shows that, unlike Benjamin's suggestion, which until today has remained the prevalent way of thinking within the Western art world, an artwork's 'aura' seems to be more than a fixed entity embedded in the object's role in a traceable past. On the contrary, the lack of physical contact due to the omnipresence of a deadly virus shows that art's significance reaches far beyond its material unicity and the museum's physical walls. Yet, how are an artwork's non –physical values constructed and how do these intangible characteristics originate from the artwork itself? Could a 3D print possibly take over any other non –perceptive authentic quality, thus becoming a genuine representation of the original painting? Could this mean that 3D prints, which in materiality are anything but the original artwork be meaningful to the original artwork's 'cult value' and the sustainability of the museum experience after all?

From the perspective of 3D printing, this article uses the COVID –19 crisis as an opportunity to re –evaluate the significance of reproductions for art's authenticity and the way they can contribute to keeping the art museums meaningful in our rapidly changing cultural environment. The first section of this article provides a brief introduction to the history and development of our contemporary obsession with an artwork's material unicity and the rejection of reproductions. Using philosopher David Dutton's approach to authenticity expressed in his essay *Authenticity in art* (2005) will unveil the way we nowadays perceive artworks and experience their authentic value.[7] This helps in unfolding the way an artwork's authentic value, and potentially that of a 3D print, can be constructed without relying on materiality alone. The third section introduces Henry Jenkins' (2008) theory of the culture of convergence to be able to understand our contemporary perception of and relationships with artworks as dispersed over mixed media in and beyond the artwork's materiality and the museum's physical walls.[8] Consequently, it will become possible to understand that although we have become more physically distanced from the artwork's material authenticity, it appears that 3D prints (and other reproduction methods, including digital) contribute to a deeper

7 Dennis Dutton, "Authenticity in Art," in *The Oxford Handbook of Aesthetics*, Oxford Handbooks Series (Oxford: OUP Oxford, 2005).

8 Henry Jenkins, *Convergence Culture: Where Old and New Media Collide*, New York University Press (NYU Press, 2008).

connection to art than ever before. Based on this analysis, the article ends by proposing ways in which museums can use technologies such as 3D printing to adapt to the new circumstances enforced by this deadly virus. That way, new and meaningful narratives can be developed which can take place in a world where there is limited or even no engagement with the actual object or the museum as a physical space.

MATERIAL AUTHENTICITY: A POST –MODERN OBSESSION

Nowadays, when we go to a museum we expect to see 'authentic' artworks. As the Oxford English Dictionary exemplifies, 'aura' or 'authenticity' is the condition of being authentic, proving that an object or an artwork is *genuine*, created in a *traditional* way that faithfully resembles an original based on *reliable* and *accurate* facts, and that something has the quality of being *real* or *true*.[9] But what makes something real, genuine or true to us? Who decides what is considered 'traditional'? And which facts do people consider reliable and accurate? When we speak of authenticity in contemporary Western society, we usually mean an artwork in materiality that is single and unique, and is signed by an artist: everything a copy – or a 3D print if you will – is not. Examining the artwork's original material reveals the artwork's identity, which expresses the artist's intention. However, this contemporary fixation on the authenticity of the material object in tradition only covers a small period of our (art) history, as it has only developed over the past two and a half centuries.

During the Middle Ages, for example, art's authenticity was perceived as a collective phenomenon where the church decided whether or not something was authentic, and where truth or authenticity did not rely on material originality but on its function within society as the provider of a connection with the supernatural. As art historian Nicole Ex explains, unlike today, an artwork's meaning and importance were not bound to the individual artist who signed the object nor the artifact's unique traceable past. Art was seen as a collective

9 Oxford Dictionaries, *Authenticity*, accessed November 1, 2020 https://en.oxforddictionaries.com/definition/authenticity
Oxford Dictionaries, *Authentic,* accessed November 1, 2020 https://en.oxforddictionaries.com/definition/authentic

phenomenon that served the community as a whole.[10] However, Ex explains, in the subsequent centuries this medieval idea was rejected: time was no longer seen as circular, but as linear, meaning that art was a continuously evolving and self –improving entity.[11] The slowly increasing awareness of the differences between the past and present meant that artworks were no longer seen as replaceable and identical, but gained importance as individual historical artifacts that should be cherished.[12] During the Scientific Revolution (roughly 1550 –1700) in Western Europe in which the natural sciences such as mathematics, physics and astronomy advanced considerably and generated new insights into how we perceive and understand the (material) world around us. French philosopher René Descartes' (1596 –1650) famous quote *cogito ergo sum* (I know, therefore I am) perfectly describes the shifting philosophy that validity no longer relied on magic, rituals, or intangible superpowers, but instead, due to the development of tools in support of scientific breakthroughs (e.g. the telescope), it became measurable, personal and based on empirical facts.[13] The idea grew that art's authenticity is solely embedded in the scientifically provable qualities of the artwork as an object; hence the elements that make up its materiality and unique composition: its paint, impasto, canvas and *patina*, art scholar Thierry Lenain explains.[14] No longer was the likeness of visual characteristics and a plausible declaration of an artwork's identity sufficient in determining art's quality and granting an object its 'auratic' experience.

The effects of the Scientific Revolution and the succeeding technical revolution it started with new reproduction methods (e.g. the printing press, etching and lithography) radically changed the art field. The expansion of humanistic thinking started a re –evaluation of society and increased the interest in the search for individuality and the unicity of materials – artworks – that attribute to one's agency. The romantic ideas of philosopher Jean Jacques Rousseau (1754) – a reaction to these scientific and technical developments – mark the start of an increasing interest in authenticity as a topic for philosophical reflection.[15] He described authenticity as a manner of being: to be authentic is to

10 Nicole Ex, *Zo Goed Als Oud: De Achterkant van Het Restaureren* (Amsterdam: Amber, 1993), 130–48.

11 *Ibidem*, 52-53.

