

**Against Immateriality: 3D CGI and Contemporary Art**

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Submitted in accordance with the requirements for the degree of  
Doctor of Philosophy

The University of Leeds  
School of Fine Art, History of Arts & Cultural Studies

March 2020

The candidate confirms that the work submitted is her own and that appropriate credit has been given where reference has been made to the work of others.

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This work was supported by the Arts & Humanities Research Council (grant number AH/L503848/1) through the White Rose College of the Arts & Humanities.

## Acknowledgements

This thesis was supervised by three, uniquely qualified people: Professor Gail Day, Dr. Diane Morgan and Professor Christopher Taylor. I would like to thank each of them for the enthusiasm with which they responded to my initial project proposal and the insights and expertise that they have shared with me over the past three or so years. I would especially like to thank Gail for her assistance with the tricky funding application; without a scholarship, I would not have been able to undertake this research.

I would like to extend my thanks to the Arts and Humanities Research Council for offering me a doctoral award and to the staff at WRoCAH for their encouragement along the way.

To the dear friends who I was fortunate enough to meet almost as soon as I arrived in Leeds, thank you for making me feel at home; Emma Parker, Hayley Toth and Nathan Brand, you were there from the start. To Dominic Davies, Amber Lascelles, Rachel Johnson, Kate Spowage, Maddalena Morretti, fellow *Poor Image Projects* cofounder Anya Stewart–Maggs, Eleanor Rambellas Roche, Patrick Ward, Jamie Hudson, Jules Lister, Caitlin Stobie, the arts organisation Skippko, the artists at serf studios, and many more; it has been a privilege to spend time with such warm and creative souls. Thank you too to those close friends from Weimar, now Berlin, who have been there throughout, in particular Duygu Atceken, Golriz Behgoo, Meng Chang, Mert Akbal, and Victor Stoljarow.

To my family—Lloyd, Laura, Janet, Joe *and* Ted—thank you always for your ongoing love and support. To my parents especially, thank you for instilling in me the belief in the transformative power of education and the confidence to pursue the unknown. I will be forever grateful.

Finally, thank you Stefan Kraus. Einfach gesagt: ohne dich, wäre es nicht möglich gewesen!

## Abstract

*Against Immateriality: 3D CGI and Contemporary Art* is a practice-led research project exploring three-dimensional computer-generated images (3D CGI), still and animated, as a mode of artistic expression. A post-photographic image paradigm that is habitually associated with soft power, spectacle and commodity forms, in recent years 3D CGI has emerged as a compelling way through which artists might express, represent and comprehend the effects of digitisation on art and life. Across three thematically linked but distinct chapters—*Materialising*, *Corpsing*, and *Becoming 3D*—I argue for the cultural, social and political realities associated with 3D CGI, investigating its unique characteristics as a sensual, multi-perspectival mode of image, object and world building. Through an exegesis of my own artistic practice, one in which I produce 3D computer-generated artefacts before translating them into physical objects and spatial installations, I examine the conditions of 3D CGI production, presentation and dissemination. I contextualise this practice within a broader movement within contemporary art of artists that use 3D CGI to comprehend and interrogate digital culture, analysing artworks by Mark Leckey, Ed Atkins, Sondra Perry, and the research group, Forensic Architecture. Each of these diverse examples provides a distinctive perspective on the implications of this mode of digital image making, including its role in refiguring notions of embodiment and materiality, how it can be used to vision aspects of contemporary society that are often occluded, and its ability to (re)construct images of traumatic pasts, turbulent presents and speculative futures. Ultimately, I argue that 3D CGI allows for reflection on and critique of digital technologies by underlining their immanent materiality and the lived, bodily effects these so-called immaterial images have the power to produce.

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## Foreword

This thesis is about relationships between humans, digital technologies and the images these technologies make possible. More specifically, it is about how humanity creates, creatively harnesses and apprehends three-dimensional computer-generated images and the insights these images offer about our particular moment in time.

The thesis title, *Against Immateriality*, is lifted from a short text written by the artist, Ed Atkins:

So I write, right here, and I fart and I belch and tear up or go for a piss: my body insists on my re-engagement with it, with its story that might extend to all bodies and against all this apparent immateriality.<sup>1</sup>

In his idiosyncratic manner, Atkins points out one of the underlying paradoxes in the narrative of digital technologies and our experience of them; an understanding of computational and cognitive processes made up of intangible words, signs and images, yet ones which are inextricably bound to the wires, precious metals, data centres, chemicals and labouring bodies that are essential in powering and producing them. Thus, while the images discussed in the pages that follow were born in the world of the *soft*—a world of cloud storage, remote networking, algorithms, and services—as Atkins suggests, and as I insist throughout, they are also a product of the world of the *hard*—a world of raw matter, e-waste, places, and people; in short, *practice*. My experiences of working with and through 3D visualisation software—and perceiving the computer-generated images it produces—embodies and complicates this paradox absolutely; it is a process by which both myself and these images are rendered simultaneously dynamic and static, creative and highly prescribed, material and intangible, three-dimensional and flat.

Ultimately, like the succession of novel digital devices that partially defined my childhood throughout the 90s, the decade when digital culture was first embedded into so many aspects of everyday life, the hardware and software that produces the kinds of 3D computer-generated images discussed in these pages will one day, perhaps soon, become *obsolete*, hastily replaced by something more agile, more dimensional, more *real*. At this moment, however, I believe that the production, presentation and study of 3D CGI, an amorphous and malleable mode of image and world-making, might yet offer a way of processing, parsing and expressing our rapidly changing present, the pasts it contains and the futures it has the potential to imagine.

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<sup>1</sup> Ed Atkins 'A Questionnaire on Materialisms', *October*, 155 (2016), 3–110 (p. 7) <[https://doi.org/10.1162/OCTO\\_a\\_00243](https://doi.org/10.1162/OCTO_a_00243)>.

**Introduction:  
Made In 'Eaven?**

A 35mm film loops through a projector and the image chemically exposed onto its celluloid surface appears illuminated on the gallery wall opposite. It shows a clean, bright, sparsely furnished room—the artist’s studio. In the middle of the space there is a single white plinth and sitting atop, a sculpture of a silver rabbit. The sculpture is none other than Jeff Koons’ infamous 1986 work, *Rabbit*, an object familiar to many from the innumerable images and imitations it has since so virulently spawned. Immediately recognisable by way of its puffy limbs, pinched seams, inflated balloon body and mirrored surface, *Rabbit* is the product of precise machine manufacturing. Bearing no mark of human influence, it is infallible; a contemporary acheiropoieton, an icon made without hands. The camera moves in to survey the sculpture more closely but something about the movement feels ‘off’; it is too smooth, too uniform, almost drone-like. In the convex body of the sculpture, the studio space is reflected, only now its straight architectural lines bow and bulge. This, the moment of realisation: There is no camera reflection to be seen in its impossibly smooth surface. It is a trick, a simulated rabbit, a computer-generated replica of the original and, although it appears cold, hard, smooth and metallic, it is not. Rather, it is a chimera, a rabbit replicant conjured by the magic of computer code. Finally, the camera—the software asset that acts as camera—zooms so far into the sculpture that only the warped reflection of the room remains: ‘the mirror-reflection of absolute feedback is a process of bracketing out the object’.<sup>2</sup> With this, *Rabbit* melts away, momentarily ceasing to exist. Finally, the camera pans back out and returns to its starting position, ready to trace the same path, at the same speed, forever.

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<sup>2</sup> Rosalind Krauss, ‘Video: The Aesthetics of Narcissism’, *October*, 1 (1976), 51–64 (p. 55) <<https://doi.org/10.2307/778507>>.

*Image Removed*

Figure 1. Stills from *Made In 'Eaven*, Mark Leckey, 2004.

## Made In 'Eaven

Mark Leckey's 2004 work, *Made In 'Eaven*, is an early example of a 3D computer-generated animation created by a contemporary artist. A moving-image loop that lasts just one minute and thirty seconds, it remains compelling not because of its then appeal to technological novelty but because it asks the audience to consider how the emergence of 3D computer-generated images or imagery (3D CGI) in society and art has fundamentally changed how images, objects and commodities—and the concepts of materiality and embodiment that accompany them—are *produced, experienced* and *understood* in the digital age. 'Conceptions of virtuality, simulation, computer reproduction and rendering', writes Elizabeth Grosz, 'transform our understanding of the real, matter, space, the body, and the world'.<sup>3</sup>

In the reading of *Made In 'Eaven* that follows, I introduce some of the key questions and concerns that have informed this research project, shaping both its practice-led and written outputs. I argue that it—and indeed many other contemporary artworks that utilise, present or revolve around 3D CGI, including those discussed in this thesis—are an attempt to grapple with how digitisation enters into and impacts all arenas of life and art: What are the conditions of production for 3D computer-generated images and animations? How are these conditions reflected in the rendered surfaces of such images? What are the political, social and cultural implications of 3D CGI and how do these various inflections inform how contemporary artists conceptualise, deploy and stage this particular medium? What about this mode of imaging and imagining the world articulates something meaningful about the current state of art and life?

Throughout, I consider 3D computer-generated images—images materially, spatially and temporally ambiguous—the software used to produce them, and the hardware used to power and display them, to be what Marx called a social hieroglyphic. Understood as the seemingly innocent artefacts, products and objects of capitalism which are transformed through notions of value and utility, a social hieroglyphic veils the real relations between humans and their environments. Within these socially produced and determined hieroglyphic abstractions is disguised a world of complex networks and interactions. The task then, as Sean Cubitt writes, is to unearth that which is 'buried in the hieroglyphic forms of our communications hardware',<sup>4</sup> (and software) and, by considering 3D CGI not only in terms of final product but as mode of production, to uncover the depth which lies on and beneath these three-dimensional, digitally rendered image surfaces.

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<sup>3</sup> Elizabeth Grosz, *Architecture from the Outside: Essays on Virtual and Real Space* (MIT Press, 2001), p. 77.

<sup>4</sup> Sean Cubitt, *Finite Media: Environmental Implications of Digital Technologies* (Duke University Press, 2016), p. 74.

The original Jeff Koons sculpture sampled by Leckey is an object that unequivocally embodies the adoption of pop cultural appropriation as artistic strategy in the 1980s. The obscene prices that *Rabbit* has since commanded on the art market make it manifestation of the intertwining of art and global capital par excellence. It is the combination of speculative financial value and a highly figured materiality that enables Koons' postmodern pop pieces to seemingly transcend everyday objecthood and enter the vertiginous realm of the capitalist sublime. As such, *Rabbit* is an object imbued with magic, a particular assemblage of matter severed from use-value through complex social relations: 'As it steps forth as a commodity', writes Marx, in his famous analysis of commodity fetishism, 'it is changed into something transcendent'.<sup>5</sup>

During a talk about his work in 2014 at The Bluecoat in Liverpool, Leckey announced *Rabbit* to be, 'the ultimate capitalist object [...] in its absolute flawless perfection, it's like a thought made real'.<sup>6</sup> So too, upon initial contemplation, does Leckey's rabbit appear to transcend mere matter. Not, however, in the manner of Koons—the transmutation of matter through commodification—but through the transformation of a very particular manifestation of physical being-in-the-world—material, matter, metal—into data or simulated sensuous surface.

Leckey's rendering, like all 3D computer-generated images, highlights the ways in which digital media alters how images and objects are constructed, both in our minds and in the world. Through digitisation, Leckey asks the audience to consider the ontological nature of matter itself; its authenticity, permanence and value. Mediated through software, *Rabbit* oscillates not only between image and object but between material and immaterial and the array of associations these two states provoke. Whereas material is typically used to indicate that which is solid, tangible and definite, immaterial often connotes the formless, ephemeral and precarious, the irrelevant and easily dismissible, yet also notions of a spiritual dimension that lies beyond the earthly plane or mere matter. In this way, the 'immaterial' iteration calls the significance of matter into question whilst simultaneously exposing the complexity of digitally produced imagery; because, although Leckey's rabbit appears to have volume, mass and texture, it does not in any way that we can experience haptically or indeed, buy, sell or store in a traditional manner. Thus, despite the ability of a 3D model to retain volume, as it is transformed into code, digitally animated and projected, it is also *flattened*. In its apparent

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<sup>5</sup> Karl Marx and Friedrich Engels, *Capital: A Critique of Political Economy. 1, 1* (Chicago: Kerr, 1906), p. 82.

<sup>6</sup> 'The Double Negative » Mark Leckey: Transformed by the Digital Realm' <<http://www.thedoublenegative.co.uk/2013/04/mark-leckey-transformed-by-the-digital-realm/>> [accessed 12 June 2018].

immateriality, as if an apparition from heaven, this rabbit is no longer discernible as either solid or incorporeal, literal or figurative— instead, it exists somewhere between states.

Just as Leckey's immaterial phantasm makes strange the relationship between image and object, so too does digitisation alter assumed associations between matter and value. As a store of value, physical money, like the original sculpture, is made out of finite material resources: once precious metals, now embossed paper, holographic foil, rendered animal fat and petrochemicals. Today, though global finance is largely made up of imperceptible flows of data generated by machines for machines, it remains fundamentally reliant on physical bodies, wires and networks in order to function. This, as Bill Maurer writes, is '[d]igital credit's undeniable materiality',<sup>7</sup> one which ensures the boundaries between material and symbolic worth are blurred. Leckey's simulated rabbit presents us with a similar ambiguity, speaking of how value is constructed through matter but also streams of information. As such, it is a critique of a society giddy with the endless potential of dematerialised value through digitisation and yet, a world of art and commerce that is still fixated, as if in awe, with *stuff*.

Most will only ever perceive *Rabbit* through photographic reproduction: as a static representation, in print or online. By contrast, Leckey's version, unlike a photograph, is made lively through the shifting perspective of the virtual camera, one which makes the sculpture's reflective surface *fluid* and reveals the spatial, temporal and material weight afforded by 3D CGI: 'you can feel it [...] the volume or mass of the thing's been captured at that moment and [...] you experience in this sensual way'.<sup>8</sup> This material and ontological hybridity is one of the crucial underlying differences between lens-based and computer-generated representations. The idea of something intangible that is nevertheless capable of being experienced sensually foregrounds the status of the digital, or the digital object, as commodity fetish; one which, through reproduction, Leckey comes to possess, albeit a mere ghostly facsimile.

Upon closer analysis, several clues indicate that Leckey does not only want to communicate and critique how matter becomes transcendent through commodification or indeed, that matter might be transcended through digitisation; this image-object is yet more ambiguous. The first such clue is the artist's decision to display *Made In 'Eaven* not as a digital file but using antiquated technology. The work is most commonly projected as a 16 mm film or shown on an angular, black, cube monitor—that seemingly universal display method indicating that what the audience is experiencing is video art. In both instances, the original CG animation must undergo a process of translation from digital code to analogue storage—light sensitive film strip or magnetic tape—a process that constitutes additional labour and

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<sup>7</sup> Bill Maurer, 'That Touch of Money' in *Being Material*, ed. by Marie-Pier Boucher and others (MIT Press, 2019), pp. 112-118, (p. 118).

<sup>8</sup> 'The Double Negative » Mark Leckey'.

material cost since the original file is readily playable in its ‘native’ digital format. In the essay ‘Video: The Aesthetics of Narcissism’, written in 1976 and thus before the popularisation of digital technology, Rosalind Krauss states that it seems, ‘inappropriate to speak of a physical medium in relation to video. For the object (the electronic equipment and its capabilities) has become merely an appurtenance’.<sup>9</sup> The use of 16 mm film to display *Made In ‘Eaven* could indeed be read as stylistic affectation but it also serves to illuminate the ways in which the advent of digital media has rapidly accelerated the loss of medium specificity that Krauss foresaw. As such, by making the animation specific to filmstrip or VHS tape, Leckey highlights the medium non-specificity of digital media. ‘Video’s real medium’, writes Krauss, ‘is a psychological situation, the very terms of which are to withdraw attention away from an external object—an Other—and invest it in the Self’.<sup>10</sup> Perhaps unaware of just how pertinent this statement would later become in the internet era—a time where globally networked technologies of personalisation and surveillance increasingly rotate 180° to face the user—Krauss points out the ways in which digital devices have come to be welcomed and are now inextricably bound to the intimate personal sphere. Linda Norden’s comments on artist Jordan Wolfson are here relevant: ‘Wolfson approximates the peculiarly reflective critical space of a generation increasingly defined by the conflation of digital screen and mirror – a mirror that floods, or overwhelms, an anxious echo that talks back in an endless assault of options’.<sup>11</sup> The more we use digital tools, the more we share, the more we become intertwined with them as we encode parts of our being; flesh and thought into pixels, information, data. The final moments of *Made In ‘Eaven*, when the virtual camera zooms so far into the surface that the boundaries of the sculpture disappear—‘a process of bracketing out the object’<sup>12</sup>—hint that, just as *Rabbit* dissolves into technology, so too might we.

The transferral of the original CG loop to an analogue medium also leads to a second phenomenon: the introduction of a textural ‘warmth’ or grain to the image that is at odds with the cold precision sometimes attributed to digital image media. This generates what Laura Marks has dubbed ‘haptic visuality’, a quality of moving image that evokes tactility and a sense of materiality:

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<sup>9</sup> Krauss, p. 57.

<sup>10</sup> Ibid.

<sup>11</sup> Linda Norden, ‘Jordan Wolfson’, *Chisenhale Gallery* <<https://chisenhale.org.uk/exhibition/jordan-wolfson/>> [accessed 12 June 2018].

<sup>12</sup> Krauss, p. 57.

The main sources of haptic visuality in video include the constitution of the image from a signal, video's low contrast ratio, the possibilities of electronic and digital manipulation, and video decay.<sup>13</sup>

To combine these different images qualities is to mix pixel and grain, bit and atom, and the different temporalities of each. This is a gesture which invokes the *immortal* qualities of the image or idea on the one hand and the *mortal* nature of the object or thing in the world on the other; the physical film strip or video tape that will eventually decay, taking the image with it, and the seemingly ephemeral yet endless reproducibility of the digital.

Leckey's intentions are further unveiled in the way the work is installed. Now positioned within the gallery on a white plinth—one which mirrors that upon which the simulated rabbit sits in the video—the film projector or television is physically and metaphorically elevated. No longer simply a means by which to view the work, display technology itself becomes objet d'art. As Melissa Gronlund writes, this means of displaying the work, 'phenomenologically ramps up its physicality rather than hiding it'.<sup>14</sup> *Industrial Light & Magic*, the title of the exhibition for which Leckey was nominated for the Turner Prize in 2008, one that featured *Made In 'Eaven* alongside other works, is lifted from the visual effects company of the same name founded in 1975 by George Lucas. ILM was first conceived as a way for the film production company *Lucasfilm* to produce innovative visual effects for the first Star Wars film. As such, the title suggests not only Leckey's interest in popular cultural forms but in the magic of illusion, the 'industrial' scale upon which such productions are undertaken and, once more, the 'mystical character of commodities'.<sup>15</sup> To foreground apparatus from pre-digital times whilst working with 3D CGI is to evoke early ideas relating to the magic of cinema and the illusionistic power of digital animation. As a global industry, 3D CGI is one which trades in notions of magic, a reality demonstrated not only in the spectacular products of Hollywood but in the names of popular 3D visualisation software themselves; Maya, Cinema4D, Houdini, Sculptris and Blender each conjuring associations of sorcery and the inception of worlds. As artist Baruch Gottlieb writes: 'The kaleidoscopic of contemporary culture seems to indicate a return to pre-literate "magical thinking" but it is in fact a product of highly literate scientific, technical literacy'.<sup>16</sup>

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<sup>13</sup> Laura U. Marks, *Touch: Sensuous Theory And Multisensory Media* (Minneapolis, Minnesota: University Of Minnesota Press, 2002), p. 13.

<sup>14</sup> Melissa Gronlund, *Contemporary Art and Digital Culture* (London ; New York: Routledge, 2016), p. 128.

<sup>15</sup> Marx and Engels, p. 82.

<sup>16</sup> Baruch Gottlieb, 'Baruch Gottlieb | Flusser Studies' <<http://www.flusserstudies.net/person/baruch-gottlieb>> [accessed 3 February 2020].

Ultimately, through this particular combination of image production techniques and modes of display—tactics which serve to defamiliarize an image regime intimately tied to a highly commercial entertainment industry—Leckey appears intent on reintroducing a materiality, and thus a fallibility, to the image, one that stands in direct opposition to the claim of sublimity made by both the original sculpture and digital facsimile: ‘works that use low and obsolete electronic technologies may be considered an act of corporate refusal and an insistence on the materiality of the medium’.<sup>17</sup>

This idea is underlined through the idiosyncratic title of the work, one borrowed from a second Koons’ work, *Made In Heaven*, from 1989. A photo series featuring the artist and his then wife, Ilona Staller, posing in a kitsch, pastel coloured studio, Koons claimed the work to be a comment on the relationship between art, popular culture and sexuality. By removing the aspirant H to use a non-standard orthographic spelling of heaven, Leckey indicates his own regional accent, one that is often stereotypically used to denote the uneducated and the working classes. By doing so, the artist gently satirises the work from which the name is borrowed and, crucially, grounds both works, thereby bringing them *down to earth*. Thus, one of the central messages of the work is exposed, or, in other words, the veil is lifted from this particular social hieroglyphic; Leckey is asserting that neither Koons’ original sculpture nor his 3D CGI rendering are in fact, made in heaven, a place or a status that, ‘transports the human state of ignorance, embodiment and finitude to one of immateriality and immortality’.<sup>18</sup> Otherwise said, neither *the ultimate capitalist object* nor a product of what Donna Haraway famously labelled the ‘light’ and ‘clean’<sup>19</sup> machines of post-modernity are transcendental. Rather, both are exposed as products of interconnected flows of capital, technology, resources, matter, labour and bodies, each subject to political agenda, corporate motivation and complex social relations: messy, mortal, material and very much made on earth. A such, I argue that the work is a manifestation of what Laura Marks succinctly describes in the conclusion to *Touch: Sensuous Theory and Multisensory Media*:

More profound, and underlining the basic mistake of capitalism as well, is the belief that “virtual” value can be created independently of the material world. The transcendental discourse around digital media is based on a desire for immortality that comes only at the expense of severing ties with the material world [...]. Life is analog.

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<sup>17</sup> Marks, p. 181.

<sup>18</sup> Robert M. Geraci, *Apocalyptic AI: Visions of Heaven in Robotics, Artificial Intelligence, and Virtual Reality* (Oxford University Press, 2012), p. 139.

<sup>19</sup> Donna Haraway, ‘A Manifesto for Cyborgs: Science, Technology, and Socialist Feminism in the 1980s’ in *Feminist Social Thought: A Reader*, ed. by Diana Tietjens Meyers (London: Routledge, 2014), pp. 502-531, (p. 506).