12 I must emphasize that although there was indeed an initial awareness of historicity and the idea of being able to trace objects back in time, this did not mean that all previous ways of handling art were rejected. The imitation and the reuse of ancient objects and artworks was still largely executed and remained of importance.

13 *Cogito ergo sum* can be found in René Descartes' Discours de la Méthode (1639), a book that argues that the truth can only be found in science.

14 Thierry Lenain, *Art Forgery: The History of a Modern Obsession* (London: Reaktion Books, 2012), 164–67.

15 Jean-Jacques Rousseau, *Discourse on Inequality: On the Origin and Basis of Inequality Among Men* (Auckland: Floating Press, 2009).

perceive the individual self in a way that is specifically our own, or simply put: to be authentic is to be unique in a moment, time and manner which cannot be strictly defined.[16] This romantic desire to create a distinct 'national identity that is specifically – in Rousseau's words – one's own, increased with the rise of nationalism in Europe, starting with the French Revolution in 1789. As many contemporary art scholars explain, to be able to express the desire for one's own unique identity, art and the artist became powerful players.[17] For this reason, Ex explains, it became important to conserve the objects that represent national identity. This romantic idea of the exploration and expression of the individual self drastically changed the way art was understood, and this can still be felt today.

Artworks, for the first time, became objects of elaborate study, as it became a priority to secure the unique lifecycle of the singular material object in time and tradition. The necessity of collecting and categorizing artifacts led to the development of the museum as a place to display and educate people about these important material remains of previous times, Lenain explains.[18] Furthermore, Ex clarifies, the nostalgic feelings an object's materiality envoked in the viewer meant that art no longer fulfilled a documentary function: an artwork becomes a relic of previous times, paving the way for the romantic idea that material deformations, discolorations and discrepancies that provide proof of the past should be cherished and, therefore, should remain visible for future generations. An object's decay, Ex argues, was no longer seen as a distortion or a negative effect, but, on the contrary, became one of art's most important assets.[19]

As Ex and Dennis Dutton remark, the fixation on individuality and the idea that the 'auratic experience' is inherent to an artwork's materiality has systematically become an integral part of twentieth–century art philosophy, theory and museum practice.[20] Western society today is still fixed on the *ego*: the belief that authenticity is unique to every individual and the only way to encounter

16 *Ibidem.*

17 Ex, *Zo Goed Als Oud,* 53-55; Lenain, *Art Forgery*.

18 Lenain, *Art Forgery*, 258–61.

19 Ex, *Zo Goed Als Oud*, 54-56.

20 Ex, *Zo Goed Als Oud,* 55-57; Dutton, "Authenticity in Art", 176-188.

'aura' is in an original artwork, that is, in a work of art with a unique composition of materials, characteristic of a fixed moment in time, and skilfully crafted by the autonomous genius. Although we are more familiar with technical reproducibility than Benjamin was at the time, his focus on the divide between authenticity and replication has not diminished. Analysing statistics of museum visits and tourism in the Netherlands provided by the Museum Association (*Museum Vereniging*) makes it clear that the opposite is happening: the fact that people from all over the world travel to see artworks in real life shows that Benjamin's prediction of an entire replacement of an artwork's 'cult value' by its 'exhibition value' has not happened.[21] Moreover, various art historians such as Ann –Sophie Lehmann (2015) and Mari Lending (2020) observe that since the 1990s there has been a significant growth in the focus on an artwork's material properties, a re-materialization, within art history, where the history, historicity and origin of materials and the materiality of things and objects have become the main topic of study within the art field.[22] Furthermore, art historians and museum experts such as Sarah Dudley (2010) and Eileen Hooper –Greenhill (2000) argue that the Western focus on materiality is largely shaped by museum practices. In a world dominated by reproductions, safeguarding an artwork's materiality as the only true provider of Benjamin's 'aura' has remained the priority of museums.[23]

MUSEUM MATERIALITY AND AUTHENTICITY

Historically, as an extension of the nineteenth-century *Kunst und Wunderkammer*, the goal of museums has been object-centred to a large extent: as private collections became public, the museum's function became one to collect, document, classify and take care of objects to be able to disclose these artifacts and to provide reliable information about our past, museum specialist Bettina Carbonell argues.[24] In this sense, I argue that a museum's mission has always been two-fold: on the one hand, it revolves around objects as it is there to conserve the materials of our past and present; on the

21 De Museumvereniging, "Museum Vereniging, Bijna 9 Miljoen Museumbezoeken in 2018 Met Museumkaart," accessed November 2020 https://www.museumvereniging.nl/bijna-9-miljoen-museumbezoeken-in-2018-met-museumkaart

22 Anne-Sophie Lehmann., Christy Anderson, Anne Dunlop, Pamela H. Smith (eds.), "The Matter of the Medium. Some Tools for an Art Theoretical Interpretation of Materials", *The Matter of Art: Materials, Technologies, Meanings 1200-1700*, (Manchester: Manchester University Press, 2015), 25-27.
Lending, M., "Returning to Distorted Origins", *The aura in the age of digital materiality: rethinking preservation in the shadow of an uncertain future*, (Milan: Silvana Editoriale, 2020), 57-63.

23 Sarah Dudley, *Museum Materialities: Objects, Engagements, Interpretations* (London: Taylor & Francis, 2013), 1–21, 99-103,185-189; E. Hooper-Greenhill, *Museums and the Interpretation of Visual Culture*, Museum Meanings (London: Taylor & Francis, 2020).

24 Bettina M. Carbonell, *Museum Studies: An Anthology of Contexts* (London: Wiley, 2012), 1–11.

other hand, it has always had a societal role that it has to attribute to and reflect the necessities of contemporary culture. Therefore, museums have always been involved with society, according to museum specialist McClellan.[25] By conserving and classifying objects, museums build their authority through providing legitimate cultural knowledge based on the authenticity and the material validity of the objects in their collection. From this point of view, the way these objects are interpreted is mediated by the museum whose authority is mainly based on the superiority of the artworks that form part of its collection. Therefore, McClellan says, the societal focus of museums and their communication to the public has mostly been dedicated to educating the public, curating and the exploration of museums' historical development through their objects.[26] Moreover, sociologist Tony Bennett (1995) adds, this emphasis on the material object has resulted in what he refers to as 'the exhibitionary complex', in which museums engage mainly in a one –way conversation of 'show and tell' about their objects.[27] Additionally, professors of pedagogy and art education Carmel Borg and Peter Mayo (2010) argue that the selection, legitimization, inclusion and/or exclusion of these objects, and the contexts and cultures they belong to results in museums becoming houses of institutional power as they obtain both material and symbolic power, with the curator as the gatekeeper of the real and genuine.[28]

As Hooper –Greenhill describes, this model of communicating information via the museum's collection has remained in museums for a long time, as museums remained largely unresearched and rather exclusive until the late 1980s. However, since the 1990s, museums have become more and more mainstream and a topic of re –evaluation.[29] This has caused a shift in museology, which art historian Peter Vergo (1997) classified as 'new museology', where there was a growing awareness of the social and political role of museums and the necessity to encompass community participation in curatorial practices.[30] Since that time, museums have started to reconsider their function in society as one that should focus more on the socio –cultural aspects of an artwork, its relationship

25 Andrew McClellan, *The Art Museum from Boullée to Bilbao*, Ahmanson Murphy Fine Arts Imprint (Berkley: University of California Press, 2008), 5–19.

26 *Ibidem*, 19–33.

27 Tony Bennett, "The Exibitionary Complex," The Birth of the Museum, 1 (1995): 30.

28 Carmel Borg and Peter Mayo, "Museums: Adult Education as Cultural Politics," *New Directions for Adult and Continuing Education*, no. 127 (2010): 35–44.

29 Hooper-Greenhill, *Museums and the Interpretation of Visual Culture*.

30 Peter Vergo, *The New Museology*, (London: Reaktion Books, 1997), 22-29.

between people and objects and art's intangible values rather than on the object itself. Whereas museums primarily focused on collecting, conducting research and presenting the outcomes, nowadays educating the public has become more important, according to museum education specialists John H. Falk and Lynn Dierking.[31] Consequently, there has been an increasing awareness that the authenticity of original artworks, their copies and the museum as a physical space is not solely linked to their unicity as a physical object in time and space but reaches far beyond this. This has resulted in a pressing redefinition of the concept of the museum to one that is more inclusive, democratizing and polyphonic.[32] Today, the museum is defined as follows, according to the 2017 International Council of Museums' (ICOM) *Code of ethics*:

> "A museum is a non –profit, permanent institution in the service of society and its development, open to the public, which acquires, conserves, researches, communicates and exhibits the **tangible and intangible** heritage of humanity and its environment for the purposes of education, study and enjoyment."[33]

Although this clearly states the importance of art's intangible evidence, Dudley critiques that in reality, the object –focused policy still prevails in most Western museums. She explains that authentic objects are displayed 'as is', relying on the interpretation of their visual and aesthetic qualities, the more semantic and symbolic meaning, which is often not understandable without additional information. The increasing attention to museums in the mainstream, art's popularity and the resulting model of blockbuster exhibitions and mass events attribute to the objectification of authenticity. In order to support these demands evoked by these developments, museums have to create exhibitions that are generally interesting and which cover easily understandable themes that appeal to the majority of society. As Dudley describes, the easiest way a museum can do this is through its objects: the objects are actors expressing the truthfulness of the museum's message.[34] As Simon explains, a museum's

31 John H. Falk and Lynn D. Dierking, *The Museum Experience* (London: Taylor & Francis, 2016), i–ix

32 "Museums are democratizing, inclusive and polyphonic spaces for critical dialogue about the pasts and the futures. Acknowledging and addressing the conflicts and challenges of the present, they hold artefacts and specimens in trust for society, safeguard diverse memories for future generations and guarantee equal rights and equal access to heritage for all people. Museums are not for profit. They are participatory and transparent, and work in active partnership with and for diverse communities to collect, preserve, research, interpret, exhibit, and enhance understandings of the world, aiming to contribute to human dignity and social justice, global equality and planetary wellbeing." – The International Council of Museums - https://icom.museum/en/news/icom-announces-the-alternative-museum-definition-that-will-be-subject-to-a-vote/

33 The International Council of Museums, "The ICOM Code of Ethics," accessed December 2020, https://icom.museum/wp-content/uploads/2018/07/ICOM-code-En-web.pdf

34 Dudley, *Museum Materialities: Objects, Engagements, Interpretations*, 1–18.

processes of registration, classification and displaying of exhibits result in an authoritarian attitude and the creation of a one –way conversation between institute and visitor: museum missions claim that museums are public trusts but in reality, artworks are still owned by the museum, not the public. In a world where reproductions, 'fake news' and high –quality forgeries are omnipresent, museums are supposed to curate and communicate about 'the real (object)', rejecting almost every form of physical reproductions, whereas visitors are supposed to swallow what is presented without asking questions.[35] Additionally, the *Code of Ethics* shows that one of the museums' main tasks is to display primary evidence of history, resulting in a rejection of reproductions. If museums decide to use copies, reproductions and facsimiles, they should label them clearly as such.[36] Thus, art historian Fiona Cameron (2007) explains, it seems that museums have opted to create a world of true material objects that exist almost completely separately from any human concerns and the desires and conflicts of society.[37] However, Simon, Dudley and Hooper –Greenhill emphasize that museum objects never stand alone, as their significance is largely constructed through social engagements outside of the material object and the museum's physical walls. Moreover, Dudley emphasizes that museums restrict us compared to when we are outside: our senses experience and interpret the world, which is reduced not only by the museum's walls as a building but also through its choice of objects, mediums and frames to express its ethos.