The abstraction of communication into information is an attempt to hold mortality at bay, but it takes place at the expense of our own dematerialization.<sup>20</sup>

Leckey exploits the unique sensual appeal of 3D CGI and its commercial and pop cultural associations to stage digital technology as a question—the question—of our times. In this way, *Made In 'Eaven* can be considered a form of what Krzysztof Ziarek has labelled poietic techne. Following Heidegger's distinction between two types of techne—ones that are technical and operate on the principle of manipulation and domination and ones that are poietic and rather manipulate artistic materials in a manner that *undoes* power and manipulation—Ziarek claims that the distinction between art that uses digital technologies and everything else lies in how they are technical:

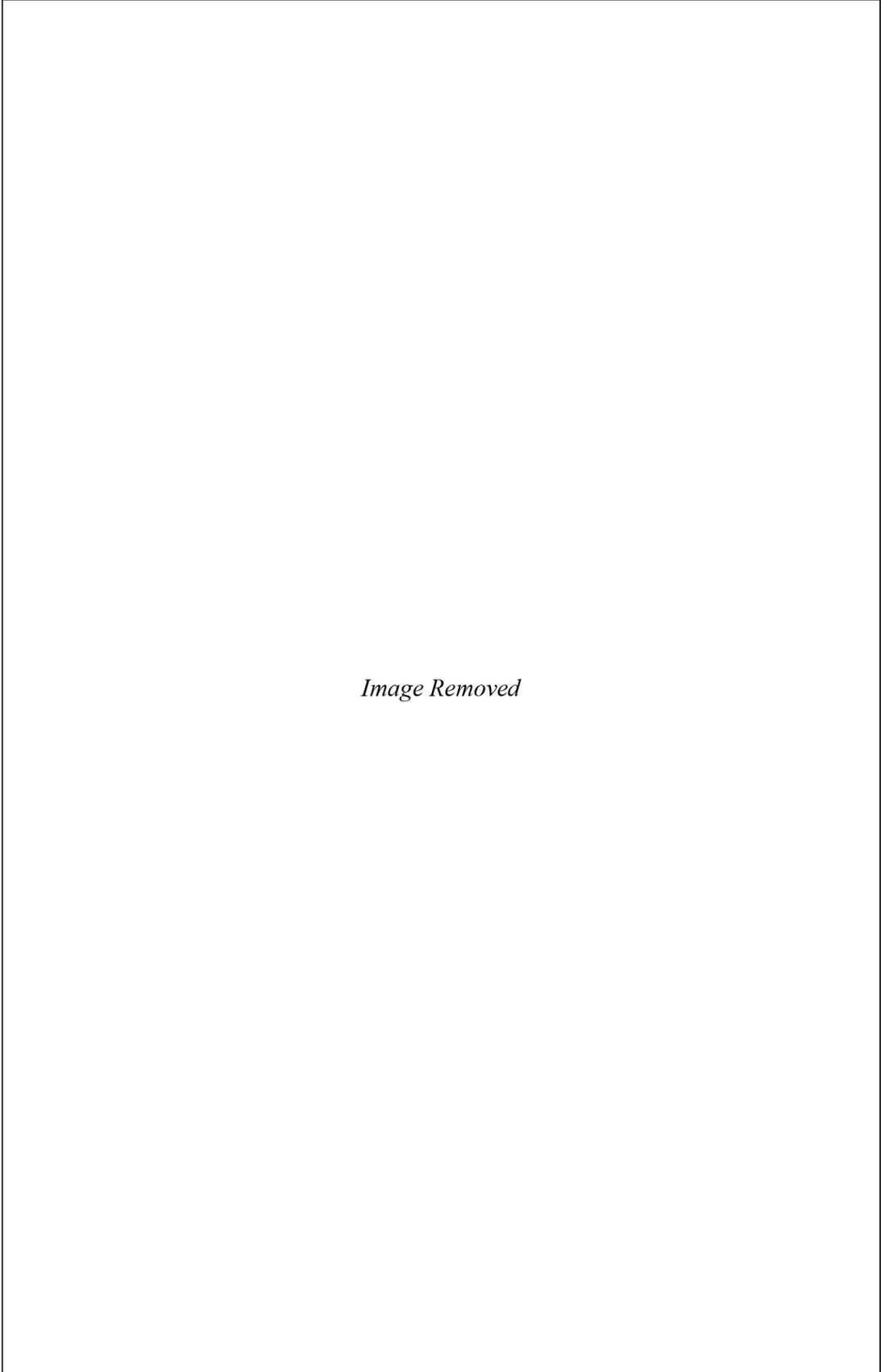
Technology, including the different technologies which contemporary art employs, is, in its essence, predicated on the idea of manipulation. In the information age, this principle implies that everything is determined in terms of its availability as information: what exists is seen as translatable into information, and thus as intrinsically predisposed to being stored, manipulated and processed as data. Art, by contrast, uses the same techniques to base its existence in the technological world but shapes them differently, specifically in a way that undoes the manipulative momentum of power.<sup>21</sup>

What is at stake in *Made In 'Eaven*—and, as I argue throughout this thesis, certain artworks conceived with and through 3D CGI—is the ability to wield digital technology in such a way as to undo the 'manipulative momentum' of technocapitalism, to invite a different gaze on both physical and digital worlds and to tell a story that complicates, enlivens and draws out these connections.

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<sup>20</sup> Marks, p. 178.

<sup>21</sup> Krzysztof Ziarek, 'The Work of Art In The Age of Its Electronic Mutability', in *Walter Benjamin and History*, ed. by Andrew Benjamin (London: Continuum, 2005), pp. 209-225 (p.217).



*Image Removed*

Figure 2. Two alternative modes of display for the *Made In 'Eaven*, 2004, Mark Leckey. Left: Shown on a cube monitor at Schloss Dyck, Germany, 2010. Right: A 35mm film projection of the animation at the Turner Prize exhibition, 2008.

## A Very Short History of the Development of 3D CGI and the Rise of the Computer in Art

While this thesis is neither a history of the emergence of 3D computer graphics<sup>22</sup> nor a comprehensive story of the rise of the computer in art,<sup>23</sup> aspects of these histories are useful in that they illuminate certain developments in, and attitudes towards, digital technologies—across society and in the art world—ones which continue to inform current applications.

According to image scholar W.J.T. Mitchell, 3D CGI, unfolding out of a more general field designated computer graphics (CG) and computer visualisation techniques, is a type of biocybernetic reproduction belonging to a present defined by image, spectacle, surveillance, and visual display:

If mechanical reproducibility (photography, cinema, and associated industrial processes like the assembly line) dominated the era of modernism, biocybernetic reproduction (high-speed computing, video, digital imaging, virtual reality, the internet, and the industrialization of genetic engineering) dominates the age that we have called ‘postmodern.’<sup>24</sup>

Today, the terms computer visuals, computer imagery, computer animation, digital animation and computer-generated imagery are often used interchangeably. Lev Manovich argues that, despite the mutability of terminology used amongst the ‘professional production milieu’,<sup>25</sup> all such terms are invariably understood as referring to 3D graphics and not other imaging technologies, such as digital photography. Moreover, this language, ‘reflects an implicit understanding that 3D graphics is a new medium unique to a computer’.<sup>26</sup> Indeed, it can be argued that the emergence and development of 3D CGI over the latter half of the 20<sup>th</sup> century has generated a new image paradigm and with it, a shift in visual culture, one which ‘takes the new born-digital media which was invented in the 1960s and matured by the early

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<sup>22</sup> For comprehensive histories of the development of 3D CGI/computer animation see: Michael Betancourt, *The History of Motion Graphics* (Wildside Press, 2013); Christopher Finch, *The CG Story: Computer-Generated Animation and Special Effects* (New York: The Monacelli Press, 2013); Tom Sito, *Moving Innovation: A History of Computer Animation / Tom Sito* (Cambridge, Mass. [u.a.]: Cambridge, Massua : MIT Press, 2013).

<sup>23</sup> Three volumes tracing these histories include: *New Media in the White Cube and beyond: Curatorial Models for Digital Art*, ed. by Christiane Paul (Berkeley: University of California Press, 2008); Christiane Paul, *A Companion to Digital Art* (John Wiley & Sons, 2016); *Mainframe Experimentalism: Early Computing and the Foundations of the Digital Arts*, ed. by Hannah Higgins (Berkeley: University of California Press, 2012).

<sup>24</sup> William J. Mitchell, *What Do Pictures Want?: The Lives and Loves of Images* (University of Chicago Press, 2013), p. 318.

<sup>25</sup> Lev Manovich, *Software Takes Command* (New York ; London: Bloomsbury Academic, 2013), p. 290.

<sup>26</sup> *Ibid.*

1990s—interactive 3D computer graphics and animation—and transforms it into a general platform for moving media design'.<sup>27</sup> In *Software Takes Command*, Manovich writes that, 'the new media of 3D computer animation has "eaten up" the dominant media of the industrial age—lens based photo, film and video recording'.<sup>28</sup> As such, 3D CGI is neither an expansion of lens-based technologies nor 'an extension of architectural drafting, projection geometry, or set making', but a new medium, one characterised by an ability to, 'represent a three-dimensional structure of the world' and with it, the capacity to manipulate it 'using various tools with ease and precision'.<sup>29</sup>

The 3D visualisation software of today is rooted, alongside various technological innovations that appeared contemporaneously to it, in Ivan Sutherland's 1963 *Sketchpad* system. Developed whilst a PhD student at MIT, *Sketchpad* was a software program that pioneered use of human-computer interaction and a graphical user interface yet consisted of little more than lines and dots drawn on cathode-ray tube screens. Andrew Darley points out that the motivations behind developing computers and software which could visualise processes, events and states came from engineers and computer scientists working in corporate, military, medical and academic research environments. Crucially, Darley suggests that the development of early computer graphics was motivated not by artistic concerns but ones functional, scientific and financial:

Many of the digital technologies and techniques underpinning current forms of visual digital culture were first developed in relation to research goals and technical problems that were constructed in ways which had little to do with aesthetic applications.<sup>30</sup>

Manovich confirms this viewpoint, claiming the development of computer-aided design and manufacturing techniques (CAD/CAM) and their use in 3D animation were largely 'determined by the needs of the early sponsors of this research – the Pentagon and Hollywood'.<sup>31</sup> As such, the rise of 3D CGI as a mode of creative expression is analogous to that of film; as Erwin Panofsky once famously wrote in a discussion of the rise of film as artistic medium: 'It was not an artistic urge that gave rise to the discovery and gradual

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<sup>27</sup> Manovich, *Software Takes Command*, p. 290.

<sup>28</sup> Manovich, *Software Takes Command*, p. 294.

<sup>29</sup> Ibid.

<sup>30</sup> Andrew Darley, *Visual Digital Culture: Surface Play and Spectacle in New Media Genres* (Routledge, 2002), p. 12.

<sup>31</sup> Lev Manovich, *The Language of New Media* (Cambridge, Massachusetts: MIT Press, 2002), p. 193.

perfection of a new technique; it was a technical invention that gave rise to the discovery and gradual perfection of a new art'.<sup>32</sup>

Technical innovation in the field of computer graphics is still dominated by the *Association for Computing Machinery* (ACM) and presented at their *Special Interest Group on Graphics and Interactive Techniques* (SIGGRAPH; an annual conference on computer graphics since 1974). A centralised research body, SIGGRAPH offers research awards based more on the technical innovation of hardware and software and less on the development of a critical discourse around these technologies.

Concurrent to the development of computer technologies in research labs sponsored by governments and corporations throughout the 1960s,<sup>33</sup> were broader movements which focussed on, 'increased conjecture as to the nature of such technology and the promise it held for the future of society'.<sup>34</sup> Interest into the artistic potential of computing meant that technicality gave way to considerations pertaining to the aesthetic, moral and social shifts heralded by these new technologies. Artistic initiatives were established which attempted to incorporate and discuss digital technologies in critical ways, groups such as *New Tendencies* (1961-1973) and *Experiments in Art and Technology* (E.A.T., since 1967). Thus, with a sense of social responsibility not emphasised by organisations such as SIGGRAPH, artists began mounting exhibitions that attempted to encourage critical debate:

The critique of these mainstream IT industries for their lack of critical discourse and social awareness was common among the practitioners with a background in humanities, art, and culture.<sup>35</sup>

The landmark *Cybernetic Serendipity* exhibition held at the ICA in London in 1968 is now considered to be a watershed moment for the adoption of the computer in art. The exhibition brought together three streams of interest relating to the computer as a creative and social tool: the first featured works (images, but also music, animations and texts) generated by computers, the second cybernetic robots and painting machines, and the third explored social uses of computers and the history of cybernetics. We can glean something of the then contemporary attitudes towards art and computers in the introduction of the exhibition catalogue written by curator Jasia Reichardt:

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<sup>32</sup> Erwin Panofsky, 'Style and Medium in the Motion Pictures', in *The Visual Turn: Classical Film Theory and Art History*, ed. by Angela Dalle Vacche, (Rutgers University Press, 2003), pp. 69-74 (p. 69).

<sup>33</sup> Notably, MIT's *Artificial Intelligence Lab* and *Bell Laboratories* in Murray Hill, New Jersey.

<sup>34</sup> Darley, p. 13.

<sup>35</sup> Paul, *A Companion to Digital Art*, p. 50.

Cybernetic Serendipity deals with possibilities rather than achievements, and in this sense it is prematurely optimistic. There are no heroic claims to be made because computers have so far neither revolutionised music, nor art, nor poetry, in the same way that they have revolutionised science.<sup>36</sup>

Reichardt cautiously predicts the revolutionary shift that computers would come to have in art and all forms of social, cultural and political life. As of 2012, Clare Bishop commented that: 'Most art today deploys new technology at one if not most stages of its production, dissemination, and consumption'.<sup>37</sup> So too does Reichardt hint at the so-called democratisation of creative production as a result of the popularisation of computers, writing that 'people who would never have put pencil to paper, or brush to canvas, have started making images, both still and animated, which approximate and look identical to what we call 'art' and put in public galleries'.<sup>38</sup> Though writing at a time when artists still had to build relationships with scientists, learn to write code and often construct their own hardware, Reichardt foretells the user-friendly interfaces, off-the-shelf software packages and consumer-friendly devices of today. Finally, Reichardt also appears to anticipate how the technological optimism of the time would eventually give way to attitudes tempered by the recognition that, for all the freedoms digital technologies offer, they are increasingly intertwined with warfare, economic exploitation and environmental destruction; in short, technocapitalism. In 'Art and Technology: The Panacea that Failed', Jack Burnham reflects with a certain cynicism on the entanglements between technology, artists, the state and corporations:

No doubt, E.A.T.'s greatest success was its ability to extract relatively large sums of money from the National Endowment for the Arts, the New York Arts Council, large corporations, and various patrons of the arts. Technology seemed to be the key to loosening all sorts of purse strings.<sup>39</sup>

Max Kozloff is more cutting still, charging 1960s artists who used such technologies with not hesitating to, 'freeload at the trough of that techno-fascism that had inspired them'. Co-opted by capital, Kozloff claims these artists were nothing but, 'would-be magi, con-men, fledgling technocrats, acting out mad science fiction fantasies'.<sup>40</sup> In partial reaction to these

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<sup>36</sup> Jasia Reichardt and Institute of Contemporary Arts London, *Cybernetic Serendipity: The Computer and the Arts* (London: Studio International, 1968) p. 5.

<sup>37</sup> Claire Bishop, 'Digital Divide: Contemporary Art and New Media' <<https://www.artforum.com/print/201207/digital-divide-contemporary-art-and-new-media-31944>> [accessed 12 June 2018].

<sup>38</sup> Reichardt and Institute of Contemporary Arts London, p.5.

<sup>39</sup> Jack Burnham, 'Art and Technology The Panacea That Failed' <[https://monoskop.org/images/4/4e/Burnham\\_Jack\\_1980\\_Art\\_and\\_Technology\\_The\\_Panacea\\_That\\_Failed.pdf](https://monoskop.org/images/4/4e/Burnham_Jack_1980_Art_and_Technology_The_Panacea_That_Failed.pdf)> [accessed 8 February 2020].

<sup>40</sup> Max Kozloff, 'The Multimillion Dollar Art Boondoggle', *Artforum*, October 1971, pp. 72-76 (p. 74).

new associations and indeed to the increasing commercialisation of art and life, at the same time digital graphics were being developed in the computer science labs in the 1960s, there came conceptual art, a movement which turned towards ephemerality, experience, software and systems of information as a way of thinking. In *Six Years: The Dematerialization of the Art Object from 1966 to 1972*, Lucy Lippard talks of the desire to shun the medium-specificity of modernism and to critique the idea of art as commodity, writing instead that ‘the idea was paramount and the material form is secondary, lightweight, ephemeral, cheap, unpretentious and/or dematerialized’, evident in the use of reproducible mediums such as ‘video, performance, photography, narrative, text, actions’.<sup>41</sup>

Reflecting on the early development of computer graphics and their emergence in art, we can better recognise how both commercial enterprises and artists position themselves in relationship to technology and the constant tension between the two.

### **3D CGI Today**

3D computer-generated imagery is today ubiquitous, entering the contemporary media milieu in a variety of guises. In advertising, 3D CGI presents itself as a way to vision and animate all manner of consumer products; clothing, gadgets, toys, food, drinks and cars are rendered glossy and from multiple angles through 3D rendering, a technique that is often more cost effective and malleable than attempting the same with lens-based capture. 3D CGI offers designers the chance to experiment with volume and form, allowing objects to be accurately illuminated and drafted during the prototyping phase and, as I discuss in detail in Chapter 3, it allows architects to share highly detailed visualisations of speculative structures with clients and shareholders. In the medical professions, computer animation can be used to picture microscopic interactions happening inside the body, whilst urbanists use it to model physical interactions between notional crowds in busy city spaces. So too is 3D CGI used in archaeology to vision tangible images of past settlements and artefacts based on their crumbling remains and for physicists it can be used to visualise outer space events invisible to the naked eye. Of course, the most prominent use of 3D CGI is in the entertainment industries: film, video gaming and pornography. Ever since Pixar’s *Toy Story* of 1995, the first feature-length computer generated film, the visual language of CGI has been indivisible from commercial spectacle. As Patrick Crogan points out:

One does not need to be an industry practitioner or a digital vfx researcher to see ample evidence of the extent to which the mainstream cinema image is both subject to

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<sup>41</sup> Lucy R. Lippard, *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (Berkeley: University of California Press, 1997) p. vii.

the product of digital processes of image generation, manipulation and filtering, and spatial and temporal (re)composition.<sup>42</sup>

To consider these instances, however briefly, is to recognise that 3D CGI, in the service of commerce and mass entertainment, is a highly capitalised visual form that has the power to thrill and manipulate audiences. Moreover, what further unites many of these examples beyond shared technical origins and global production and distribution networks, is that they adhere to a dominant aesthetic of photorealism. As Patrick Power writes: ‘Realism and naturalism, ideas of art as an imitation of reality, are currently the primary ethos of 3D animation culture and technology’.<sup>43</sup> In these industries, higher production value equates to high the resolution, a phenomenon that Hito Steyerl dubs the ‘fetish value of high-resolution’.<sup>44</sup> Photorealism and resolution are directly linked to available material resources; the labouring bodies, raw materials and computer power which they require, all put into motion by capital. Thus, the material basis of the *best* computer-generated imagery is hidden amongst the pixels of the final product or, to coin a phrase, depth is hidden on the surface. These systematic links ensure the connection between commerce and CGI, and speak of a new reality, one cultivated within the context of digital screen media.

### **(Hyper)realism and (Im)materiality**

To create and perceive three-dimensional computer-generated imagery is to cause a variety of—sometimes conflicting—sensual and imaginary responses in the mind of the computer operator / viewer. The illusion of three-dimensional objects located within a Cartesian space that is *other*, ones formed and animated algorithmically, often implies the weight and mass of physical matter and the ‘real world’ properties and behaviours we know it to possess. The refinement and commercialisation (often framed as a democratisation) of soft- and hardware, the increasing application of automated processes to replace once laborious animation techniques and the current ubiquity of powerful microchip technology, means that, borne out of the computer, emerge image-scapes of worlds—both inner and outer—which show an unprecedented level of detail. One might say that the illusion of life conjured by these images is now so persuasive that representation (image) and substance (object) are effectively

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<sup>42</sup> Patrick Crogan, ‘San Andreas and the Spiralling of the Analogico–Digital Animated Image’, *Animation*, 12.3 (2017), pp. 334–49 (p. 340) <<https://doi.org/10.1177/1746847717729595>>.

<sup>43</sup> Pat Power, ‘Animated Expressions: Expressive Style in 3D Computer Graphic Narrative Animation’, *Animation*, 4.2 (2009), pp.107–29 (p. 108) <<https://doi.org/10.1177/1746847709104643>>.

<sup>44</sup> Hito Steyerl, ‘In Defense of the Poor Image - Journal #10 November 2009 - e-Flux’ <<https://www.e-flux.com/journal/10/61362/in-defense-of-the-poor-image/>> [accessed 4 December 2020].

bound. Akin to a map at a 1:1 scale with the territory it describes, image is reality. As media theorist Vilém Flusser once wrote, ‘Where we can have no immediate experience, it is the media themselves which are the things for us’.<sup>45</sup>

As intangible visualisations of matter, computer-generated images are visible, sensory artefacts generated by lines of code and pre-scripted algorithms, all powered by the computer’s GPU (Graphics Processing Unit). In this way, CGI can be understood as an embodiment of a dialectical state of materiality and immateriality, a duality that is inherent to and constantly performed by the processes and products of digital technologies more generally. The intrinsic utopian potential that lies in the ability to produce complex moving images entirely within 3D software without requiring any direct material referent within the world is an unprecedented development in the history of visual culture. Beyond their capacity to simulate the stuff of life that is readily perceivable—the earth, the biological and artificial artefacts that spread out across it and the waste generated by processes of consumption and production—CGI also allows for the visualisation of things that, due to modern science, we know to exist but are not directly perceivable as such. 3D CGI visions the undetectable on an anthropocentric scale, all the way from the micro—red blood cells pumping through an artery—to the macro—dust clouds swirling on some faraway planet. As one particular example, Pasi Väliäho highlights the application of CGI in fMRI (functional magnetic resonance imaging), a technique used to visually represent the brain:

Thus, we find ourselves within a realm of computer-generated animations produced to give a visible appearance to something that falls outside the realm of visibility. And the epistemological weight assigned to these animations rests of a series of inferences, from the brain’s chemistry to neural activity, from neural activity to mental events, from the experimental laboratory to the world outside, and so on.<sup>46</sup>

The idea of materiality that lies beyond the threshold of human perception was one of the key concepts informing the exhibition *Les Immaterieux*; curated by Jean-François Lyotard and Thierry Chaput and held at the Centre Pompidou in 1985, it is now considered pivotal in the story of where art and digital technology meet. In the following extract from the curatorial rationale, Lyotard theorises the inseparability of *content* and *container*, the relationship between matter and digital processes, and the importance of scale:

The term ‘immaterials’ has been chosen for two reasons:

- the message cannot be disassociated from the support (material), and the code itself is inscribed into the support as an orderly distribution of the discrete elements (grains)

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<sup>45</sup> Vilém Flusser, *Writings* (University of Minnesota Press, 2002), p. 27.

<sup>46</sup> Pasi Väliäho, *Biopolitical Screens: Image, Power, and the Neoliberal Brain* (MIT Press, 2014), p. 23.

which constitute the material (electronic waves, sound waves, light waves, elementary particles and their differential features etc.). The material disappears as an independent entity. The principle on which the operational structure is based is not that of a stable ‘substance’, but that of an unstable ensemble of interactions. The model of language replaces the model of matter.

- the scale on which the structure is operational in contemporary techno science and artistic experimentation is no longer a human one.<sup>47</sup>

An investigation of scale in relation to technical apparatus also preoccupies Flusser, who writes of ‘apparatuses that, on the one hand, assume gigantic size, threatening to disappear from our field of vision (like the apparatus of management), and, on the other, shrivel up, becoming microscopic in size so as to totally escape our grasp (like the chips in electronic apparatuses)’.<sup>48</sup> Thus, the ability of 3D CGI to vision the micro and the macro at human-scale is a gesture that both stabilises and shocks perception; the world untethered from the senses through knowledge of modern science is brought, highly mediated, into the realm of visibility.

In making thought visible, sharable and of a manner, real, so too does digital animation have the ability to project the imagination, here understood as ‘the faculty of reviving or especially creating images in the mind’s eye’.<sup>49</sup> CGI allows for the projection of internal, dreamlike, mental images—visions of the fantastical and horrific, of fictional pasts and hypothetical futures—and thus gives shape and form to what is typically nebulous, hidden and subjective. In this way, 3D CGI is closer to traditional forms of animation—and to a lesser extent ‘static’ mediums such as drawing and painting—than it is to photography. Like digital animation, these mediums are similarly plasmatic in nature and thus capable of depicting realities unshackled from the realm of the physically possible. By allowing for both thought and substance to defy the usual constraints of time and space, CGI can be said to contain the future possible, or, as Esther Leslie and Joel McKim write: ‘Digital animation allows for future worlds or alternative versions of this world to be both envisioned and argued for’.<sup>50</sup>

Computer animation shares a further quality with the human imagination in that it facilitates ‘the ability to create and rehearse possible situations, to combine knowledge in unusual ways, or to invent thought experiments’.<sup>51</sup> According to Katherine Hayles, simulation

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<sup>47</sup> Jean-François Lyotard, ‘Les Immatériaux’ [April 1985], in *Thinking About Exhibitions*, eds. Reesa Greenberg, Bruce W. Ferguson and Sandy Nairne (London: Routledge, 1996), pp. 159-173 (p. 164).

<sup>48</sup> Vilém Flusser, *Towards a Philosophy of Photography* (Reaktion Books, 2013), p. 21.

<sup>49</sup> ‘Imagination - Oxford Reference’ <<https://doi.org/10.1093/oi/authority.20110810105125503>>.

<sup>50</sup> Esther Leslie and Joel McKim, ‘Life Remade: Critical Animation in the Digital Age’, *Animation*, 12.3 (2017), 207–13 (p. 211) <<https://doi.org/10.1177/1746847717740841>>.

<sup>51</sup> ‘Imagination - Oxford Reference’.

is a necessary function of thought. Through simulation, humanity is able ‘to grasp abstract concepts’, indicating an intimate relationship between mind and matter. ‘Thinking is deeply entwined with the recall and re-enactment of bodily states and actions,’<sup>52</sup> writes Hayles, implying a cyclical relationship between the virtual or cognitive and the material, each shaping and facilitating the other in turn.

The unique qualities of 3D CGI, its ability to generate powerful, affective responses in the viewer, ensure that it is a valuable visual medium for commercial enterprises; multi-billion-dollar concerns such as the entertainment industries of Hollywood and gaming, advertising and social media, in which permutations of art and programming are interwoven with transnational production networks serving global audiences. As artist Ed Atkins wryly comments in reference to Snapchat’s widely shared anthropomorphic ‘hotdog meme’ of 2017: ‘CGI is a tool as any other, and the utopic promise of dreams manifested is instead used by corporations to draw cell-shaded hotdogs which dance to mock us’.<sup>53</sup> Here, like so much CGI content, the intangible pixels which dance across the screen are rendered impotent in the face of consumer culture and, both literally and figuratively, take up the definition of immaterial as being irrelevant and inconsequential. Echoing the cynicism voiced by Burnham writing after the technological optimism of the 1960s had soured, Melissa Gronlund suggests that the close ties between ‘immaterial’ forms of cultural production, such as CGI, and technological capitalism continue to generate a persistent anxiety about the erosion of art as a route to enlightenment through the imposition of commerce and the technologies associated with it:

The pushback against immateriality is also influenced by the perceived close connection [...] between immateriality and capitalist or neoliberal economic policies. Indeed, “immateriality” comes to stand in for a host of conditions, from the service economy to immaterial labour to finance capitalism.<sup>54</sup>

Ultimately, the 3D computer-generated images that artists produce, manipulate and edit, like all other contemporary surface media, emerge as a result of the victory of consumer society. The stakes of employing 3D CGI as mode of artistic expression therefore lie in how, if at all, these underlying realities can be utilised in such a way as to diverge from prescribed and prescribed paths.

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<sup>52</sup> Katherine N. Hayles, *Unthought: The Power of the Cognitive Nonconscious* (University of Chicago Press, 2017), pp. 48–49.

<sup>53</sup> Press Release Martin-Gropius-Bau, ‘Ed Atkins, Old Food, 2017’ <[https://www.artefakt-berlin.de/fileadmin/files/archiv/Immersion2017/pdfs\\_EN/Pressemappe\\_Ed\\_Atkins\\_Old\\_Food\\_Englisch\\_27.09.2017.pdf](https://www.artefakt-berlin.de/fileadmin/files/archiv/Immersion2017/pdfs_EN/Pressemappe_Ed_Atkins_Old_Food_Englisch_27.09.2017.pdf)> [accessed 1 February 2020].

<sup>54</sup> Gronlund, p. 107.

## A Note on Curatorial Labels

In 'International Networks of Early Digital Arts', Darko Fritz points out that throughout their history, digital arts and other forms of media art have not been consistently represented or developed in the same way that more dominant streams of modern and contemporary art have.<sup>55</sup> This view is shared by Claire Bishop who, in the essay 'The Digital Divide', writes of the disavowal of the digital by the art world, asking: 'While many artists use digital technology, how many really confront the question of what it means to think, see, and filter affect through the digital? How many thematize this, or reflect deeply on how we experience, and are altered by, the digitization of our existence?'<sup>56</sup> Historically, this lag might have been located in the fact that digital tools were only at the disposal of only the most well-funded and profit-generating industries—government research, the military and mainstream entertainment—and the slowness of the gallery machine to change as rapidly as the world. However, as we have already seen, digital tools have been widely available since the 1980s and so we might rather pinpoint the tendency of the art world to 'disavow' the digital more accurately in the fact that it is still largely sustained by the trade and ownership of matter, in other words, 'visual art's ongoing double attachment to intellectual property and physicality'.<sup>57</sup> Burnham echoes these thoughts, contextualising them within a much longer history of the antagonism between art and technology:

With the rash of "Tek-Art" adventures during the 1960s, substantial numbers of artists and critics feared that electronics might soon overwhelm the prestige of the traditional art media as found in painting and sculpture. At the time, the spectre of an engineer controlled art world seemed a bit too imminent for comfort.<sup>58</sup>

Recently, the label 'post-internet' or 'post-digital' has been used to describe the work of certain artists who use CGI and related technologies. Interestingly, Richard Grayson writes how, 'Post-internet art is the first internet and computer-related practice to be supported by an international network of commercial galleries'.<sup>59</sup> These curatorial labels partially articulate a shift from marginal to mainstream as they highlight how the prevalence of digital tools—in life and art—is no longer remarkable or noteworthy since, 'the revolutionary period of the digital

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<sup>55</sup> Darko Fritz 'International Networks of New Media Arts', in Paul, *A Companion to Digital Art*, pp. 46-68.

<sup>56</sup> Bishop.

<sup>57</sup> Bishop.

<sup>58</sup> Burnham, 'Art and Technology The Panacea That Failed'.

<sup>59</sup> 'Art Monthly : Article : Talkin' 'bout Their g-g-g-Generation – Richard Grayson on the Ends of Post-Internet Art' <<https://www.artmonthly.co.uk/magazine/site/article/talkin-bout-their-g-g-g-generation-by-richard-grayson-september-2015>> [accessed 12 June 2018].

information age has surely passed. The tendrils of digital technology have in some way touched everyone'.<sup>60</sup> Post-digital does not then refer to a period *after* digital but to a mode of maintaining, 'a temporal and critical distance from the digital, while remaining partly defined by it'.<sup>61</sup>

Thus, whereas Fritz suggests that the trend of underrepresentation for digital arts continues up until the present, I argue that in recent years there has been a shift away from separate categorisations of art produced and displayed using digital tools and an adoption of these works and artists into the mainstream. As such, throughout this thesis I refer to the artists who use 3D CGI tools in their work simply as contemporary artists. Though not an unproblematic label in itself, since, as Peter Osborne writes, 'to claim something is contemporary is to make a claim for its significance in participating in the actuality of the present – a claim over and against that of other things, some of which themselves may make a similar claim on contemporaneity',<sup>62</sup> my main motivation is to assert how artwork that utilises 3D CGI does not stand apart from other, older or more traditional art forms. Existing within the same physical, social, economic networks, digital technology and art are now indivisible.

### **This is Not Just CGI**

As both a medium of artistic expression and as a way of conceptualising our digitally mediated present, since the early 2000s, 3D CGI has become part of the practices of numerous contemporary artists. Artists such as Ed Atkins, Kate Cooper, Cao Fei, John Gerrard, Lawrence Lek, Jon Rafman and Jacolby Satterwhite are known almost exclusively for presenting computer animations within larger, audio-visual installations. Others, including Andreas Angelidakis, Matt Collishaw, Aleksandra Domanovic, Pierre Huygue and Helen Marten, are more typically known as sculptors or makers of objects and spatial installations. It would appear that these artists have found in the experimental, three-dimensionality of CG modelling and animation a new way to apply sculptural thinking. Other artists still employ 3D CGI alongside a whole host of other digital image-making, processing and production techniques. Green-screen technology, live-action footage and a variety of digital image sources and qualities push up against 3D computer-generated artefacts in the moving image works of Larry Achiampong and David Blandy, Cecile.B.Evans, Sidsel Meineche Hansen, Melanie

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<sup>60</sup> Kim Cascone, 'The Aesthetics of Failure'

<[http://subsol.c3.hu/subsol\\_2/contributors3/casconetext.html](http://subsol.c3.hu/subsol_2/contributors3/casconetext.html)>; [accessed 10 June 2018]

<sup>61</sup> Ryan Bishop and Kristoffer Gansing, *Across & beyond - A Transmediale Reader on Post-Digital Practices, Concepts, and Institutions* (Berlin: Sternberg Press, 2017), p. 6.

<sup>62</sup> Peter Osborne, *Anywhere or Not at All: The Philosophy of Contemporary Art* (London ; New York: Verso Books, 2013), p. 6.

Jackson, Mark Leckey, Sondra Perry, Hito Steyerl and Jordan Wolfson. Here, the addition of objects, hardware and sculptural elements become a way to physically stage these moving image works; a tactic I similarly employ in my own artistic practice, this is a mode of presentation which serves to emphasise connections between space and artefact, screen and body. Victor Burgin, Harun Farocki and Rehana Zaman draw rather on their existing filmmaking and photography practices, expanding these through use of 3D CGI. Indeed, one of Farocki's last works, the series *Parallel I-V* made between 2012 and 2014, traces the emergence of CGI, conceptualising it as a visual medium. Finally, existing somewhere on the boundary between science, art and activism, the interdisciplinary research group Forensic Architecture use 3D CGI in combination with many other digital tools to investigate and present human rights abuses through various exhibition formats. This list is not exhaustive, nor does it make any claims for the significance of the works produced; what it does show is the breadth and malleability of CGI, its ability to assume all manner of forms and to transmit multiple meanings. Furthermore, it demonstrates how art produced using digital tools like 3D CGI, ones that question 'res digitalis', can be said to have arrived in the mainstream art world.

In the article 'Seven Notes on the Immaterial', Nicolas Bourriaud makes the salient point that, 'whatever happens in it, a movie is a documentary on the conditions of its own shooting, a discourse whose primary purpose is to record'.<sup>63</sup> So too are computer-generated images and animations a *record* of the changing material conditions of the present. In this way, artworks produced using 3D CGI and the equipment they are shown on, regardless of their content, inevitably tell us something of the political, social, cultural and technical conditions of our particular moment, an idea echoed by Victor Burgin:

[...] my turn to photography in the 1960s was motivated largely by my wish to develop an art practice that was in dialogue with the dominant representational forms of its time. [...] It is this same wish to engage with the actually existing contemporary image-environment that has led me out of industrial photography – cameras of metal and glass – into working with virtual cameras in the computer-generated space of 3D modelling programmes.<sup>64</sup>

Beyond technical crossovers, I identify several shared concerns preoccupying the artists listed, concerns which, as I argue throughout this thesis, currently find themselves most imaginatively expressed using 3D CGI and its staging through various exhibitory formats. Firstly, many of these artists utilise the complex networks of digital hardware and software embedded into our daily lives, those upon which CGI production also relies, in order to

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<sup>63</sup> Nicolas Bourriaud, *Parkett no. 71: (Im)material?* (Zürich: Parkett-Verlag, 2004) p. 5.

<sup>64</sup> Victor Burgin, 'Tank Magazine', *Tank Magazine* </issue-76/features/victor-burgin/> [accessed 5 February 2020].

express something of what it means to ‘live a digital life’. How is life changed by living with and through digital tools? How might the shifts heralded by digital technologies be creatively expressed using the same digital tools? Of course, the desire for an art that represents, and thereby attempts to grasp and articulate, one’s reality is no new phenomenon, the eternal question being: ‘If we are to represent the world in which we live, what are the conditions and tools that could allow us to do so?’<sup>65</sup> As such, witnessable in (successful) projects conceived with and through 3D CGI, both materially and conceptually, there is a sincere attempt to engage with digital mediation and its existential significance, its impact on social, cultural and political fields, its power to form and inform the way we live today.

Secondly, it can be said that many of these works frame relationships between humanity and technology as antagonistic and liberating in turn. Indeed, an exploration of the particular dis-ease experienced between humanity and our digital prostheses make for some of the most compelling examples. These are artworks which employ 3D CGI to transmit feelings of anxiety and urgency of a kind that is perhaps particular to the Anthropocene, an age of increased connectivity, accelerated technological development and screen mediation in which humanity has significantly impacted global ecosystems. That this disruption is caused in no small part by the production, consumption and rapid disposal of technologies that feed into 3D CGI production is here significant. In attempting to ‘lift the veil’ on the conditions of digital technology, to reveal hidden truths about the relationships between people and their environments, it can be argued that artists using 3D CGI merely perpetuate the very same systems. Ultimately, as I go on to argue throughout, it is precisely because of digital animation’s intimate ties with capital, labour and mainstream forms of entertainment and cultural production that ensure it is a dynamic means through which to parse the present. More than this, as Leslie and McKim suggest, digital animation, with its links to the everyday and pop culture, may also offer a way of subverting the dominant conventions of art itself:

Artists who use animation today where they might once have used paint or bronze are frequently fascinated by the long history of animation as the contrary of art, a ‘lowbrow’ form to which a kitsch quality adheres.<sup>66</sup>

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<sup>65</sup> Ingrid Hoelzl and Remi Marie, *Softimage: Towards a New Theory of the Digital Image* (Bristol; Chicago: Intellect, 2015), p. 38.

<sup>66</sup> Leslie and McKim, p. 209.

## Thesis Scope and Chapters

This thesis focusses on how 3D CGI has emerged as a means of creative expression in contemporary art, an investigation that requires contextualising artistic practice within the widespread changes brought about by the digitisation of life. As such, meaning is found in an amalgamation of technical description, personal reflection and socio-political analysis. The very nature of 3D computer-generated imagery, a highly complex form of imaging and imagining worlds, processes, states and movements that is borne out of various material and immaterial entanglements, means that it inevitably overflows any conceptual, historical and terminological container within which it is placed. As use of 3D CGI expands, it continually shifts and morphs, absorbing, replicating and altering all manner of other techniques, media and styles along the way. As such, this written thesis and the concomitant artistic practice described draws on research from multiple sources: animation studies, digital image studies, philosophy, art history, computer science, media studies and media archaeology. There are, however, clear limits in scope. For example, a variety of ingenious artistic practices which employ related technologies are not discussed: 3D scanning and 3D printing, photogrammetry, real-time animation and computer game design do not feature, just as there is no sustained discussion of the audio components of audio-visual installations which employ 3D CGI.

I argue for the materiality of 3D computer-generated images and, by extension, digital ways-of-being, in three distinct chapters. The first is a personal account of my practice, the *how* and the *why* of production, and what this reveals about societal shifts brought about by digitisation. The second chapter encompasses bodily configurations, representations and understandings of 3D CGI, while the third discusses the politics of CGI as an image and world-making tool. As such, with each consecutive chapter, I attempt to move outwards, starting from the personal before taking in an ever-broader view of 3D CGI and its role in art and life. This is not to make any claims of the centrality of my work but to acknowledge that it is through practice that meaning might be revealed.

In Chapter 1, *Materialising*, I describe my artistic practice, one of working with and through 3D CGI. Considered an extended statement of artistic intent, this chapter is presented as an exegesis of practice in three parts, each documenting and reflecting on a different project—*Softbodies*, *Bodies of Water*, and *The Flashes*. Several other works were produced as part of this thesis, all of which are documented in the appendix, but I consider these three to be the most fruitful for detailed analysis. I here discuss the different aspects of developing, producing and displaying 3D CGI: namely, the algorithms and image qualities, that constitute this contemporary image paradigm and the artefacts that extend out from it. I attempt to trace the *stuff* of the digital by considering the materials and processes by which 3D computer-

generated images are transformed, shaped and translated from the screen and into physical space.

In Chapter 2, *Corpsing*, I focus on 3D computer-generated representations of the human body, how they relate to corporeality and their emergence in artistic contexts. I go on to claim that the 3D rendered bodies which populate the work of contemporary artist Ed Atkins speak not only to and about the impact of digital culture on the human body, but also seek to undermine and resist one of its overarching narratives; that we might transcend materiality, and thus embodiment, through digital technology. In particular, I trace the ways in which Atkins utilises an affective, sensual form of what Mikhail Bakhtin dubs grotesque realism, a satirical mode which renders visible the messy realities of embodied experience, and through which technology, humanity and their digital representations are burlesqued. In this section, diary entries interject the main text as a way of underlining how Atkins' work is apprehended bodily.

In the final chapter, *Becoming 3D*, I discuss the ways in which 3D CGI can be used to make visible occluded pasts, reconstruct contested presents and project alternative futures. Beginning with an exploration of how 3D CGI is used to construct and collapse worlds in architectural visualisations and video games, I position digital animation within the military-industrial-complex that has expanded through digitisation to encompass finance, entertainment, and architecture. Through the work of Forensic Architecture and Sonda Perry, I consider how 3D CGI, operating as a device of concealment and revelation, has the ability to go beyond commercial applications, thereby unveiling the sociocultural politics of the present. I argue that the spatial and material hybridity of 3D CGI can be used as a tool of self-determination, allowing Forensic Architecture and Perry to collapse and construct images, worlds and narratives anew and thus, material realities to which these narratives pertain.

Taken together, this thesis and the concomitant artistic practice aim to reveal how art made with and through 3D CGI—a digital imaging regime borne out of, subject to and put to work by dominant forms of technocapitalism—can be used to express something about the material ambiguity of the digital by rejecting claims of immateriality and by rendering visible and reflecting critically on these realities. Finally, witnessable throughout is the central claim that it is only through practice, one that is grounded in the material world and its most immanent site, the body—albeit one that has been reconstituted by digitisation—that meaning is revealed, since, as Mark Leckey reminds us : ‘Research has to go through a body; it has to be lived in some sense—transformed into something that is lived—in order to become whatever we might call art.’<sup>67</sup>

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<sup>67</sup> ‘KALEIDOSCOPE – Mark Leckey’ <<http://kaleidoscope.media/mark-leckey-art-stigmergy/>> [accessed 11 March 2019].

## **Chapter 1**

### **Materialising: Softbodies, Bodies of Water, The Flashes**

## PART 1 – On Algorithmic Animation, Folding and Unfolding in *Softbodies*

Softbodies

or Soft Body Dynamics:

A field of computer graphics that allows for visually realistic physical simulations of the motion and properties of deformable objects.

For instance:

a rubber ball bouncing off a polished concrete floor,

a fleshy mass pressed up against an unyielding metal surface,

a sheet of fabric pulled down by gravity until it meets resistance,

draping,

folding,

gathering in a pool.

Also:

digital avatar,

profile picture,

soothing filter.

And the tired, bruised shell that awkwardly hunches over  
liquid crystal display clutched in palm.

Now peeled away from the surface of the screen,  
the static charge of latex attracts specks of dust and strands of hair.  
Fingerprints on glossy membrane show traces of careless handling  
and scars form where it snags on sharp edges.

All this matter:

it's too heavy

and too inefficient.

So retreat,

back to screen,

and try to repair,

softbodies.<sup>68</sup>

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<sup>68</sup> Text for *Softbodies*, Bethan Hughes, 2017.

The text on the preceding page is one element of *Softbodies*, an installation of digital and physical artefacts, 2D and 3D, that can be combined and displayed in a variety of ways. First presented in its entirety in 2017 as part of *The Fold*, a series of exhibitions shown at the School of Fine Art, History of Art and Cultural Studies' Project Space, University of Leeds, and later partially exhibited at several other venues, the work also includes a triptych of 3D rendered animation loops shown on portrait LCD screens; a series of large, A0 digital inkjet prints on a thin, semi-transparent, Japanese paper known as Kozo; sculptural assemblages made from scaffolding and sheets of coloured latex.

The project began in October 2016, with the explicit intention to investigate relationships between the process of using 3D visualisation software, the three-dimensional images it generates, and physical matter itself. Though the work came to include objects and artefacts arranged in space, it began solely within the viewport of 3D visualisation and animation software, Cinema 4D; as such, like all other practical works produced as part of this PhD, it was 'born digital'. Crucially, it was developed with and through animating virtual matter algorithmically. Indeed, the relationship between algorithms and physical matter ultimately came to (in)form its conceptual and aesthetic essence, raising questions of how algorithms function as an organising principle not only for the animated pixels simulating three-dimensional objects and sensual textures *on screen*, but for bodies, matter and ways-of-being *IRL*. Ultimately, a tactic of taking these so-called immaterial images, ones produced using an algorithm based *in* and *on* real-world physics and transferring elements of them back into the physical realm came to inform all research which followed.

### **Animating Algorithms**

An algorithm is broadly defined as 'an abstract, formalized description of a computational procedure' and is made up of a prescribed set of 'well-defined rules'.<sup>69</sup> In this way, though only using the notion of computation and not computers themselves, it can be said that there exist clear parallels between the art-by-instruction tactics first employed by conceptual artists in 1960s and algorithmic processing. Today's computational algorithms are designed to provide the 'solution to a problem', with the final result being 'the transformation of some data'.<sup>70</sup> Lev Manovich writes that we are now experiencing the, 'gradual automation of more and more functions in modern society using algorithms',<sup>71</sup> the consequence of which

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<sup>69</sup> 'Algorithm - Oxford Reference' <<https://doi.org/10.1093/oi/authority.20110803095402315>>.

<sup>70</sup> Ibid.