Now more than ever, living in a world dominated by a pandemic, when there is no chance of seeing original works of art, let alone engagement with the museum as a physical space, it has become evident that our engagement with artworks and museums is able to continue. It may be that it is growing entirely without their 'authentic' material presence. As I am confined to my home with a reproduction of an original artwork, I have indirectly dedicated meaning and significance to the original artwork, as it became an artwork that has been through these tough times with me. The idea that an artwork's

35 Nina Simon, *The Participatory Museum* (La Vergne: Lightning Source Inc, 2010), i–v, 120–35.

36 The International Council of Museums, "The ICOM Code of Ethics," 25–30.

37 Fiona R. Cameron, "Object-Oriented Democracies: Conceptualising Museum Collections in Networks," *Museum Management and Curatorship* 23, no. 3 (2008): 229–43.

significance is solely based on its materiality as a confirmation of 'truth' and the museum providing this 'authentic experience' is for this reason unattainable. Furthermore, it falls short in acknowledging the significance of art and the important societal role of the museum. The crisis pressurizes museums to grasp the meaning of artworks beyond their finalized materiality. But how do artworks generate meaning beyond their material? Does a museum need to rely on the physical encounter with objects alone? Thus, can a reproduction obtain significance after all?

TRANSCENDING MATERIALITY: THE INTANGIBLE QUALITIES OF ART

Nowadays, it has become evident that artworks are appreciated beyond their material qualities. For example, artists play with the idea of artworks as unique material objects (e.g. Dadaist Marcel Duchamp's ready –mades). Furthermore, contemporary artworks are often made of unstable materials, leading to their inevitable self –destruction or are not made of physical materials at all (e.g. Beeple's *Everydays — The First 5000 Days* (2021) (Figure 4.))

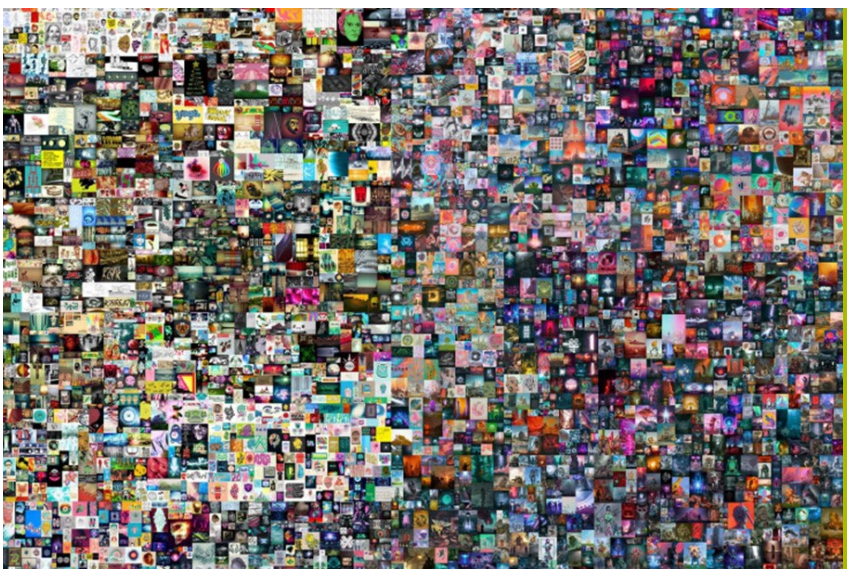

Fig. 4. Everydays —
The First 5000 Days
Beeple, 2011 –2020, NFT

challenging the concept of 'aura' as solely embedded in an artwork's physical presence. Moreover, due to globalization and digital interconnectivity, there is a rising awareness in museum practice that 'aura' is a dynamic characteristic, constructed through a multiplicity of interpretations depending on a variety of factors, among others culture and ethnicity.[38] Recent events such as the fire in the Nôtre Dame cathedral in Paris and the Islamic State's destruction of archaeological sites not only demonstrate the fragility of cultural heritage, they also underscore the socio –cultural value of artworks that reaches far beyond and are more long –lasting than materials alone. One author whose essay is useful in explaining how art's intangible qualities can be captured and explained and whose text is often referred to is philosopher Denis Dutton.[39] To me, he proposes an interesting yet comprehensive and concise scheme for thinking about an artwork's authenticity as an element that results from its external and more conceptual significance, rather than being based on its unique manifestation alone. He adopts an interesting approach to reproduction, arguing that an artwork's artistic experience reaches far beyond its physical form: it can be functional, material and conceptual.

Dutton sees authenticity as a "dimension word" as it depends very much on the context and the relation to what is considered to be authentic.[40] Dutton suggests that authenticity consists of two contrasting notions. Firstly, he distinguishes *nominal authenticity*, which correlates with the historicity of the object itself and is expressed by the correct identification of the origins, authorship, or provenance of an object. Thus, nominal authenticity is highly dependent on its material qualities, as it provides direct evidence of the object's connection to the past. This ensures that the artwork is properly named, rather than a forgery or a falsely portrayed version. Looking at a 3D print's material clearly reveals that it is nothing like that of Fabritius' original as it is made of plastic, a recently invented material that does not carry the same traces of time. Thus, the *nominal authenticity* of the 3D print is not the same as the seventeenth –century *Goldfinch*.

38 Dudley, *Museum Materialities: Objects, Engagements, Interpretations*., 1-18.

39 Dutton, "Authenticity in Art."

40 Ibidem, 258-63.

Secondly, whether the nominal authenticity of an object or artwork and its materiality grants it some unique value, and whether it is irreplaceable, depends on *expressive authenticity*: a subjective approach to an artwork as an expression of the values and beliefs of an individual or society. What he means by this is that nominally a 3D print of Fabritius' *The Goldfinch*, in the context of its original, will never be (and can never be seen as) an original Fabritius. Yet, in its own assessment, it will be an original and authentic artwork of the copyist – or even the 3D printer – that made it. Thus, the nominal value depends on the context of the value judgment.