<sup>71</sup> Lev Manovich, 'Can We Think Without Categories?', *Digital Culture & Society*, 4.1 (2018), 17–28 (p. 18) <<https://doi.org/10.14361/dcs-2018-0103>>.

impacting all forms of life. As data is transformed by algorithms, so too are the ways in which humanity works, lives, communicates and creates. Algorithms are now globally ubiquitous, fulfilling all manner of functions, deployed in all manner of fields: agriculture, medicine, pharmaceuticals, human resource departments, military operations, weapons testing, customer service roles, transportation systems, credit scoring, high-frequency trading, music production, e-commerce, language translation, and finally, in the production of computer graphics such as 3D CGI. Though only a superficial overview of possible applications, this list clearly demonstrates the mutability and efficacy of algorithmic data processing and its impact on life. Despite their prevalence, the *what* and *how* of algorithms remains largely opaque for a vast majority of the world's population. According to Paul Dourish, algorithmic opacity connotes two different, yet interlinked phenomena: the trade-secret protection of algorithms by companies which develop and rely upon them—Facebook, Twitter, Google, Amazon—and, in lacking the specialised skills and knowledge necessary, the inability of most of humanity to 'read', understand, and thus manipulate them. As such, it is only when algorithms manifest with and through matter that they become visible and tangible:

The algorithm is powerful and has many applications, but much of what makes it effective in our world is the fact that particular implementations of the algorithm can be embodied in devices and infrastructures with specific operating capacities.<sup>72</sup>

More generally, as a mode of visual, social and structural organisation—of world building—algorithms find themselves bound up with broader conversations pertaining to digital automation, questions of, 'digital control and management achieved through sensing, large-scale data storage, and algorithmic processing within a legal, commercial, or industrial framework that lends it authority'.<sup>73</sup> Automation, defined as the application of 'self-governing machines to carry out manufacturing, distribution and other processes automatically', entails the use of feedback, or sensors which 'check a system's operations and send signals to a computer that automatically regulates the process'.<sup>74</sup> Despite the purported dematerialisation of automated processes as they are extended and expanded through digitisation, the ultimate goal of automation remains as it was when adopted by Ford in 1949; namely, to streamline and economise, and in many instances replace, manual, and increasingly cognitive, human labour. The 'Vorsprung durch Technik' of today's car assembly lines are a synchronisation of hard-

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<sup>72</sup> Paul Dourish, 'Algorithms and Their Others: Algorithmic Culture in Context', *Big Data & Society*, 2016, 1–11, (p. 6) <<https://doi.org/10.1177/2053951716665128>>.

<sup>73</sup> *Ibid*, p. 3.

<sup>74</sup> 'Automation', in *World Encyclopedia* (Philip's) <<https://www.oxfordreference.com/view/10.1093/acref/9780199546091.001.0001/acref-9780199546091-e-846>> [accessed 2 October 2019].

and software, carefully calibrated networks of visible and invisible labour operating on an industrial scale. In 1857, Marx prophesied that automation would come to transform human labour, writing how, through automation: ‘The human being comes to relate more as watchman and regulator to the production process itself’.<sup>75</sup> He goes on to argue that since capitalism derives all value from the appropriation of human labour and yet, in its continual search for efficiency and expansion seeks to replace labour through automation, it renders itself obsolete: ‘Capitalism thus works towards its own dissolution as the form dominating production’.<sup>76</sup> Today, while algorithmically driven automation has undoubtedly changed the nature of work for many, labour is far from obsolete—rather, it is increasingly either outsourced or replaced by other kinds of repetitive actions, namely, the clicking, swiping and typing of the cognitariat. According to Yuk Hui, as humans are transformed into regulators of processes beyond individual comprehension, society undergoes a deskilling:

As part of an industrialized civilization, human beings have begun to lose their role as technical individuals, as they become mere operators, either pushing a button, moving raw material, or cleaning the machine. This does not necessarily mean that the human’s position in the associated milieu will become any less important than it already is [...]. It is rather more likely that they will slowly become deskilled, and their technical knowledge, which indicates their affinity to machines, will be reduced to the most superficial level.<sup>77</sup>

Alongside algorithmic opacity, the estrangement of human knowledge from machine function observed by Hui, one that can be characterised as a Marxian alienation in which autonomy is symbolically transferred to the computer, can also be traced to the so-called ‘blackboxing’ of digital technologies. Understood as the literal and figurative impenetrability of the processes which make up both hardware and software, blackboxing can be said to lead to a focus on ‘inputs and outputs and not on [its] internal complexity’.<sup>78</sup> In *Automatic Society: The Future of Work*, Bernard Stiegler draws attention to an interview with computer scientist Jérémie Zimmermann, in which he claims that the computers of the past were, ‘understandable and programmable by their users’,<sup>79</sup> yet today they are, ‘designed so as to prevent the user

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<sup>75</sup> Karl Marx, *Grundrisse: Foundations of the Critique of Political Economy (Rough Draft)* (Harmondsworth: Penguin Books, 1973), p. 705.

<sup>76</sup> *Ibid.* p. 700.

<sup>77</sup> Yuk Hui, *On the Existence of Digital Objects* (University of Minnesota Press, 2016), p. 57.

<sup>78</sup> Bruno Latour, *Pandora’s Hope: Essays on the Reality of Science Studies* (Cambridge, Mass: Harvard University Press, 1999), p. 304.

<sup>79</sup> Jérémie Zimmermann, ‘La Surveillance Est Massive et Généralisée’ <<https://www.philomag.com/les-idees/jeremie-zimmermann-la-surveillance-est-massive-et-generalisee-8096>> [accessed 6 February 2020].

from accessing some of the functions and options'.<sup>80</sup> To sever computer from computational process is to sever user from function and, symbolically at least, matter from mathematics.

Products produced by Apple Inc. are the manifestation of this widespread change par excellence; whereas once a semi-transparent plastic shell literally exposed the computer's inner-workings, today's user manipulates not a black box but a sleek, sealed, aluminium 'unibody' shell that is largely un-upgradable, unhackable and incomprehensible. As Ed Atkins writes, off-the-shelf and turnkey products, while advancing functionality and efficiency for non-experts, also ensure that the power to manipulate tools towards ends unscripted and unsupported by technology companies—such as overcoming policies of inbuilt obsolescence—remain beyond the knowledge of end consumers: 'user-friendliness more often than not pervades in order to maintain ignorance, and is engaged in economically justified mollification'.<sup>81</sup>

### **Algorithmic Animation**

That animation has too been transformed through the application of algorithmic processing is unsurprising since, as Manovich writes: 'Computerization virtualized practically all media creating and modification techniques, "extracting" them from their particular physical medium of origin and turning them into algorithms'.<sup>82</sup> Now digital and three-dimensional, animation is 'supercharged' and 'amplified', its controls made 'explicit, formalized, quantifiable, and programmable',<sup>83</sup> its range of applications extended.

Fundamentally requiring of a number of frames (discreet images) in order to conjure the persistence of vision and thus the illusion of life—from the earliest Magic Lantern displays, Zoetropes and flipbooks to the digital animations of today—animation is a uniquely effortful undertaking. Images once stored on paper and celluloid are now found on local hard drives and remotely accessible server centres; as such, though deferred and mediated in different ways, the physical implications of animation as a resource intensive medium persist. Today, at a rate of between thirty and sixty frames per second (fps), for just several minutes of animation, thousands of single digital images must be stored, encoded, compressed and recalled. Thus, requiring time, repetitive labour and resources, yet existing under the dominating imperative of economic efficiency, animation was 'automated' long before it was

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<sup>80</sup> Zimmermann.

<sup>81</sup> Ed Atkins, Andreas Weisser, and Julia Stoschek, *GENERATION LOSS: 10 Years Julia Stoschek Collection* (Bielefeld: Kerber, Christof, 2017), p. 39.

<sup>82</sup> Lev Manovich, 'After Effects, or Velvet Revolution: Part 2', *Artifact*, 1.2 (2007), pp. 67–75, (p. 75) <<https://doi.org/10.1080/17493460701206744>>.

<sup>83</sup> Ibid.

made digital and three-dimensional, most famously by Disney, early adopter of Fordist modes of production.

Manovich further links animation to the development of automation in the 20<sup>th</sup> century through what he dubs the ‘automation of sight’, claiming that algorithms first arrived as a way of automating perspectival imaging, a process which began in the renaissance and concluded with the development of computer vision:

This automation became possible because perspectival drawing has always been a step-by-step procedure, an algorithm involving a series of steps required to project coordinates of points in 3-D space onto a plane.<sup>84</sup>

Beyond perspective, algorithms, ones often based on real-world physics, are in use at every level of 3D CGI production, from the modelling of objects and how they interact, to lighting and camera movement. As Leon Gurevitch writes, algorithmic animation generates a zone of possibility perhaps unique to the medium, one that can be considered simultaneously rigid and plastic, soft and hard:

[...] automated algorithms provide the spaces, objects and even “camera” with a set of behaviours consistent with the physics of the real world at the same time as they allow for a plasticity in such rules only possible in animation.<sup>85</sup>

As such, algorithmic computer animation brings new meaning to the notion of animator as one who conjures life through the manipulation and transformation of matter. The very name *computer-generated* evokes the non-human genesis of such images, of effects that seem to spring forth as if spontaneously from the computer without human intervention, thus blurring distinctions between artist, author and operator. This, as Vivian Sobchack writes, feeds into narratives relating to the ‘invisibility and effortlessness (as well as further alienation) of labour as it is now phantasmatically perceived in relation to electronic technologies’.<sup>86</sup> Moreover, it implies an autonomy of the digital, an idea of something beyond human control:

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<sup>84</sup> Lev Manovich, ‘Automation of Sight: From Photography to Computer Vision’ in *Electronic Culture: Technology & Visual Representation*, eds. Timothy Druckrey and Alluquere R. Stone (New York: Aperture, 1997) pp. 229-295 (p. 231).

<sup>85</sup> Leon Gurevitch, ‘Computer Generated Animation as Product Design Engineered Culture, or Buzz Lightyear to the Sales Floor, to the Checkout and Beyond!’, *Animation*, 2012, 131–149, (p. 134) <<https://doi.org/10.1177/1746847712438133>>.

<sup>86</sup> Vivian Sobchack, ‘Animation and Automation, or, the Incredible Effortfulness of Being’, *Screen*, 50.4 (2009), 375–391, (p. 385) <<https://doi.org/10.1093/screen/hjp032>>.

We now live in a culture pervaded by perceptive and cognitive computational machines (perhaps better called ‘entities’) that have achieved such power and agency as to have achieved what some might call ‘a life of their own’.<sup>87</sup>

Disney sought to streamline celluloid animation by dividing his labour force into independent, task-based units—animating, inking, colouring. Large-scale productions are still rationalised in this manner. In a case study of professionals who use the 3D software *Maya*, Aylish Wood describes how:

Teams work on different parts of a production pipeline, involved in making models, rigs, doing the animating, shading and lighting before the sequences are rendered and then edited to create the sequence of images seen by an audience.<sup>88</sup>

The implementation of computer algorithms and the increased power and accessibility of off-the-shelf hardware also means that each stage of production—from modelling to animating and rendering—can now take place on just one computer. Work (once) done by a specialised department can now be undertaken by blocks of pre-scripted code, bundled together with software or downloadable as plug-ins—paid for or free—from the web. As such, through the introduction of computational algorithms, animation returns once more to a cottage industry akin to that of the 1920s and 30s, a time when ‘anyone with a camera, paper or celluloid, and drawing skills could mobilize family or friends to make an animated film’.<sup>89</sup>

Thus, though algorithms remain opaque for the vast majority of consumers, including artists and many whose work involves producing and manipulating digital images, their application has also led to a rise in experimental animation practices. Here, online, global communities<sup>90</sup> of individuals operate beyond the dominant economic forces which define mainstream animation, often sharing their self-made creations to the web:

Experimental animation is predominantly aligned with nonindustrial production contexts that foreground the role of the individual artist, and it can also be identified by particular modes of circulation and distribution.<sup>91</sup>

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<sup>87</sup> Ibid, p. 375.

<sup>88</sup> Aylish Wood, ‘Behind the Scenes: A Study of Autodesk Maya’, *Animation*, 2014, 317–332, (p. 320) <<https://doi.org/10.1177/1746847714546247>>.

<sup>89</sup> Thomas LaMarre, *The Anime Machine: A Media Theory of Animation* (University of Minnesota Press, 2009), p.87.

<sup>90</sup> Artist and animator Alan Warburton explores subcultures of independent 3D animation production in the video essays *Goodbye Uncanny Valley*, 2017, and *Fairytales of Motion*, 2019 <<https://alanwarburton.co.uk/>>.

<sup>91</sup> Miriam Harris, Lilly Husbands, and Paul Taberham, *Experimental Animation: From Analogue to Digital* (Routledge, 2019), p. 1.

Ultimately, algorithmic animation speaks of accelerated efficiency, of images, objects and worlds produced using pre-sets and globalised production techniques that are in use across multiple different industries, from the commercial to the corporate, the scientific to the avant-garde. This, as Scott Bukatman writes, constitutes one of the paradoxes of digital animation:

Animation as an idea speaks to life, autonomy, movement, freedom, while animation as a mode of production speaks to division of labor, precision of control, abundances of preplanning, the preclusion of the random.<sup>92</sup>

## Folding

It was through experimenting with algorithmic animation that the installation *Softbodies* materialised. The project began, however, with a simple intention: to create, within 3D software and in the most direct way possible, a three-dimensional, material form from a two-dimensional plane, namely, through the act of folding. This, however, was achieved not manually (by flipping, stretching and nudging planes individually) but through experimentation with Soft body dynamics (SBD). In contrast to ‘hard surface’ modelling, a term used to describe the use of polygons to generate angular, geometric 3D models, SBD, falling under the broader category of organic or soft surface modelling, is based on algorithms calculated using real world physics. As such, SBD allows for the simulation of soft, malleable and organic-seeming objects and belongs to a set of algorithms designed to transform ‘*a geometric object*’ into ‘*a flexible object called a soft body*’.<sup>93</sup> Though now an inbuilt feature of many popular 3D visualisation programmes, as Sean Cubitt suggests, this was not always the case, since: ‘The problem of making the objects soft and resilient was complex and took several years to resolve’.<sup>94</sup>

One particular application of this algorithm, the one I employed within Cinema4D, allows the user to simulate textiles and similarly labile materials. Its application entails designating a polygon shape as a ‘cloth body’ and then allowing this to interact with external forces: simulated wind, gravity, or another object in the scene, one also designated with physical attributes such as a ‘rigid body’. To change the stretchiness, flexibility, weight and thickness of the plane is to change how it interacts with these external forces and thus, the way in which it ripples, falls, folds, settles; in other words, how it becomes 3D. As it bends, drapes

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<sup>92</sup> Scott Bukatman, *The Poetics of Slumberland: Animated Spirits and the Animating Spirit* (Berkeley: University of California Press, 2012), p. 108.

<sup>93</sup> ‘Soft Bodies | Maya | Autodesk Knowledge Network’ <<https://knowledge.autodesk.com/support/maya/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/Maya/files/GUID-20790C1E-D32E-457C-A867-BC2345EF707C-htm.html>> [accessed 1 May 2017].

<sup>94</sup> Sean Cubitt, ‘Digital filming and special effects’, in *The New Media Book*, ed. by Dan Harries (London: British Film Institute, 2004), pp. 17-30 (p. 20).

and bulges, echoing the squash and stretch of traditional animation, it mimics the properties of a pliable, plastic object or material. The ability to make minute changes within each parameter mean there are an infinite number of possible outputs. Thus, as the soft bodies algorithm enacts ‘the material and spatial operation of folding’<sup>95</sup> within software, making a 3D volume from a 2D plane, it visually manifests a computational process on screen.

The ‘objects’ that emerged out of these experiments, variously folded, topological structures, appeared simultaneously material and immaterial, leading the eye to ‘confuse different orders of space and surface’.<sup>96</sup> That they recalled all manner of matter—solid and fluid, organic and synthetic—is unsurprising since, as Gilles Deleuze writes in *The Fold*: ‘what period and what style could fail to see in the fold a painted or sculpted line? And it is not only clothing, but also the body, rocks, the waters, the earth, line itself’.<sup>97</sup> Often though, these algorithmically formed folds were most reminiscent of the intermediary form of the textile:

[V]eil, canvas, tissue, chiffon, fabric, goatskin and sheepskin [...] all the forms of planes or twists in space, bodily envelopes or writing supports, able to flutter like a curtain, neither liquid nor solid, to be sure, but participating in both conditions. Pliable [...] stretchable [...] topological.<sup>98</sup>

As with all animation, so too was there was a distinct temporality to these renderings. It was only by enacting the algorithm over the course of several frames that I, a user interacting at the level of interface could experience the transformation of data. More than this, these screen objects also recalled a variety of *things folded* from the past, of representations of soft, fleshy forms and the fabrics used to define them: the ecstatic marble folds of a Bernini sculpture, the opulent textiles which shroud figures in Japanese Ukiyo-E woodcut prints (*Pictures of the Floating World*), and the tonal studies of draped fabrics by Da Vinci and Dürer. Each form summoned a particular kind of tactility and physicality, evoking Paul Valéry’s description of the drapery in a tempera sketch by da Vinci:

These textile structures have no anatomy [...] and no pre-established formal design; instead there are the slacknesses and accidental tensions of the material, combined with the effects of its weight, its relaxed quality as a whole, with the local formation of folds [...] a continuous surface but one whose laws cannot be fixed.<sup>99</sup>

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<sup>95</sup> *On Folding: Towards a New Field of Interdisciplinary Research*, ed. by Michael Friedman and Wolfgang Schäffner (Bielefeld: Transcript-Verlag, 2016), p. 8.

<sup>96</sup> Gilles Deleuze, *The Fold* (A&C Black, 2006), p. xii.

<sup>97</sup> *Ibid*, p. 38.

<sup>98</sup> Michel Serres, *Atlas*, trans. by Michael Bischoff (Berlin: Merve Verlag GmbH, 2005), p. 45.

<sup>99</sup> Paul Valéry and Jean-Clarence Lambert, *Écrits sur l’art* (Club des libraires de France, 1962), p. 228.

Yet, though appearing random, these images were a product of the underlying logic of the algorithm. With the same code, each ‘soft body’ can be replicated anywhere and at any time in the exact same way. Thus, whilst simulating physical matter, 3D simulated soft bodies are subject to neither the fluctuations nor the temporal decay and fragmentation of nature. For instance, once a plane drapes and deforms over the course of say, 90 frames, it will continue to do so in the exact same way and at the exact same rate forever or until the hardware which supports the simulation breaks down. Where variations in wind and gravity create an infinite number of iterations in the folds of real life (patterns that will never present the same way twice) the external causes of the image within the 3D software, though also infinite, are subject to a different materiality and temporality.

As such, the series of soft structures which emerged are perhaps best thought of as objectiles. A concept originating from architect and designer Bernard Cache to describe the fluid design possibilities proposed by the computer and further developed by Deleuze, an objectile does not define an essential form but a mathematical function which generates a ‘continuum through variation’.<sup>100</sup> As such, an objectile contains, ‘an infinite number of objects. Each different and individual object eventualizes the mathematical algorithm, or objectile, common to all’.<sup>101</sup> Mario Carpo, contrasting this mode of production with the objects of standardised mechanisation, writes that: ‘the objectile is not an object but an algorithm – a parametric function which may determine an infinite variety of objects, all different (one for each set of parameters) yet all similar (as the underlying function is the same for all)’.<sup>102</sup> Crucially, infinite variation through algorithmic design leads to outputs that are in fact much closer to hand-craft than to industrial production. As Carpo observes:

Acting almost like prosthetic extensions of the hands of the artisan, digital design and fabrication tools are creating a high-tech analog of preindustrial artisanal practices.<sup>103</sup>

Thus, while these soft forms spoke about the ‘algorithmisation’ of existence through digitisation—of the rationalisation of objects, biological forms, intentionality and intelligence—by synthesising their own material reality, in three spatial dimensions and in time, they also spoke a digital tactility and immanent corporeality.

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<sup>100</sup> Deleuze, p 19.

<sup>101</sup> Mario Carpo, *The Alphabet and the Algorithm* (Cambridge, Mass: The MIT Press, 2011), p. 91.

<sup>102</sup> Ibid, p. 40.

<sup>103</sup> Ibid, p. 45.

## Softbodies

The final stage of the work entailed lifting these soft forms or objectiles from the screen and translating them into a series of physical artefacts to be displayed in space: a process of unfolding in which the ‘composite of animated and simulated image forms only made possible by the synthetic means of computer automation’ that constituted the algorithmically animated loops I had produced were refigured as a series of digital prints and sculptural assemblages.

With the intention to bring together, in one shared zone, the various material, spatial and temporal inflections proposed by the digital, immaterial soft bodies, unlike the ‘hardware’ rendered<sup>104</sup> animation loops which were shown on LCD screens, the still images for the prints were rendered hyper-realistic and in an extremely high resolution. Applying ambient occlusion and global illumination—two techniques of image rendering in which the computer calculates the dynamic interaction of light between objects in any given scene—these folded forms, suggestive of human figures, yet ones which are absent or hollow, were printed on a thin Japanese paper called Kozo. With a level of depth accentuated by subtle highlights, deep shadows and various translucencies, within these ‘trompe d’oeil’ printed images collide the characteristics of the digital and analogue, screen and object, 2D and 3D. The third and final element, a series of sculptural forms similarly suggestive of bodies and bodily matter, were the last to be produced. The sculptures made using flat sheets of latex and metal scaffolding, can be considered a ‘dumb’ reconstruction of the process enacted in the software—the draping and folding of a flat, malleable plane as it meets resistance—and mimic the forms / objects created on screen. Flexible, elastic, homogenous, and in some instances semi-transparent, latex is a decidedly curious material which connects violent histories of colonial extraction and exploitation with the history of industrialisation, fetish and fashion; at once natural (tapped from the trunks of *Hevea brasiliensis* or Pará rubber trees) and artificial (vulcanised, coloured garish and flattened into smooth sheets by industrial rollers). When draped over the scaffold structures, these latex sheets recalled not only the digital softbodies, but Jean-Luc Nancy’s description of skin in *Corpus*:

[A] skin, variously folded, refolded, unfolded, multiplied, invaginated, exogastrulated, orificed, evasive, invaded, stretched, relaxed, excited, distressed, tied, untied.<sup>105</sup>

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<sup>104</sup> A section on rendering follows in chapter 1, part 3, p. 64.

<sup>105</sup> Jean-Luc Nancy and Richard Rand, *Corpus* (New York: Fordham University Press, 2008), p. 31.

An instance of soft matter, a scientific term used for substances that can be classified as neither solid nor liquid—such as ‘gels, foams, elastomers, rubber, liquid crystals, or suspensions’—latex is an ‘in-between’ material, one which, as Christiane Sauer writes, ‘might seem unsound at first sight, because they do not fit clearly into known categories’.<sup>106</sup> Thus, like 3D CGI, latex is materially ambiguous, or, as Roland Barthes once said of Plastic, a material of ‘infinite transformation’. In ‘The Poetics of Softness’ from 1967, Max Kozloff writes that:

[One] thing sculpture is quite simply not allowed to be, if it has any presentations to the mainstream, or any claim to historical necessity, is soft. I mean soft in the literal sense of easily yielding to physical pressure. A soft thing can be poked, moulded, squeezed, scrunched. In a word, its surface is elastic, and its densities are scandalously rearrangeable. [...] a soft sculpture in various proportions, might suggest fatigue, deterioration, or inertia. It mimes a kind of surrender to the natural condition which pulls bodies down. [...] regardless of how abstract a soft sculpture, it will unavoidably evoke the human.<sup>107</sup>

The sculptures in the installation, like the animation loops and prints, were similarly suggestive of bodily shapes and forms. Yet, unlike the animations and prints, over the course of the exhibition, the latex began to oxidise and decay, revealing how it is subject to different material conditions. Ultimately, the confluence of all three elements—screen, print, sculpture—aimed to stage physical and algorithmic matter as material ambiguous, both soft(ware) and hard(ware). To take what has been made efficient through digitisation and to make it inefficient and bodily is an attempt to resist the rationalisation and dematerialisation of matter and to highlight relationships between the process of using 3D visualisation software, the three-dimensional images it generates, and physical matter itself.

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<sup>106</sup> Christiane Sauer, ‘Soft Matter’, in *Sculpture Unlimited 2: Materiality in Times of Immateriality*, ed. by Eva Grubinger and Jörg Heiser (Berlin: Sternberg Press, 2015), p. 41.

<sup>107</sup> Max Kozloff, ‘The Poetics of Softness’, in *Renderings: Critical Essays on a Century of Modern Art*, ed. by Max Kozloff (London: Studio Vista, 1970), pp. 223–35 (pp. 223–224).

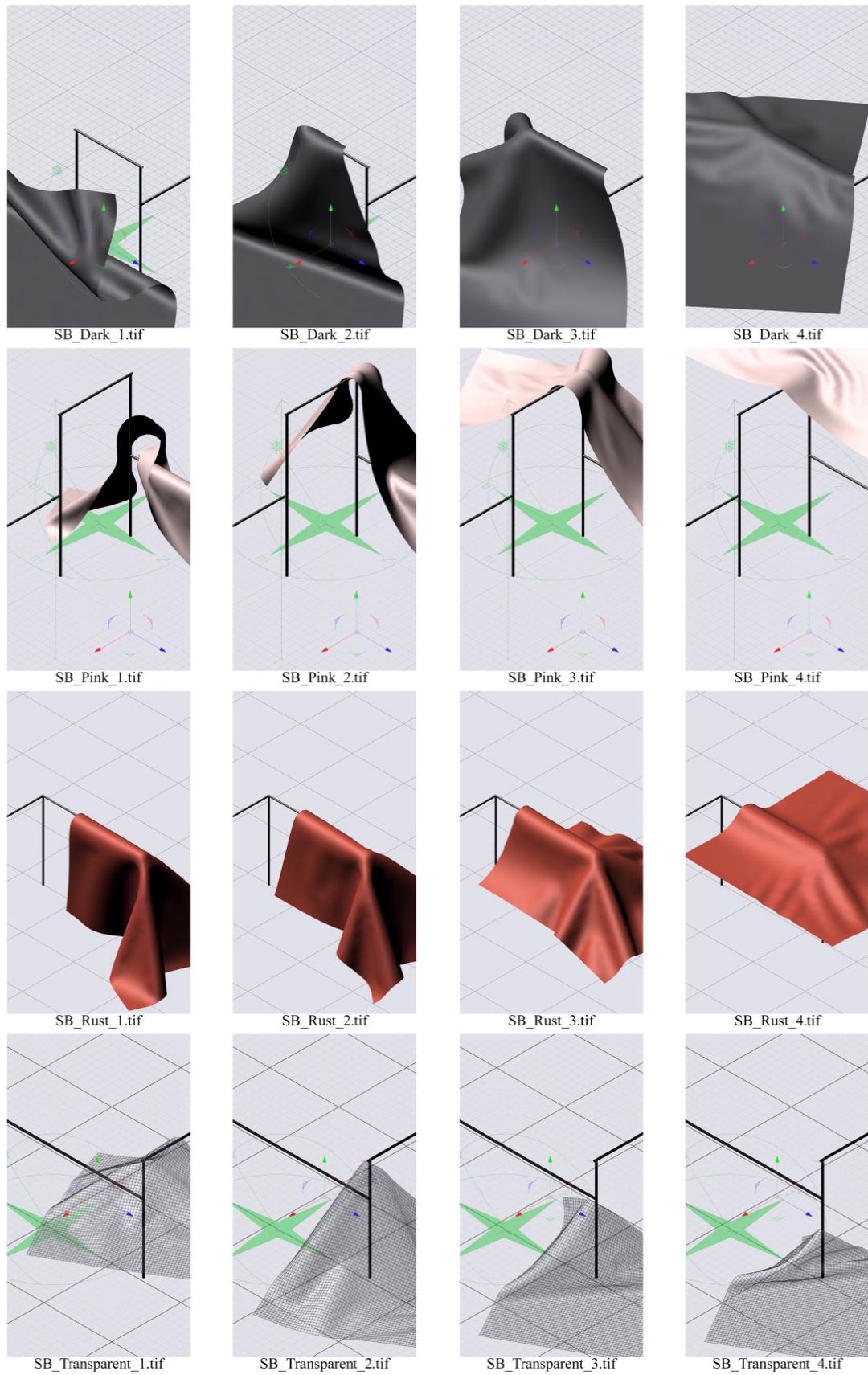


Figure 3. In software frames of the *Softbodies* animation loops showing how a plane morphs and folds over time.



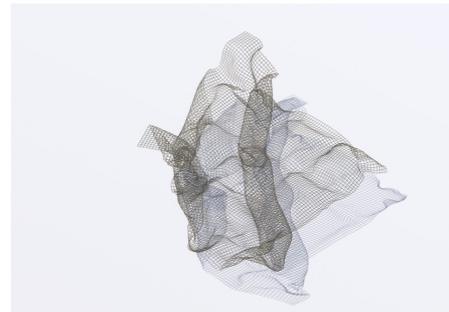
SB\_lame.tif



SB\_latex.tif



SB\_latexpearl.tif



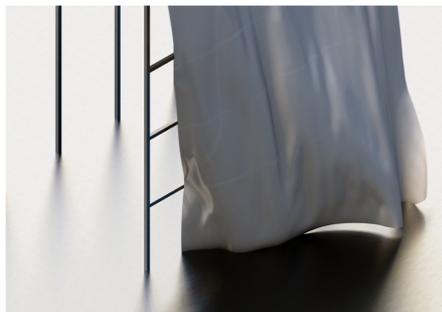
SB\_mesh.tif



SB\_pearlescent.tif



SB\_pleat.tif



SB\_reflect.tif



SB\_volume.tif



SB\_yellowdrape.tif



SB\_yellowdrape2.tif

Figure 4. Sketches for *Sofibodies*. Rendered image-objects created using the soft body dynamics algorithm within the software, Cinema 4D, 2016.

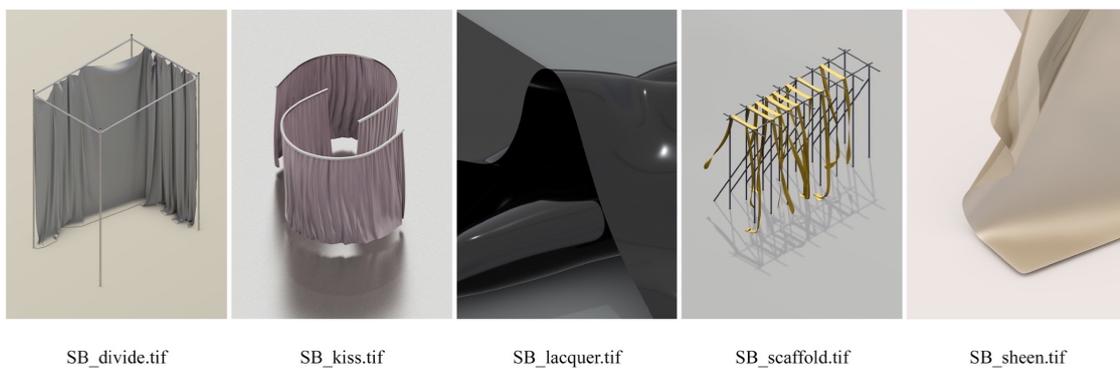


Figure 5. Sketches for *Softbodies*. Rendered image-objects created using the soft body dynamics algorithm within the software, Cinema 4D, 2016.



SB\_install\_1.jpg



SB\_install\_2.jpg



SB\_install\_3.jpg



SB\_install\_4.jpg

Figure 6. *Sofibodies*, 2017. Installation view capturing screens, sculptures and prints at Project Space, Leeds.



SB\_install\_5.jpg



SB\_install\_6.jpg



SB\_install\_7.jpg



SB\_install\_8.jpg

Figure 7. *Softbodies*, 2017. Installation view at Project Space, Leeds.



Figure 8. *Softbodies*, 2017. Digital inkjet print on Kozo paper, A0.

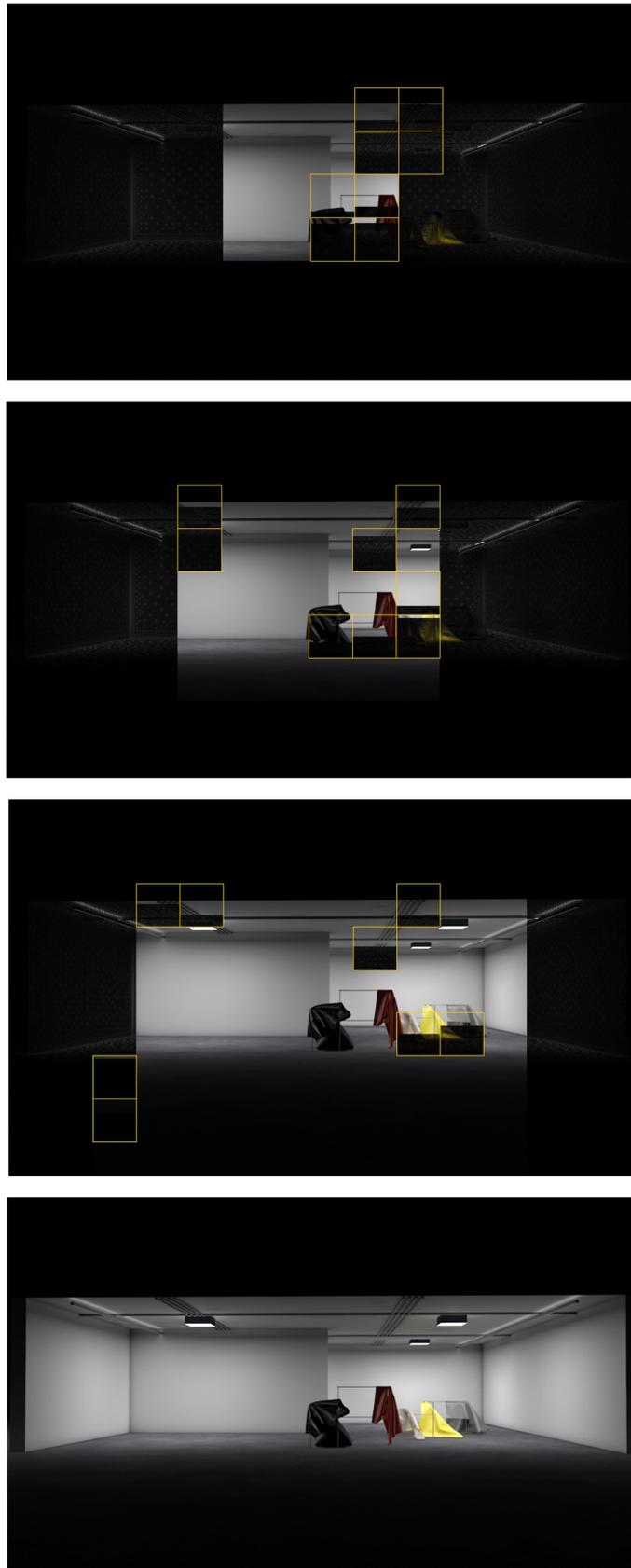
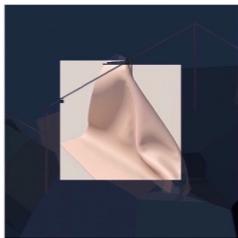
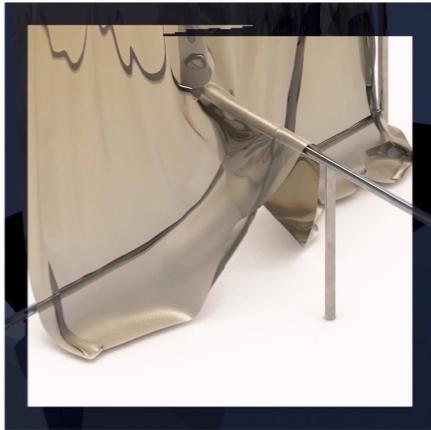


Figure 9. Image tests for *Sofibodies*, 2017, showing how the image slowly materialises during the process of rendering.

THE FOLD  
#2  
-



Bethan Hughes  
SOFTBODIES

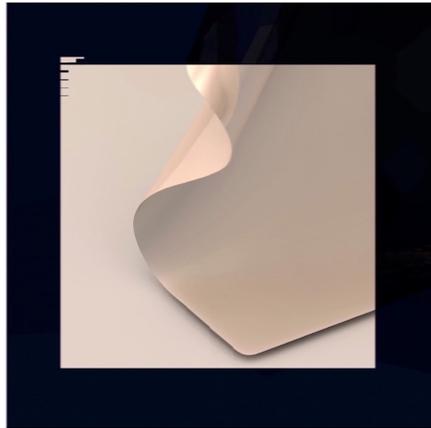
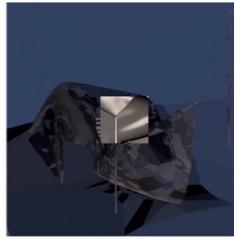


Image © Bethan Hughes, SOFTBODIES (2017)

VENUE PRIVATE VIEW EXHIBITION DATES  
Project Space, School Of Fine Art, History Of Art & Cultural Studies, Leeds 3 March 2017 4 – 25 March 2017

## Bethan Hughes SOFTBODIES

Bethan Hughes  
SOFTBODIES

Practice-led PhD Candidate at the University of Leeds, Faculty of Fine Art, History of Art and Cultural Studies. Bethan Hughes (b. 1989, Miami) previously completed an MA in Media, Art and Design at the Bauhaus-University Weimar, Germany (2015) and a BA in Fine Art at The Glasgow School of Art (2011).

Recent exhibitions include  
BERLIN CAROPLAGE, collaboration with Duygu Atabek, Plattenbauvereisigung, Tempelhofer Feld, Berlin (2016) ;  
NEW PRISM, Bauhaus Str. 1, Weimar (2015) ;  
TRANSLAT TRANSLATE, collaboration with Golriz Behgo, WaArtGallery, Weimar (2015) ;  
STRANGELY FAMILIAR, collaboration with Golriz Behgo, Marlinenstrasse 9, Weimar (2014) ;  
BLIND PLOTTING, group show, The Arches, Glasgow (2012).

Recent publications include  
PURE BEAUTY, collaboration with Louis De Belle, in San Rocco 13, San Rocco Milan (2017) ;  
FACETS OF NOTIT, in Forms of Formalism No. 3, Lucia Ver'leg (2016) ;  
CEREMONY, collaboration with Louis De Belle, in 5 Fundamental Acts, e+m bookstore (2015).

Bethan Hughes, SOFTBODIES (2017)

Pigment print on Kozo paper (118x84 cm), latex, scaffold, 3 screen hardware-render loops.

Softbodies

or Soft: Body Dynamics:

A field of computer graphics that allows for visually realistic physical simulations of the motion and properties of deformable objects.

For instance:

a rubber ball bouncing off a polished concrete floor, a fleshy mass pressed up against an unyielding metal surface, a sheet of fabric pulled down by gravity until it meets resistance, draps, folds, gathering in a pool.

Also:

digital avatar, profile picture, soothing filter, And the tired, bruised shell that awkwardly hunches over liquid crystal display clutched in palm.

Now peeled away from the surface of the screen, the static charge of latex attracts specks of dust and strands of hair. Fingerprints on glossy membranes show traces of careless handling and scars form where it smags on sharp edges.

All this matter: it's too heavy and too inefficient.

So retreat, back to the screen, and try to repair, softbodies.

CENTRE FOR AUDIO VISUAL EXPERIMENTATION fine-art.leeds.ac.uk UNIVERSITY OF LEEDS

Figure 10. *Softbodies* catalogue, 2017. Produced as part of the exhibition series *The Fold*, Project Space, School of Fine Art, History of Art and Cultural Studies, University of Leeds, 2017-18.

PART 2 – On Fluid Dynamics and Liquid-Crystals in *Bodies of Water*

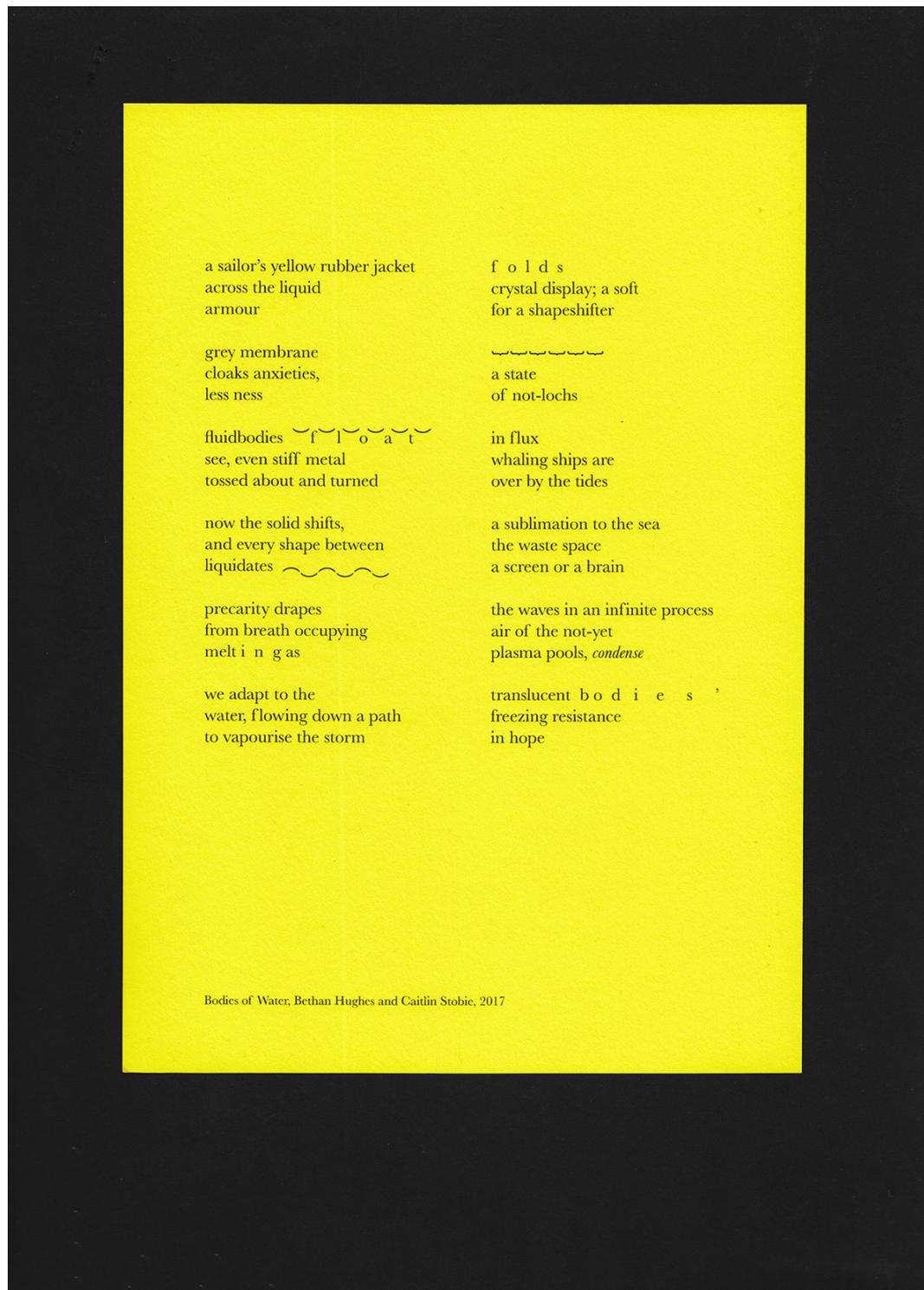


Figure 11. *Bodies of Water*, 2017. Printed handout, text written in collaboration with Caitlin Stobie.

The second fully-realised practice-based output of this PhD project was *Bodies of Water*, a temporary, multimedia installation made up of 3D CGI animation loops shown on a cracked LCD monitor; a generative moving-image loop shown on a damaged iPad; various kinds of printed matter; temporary sculptures; and the co-authored text-poem pictured on the previous page. Building on research into how matter is visioned, made and unmade within the materiality ambiguous realm of 3D visualisation software that had begun with *Softbodies*, *Bodies of Water* constitutes an attempt to explore how the media-intensive milieu of today brings the material and immaterial—matter, images, hardware, software, systems—into equivalence. Moreover, as the title of the work implies, I here associate this equivalence with the immanent fluidity of digital systems, images and bodies—organic, organisational or otherwise—placing these things within a shared aesthetic, physical, operational and metaphorical space. In this work, the plasticity of CGI came to the fore as a means to think through fluidity—social, material, cognitive and visual.

### **Liquid Modernity**

Sociologist Zygmunt Bauman opens his compelling analysis of post-modern society, *Liquid Modernity*, with a chemical description of fluidity; matter that, unlike a solid, cannot easily hold its shape. Having the ability to rapidly shift to take on new shapes and forms, fluids are inconsistent and protean, associated with lightness, mobility and transformation. Through this distinctly material metaphor, Bauman argues that what unites divergent forms of life today is ‘their fragility, vulnerability and inclination to constant change’.<sup>108</sup> As such, the subjects of liquid modernity are ‘in a state of perpetual becoming’,<sup>109</sup> a process that is never completed since their changeability is indefinite: ‘change is the only permanence, and uncertainty the only certainty’.<sup>110</sup> Bauman extends his analysis to claim that all forms of social, cultural and political life are now plastic, heterogeneous, and contingent. Whilst allowing for certain kinds of individual freedoms to flourish, liquid life atomises collective and concrete ways of being and with them, security and stability. Bauman tells us that liquid modernity divides society into those who can harness the opportunities it affords and those at the whim of such changes—the so-called ‘tourists’ and ‘vagabonds’. As Bauman scholar Mark Davis writes,

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<sup>108</sup> Zygmunt Bauman, *Liquid Modernity* (Cambridge, UK; Malden, MA: Polity Press, 2012), p. viii.

<sup>109</sup> *Ibid.*, p. 209.

<sup>110</sup> *Ibid.*, p. viii.