Although Dutton's theory seems simple, he adds something crucial to the assessment of value concerning authentic objects. In his text, Dutton quotes: "Too often discussions of authenticity ignore the role of the audience in establishing a context for creative or performing art."[41] Here, he emphasizes that authentication does not end with the confirmation of the nominal authentic object itself, but rather starts when the authentication has taken place, at which point the authentic object becomes the subject of constant re –evaluation. What makes something irreplaceable, authentic depends on more dynamic aspects other than just its static historicity, age value and its nominal authenticity. In his text Dutton questions himself:

> "Why then, do critics and historians of art, music, and literature, private collectors, curators, and enthusiasts of every stripe invest so much time and effort in trying to establish the provenance, origins, and proper identity — the nominal authenticity — of artistic objects?"[42]

Dutton continues by saying that the conventions of authenticity shift over time in response to changes in the context in which it is embedded, such as the socio-cultural environment the artwork originates from, the way it is displayed and interpreted. To him, artworks are first and foremost "[…] manifestations of both individual and collective values, in virtually every conceivable

41 Dutton, "Authenticity in Art," 269.

42 Dutton, 269.

relative weighting and combination."[43] In this sense, a 3D print of Fabritius' *The Goldfinch* could acquire its own significance when individuals or larger audiences appreciate it in a particular way. Furthermore, the assignment of value to a 3D print does not have to mean that the 3D print replaces the original: expressive authenticity allows Fabritius' original as well as the 3D print to exist side by side in harmony as they both attribute to the artwork's authenticity in their own particular way. Dutton argues that authenticity as a concept is hard to describe because it is complex and peculiar, and is a quality that is not static but a phenomenon that is always in flux. For this reason, it is hard, if not impossible, to construct a uniform definition of authenticity as it is different in every individual case.[44] For this reason, I argue that considering works of art only as materially valuable entities falls short in capturing what the authenticity of art truly entails. Based on this analysis, I believe that authenticity is something intangible that cannot be ascribed to a static state or object, to just the original artwork's material alone. Authenticity is always contingent, ever-changing, dependent on various factors and can be attributed to different qualities of an artwork. To use art historian Adam Lowe's words:

> "Objects are the repositories of compounded ideas, thoughts, materials, evidence, transactions and the actions of time. They are the counterpoint of the ephemeral communications of today – they require time and reflection but they deliver complex insights – they reflect and redirect every thought we impose upon them."[45]

Only a small part of the notion of authenticity depends on the artwork as a material expression of a set moment in time and space. Shifts due to the changing relationships of the individual (artist) in society, new scientific discoveries, changes in social networks and transitions in cultural perception and preference are far more crucial for the assessment of authenticity. 'Aura' is place and time dependent because it is inherently connected to fluctuations in the perception of a variety of values which influence the significance of both

43 Dutton, 270.

44 Dutton, 266–72.

45 A. Lowe, *The Aura in the Age of Digital Materiality - Rethinking Preservation in the Shadow of an Uncertain Future* (Milan: Silvana Editoriale, 2020), 16.

original artworks and their 3D printed reproductions. For example, because of technical research, we know how *The Goldfinch's* materials have changed and discoloured over time. Using 3D printing, it becomes possible to reconstruct the painting the way it would have looked when Fabritius' had just finished painting the artwork; hence coming closer to the artist's intention. Thus, hypothetically speaking, if society's assessment of aura no longer relied mainly on material originality, but shifted towards conceptual similarity, the 3D print would become more 'auratic' than the version painted by Fabritius.

Now that we have concluded that a 3D print will never replace the original artwork's materiality but, in theory, can attribute to a painting's overall value, as authenticity is not static, singular and final but fluid, plural and dynamic, it is important to analyse the way this impacts museum practice. As this section has shown, in the COVID and post-COVID society the significance of artworks is and can be constructed – possibly entirely – outside of the artwork's original material and outside the museum's walls. It becomes clear that the object –focused approach that relies on material authenticity is no longer sustainable and should be re –evaluated. Right now, the consequences of COVID-19 highlight that society quickly adapts to limitations in physical contact. This emphasizes and confirms the idea of 'aura' as something that not only transcends the artwork's material itself, but also that of the museum as a physical space. Therefore, it is crucial to clarify how this conversion of authenticity from single and static to a more plural and fluid perception affects the interaction with museum objects, and, consequently, the museum experience. This will elucidate the role that 3D prints play in contemporary society and whether the significance of the original artwork can be applied in any way to these prints. It will then be possible to determine whether 3D reproductions can be useful for museums and their collections in enabling them to become more resilient and to ensure their longevity.

THE CONTEMPORARY CULTURE OF CONVERGENCE

One often-quoted way of understanding the contemporary perception of art and the role of (digital) art reproduction is provided by media theorist Henry Jenkins. In the book *Convergence culture* (2006), Jenkins emphasizes how media and digital technology not only contribute to but have also become crucial for the creation of art's significance. In his book, he describes that since the 1990s, when mass media, computer technology and the Internet took flight, our culture has changed significantly. Although Jenkins' text mainly focuses on new media technologies that are computational and the fact that he does not specifically mention 3D printing, his theory is still useful in understanding the changing contemporary relationship between the reproduction, the original, the museum and the museum visitor. In his theory, Jenkins recognizes the changing relationships and experiences with new media. The rise of (media) technology has made it possible to reproduce any form of information and it has facilitated the constant flow of content across different platforms, in which interaction, connection and meaning-making have become endless.[46] For example, one no longer needs to visit the Mauritshuis to see *The Goldfinch* as new media and the reproductions it creates has made it possible to engage with artworks anywhere at any time, for example on the Internet, through our smartphones, in printed media or via digital apps (e.g. AR, VR). The omnipresence of reproductions and the possibility to engage with new information and each other has caused culture to change from – in his words – *divergence* to *convergence*. To be able to better clarify this shift from divergence to convergence, I consider it essential to make a distinction between two facets which I will refer to as *media convergence* and *social convergence*.