‘there would appear to be a potentially dangerous and contradictory (dialectical) logic to liquid life whereby things turn rapidly into their opposites’.<sup>111</sup>

Bauman’s use of material metaphor—prominent not only in *Liquid Modernity* but throughout his oeuvre—is a productive tactic by which social movements happening at micro and macro scales are given tangible form, acting as a scaffolding for imagination and comprehension. Artist Hito Steyerl applies a similarly metaphorical mode of thinking in her practice, processing the world by bringing images, objects and social movements into equivalence. Steyerl’s moving image installation of 2014, *Liquidity Inc.*, foregrounds the story of Jacob Wood, a financial analyst made redundant during the 2008 economic recession. Here, Steyerl extends the metaphor of liquidity to make symbolic and explicit connections between financial systems, images and technologies: the liquidity of contemporary capitalism, where high-frequency trading ensures rapid and instant financial transactions; the bodies of individuals caught up in economic tides of precarious labour and uncertain working conditions; the speed with which the climate crisis is transforming weather systems so that tsunamis, torrents, storms and floods are increasingly common; the fluid circulation of images and data across global networks; and finally, the plasmatic nature of 3D CGI and computer animation as visual manifestation of these shifts. Thus, *Liquidity Inc.* depicts a social reality that, like a body of water, is amorphous, powerful and unstoppable. Steyerl underlines this using lo-fi image layering, green screen keying, rapid edits and the superimposition of varying image kinds and qualities which give a physical texture to liquid modernity, thereby bringing it into the realm of sensory experience and not only one that is articulated through economics and information. As such, the work makes visible the ‘vaporious’ nature of contemporary society, one on which solid objects and social conventions are made fluid before being reformed anew. In this way, Steyerl’s practice is a manifestation of Bernard Stiegler’s argument that digital technologies engender and accelerate fluidity:

The immensity of the transformation currently underway is due both to the speed of its effects and to the fact that these effects operate on a global scale. So-called ‘big data’ is a key example of this immense transformation, which is leading globalized consumerism to liquidate all forms of knowledge (savoir vivre, savoir faire and savoir conceptualiser, knowledge of how to live, do and think).<sup>112</sup>

It would thus appear that digital animation, a shape-shifting medium borne out of the worlds of the soft and the hard, is a unique means through which to visualise and allegorise

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<sup>111</sup> Mark Davis, ‘Hurried Lives: Dialectics of Time and Technology in Liquid Modernity’, *Thesis Eleven*, 2013, 7–18, (p. 9) <<https://doi.org/10.1177/0725513613500268>>.

<sup>112</sup> Bernard Stiegler, *The Neganthropocene*: (Open Humanities Press, 2018), p. 51 <<http://www.openhumanitiespress.org/books/titles/the-neganthropocene/>> [accessed 9 February 2020].

liquid life. Yuriko Furuhashi identifies that, '[t]he tendency to focus on the plasticity of the animated image is grounded in a long history of animation studies',<sup>113</sup> citing Eisenstein's study of Walt Disney, written between 1941 and 1946, as the definitive analysis of this. For Eisenstein, 'plasmaticness' was associated with the fluid nature of animation to assume any form and the malleability of animated subjects stretched, squashed and deformed to the delight of audiences. Today's computer-generated animations, emerging out of globalised systems of production and distribution, give shape to those forces which, though 'invisible', animate the world: an idea of digital technology as the contemporary wind, breath or *Pneuma* of contemporary society. In this way, it can be argued that CGI is a type of plasmatic 'hypermatter', a state of matter which, though evanescent, is nevertheless a state of matter. Stiegler employs the terms hypermatter to describe, 'a complex of energy and information where it is no longer possible to distinguish its matter from its form',<sup>114</sup> and hypermaterial as 'a process where information — which is presented as a form — is in reality a sequence of states of matter produced by materials and apparatuses, by techno-logical dispositifs in which the separation of form and matter is also totally devoid of meaning'.<sup>115</sup> As such, 3D CGI, in line with Furuhashi, speaks of 'plasticity at the level of *the material process of production* (i.e. the image-making process) instead of simply treating it as *an attribute of the finished product* (i.e. the appearance of the image itself)'.<sup>116</sup>

## Fluid Simulations

*Bodies of Water* began within 3D visualisation software, a zone where, due to the increased power of computing and accessibility to software, fluidity has risen to prominence in recent years. Fluids, here understood as realistic simulations of watery or viscous substances, deforming soft bodies, and infinite ocean surfaces, can be produced in several ways. The most common and currently the most physically accurate is to use a particle system. A second method, that which was used to develop *Bodies of Water*, is to use a shader effector. Particle systems are particularly apt in simulating fluids—so-called fluid dynamics—but are also used to produce all manner of visual effects:

[P]article systems algorithms are used by digital artists and motion graphics designers to generate abstract animations; the same algorithms are also widely used in film

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<sup>113</sup> Yuriko Furuhashi, 'Rethinking Plasticity: The Politics and Production of the Animated Image', *Animation*, 6.1 (2011), 25–38 (p. 26) <<https://doi.org/10.1177/1746847710391226>>.

<sup>114</sup> Bernard Stiegler, Philippe Petit, and Vincent Bontens, *Economie de l'hypermatériel et psychopouvoir* (Paris: Mille et une nuits, 2008), p. 111.

<sup>115</sup> Ibid.

<sup>116</sup> Furuhashi, p. 27.

production to generate realistic-looking explosions, fireworks, flocks of birds and other physical natural phenomena.<sup>117</sup>

In short, particle systems allow the animator to ‘emit’ particles from a chosen source and then, through the introduction of various forces, observe and record how these particles move, change and interact over time. Particles may be interconnected, acting as a unit and moving in accordance with a set of fixed constraints—for example, through the application of universal gravity so that they ‘sink’ or ‘float’. Alternatively, they can move in accordance with one another—for example, through magnetisation so that they are attracted to, or repulsed by, one another.<sup>118</sup> As such, a particle system accurately mimics, ‘[the] continuous and irrecoverable change of position of one part of the material relative to another part when under shear stress constitutes flow, a characteristic property of fluids’.<sup>119</sup>

RealFlow, launched in 1998 by Next Limit Technologies and both an independent software and a plugin component, specialises in the simulation of fluids using particle systems. A moving image show reel on their webpage shows how their software is used to visualise spectacular scenes where all manner of substances—water, milk, chocolate, lava—flow, spray and swirl according to their various viscosities.<sup>120</sup> Here, fluid simulation becomes pure commodity form as the primal, elemental and bodily associations of viscous substances are harnessed by companies such as DreamWorks Studios, Industrial Light and Magic and Walt Disney Pictures.

Unlike fluid dynamics, using a shader effector to animate a body of water does not render liquids as particles (volumetrically) and thus, does not allow for fluids that split and flow into smaller units. Rather, it simulates the undulating surface of a body of water. In short, in a manner not dissimilar to the soft bodies algorithm, it allows for the deformation of a flat XY plane so that, when animated over time, it becomes a rippling three-dimensional surface. Viewed through the virtual camera and from certain perspectives, the plane appears as if a unified fluid body. The deformation of the plane is caused by mapping an animated noise pattern onto it; depth coordinates follow the tonal values of the noise pattern. The more contrasting the values of the noise pattern (from black through to white) the greater the depth variation across the plane. Websites such as c4depot.com (a third-party resource for Cinema4D) offer such effects as plug-ins. Infinite Arctic, City Rig, Infinite Dunes, Nebulator & Plasmafier (for outer space scenes), EZ Cloud and Infinite Oceans are ‘scripts’ or software

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<sup>117</sup> Manovich, *Software Takes Command*, p. 139.

<sup>118</sup> For a comprehensive description see Jos Stam, *The Art of Fluid Animation* (Boca Raton, Florida: A K Peters/CRC Press, 2015).

<sup>119</sup> Bauman, *Liquid Modernity*, p. 1.

<sup>120</sup> ‘RealFlow Home’, *RealFlow* <<http://www.nextlimit.com/realflow/>> [accessed 9 February 2020].

assets that the user can apply and (infinitely adjust) at the level of interface. A further instance of animation through algorithmic automation, there is here a paradoxical relationship between the plasmatic nature of CGI as image form and the rigid nature of its conditions of production. As Manovich suggests: ‘Although software does not directly prevent its users from creating from scratch, its design on every level makes it “natural” to follow a different logic – that of selection’.<sup>121</sup> Indeed, the sheer complexity of 3D software means that animators often follow the logic of the script, the software and the company:

While commercial companies employ programmers capable of adopting published algorithms for the production environment, the theoretical work of these algorithms mainly takes place in academic computer science departments and in research groups of top computer companies such as Apple or Silicon Graphics.<sup>122</sup>

Alongside this, there simultaneously exists a great hive mind of users from around the globe, each adapting, modifying and interpreting software assets and sharing the outcomes as tutorials on web platforms such as YouTube and GitHub. This phenomenon reintroduces a malleability into CGI as a mode of production, one that mirrors longer traditions of how technical practices transform through acts of replication. Though guidance pertaining to 3D CGI production is documented within official handbooks, the exchange of knowledge in online communities is increasingly common. The resulting ‘community’ is not a centre that holds but a network of fluid relations, an assembly of visual effects, remote interactions and information sharing platforms that rapidly form, transform and dissolve. As such, at the level of both process and final image, 3D CGI is a synthesis of plastic relations, a dissolving and simultaneous visioning of physicality. It was in an attempt to represent these antagonisms—between liquid and solid, flexible and stiff, material and immaterial—that inspired *Bodies of Water* began.

### **Liquid-Crystals**

Like *Softbodies*, *Bodies of Water* ultimately manifest as a temporary installation of digital and physical artefacts. Though not a site-specific work, the architectural features of the exhibition space, serf studios, came to inform how it was spatially arranged. The focal point of the installation was the series of animated loops of an inky, swelling ocean surface rendered using Cinema 4D, ones shown on a large, cracked LCD monitor that was suspended in the

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<sup>121</sup> Manovich, *The Language of New Media*, p. 129.

<sup>122</sup> Lev Manovich, ‘Reality Effects in Computer Animation’ in *A Reader In Animation Studies*, ed. by Jayne Pilling (Indiana University Press, 1998), pp. 5-15 (p. 10).

space using strapping. In *Things*, a book about how humanity relates to the objects of everyday life, Bill Brown writes that:

We begin to confront the thingness of objects when they stop working for us: when the drill breaks, when the car stalls, when the windows get filthy, when their flow within our circuits of production and distribution, consumption and exhibition, has been arrested, however momentarily.<sup>123</sup>

Indeed, like a rock in a river, the fracture in the glass surface of the monitor punctuated the image, thereby disrupting its visual flow with a liquid-crystal one of its own. Moreover, it highlighted the physicality of the device itself, the ‘inconvenience’ of hardware which, like an organic body, is liable to breakdown, decay and become obsolete, thus interrupting the imagined inevitability of the infinite tide of information that digital devices spew forth. Damaged technological devices speak about the rapid obsolescence and replacement of products driven by technocapitalism:

[I]t is the mind-boggling speed of circulation, of recycling, ageing, dumping and replacement which brings profit today - not the durability and lasting reliability of the product. In a remarkable reversal of the millennia-long tradition, it is the high and mighty of the day who resent and shun the durable and cherish the transient, while it is those at the bottom of the heap who - against all odds - desperately struggle to force their flimsy and paltry, transient possessions to last longer and render durable service.<sup>124</sup>

As Brown suggests, broken technologies change the conditions of subject-object relations since they posit a physicality or a bodily correspondence to what are typically perceived as purely data driven process. In doing so, they punctuate the narrative of infinite, immaterial media. In *Liquid Crystals: The Science and Art of a Fluid Form*, Esther Leslie argues that part of the reason why 3D CGI animation is now so pervasive is that LCD screen technologies ‘invite’<sup>125</sup> these vivid, fluid, high-resolution images. As such, the damaged screen, leaking liquid pixels which spread out across of the surface of the image, also unveil relationships between content—a hyperreal oceanscape that ripples and swells—and container:

Liquid crystal became the matter *of* the screen, its modulator, and, as liquid and crystal scenarios, it is the matter *on* the screen. [...] It is photorealistic, but without easy comparison in real-world experience. This digital nature sublime cries out for the machinery’s remarkable vividness in modelling three-dimensions, its deftness at

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<sup>123</sup> Bill Brown, *Things* (Chicago: University of Chicago Press Journals, 2004), p. 4.

<sup>124</sup> Bauman, *Liquid Modernity*, p. 14.

<sup>125</sup> Esther Leslie, *Liquid Crystals: The Science and Art of a Fluid Form* (Reaktion Books, 2016), p. 205.

displaying supersaturated colours, the ability to display smooth and dramatic movement [...].<sup>126</sup>

Lastly, a damaged mode of display for a digital image file also emphasises the ways in which digitisation has altered perceptions of permanence. In 'For A Concept of Immaterial Indestructability', Mathew Bowman points out how methods employed by museums and galleries in order to protect and preserve physical objects do not apply to ones that are born digital. Made up of that which is reproducible, iterable and cloud-based—code—the so-called ephemerality of the digital paradoxically provides a more stable link to permanence—eternity—than any object. In *Bodies of Water* however, screen and animation were considered one body, introducing a specificity and vulnerability to the digital image: today, the screen used for the exhibition no longer works, a loss of function that takes the artwork with it.

### **Bodies of Water**

The space in which *Bodies of Water* was installed was conceived of as a vessel, within which, like 3D CGI more generally, things overflowed their respective containers. Alongside the suspended screen was a collection of artefacts, ones flexible and rigid, artificial and natural, flat and three-dimensional, soft and hard. These were, in no particular order: yellow plastic bags, some in piles and some filled with water, a photocopied print of an individual frame from the animation, a smaller risograph print of a different animation frame, a wall text, latex sheets draped over scaffolding and threaded onto it like a curtain and a damaged iPad mounted to the wall showing an animated, yellow gradient loop. Though each disparate element conjured its own respective material associations, presented together, a new overall impression was formed. In *Form and Object: A Treatise on Things*, Tristan Garcia writes how: 'We live in this world of things, where a cutting of acacia, a gene, a computer-generated image, a transplantable hand, a musical sample, a trademarked name, or a sexual service are comparable things'.<sup>127</sup> Garcia places computer-generated imagery in a continuum with all manner of natural, physical, social, computational, technological and cultural entities, thus suggesting that material difference is no longer what separates the stuff of life. As with Garcia's conceptualisation, the collection stuff in the exhibition space was one which privileged neither the material (physical/solid) nor the immaterial (spiritual/incorporeal).

In *An Archaeology of the Immaterial*, Victor Buchli highlights the work of Soviet art theorist Nikolai Tarabukin and his conceptualisation, written in 1923, of what he called the

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<sup>126</sup> Ibid, p. 217.

<sup>127</sup> Tristan Garcia, *Form and Object: A Treatise on Things*, trans. by Mark Allan Ohm and Jon Cogburn (Edinburgh: Edinburgh University Press, 2014), p. 1.

‘installation’, understood as the organising concept of a system or network composed of interrelated components made lively:

Many modern products are no longer objects as such. Instead, they are complexes of a number of objects that are linked inseparably in the process of consumption and thereby form a system, or they represent a kind of noncorporeal energy. Such is, for example, the use of electrical energy, which is itself an intricate system of installations from which is derived a number of ‘utilities’ [‘poleznosti’] in the form of light, heat, moving force, and so forth. Thus, we arrive at a new concept, unknown in the conditions of less-developed material culture – namely, that of the ‘installations’ [‘ustanovok’].<sup>128</sup>

As such, *Bodies of Water* as *ustanovok* takes the combination of, and relationship between, each element—animation, device, print, metal, plastic—and considers the shared fluid forces that run through and connect them all. The final exhibition only materialised for a matter of days, momentarily existing as one body before its constituent parts were broken up and dissolved, many cannibalised to form new works. Such combinations of analogue / digital matter are, as Melissa Gronlund points out, a common tactic used by contemporary artists to underline the materiality of the digital:

As opposed to the rampant circulation of images on the internet, the use of material elements in installations or viewing platforms serves to ground the works, contrasting the circulation of images with the specific conditions of spectatorship.<sup>129</sup>

Ultimately, *Bodies of Water* attempted to speak of how liquid life renders bodies, matter and ideas fluid by connecting processes and materials through the plasticity of CGI.

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<sup>128</sup> Victor Buchli, *An Archaeology of the Immaterial* (Routledge, 2015), p. 134.

<sup>129</sup> Gronlund, p. 103.

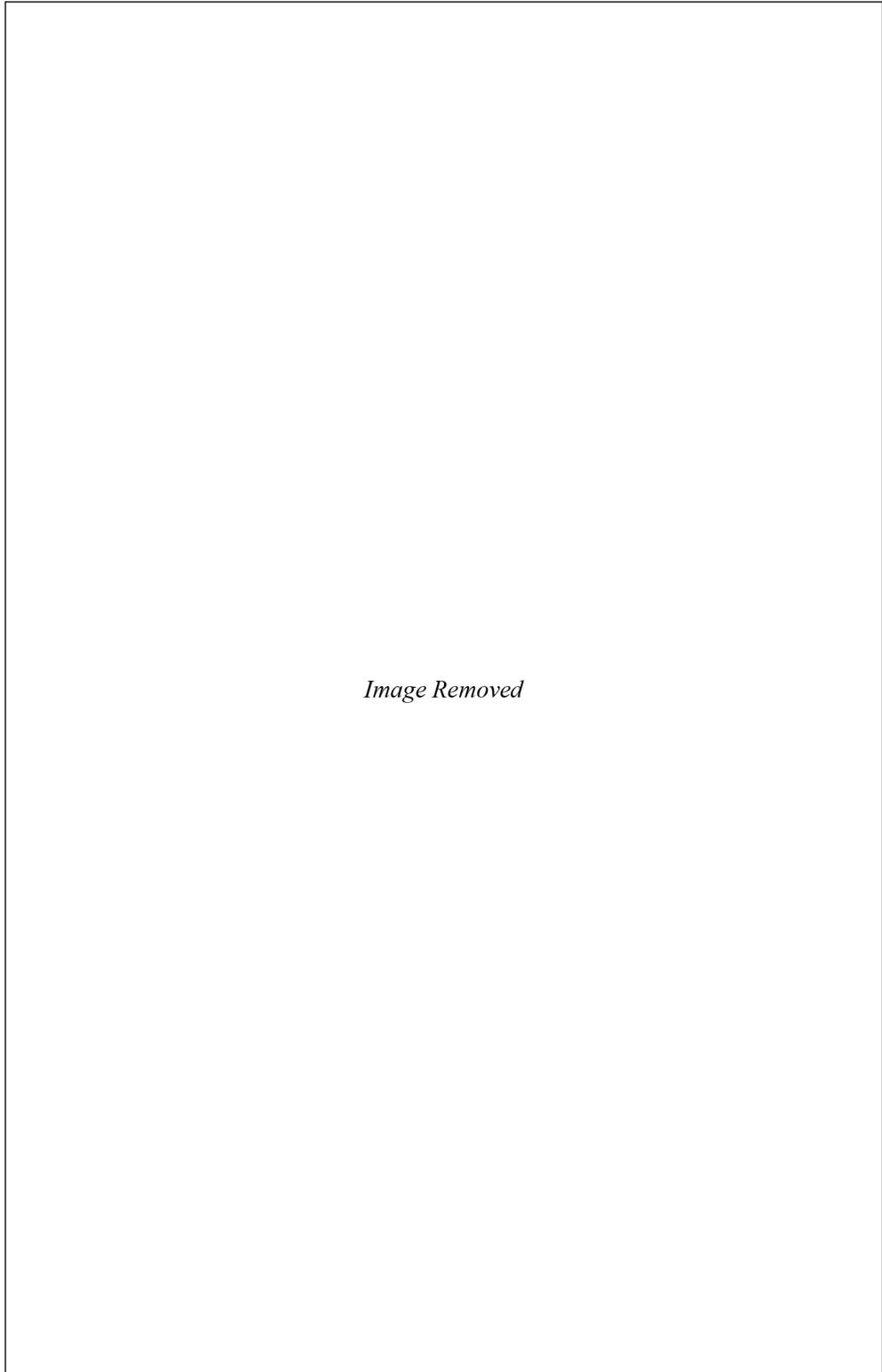


Figure 12. Stills from the *RealFlow Showreel*, 2017.

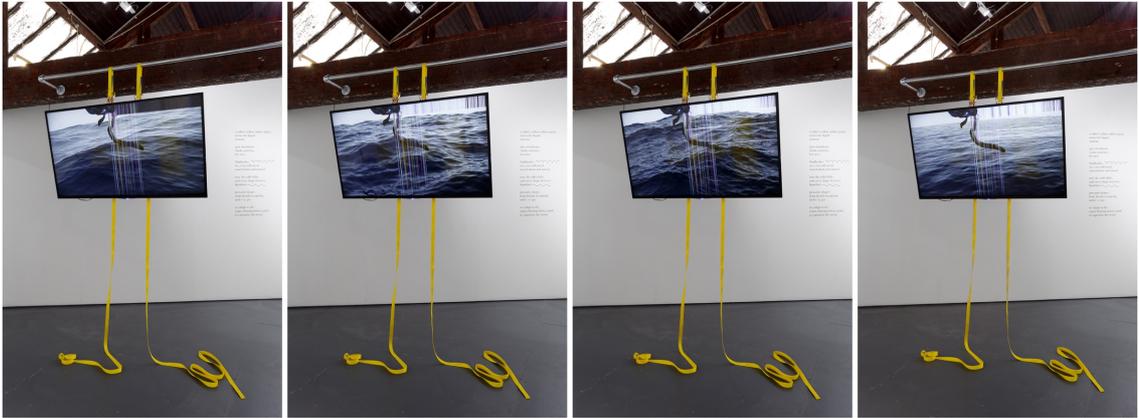
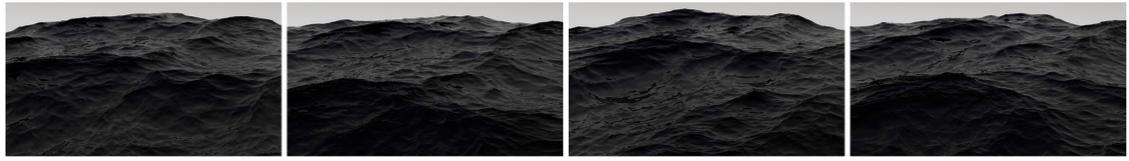


Figure 13. *Bodies of Water*, 2017. Installation shots from serf, Leeds, showing 3D CGI loop on suspended, cracked screen.



BoW\_V.1\_1.png

BoW\_V.1\_2.png

BoW\_V.1\_3.png

BoW\_V.1\_4.png

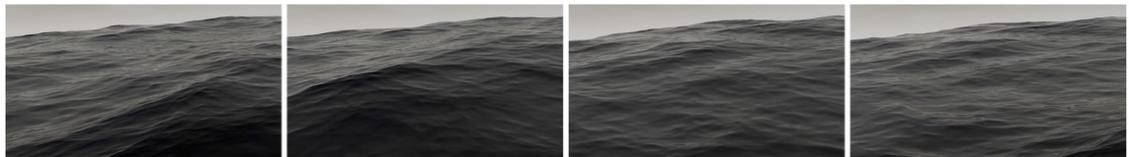


BoW\_V.1\_5.png

BoW\_V.1\_6.png

BoW\_V.1\_7.png

BoW\_V.1\_8.png

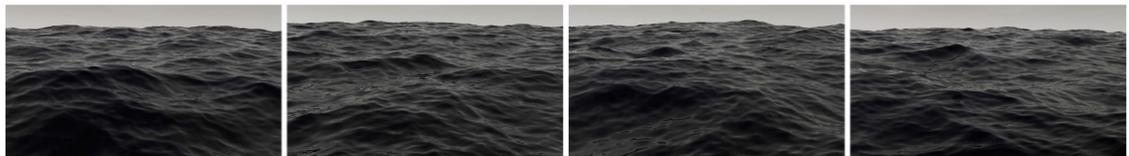


BoW\_V.1\_9.png

BoW\_V.1\_10.png

BoW\_V.1\_11.png

BoW\_V.1\_12.png

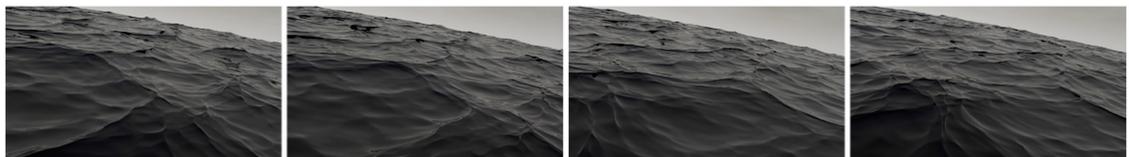


BoW\_V.1\_13.png

BoW\_V.1\_14.png

BoW\_V.1\_15.png

BoW\_V.1\_16.png



BoW\_V.1\_17.png

BoW\_V.1\_18.png

BoW\_V.1\_19.png

BoW\_V.1\_20.png

Figure 14. Animation stills from *Bodies of Water*, 2017.