Firstly, *media convergence* is quite similar to Dutton's explanation of the artwork's *expressive authenticity*. Jenkins explains that media convergence can be understood as a combination of new and old media within one single piece of work. Therefore, he argues, the significance of an artwork no longer relies

46 Jenkins, *Convergence Culture: Where Old and New Media Collide*, 1–13.

solely on the artwork's material as displayed in a museum alone but, instead, is constructed through a multi-media network. Jenkins argues that the importance of art has become dispersed over a multiplicity of media. In a similar fashion to Dutton's statement, Jenkins emphasizes that reproductions that occur via already existing and new technologies – such as 3D printing – will not replace the significance of old media – the original artwork itself –, but it will add to its significance.[47] Eventually, he continues, these art reproductions dispersed over various media together with the artwork will eventually merge to the point where they all contribute to the artwork's significance. In the case of *The Goldfinch*, this means that Fabritius' original seventeenth-century painting at the Mauritshuis together with the 3D print I have at home – each having its own significance in a different context – contribute to the whole significance the artwork has for me and the experience it gives me.

This dispersion of information and the multiplicity of forms of engagement with artworks has not changed the perception of artworks alone, but has, consequently, also had its effects on our social behavior and ways of communicating. This change from social divergence to social convergence, according to Jenkins' theory, means that communication no longer relies on just one medium – the artwork – and one source – the museum – that are the providers of valid information. Instead, information is received and provided through the simultaneous and multiple uses of a variety of media, each conceived with the strengths of each medium in mind.[48] For example, whereas the Mauritshuis provides the artwork's real material, a 3D print allows me to touch the painting's brushstrokes, something I cannot do with Fabritius' original. Furthermore, the continuous flow of content and the accessibility of new information and interpretation across different forms of media, Jenkins argues, presents a back-and-forth power struggle over the distribution and control of content: information, creation and the way art is communicated is no longer under the control of one authority – the museum – but becomes accessible to everyone in the technical environment.[49] Because of the latter,

47 Ibid., 1–16, 112, 185–90.

48 Jenkins, *Convergence Culture,* 1–16.

49 Ibid. 215–16.

there has also been a shift in our behaviour, which I want to refer to as *social convergence*. What this entails is that instead of passively receiving information, the contemporary museum visitor has become more actively engaged, and hence more critical of the information that is served to them. Additionally, digital scholar Marc Prensky (2001) observes, today's generation and those to come are *digital natives*, meaning that they have been used to the interactive culture of computers from birth.[50] They are more accustomed to using technology, taking the collection of information into their own hands, and also more accustoms to engaging with artworks in ways that go beyond their original material. As art scholar Meredith Hoy describes, the way we learn and work is more remote, interactive, personal and individual yet global at the same time. Because of the latter, convergence culture is one of more engagement: where in the past people used to fulfil an individual role, they now find a collective process of social interaction. Their engagement with original artworks and their (digital) reproductions is therefore different from that of earlier generations, as to them, this engagement with multiple versions of an artwork is familiar. Today's generation rapidly and easily switches from one medium to the other, between artwork and (3D) reproduction. The shift from passive to active and interactive, from exclusive to global, from absorbing to criticizing is to me what defines the recent *social convergence*.

Yet, what does this convergence mean for museums in theory and practice? As Simon proposes, this shift of both social convergence as well as material convergence has caused a significant shift in the behaviour of museum visitors:

> "[…] people want to do more than just "attend" cultural events and institutions. The social Web has ushered in a dizzying set of tools and design patterns that make participation more accessible than ever. Visitors expect access to a broad spectrum of information sources and cultural perspectives. They expect the ability to respond and be taken seriously. They expect the ability to discuss, share, and remix what they consume."[51]

50 Marc Prensky, "Digital Natives, Digital Immigrants," *On the Horizon* , 5 (2001): 1–6.

51 Simon, *The Participatory Museum*, ii.

Considering Simon's expression here in the context of Jenkin's theory of convergence explains why the Museum Association's report shows a significant increase in museum visitors between the ages of 19 and 25 since museums had to switch from physical/material to more digital tools to exhibit their artworks: the perception of art, the engagement with objects and the experience of art were no longer curated by the museum alone, but could be taken into one's own hands.[52] *Culture, Corona, Crisis : best practices and the future of Dutch museums* (2021) – an analysis done on the effects of the lockdowns on the Dutch cultural field – shows that although museums already presented their artworks via extra mediums and platforms (e.g. via digital collection studios such as the Rijksmuseum's *Rijksstudio*) to some extent, the limitations imposed by the virus and the consequent necessity to include new media has forced museums to drastically change museum practice and presentation formats.[53] In this sense, the report shows that museums have become increasingly dependent on hardware and software development, and the careful curation of their digital programming has become more important. Consequently, the inevitable shift has already started to take place from a previously more physical, analogue, massive, and passive relationship with art and the museum experience to one that is more remote, multi–medial, personal, and (inter) active, towards a museum approach that complies more with Jenkins' convergence theory.

We have discussed that an artwork's authentic value cannot only be considered as an element that is solely connected to its physical manifestation but instead should be seen as a constantly shifting concept that relies on discussion, interpretation, and individual socio–cultural experiences. *Het nieuwe normaal* (the new normal) has forced museums to let go of the prevalent idea of the museum as a physical space and the individualistic idea of the one and only artwork providing the 'auratic' experience. Because of the material and social convergence of society, museums have become part of a complex dialogue between visitors, users, artworks, and objects that on the one hand

52 De Museumvereniging, "Er Is Een Breed En Groeiend Draagvlak Voor Musea." (accessed November 2020).

53 Liselore N.M. Tissen, "Culture, Corona, Crisis : Best Practices and the Future of Dutch Museums," *Journal for Conservation and Museum Studies*, 2021.

takes place within the walls of their institutions, but on the other hand increasingly beyond the boundaries of their buildings dispersed over numerous types of new and old media. This approach leaves room for 3D prints to exist and to potentially contribute to an enhanced connection to both the artwork as well as the museum. Yet, what do we make of all of this? What will the COVID-19 and post-COVID-19 museum look like and how can a 3D print contribute to this paradigm shift?

3D PRINTING AS AN EXTENSION OF THE WORK OF ART AND THE MUSEUM EXPERIENCE

The convergence imposed by new digital media which is highlighted by the consequences of COVID-19 may help reinvent the boundaries of the museum experience. Furthermore, deriving from Simon's theory, it is quintessential to move from traditional to a more participatory design as authenticity is not permanent, singular and fixed, but rather ephemeral, plural and dispersed. What this entails is that the way that information flows between institutions and users is changing. In the pre-COVID more traditional exhibitions and programs, the interpretations of the past were mediated with authority based on the primacy of the museum. Here, the institution provided content for visitors to consume, enforcing a one-way conversation. In contrast, post-COVID museum design should be more participatory. This, Simon says, could be done by focusing more on making the content high quality and accessible. That way, every visitor, regardless of their background, interest, religion, values or beliefs receives or can create a good and reliable experience.[54]

Yet, how can 3D printing contribute to this phenomenon? In *3D Reproductions of Cultural Heritage Artefacts: Evaluation of significance and experience* (2021) – a study that analyses the significance of 3D reproduction technologies for creating enhanced experiences with artworks – it became evident that for museum visitors, 3D reproduction technologies were considered essential for

54 Simon, *The Participatory Museum*, i–v, 1–6.

maintaining and enhancing the relationship between the artwork and the beholder. This is especially relevant at times when a physical connection between artwork, museum and visitor is barely possible.[55] Here, the participants said that it is clear that a 3D print of *The Goldfinch* can never replace the original artwork and is therefore always complementary to Fabritius' painting, yet it it is instrumental in creating more intangible emotional, profound and long-lasting bonds with the artwork located at the Mauritshuis. The reason for this is that it not only provides new perspectives on the artwork but it also facilitates direct and creative engagement with the beloved artwork. For example, a 3D print of Fabritius' painting can contribute as a second medium beside the original artwork that is unreachable at that point in time. It allows me to create my own tailor-made experience with the artwork. From the comfort of one's home, the 3D print combined with other (digitized) media such as virtual gallery apps (e.g. *Ikonospace* and *Occupy White Walls*) could make it possible to create virtual exhibitions with *The Goldfinch* and, having the freedom to manipulate the painting in ways one sees fit, links can be forged between artworks that are meaningful to one personally (Figure 5).[56] Through personal encounters with the artwork in the virtual realm, the active engagement with the museum and the artwork via various platforms and diverse media and a

55 Liselore N.M. Tissen, Umair S. Malik, and Arnold P.O.S. Vermeeren, "3D Reproductions of Cultural Heritage Artefacts: Evaluation of Significance and Experience," *Studies in Digital Heritage* 4, no. 1 (2021).

56 Ikonospace, accessed 1 March 2021, https://www.ikonospace.com/ *Occupy White Walls*, accessed 1 March 2021 https://store.steampowered.com/app/876160/Occupy_White_Walls/

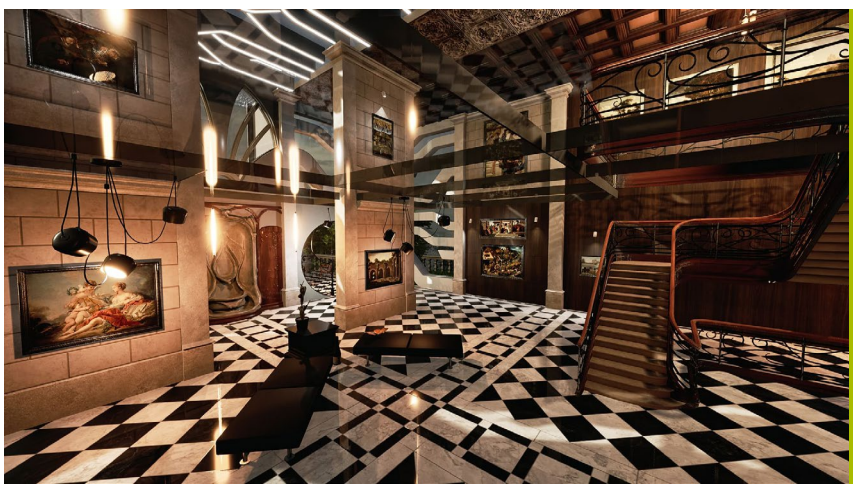

Fig. 5. Occupy White Walls, here I can create my own exhibition with The Goldfinch

3D print hanging on one's living room, it is possible to have a special bond with Fabritius' 'original' painting without needing to be physically in the presence of the artwork at the Mauritshuis in The Hague. These experiences, together with the physical artwork, constitute its significance. In this way, it is possible to have an experience with *The Goldfinch* in a way that entirely transcends the material of the original artwork. The 3D print can nonetheless largely present the artwork's physical assets. In this sense, it could be argued that the authentic values of the artwork that we attribute to it and the memories that were created through the engagement with these various media and platforms can temporarily manifest themselves in the physicality of the 3D print. I argue that, once one can visit the Mauritshuis again and see the original painting, this remote yet personalized experience can greatly attribute to a deeper and more personal connection to the original artwork now than before the pandemic hit, as it was possible to engage with the artwork in a very different and more active manner.