Figure 15. *Bodies of Water*, 2017. Installation shot from serf, Leeds.



Figure 16. *Bodies of Water*, 2017. Installation shot from serf, Leeds.



Figure 17. *Bodies of Water*, 2017. Installation shots from serf, Leeds.

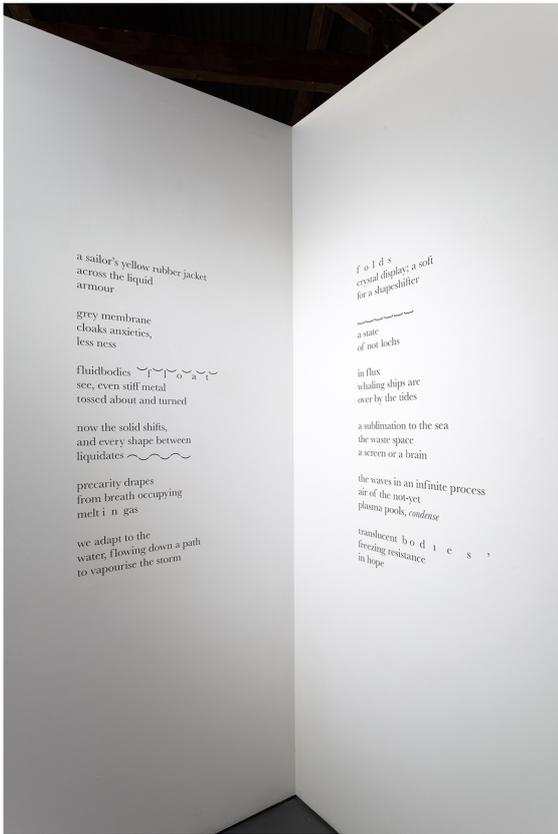


Figure 18. *Bodies of Water*, 2017. Installation shots from serf, Leeds.

### **PART 3 – On Material Transformations and Rendering in *The Flashes***

**BANKSWOMAN (L.)**

A female employed at lank to pick the stones from and to clean the coals for the market.

**BROW. 1. (L.)**

An underground roadway leading to a working-place, driven either to the rise or to the dip.

**DATLERS (L.)**

Men who work underground, not being contractors, and are paid by the day.

**FOLLOWING DIRT (L.)**

Loose shale, &c., in a thin bed forming the roof of a coal seam, which has to be taken down in the workings in order to prevent it falling and thereby causing accidents.

**MINGE or MINGY COAL (L.)**

Coal of a tender nature.

**SHUTTLES (L.)**

Natural cracks running at right angles to the dip of the strata.

**SWAG (L.)**

Subsidence or weighting of the roof.

**TEEMING TROUGH (L.)**

A cistern into which the water is pumped from a mine.<sup>130</sup>

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<sup>130</sup> William Stukeley Gresley, *A Glossary of Terms Used in Coal Mining* (E. & F.N. Spon, 1883).

In ‘Ecocritique and the Materialities of Animation’, Sean Cubitt writes that, at its most fundamental, ‘animation, including animation pre-dating the invention of cinema, requires only two raw materials: light and time’.<sup>131</sup> It is through combinations of these two intangible entities that a world of the senses comes into being. Today’s computer-generated animations, made possible by complex relationships between software and hardware, take that which is ostensibly intangible—text, code, bits—to produce images that provoke a haptic visuality, a mode of looking in which ‘the eyes themselves function like organs of touch’.<sup>132</sup> As such, CGI is a process of transformation where, ‘what was immaterial, penumbral, crystalizes from the air into solid, tangible form: reification becomes realization — immaterial physicality’.<sup>133</sup>

The final practice-based project produced and presented as part of this research, *The Flashes*, thematises the processes of material transformation that CGI animation engenders, foregrounding in particular the process of rendering. Moreover, it attempts to frame these material shifts alongside the broader shifts in labour practices that digital media have provoked. Notably, unlike previous practice-led experiments, though too concerning global networks of image production, *The Flashes* is geographically specific. While it has been presented in several iterations, it principally comprises of 3D computer-generated animations and a series of images made using coal dust and ink. These images are screen-printed onto Japanese Kozo paper that is 95cm x 65cm, an image size selected due to its approximate ratio of 16:9, the standard aspect ratio for televisions, computer monitors and the international standard format of HDTV.

## Rendered

Rendering describes the final step in the production of a computer-generated image or animation—the moment of crystallisation. The German word for rendering, Bildsynthese (image synthesis), is particularly apt in that it suggests the compounding of all the different elements which constitute a scene or file into one, discreet image. Depending on available computer processing speed, GPU power, and scene complexity, rendering is a process of indeterminate length in which the computer calculates all the elements of lighting, surface and texture contained within the frame of the virtual camera. To render is to take a detailed model or scene from the viewport of the software and transform this into an image-object that appears

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<sup>131</sup> Sean Cubitt, ‘Ecocritique and the Materialities of Animation’ in *Pervasive Animation*, ed. Suzanne Buchan (Routledge, 2013), pp. 94-114 (p. 95).

<sup>132</sup> Marks, p. 162.

<sup>133</sup> Michael Betancourt, ‘Automated Labor: The “New Aesthetic” and Immaterial Physicality | CTheory’ <[http://ctheory.net/ctheory\\_wp/automated-labor-the-new-aesthetic-and-immaterial-physicality/](http://ctheory.net/ctheory_wp/automated-labor-the-new-aesthetic-and-immaterial-physicality/)> [accessed 6 February 2020].

as if material and tangible. As the computer writes the image into the designated file format, its ‘potentiality’ is also compressed: the image is fixed at one particular point along a timeline of action and from one particular perspective. Once rendered, the image is no longer confined to 3D visualisation software, but as a JPEG, PNG, TIFF etc., it can be uploaded, shared, reproduced, printed and exhibited, thus joining the endless flow of digital artefacts that make up our contemporary image worlds.<sup>134</sup>

The verb, to render, is ‘to cause to be or become’.<sup>135</sup> Denoting processes of translation and transformation, rendering evokes distinctly material and laborious ways of grasping and handling the world: casting images, plastering walls and boiling down animal products to generate something new (lard, candles, soap). Each is a process of radical transformation which, like all transformations, requires energy in order to catalyse change. As such, rendering is a fitting description for the synthesis of computer graphics because it emphasises not only the crystallisation of code into human-readable image but it also underlines how this process is reliant on the physical computing components and the electrical grid that lie behind all contemporary media networks. This, as Jane Bennett points out, is formed out of a complex web of interconnected material and immaterial nodes:

To the vital materialist, the electrical grid is better understood as a volatile mix of coal, sweat, electromagnetic fields, computer programs, electron streams, profit motives, heat, lifestyles, nuclear fuel, plastic, fantasies of mastery, static, legislation, water, economic theory, wire, and wood — to name just some of the actants.<sup>136</sup>

Thus, beyond light and time, 3D CGI is borne out the same systems, both biological and industrial, in which our everyday realities are embedded: ‘Animation techniques are highly material in an environmental sense as well as in terms of labour and toxicology’.<sup>137</sup> As Roland Barthes once said of plastic, rendering a CGI image performs the magical operation of transmutating matter: ‘At one end, raw telluric matter, and at the other, the finished human object; and between these two extremes, nothing; nothing but a transit, hardly watched over by an attendant in a cloth cap, half-god, half-robot’.<sup>138</sup> *The Flashes* constitutes an attempt to make visible the point where the intangibility or immateriality of the 3D rendered image, its own

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<sup>134</sup> While image files may be opened and altered in an image editing software, unless the user has access to the original 3D file (commonly .obj), they can only ever edit the final image and not the original 3D scene itself.

<sup>135</sup> ‘Render, v.’, *OED Online* (Oxford University Press) <<https://www.oed.com/view/Entry/162386>> [accessed 9 February 2020].

<sup>136</sup> Jane Bennett, *Vibrant Matter: A Political Ecology of Things* (Duke University Press, 2010), pp. 24–25.

<sup>137</sup> Cubitt, ‘Ecocritique and the Materialities of Animation’, p. 95.

<sup>138</sup> Roland Barthes, *Mythologies* (Hill and Wang, 1972), p. 97.

haptic visuality, the material basis of its existence and the conditions of its production all intersect.

### Third Landscapes

The term ‘flash’ or ‘flashes’ refers, typically in North West England, to lakes, wetlands and marshes which flood land once degraded by coal mining subsidence and waste tipping. These wetlands can therefore be considered just one of the many unintended consequences of the industrial revolution, a period in which mechanised processes irreversibly altered the physical and psychosocial landscape of the region. In the short text, ‘A Place Weeping’, John Berger coins the neologism *landswept* to describe, ‘a place or places where everything, both material and immaterial, has been brushed aside, purloined, swept away, blown down, irrigated off, everything except the touchable earth’.<sup>139</sup> Like all such mining practices, the large scale extraction of coal churned up and degraded the land, taking from it that which was deemed valuable and leaving behind that which was not. In ‘A Sedimentation of the Mind: Earth Projects’, artist Robert Smithson talks about the technologies and tools developed by humans to move earth for such purposes:

Common shovels, awkward looking excavating devices, what Michael Heizer calls ‘dumb tools’, picks, pitchforks, the machine used by suburban contractors, grim tractors that have the clumsiness of armoured dinosaurs, and plows that simply push dirt around [...] They seem to turn the terrain into unfinished sites of organized wreckage. A sense of chaotic planning engulfs site after site.<sup>140</sup>

To look at these unassuming wetlands today, it is difficult to envisage the brute physical forces that formed them. The passage of time, the outsourcing of fossil fuel extraction and regeneration schemes initiated by Greater Manchester County Council mean that nature has since softened the sharp rises and hollow dips of the coalfields. Where there was once only desolate wasteland, life now flourishes: ‘open water, reedbed, fen, rough grassland, wet meadow and carr woodland [...] a diverse range of flora, invertebrates, bats and bird species’.<sup>141</sup>

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<sup>139</sup> John Berger, ‘Threepenny: Berger, A Place Weeping’  
<[https://www.threepennyreview.com/samples/berger\\_su09.html](https://www.threepennyreview.com/samples/berger_su09.html)> [accessed 23 September 2019].

<sup>140</sup> Robert Smithson, ‘A Sedimentation of the Mind: Earth Proposals’  
<<https://www.artforum.com/print/196807/a-sedimentation-of-the-mind-earth-proposals-36602>>  
[accessed 6 February 2020].

<sup>141</sup> ‘Wetlands’ <<https://www.wigan.gov.uk/Docs/PDF/Resident/Planning-and-Building-Control/Wetlands.pdf>> [accessed 6 February 2020].

French horticulturalist Gilles Clément refers to these kinds of left-over spaces as ‘tiers paysage’ or ‘third landscapes’, spaces defined as:

[A]n undetermined fragment of the Planetary Garden [that] designates the sum of space left over by man to evolution—to nature alone. Included in this category are left behind (*délaissé*) urban or rural sites, transitional spaces, neglected land (*friches*), swamps, moors, peat bogs, but also roadsides, shores, railroad embankments, etc.<sup>142</sup>

Once no longer deemed economically useful, the ravaged ground that the flashes now occupy was left untended, allowing all manner of flora and fauna to return, unobserved. As such, third landscapes such as the flashes also speak of the future and of life beyond human intervention:

The variety of species in a field, cultivated land, or managed forest is low in comparison to that of a neighbouring ‘unattended’ space. From this point of view, the Third Landscape can be considered as the genetic reservoir of the planet, the space of the future.<sup>143</sup>

### **Constructing a Landscape**

Inspired by the interrelationship between the North American landscape and the psychology of its inhabitants, a connection forever changed by industrialisation, Smithson described his earth projects—artistic interventions in which he overturned, shaped and reformed land—as artworks that deal in an ‘abstract geology’. So too does *The Flashes* emerge out of an ‘abstracted geology’, yet one which begins after the churned-up earth has been left to settle and stretches the notion into the digital realm through the process of constructing a landscape within 3D visualisation software.

I began the project by recreating the flashes wetlands within Cinema4D; first generating a topographical plane which mimicked the local geography, before cloning and randomly distributing 3D models of reeds, grasses and trees across it, thereby approximating the randomness of nature. In the viewport of the software, a physical landscape started to emerge. Such was the intricacy of these 3D models, ones composed of thousands of individual polygons, that the rendering process itself took on particular significance. The complexity of a scene, the desired resolution of an image / animation and available computing power are all contributing factors in final rendering times; a process that can take anything from several seconds to several months. Rendering is an energy-intensive process which makes the usually

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<sup>142</sup> Gilles Clément, ‘The Third Landscape’ <<http://www.gillesclement.com/art-454-tit-The-Third-Landscape>> [accessed 31 October 2019].

<sup>143</sup> Jussi Parikka, ‘Dust and Exhaustion: The Labor of Media Materialism’, *CTheory*, 2013, <<https://journals.uvic.ca/index.php/ctheory/article/view/14790>> [accessed 1 February 2020].

seamless functioning of the computer, the *thingness* of computation, apparent to the user; calculating images heats up the hard drive, causing the internal fans of the machine to whirr. Though I produced several tests which exploited the power of my laptop to its full extent, this method would prove beyond its capabilities. Professional animation studios accelerate this time and energy intensive process by employing render farms, a wonderfully bucolic name to describe what is essentially a computer server centre. A render farm describes the outsourcing of image rendering to dedicated machines, ones which harvest individual frames in an animated sequence. Though some animation studios have on-site render farms, most outsource the process thus, much like many other physical processes and indeed the extraction of fossil fuels, *thingness* happens elsewhere.<sup>144</sup> In recognition of the material resources which power this process, the customer is typically charged in GHz used per hour (total energy consumed rather than the total number of frames rendered). Jussi Parikka underlines the ways in which labour, bodies and matter converge in practices of outsourcing so-called immaterial media:

Outsourcing is historically connected to the emergence of consumer discourses that emphasize the lightness and mobility of digital technology. But it hides the outsourced hardness. Therefore, this *harder* perspective flags that supportive mechanism of labor on which immateriality can exist.<sup>145</sup>

Lacking the kinds of resources available to professional animation studios, I navigated the problem of resource-intensive rendering by employing a particular method called hardware rendering. Hardware rendering generates an image file of exactly what is seen in the viewport of the software. As such, it avoids the time-consuming calculations needed for global illumination and ambient occlusion, both power-hungry staples of photorealistic image synthesis. With this method, the image materialises in mere seconds and inevitably leads to a kind of image quality quite unlike that seen in commercial productions. Though still recognisably three-dimensional, the image has less depth, less convincing shadows and highlights, less ‘body’. Furthermore, behind-the-scenes details which show how a scene is constructed remain intact; the sharp black outlines of polygon shapes and low-resolution textures reveal what is usually expressly hidden by animators, namely, the framework upon which the image hangs. In *Hollywood Flatlands*, Leslie suggests a similar move to abstraction in the Warner Brothers animations of 1940s, one partly driven by economic imperatives since, ‘stylized world[s] of abstract shapes and thin lines had the advantage of being cheap’.<sup>146</sup> As

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<sup>144</sup> Architect Liam Young thematises these processes in *Renderlands*, 2017, a documentary tracing how design studios outsource production to Bangalore. ‘Graham Foundation > Grantees > Liam Young’ <<http://www.grahamfoundation.org/grantees/5589-renderlands>> [accessed 13 February 2020].

<sup>145</sup> Parikka, ‘Dust and Exhaustion’.

<sup>146</sup> Esther Leslie, *Hollywood Flatlands: Animation, Critical Theory and the Avant-Garde* (Verso, 2004), p. 293.

such, we can see how the antagonism between realism and resources that characterises the ‘fetish value of high-resolution’ animation today is no new phenomenon.

The end result of hardware rendering is an animation that sits somewhere between the illusion of another, fully formed physical, sensory space like our own and a theatre set made up of multiple layers of two-dimensional panels. Yet, as Power suggests, these kind of ‘compromises’ can be productive strategies for animators:

[...] material constraints can have creative advantages, and often lend a medium its charm, requiring artists/animators to adopt expressive solutions.<sup>147</sup>

Finally, once rendered, I produced a soundtrack to accompany the animation, the aim of which was to invoke something akin to a textural white noise. Built up in layers comprising of my own low-fi field recordings and found-audio plundered from the internet—in both cases, indiscriminate sounds like the wind through grasses, the slow flow of water in a brook—this digital-analogue noise was an attempt to underline the ‘immaterial physicality’ of the animation.

### **The Flashes**

In the second stage of the project, I lifted these digitally constructed landscapes from the screen and translated them into a material, bodily realm; a process of taking ‘what was immaterial, penumbral’ and crystallising it ‘from the air into solid, tangible form’.<sup>148</sup> This was largely done through experimentation with various installation formats and a series of prints using coal dust. It can be said that coal, a material innocent in itself, is one that is overly scripted, its physical properties and symbolic associations previously exploited by artists such as Jannis Kounellis, Joseph Beuys, David Nash, Tania Kovats. More recently, the media art duo YoHa (Matsuko Yokokoji and Graham Harwood) presented *Coal Fired Computers*, a project intended to highlight the connections between digital technology, health, labour and fossil fuels. YoHa write that: ‘Coal fired energy not only powers our computers here in the UK, but is integral to the production of the 300,000,000 computers made each year. 81% of the energy used in a computer’s life cycle is expended in the manufacturing process, now taking place in countries with high levels of coal consumption’.<sup>149</sup> In dust form, coal belongs to a set of materials that Lucy Lippard described as having a thinness, both literal and allusive, claiming that, ‘such themes as water, steam, dust, flatness, legibility, temporality, continues

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<sup>147</sup> Power, p. 129.

<sup>148</sup> Betancourt, ‘Automated Labor’.

<sup>149</sup> ‘Coal Fired Computers | YoHa’ <<http://yoha.co.uk/cfc>> [accessed 6 February 2020].

the process of ridding art of its object quality'.<sup>150</sup> Used in *The Flashes*, dust is understood as the 'minimum recognizable entity of material transformation and circulation',<sup>151</sup> and coal deployed as metaphor for the transformation of matter into energy (fission) and energy into matter (fusion), thus signifying both tangible and intangible shifts in the physical landscape and in labour practices.

The prints were produced by taking a still from the animation and transferring this onto paper using transparent emulsion. A line of dust was then applied to one edge of the paper before being tipped, causing it to fall across the surface of the paper. Wherever there was wet emulsion, the coal dust stuck and the image 'materialised'. Here, dust became a particularly apt metaphor for the apparent immaterial physicality of CGI. As Steven Connor writes:

Dust-like substances can give contours or clarifying outlines to other things. Thus, dust, itself formless and edgeless, can both dissolve form and disclose it, like the snow that, in the right amount, can give to things a magical new clarity of outline [...].<sup>152</sup>

The printing process, as one might imagine, was messy and difficult to control. Sooty traces were left wherever contact was made leaving a shadow across the image surface, fingerprint smudges at the paper's edge and a smoky halo around the crisp lines of the original vector image. It can be said that artistic practices that produce and present physical artefacts in concert with digital moving images are attempting to deny the *acheiropoieta* (that which is made without hands) often attributed to digital media. As Bruno Latour writes in *Iconoclash*:

More generally, the critical mind is one that shows the hands of humans at work everywhere so as to slaughter the sanctity of religion, the belief in fetishes, the worship of transcendent, heaven-sent icons, the strength of ideologies. The more the human hand can be seen as having worked on an image, the weaker is the image's claim to offer truth.<sup>153</sup>

Disrupting the 'perfection' of the digital was a similarly thematised in the 2017 work, *Plasmatic*.<sup>154</sup> In this, I utilised the same algorithm that was used to produce the forms in *Softbodies*. However, instead of using a simple texture to 'wrap' these forms, I created my own using high-resolution scans of the surface of the actual latex sheets that formed the sculptures in *Softbodies*. Bruised and oxidised, marked by fingerprints and nicked by metal, the latex

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<sup>150</sup> Lippard, p. 34.

<sup>151</sup> Jennifer Gabrys, 'Telepathically Urban', in *Circulation and the City: Essays on Urban Culture*, eds. Alexandra Boutros and Will Straw (Montreal: McGill-Queen's University Press, 2008), p. 49.

<sup>152</sup> Steven Connor, 'Pulverulence | Steven Connor' <<http://cabinetmagazine.org/issues/35/connor.php>> [accessed 6 February 2020].

<sup>153</sup> Bruno Latour, *On the Modern Cult of the Factish Gods* (Durham NC ; London: Duke University Press Books, 2010), p. 71.

<sup>154</sup> See appendix, pp. 178-182.

surface represented the passage of time and a distinct material vulnerability. Applied to a 3D model and animated using the soft bodies algorithm, the untouched reality of the screen was thereby disturbed—made human—undermining ‘image’s claim to offer truth’.<sup>155</sup> In *The Flashes*, the prints rather represent various stages of material transformation; from wasteland to wetlands to computer simulation, from coal mining to mouse-clicking to coal-dust, from material to immaterial and back again.

The final element of the work was the addition of captions to the animation, ones lifted from a *Glossary Of Terms Used In Coal Mining* published in 1883. Terms now obsolete and largely unintelligible, they recall people, processes, roles and raw materials from the past. The great-granddaughter of coal miners on both sides of the family, my tools of abstract geology are not ‘awkward looking excavating devices’ but hardware and software, my actions not digging and excavating, but clicking and typing. By constructing a 3D CGI animation of a physical space, albeit one that is stylised and simplified, I aimed to represent shifts from industrial production—that powered by the sweat of brows and the grind of heavy machinery which formed the flashes in the first place—to immaterial production—that powered by the supposed light and clean machines of the information age. Freed from these kinds of physical labour, partly through the problematic outsourcing of such processes to other parts of the world and indeed to automation, the material realities of my everyday are vastly different to those of the past; and yet, the material basis which powers CGI is of the same stuff. Thus, though these media technologies might generate feelings of weightlessness and displacement in the user—dreams of having broken free of material inconvenience—they remain tethered to the land and labouring bodies. As such, *The Flashes* is a manifestation of what Jussi Parikka calls the geology of media, an observation that the ‘deep time resources of the earth are what makes technology happen’.<sup>156</sup> To underline these material realities through 3D CGI and installation is not to reject technology but rather a contemporary reinvigoration of Smithson’s argument:

By refusing ‘technological miracles’ the artist begins to know the corroded moments, the carboniferous states of thought, the shrinkage of mental mud, in the geologic chaos—in the strata of aesthetic consciousness. The refuse between mind and matter is a mine of information.<sup>157</sup>

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<sup>155</sup> Latour, p. 71.