This example shows that using Simon's idea and 3D prints as a method to comply with the necessities imposed by society, museums can provide a multiplicity of ways to access the objects, supporting cultural engagement in unlimited ways with complementary experiences. That way, new and meaningful narratives can be developed which can take place in a world where there is limited to no engagement possible with the actual object or the museum as a physical space. As Simon says: "When people can actively participate with cultural institutions, those places become central to cultural and community life."[57] Thus, in the light of Jenkins' and Simon's idea of a more participatory and democratic experience, the ideal (post–)COVID museum is no longer a single physical space with one story to portray, but it should be seen as a multi-medium with a multiplicity of identities that are expressed through the careful choice of (digital/virtual) tools. The careful curation of this digital and technological toolbox which every museum can use should support a more engaging experience with a more diverse and complex group of visitors in a way that complies with

57 Simon, *The Participatory Museum*, ii.

the museum's message, ideals, and the experiences it wants to create. In this way, an ostensibly indistinguishable 3D printed reproduction of any artwork no longer has to be a threat to the original work of art, but instead can greatly contribute to thrilling new experiences that could not take place with the fragile material of the original artwork nor within the physical boundaries of the museum space. Instead, it can contribute to the visualization and physicalisation of different meanings and values attributed to the artwork, adding to the overall significance of both the painting and the role of the museum in society. This way, art's significance can reach far beyond its physical borders and the museum experience will no longer be limited to a 2-hour timeslot.

Het *nieuwe normaal* (the new normal) has forced museums to relinquish the prevalent idea of the museum as a physical space and the individualistic idea of the one and only artwork providing the 'auratic' experience. However, it is important to realize that an artwork's intangible meanings, cultural significance and the emotions and expressions it evokes cannot exist without a physical predecessor. Furthermore, I do not claim that an artwork's physical manifestation and that of the museum as a fixed place one can visit do not have any value and will cease to exist. As the National Museum Research also shows, there is still an increasing longing (25% of Dutch people) to finally visit the museum again once the lockdown ends, as it appears that a stronger bond with collections is still largely related to actual museum visits.[58] It is evident that aspects of their obvious and trivial material qualities as embodiments of history trigger the people's direct emotions. This is of pivotal importance and should not be disregarded. Thus, an artwork's significance and therefore also a 3D printed reproduction will always be connected to the original artwork's material. Yet, I think it is important to mention that 3D prints of all new media and technologies could be most useful and promising because, in contrast to other reproduction methods, it is still a material object: it is directly perceivable, and it can be touched, seen and held. I believe that this not only stimulates intangible and abstract appreciations of the artwork, but also triggers the emotions that arise during the direct

58 De Museumvereniging, "Er Is Een Breed En Groeiend Draagvlak Voor Musea."

experience between the object's trivial material and perceivable qualities and the beholder. This way, I argue, a 3D print to some extent can comply with both the traditional longing for an artwork's material 'aura' as well as its intangible convergent perceptions.

In the COVID and post-COVID museum, where new and old media do not collide, but rather enhance one another in creating new relationships with users, and between visitors and the museum's interactive situations. Here, in the perspective of Jenkins' convergence and Simon's stance, the museum could (and should) serve as a "platform", connecting a variety of users that can attribute to the creation of the museum's content (e.g. specialists, consumers, visitors, collaborators). It has become clear that 3D prints can become an important asset for shaping these connections and collaborations between individual visitors and cultural institutions. However, I want to emphasize that it must be kept in mind that it is hard if not impossible for the museum to guarantee the consistency of visitor experiences as the multiplicity of media used to express one's message makes it hard to oversee the quality of the experiences. Instead, the institution should aim at providing opportunities for diverse visitor co-produced experiences. The latter triggers one remaining question: What authority will museums have in a future society characterized by convergent and participatory media? This is an aspect that should also be kept in mind if museums choose to use 3D prints in their museum practice and presentation. Will they be the ones disclosing the 3D prints, or will they offer the 3D data on an open-access basis so people can freely use and print their artworks at home? I believe this is a highly important issue that requires further investigation. However, for now, we can only speculate on the consequences that the virus will have on museums and their way of presenting artworks to their audience and communicating with them, and the role of 3D printing within this debate.

CONCLUSION

The introduction of 3D printing within the art world rekindles the discussion of what is 'real' and 'authentic' and what is not, a discussion that has been inherent to the Western perception of cultural heritage. Furthermore, this notion is also disturbed by the consequences of the coronavirus. The necessary use of 3D reconstructions for the continuation of the museum experience discloses new information about original artworks and radically changes the engagement with museums. What this article has shown is that art's significance and the museum experience reach far beyond their final material aspects: the perceived authenticity of both the original and the 3D print is a social construction that is not static, but changes according to what society considers to be 'authentic'. Dutton's theory has shown that shifts in the appreciation of the functional, material, emotional or conceptual qualities of an artwork change the meaning of not only the artwork and a 3D printed reproduction but also that of the museum. Furthermore, the convergence of media and society revealed that the boundaries of museums are currently being reinvented and relocated if not entirely removed. Whereas traditionally the interpretations of the past were proposed by the museum alone, nowadays the interpretation of art has been elevated to a multi-media domain that is more critical and engaging. The rapid development of technology and (social) media has significantly changed the way we communicate and interact with museums and their collections. The material and social convergence of society have forced us to rethink our perception of art, the engagement with cultural heritage and the museum as fixed, singular and material-based objects and institutions. Here, the combination of Hoy, Prensky and Jenkins' theories opened up a way of considering the museum as not solely one medium or format, but instead as one of many. As the virus is forcing us to reassess our relationship with museums, let us move away from the idea that the museum is a physical space that welcomes hordes of visitors during pre-determined hours and fixed timeslots. Instead, let us consider the museum as a multi-medium with a multiplicity of

identities. What will matter is the careful choice of (reproduction) technologies and methods that each museum can use in support of greater engagement with a more diverse and complex group of visitors in a way that complies with the message, ideals and experiences that the museum wants to create. Instead of focusing on only one 'auratic' aspect of the artwork – its unique material – multiple 'auras' can co-exist within and outside the museum. From this perspective, where the significance and the experience of art transcend its material, a 3D printed one-on-one reproduction of Fabritius' *The Goldfinch* no longer forms a threat to the original artwork. A 3D print no longer means the end of the original artwork's "aura", but becomes the start of unlimited engagement with the artwork and the museum. This can overcome any boundaries imposed by a lethal virus whilst keeping pace with the ever-changing societies of today and tomorrow.

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