<sup>156</sup> Jussi Parikka, *The Anthrobscene* (University of Minnesota Press, 2014), p. 3.

<sup>157</sup> Smithson, ‘A Sedimentation of the Mind’.

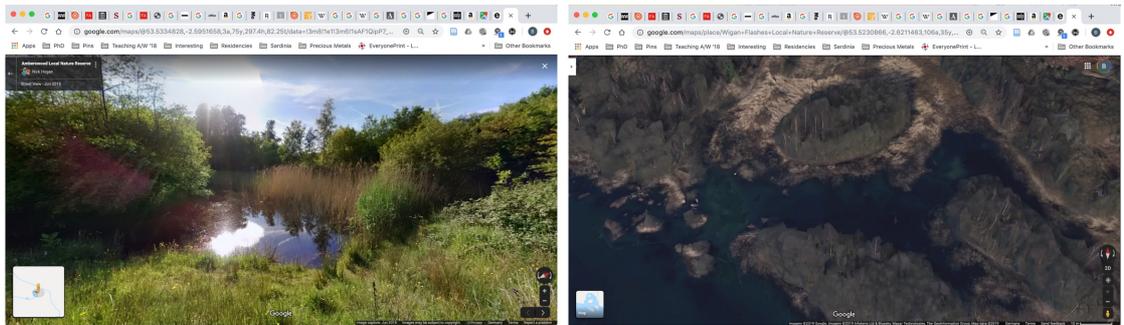


Figure 19. Screenshots of the flashes in Google Maps, Wigan, Greater Manchester.



Figure 20. Postcards depicting the flashes and waste heaps from the Wigan coalfields. Wigan and Leigh archives, date unknown.

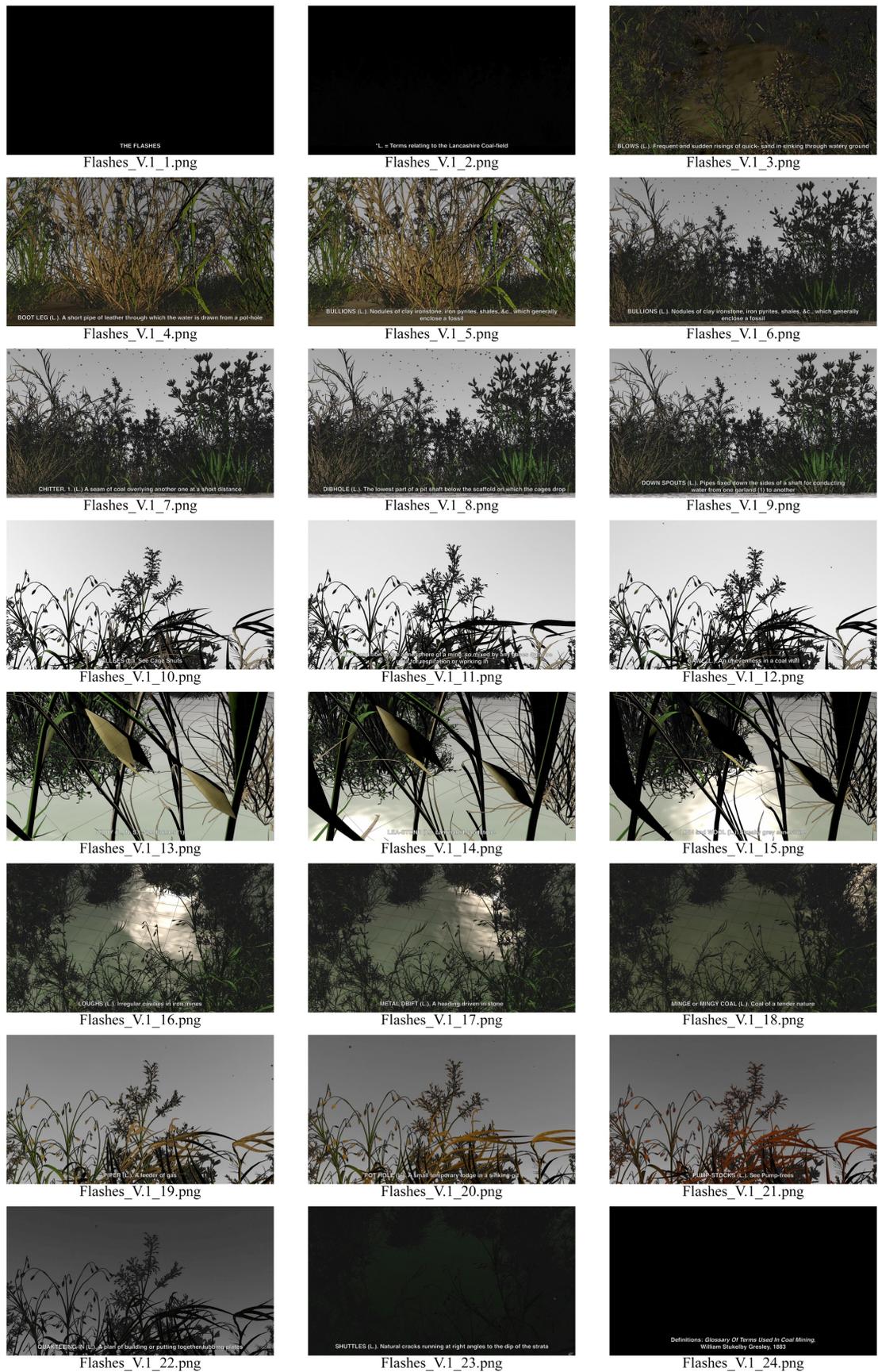


Figure 21. Animation stills from *The Flashes*, Version 1, 2019.



Flashes\_V.2\_1.png

Flashes\_V.2\_2.png

Flashes\_V.2\_3.png

Flashes\_V.2\_4.png

Flashes\_V.2\_5.png

Flashes\_V.2\_6.png



Flashes\_V.2\_7.png

Flashes\_V.2\_8.png

Flashes\_V.2\_9.png

Flashes\_V.2\_10.png

Flashes\_V.2\_11.png

Flashes\_V.2\_12.png



Flashes\_V.2\_13.png

Flashes\_V.2\_14.png

Flashes\_V.2\_15.png

Flashes\_V.2\_16.png

Flashes\_V.2\_17.png

Flashes\_V.2\_18.png



Flashes\_V.2\_19.png

Flashes\_V.2\_20.png

Flashes\_V.2\_21.png

Flashes\_V.2\_22.png

Flashes\_V.2\_23.png

Flashes\_V.2\_24.png

Figure 22. Animation stills from *The Flashes*, Version 2, 2019.



Figure 23. *The Flashes*, 2019. Installation shots from Kreuzstraße 67C, Braunschweig, Germany, 2020.

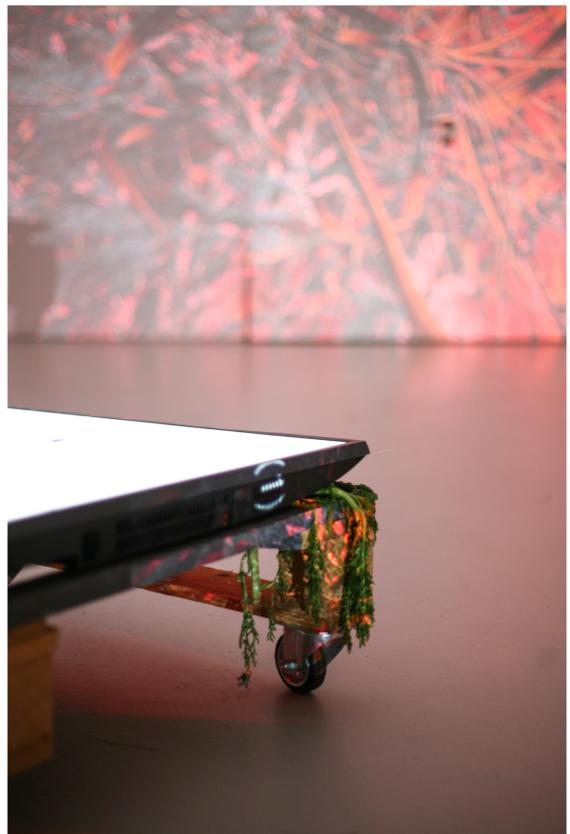


Figure 24. *The Flashes*, 2019. Installation shots from Kreuzstraße 67C, Braunschweig, Germany, 2020.

**Chapter 2**  
**Corpsing: CG Bodies, Ed Atkins and Grotesque Realism**

#### **04.04.18 - Tutorial**

I type the words ‘Cinema4D Tutorial’ into YouTube. My search results in an astonishing 1,390,000 hits. I’m not looking for anything in particular, but trends start to emerge as I scroll. I see tutorials about visual effects, ones which use physical simulators generate and animate things like water, cloth, smoke, fire; tutorials which relate to the staging of objects in virtual environments such as lighting, camera angles and perspective; tutorials with step-by-step instructions on how to model and texture objects, living things and environments like buildings, consumer goods, the natural world; tutorials showing one how to craft and manipulate human bodies. There are videos describing how to mould faces, limbs and torsos ‘from scratch’ using a polygon mesh, others about texturing these models with realistic skin shaders that utilise ‘sub-surface scattering’ to replicate the way that light penetrates the semi-translucent layers of human skin and others about how to duplicate dewy eyelashes along CG eyelids. There are still more about ‘rigging’ models—akin to positioning joints on a puppet—so that they can be invested with the approximation of life through movement. Finally, after one has mastered the challenge of visualising a three-dimensional human body so detailed that it has achieved a level of realism that is (almost) indistinguishable to a photograph, there are tutorials which show one how to shrink, stretch, distort, fragment and destroy these bodies in ways impossible IRL.

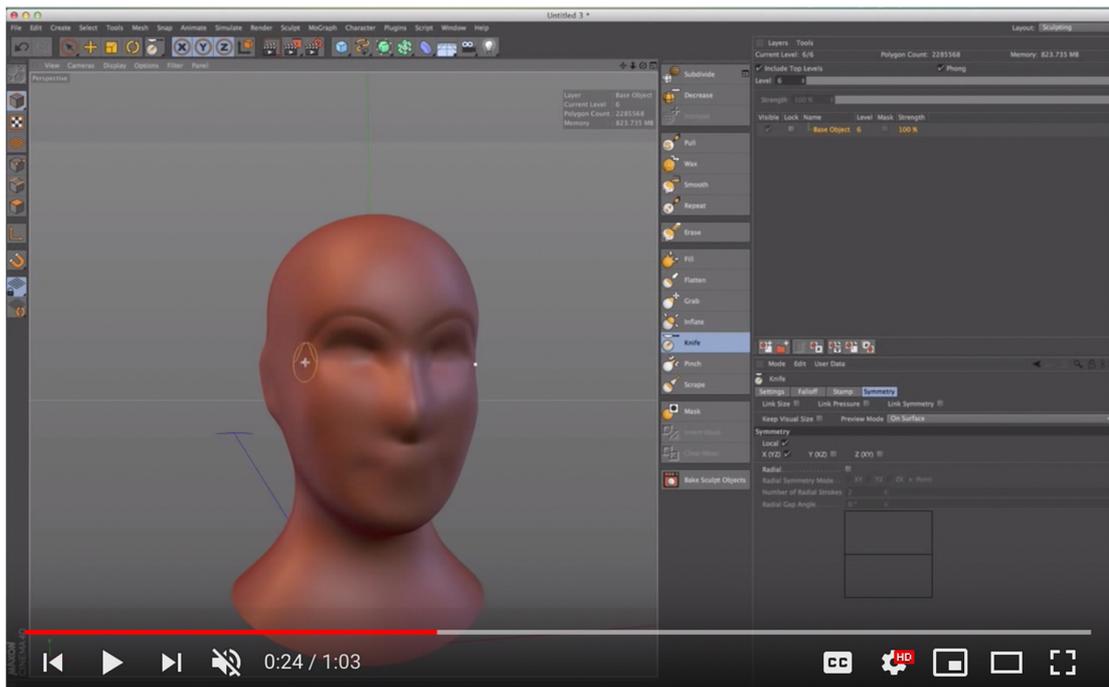


Figure 25. Top: Screenshot from YouTube of tutorial ‘Tip106 - Sculpting Part 6’ uploaded by Cinema 4D by Maxon. Bottom: Screenshot from Youtube tutorial ‘Tip94 Faster Subsurface Scattering in CINEMA 4D R13’ uploaded by Cinema 4D by Maxon.

In this chapter, I further investigate questions raised through the practice of working with and through 3D computer-generated images, asking: How do digital technologies refigure bodies, labour practices and materiality in particular, and how might 3D CGI reveal these shifts in turn? I focus on the representations of computer-generated bodies occupying the work of artist Ed Atkins. In recent years, several artists, notably Sondra Perry, Kate Cooper and Cécile B. Evans, have employed CGI avatars in a variety of animations and multimedia installations. However, I argue that no artist has explored the particular relationship between the body and its 3D computer-generated representations as extensively as Atkins. Known for creating animations which typically feature a single computer-generated protagonist and the installations which extend out from them, Atkins employs 3D CGI as a way to reckon with issues eternal—embodiment, the ethics of representation, the human condition—and the thoughts, desires and anxieties particular to our present moment—one of political and social upheaval catalysed by rapid technological advance. Ultimately, I argue that by defamiliarising CG bodies through a visual and sensual mode of grotesque realism, Atkins takes what Marks calls a ‘materialist approach’ to so-called virtual media, one which asserts that it is ‘valuable to restore the complexity’ of the interconnections between embodiment and digital technology and in doing so, deny the ‘false transparency attributed to digital media’.<sup>158</sup> How is 3D CGI uniquely positioned to pose these questions anew and just how does Atkins utilise it in order to do so?

### **CG Bodies**

3D computer-generated (CG) bodies populate, in increasing abundance, commercial—and more recently artistic—platforms. Gazing out, unseeingly, from myriad LCD screens, these imitations of humans and humanity are mirrors which entertain and instruct, vessels, into which we might momentarily and imaginatively pour ourselves, and proxies for our physical bodies which remain elsewhere. Like crash test dummies and literary characters, they are capable of simulating a fragile corporeality to play out speculative scenarios while we watch on from behind the safety of the screen. Despite this, their flesh does not age or decay in any way analogous to human skin, muscle and bone. Having no real autonomy of their own, 3D CG people are friendly in the service of corporate interests, fronting Instagram accounts, endorsing products and servicing customers. Whether rendered cartoon-like or hyper-real, CG bodies confuse the usual orders of solid and fluid, soft and hard, dense and hollow, natural and artificial, living and dead. Those which achieve photographic realism can be said to have

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<sup>158</sup> Laura U. Marks, *Touch: Sensuous Theory and Multisensory Media* (University of Minnesota Press, 2002), p. 179.

successfully traversed the uncanny valley, realising a seeming thickness of flesh and an authenticity made possible by the increasing sophistication of hardware and software to render depth, texture and movement.

We might think of these bodies and how they constructed as akin to those moulded out of clay by Pygmalion or, perhaps more accurately, as screen-based Frankenstein's monsters, fashioned out of a dense composite of elements begged, borrowed and stolen from myriad digital platforms. Today, it would appear that through CGI, the 'ability to give life to an animal as complex and wonderful as man'<sup>159</sup> draws ever closer and with it, the anxieties that simulated life incites. Yet, despite summoning that which is embodied, CG bodies remain digital and thus, unlike the monster in Shelley's fictional world, bound to the screen. As hyper-representations, they are, to borrow the words of Atkins, 'both ridiculously alive and yet completely dead'.<sup>160</sup>

Increasingly deployed in entertainment, advertising, medicine and military fields, as the technology needed to generate complex three-dimensional visual representations of the world has become more widely accessible, 3D computer-generated representations of human bodies and faces have started to appear in the art world. Since humans are exceedingly complex to visualise accurately, the definitive role played by an increased accessibility to hardware and software cannot be understated, here acknowledged by Atkins who notes how digital tools amount to no less than a fundamental change in the art making—and therefore thinking—process itself:

[T]he convenience and speed of computing as it has emerged in the consumer market over the past few years that has really made the difference for me. The kind of work that it became possible to make allowed for an immediacy of thought translated into image; the gap between what I fantasize and the realization of that fantasy—albeit within the fantasy of the computer—opened a huge new terrain of possibility.<sup>161</sup>

The 3D CG bodies with which we are perhaps most familiar are those which populate cinema and television, advertising and social media, the workplace and public 'non-spaces' such as airports and shopping centres. Though crafted within the same 3D visualisation software and circulating within shared systems of production and dissemination, remote and global, CG bodies now present artists with a novel way of expressing life itself.

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<sup>159</sup> Mary Shelley, *Frankenstein: Or the Modern Prometheus - The 1818 Text* (Oxford ; New York: Oxford University Press, 2008), p. 87.

<sup>160</sup> Fondation Louis Vuitton, 'Ed Atkins' <<https://www.fondationlouisvuitton.fr/en/the-collection/artists/ed-atkins.html>> [accessed 01 March 2019].

<sup>161</sup> 'An Intimately, Dupliciously Reflexive Experience', *Flash Art*, 2014 <<https://www.flashartonline.com/article/an-intimately-dupliciously-relexive-experience/>> [accessed 01 March 2019]

## 21.11.17 - Old Food

I enter a space that feels like a large foyer on the first floor of the Martin-Gropius-Bau in Berlin. I am here to see Ed Atkins' exhibition, *Old Food*. In the corner of the room a slab of wood, reminiscent of an offcut from a kitchen counter mounted to the wall and laser engraved with text, reads:

Your body is important to museums. If you didn't get a ticket walking in, they are instead using advanced invisible systems to measure you, laser trip wires, cameras with automated software to count you. It sounds like a joke but it's not. Ask the desk. They need to move you through, nourishing its corporate body by valorizing yours into the abstract attendance. You are converted to a numerical point, the calcium of the institution, a marketing department that is like the small intestine. This is not ticket sales, which make up a small percentage of museological vitality, and why even most free nights at museums are ticketed, it's the count. Funding demands numbers, which prove success, your eyes important, this your body's intrinsic value. Views are converted to capital. YouTube converts about a dollar per thousand views - Television much higher. The marketing tendrils extend through email, tracking, leaving cookies like Hansel and Gretel to follow you. Atkins' exhibition is the bait to lure you through its body, these rooms, its maw, the digestive tract of the rooms, walls silently kneading you, lasers like cilia to move and absorb you.<sup>162</sup> [sic]

The odd register of the text, almost like a comment written by a conspiracy theorist and posted in some paranoid enclave of the internet, initially throws me. Yet, I take the bait and proceed through the adjacent portal and into the exhibition proper. Installed across all four of the rooms of the installation are rows of vast clothing rails, all heaving under the combined weight of what appear to be thousands of costumes. So dominant are these (soft) structures that they force me to carefully navigate the corridors which form between them and my body occasionally, accidentally, brushes up against cotton, nylon, silk, taffeta. They are in fact 'ready-mades' borrowed from the archives of the Deutsche Oper, their hand drawn labels—*Macbeth, The Magic Flute, Carmen*—revealing past lives. Like castoffs in a second-hand store, they hang idly, stagnating the air around them, conjuring up visions of the bodies which once animated them.

Beyond the costume racks, gazing unseeingly from a series of wall-mounted LCD screens, are a baby, a boy, a man—computer animated, naturally. Baby is naked save for a white cloth nappy but both boy and man are clothed in pseudo-medieval garb. Most curiously, they are all weeping. Simulated tears ooze from their glassy eyes before spilling down rendered cheeks. For what or whom they weep is unclear. Their sobs create a sombre backdrop to proceedings but, confined to their screen-based lodgings, I can offer no consolation. Larger

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<sup>162</sup> Press Release Martin Gropius Bau, 'Ed Atkins, Old Food, 2017'.

LED panels—so large that they gently hum and heat—show the same animated avatars, only now they move through highly stylised computer-generated landscapes. Boy tumbles into a starkly lit cell through a dirty aperture on a wall, the space empty save for an upright piano. As if prodded by an invisible puppeteer, he stumbles over to the instrument and proceeds to play a melancholy dirge (sobbing all the while). Baby, now grown giant, is dragged on tippy toes through a picture-postcard pastoral scene and into an alpine cabin, where his blown-up baby body collides with the ‘rustique’ furniture in the room (which includes a small black and white TV playing *The Bride of Frankenstein* from 1935).

The final element of this ambitious installation is a series of wall texts like the one in the antechamber. Their tone goes from the mildly patronising—a knowing nod to the conventions of the didactic museum text?—to the stilted, as if unconsciously blurted out by a text-bot that has been fed with information—on the artist, art, humans, bodies, science and the internet—but, like us, not quite understood what it all means. Lines like, ‘If everything in Atkins’ world is glossed in artificiality it’s because somehow that makes our corpulence worse’, and, ‘Like the pity we feel for creatures helpless in bowls and zoos, and their impotence to change the situation, can’t help but remind us of our own situation, our own bodies subject to the whims of others’.<sup>163</sup>

A grotesque display (successfully) eliciting an affective response in the visitor, there is something tragicomic in the culmination of all these elements. Finally, left giddy from several hours sandwiched between costume racks and weeping screens, I am spat back out the way I came in.

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<sup>163</sup> Press Release Martin Gropius Bau, ‘Ed Atkins, Old Food, 2017’.

*Image Removed*

Figure 26. Ed Atkins, *Old Food*, 2017. Installation shots from Martin Gropius Bau, Berlin, 2017.

## Ed Atkins

Exhibiting work produced using a variety of mediums since 2005, it was not until the moving-image series *Death Mask*, 2011, that Ed Atkins (b. 1983, Oxford) appeared to fully manifest an interest in the expressive potential of high-definition digital footage and punchy, synchronous sound. In a 2012 interview, Atkins describes how laptop-based technologies open up ‘the possibility for a powerful accuracy of representation that is so much more than what was possible before’ whilst acknowledging that ‘high definition reality privileges the representation of texture and surface, but at the same time the ‘body’ of the film or video has dropped away’.<sup>164</sup>

An obsession with the slipperiness of representation, how matter is increasingly mediated by the screen and what is lost and gained through processes of digitisation informs all of Atkins’ output. Moreover, a key subtext underpinning all of Atkins’ work is the preoccupation with the relationship between life and death, a motif uniquely expressed through 3D CGI, a composite medium of digital artefact and animation suggesting the ‘conquest of death’ through infinite reproducibility:

Animation cannot be thought without thinking loss, disappearance, and death [...] one cannot think the endowing with life without thinking of the other side of the life cycle – the transformation from the animate into the inanimate – at the same time, cannot think endowing with motion without thinking the other side of the cycle of movement – of metastasis, deceleration, inertia.<sup>165</sup>

The breakthrough *Us Dead Talk Love*, 2012, and *Warm, Warm, Warm Spring Mouths*, 2013, saw Atkins using 3D computer-generated imagery to construct entire moving-image works for the first time, a medium with which he has since become synonymous. In these works, central thematic concerns appear to find malleable form and the audience is first introduced to a computer animated—often floating—head / body, one which is performed by Atkins using both motion-capture technology and ventriloquised using his own voice.<sup>166</sup>

A brief confrontation with Atkins’ ‘immaterial’ avatars (a descriptor he rejects for these figures, preferring the term surrogates instead) is enough to understand that they are attempting to communicate something about bodies, about matter and immateriality, about technology and desire. But what kinds of bodies are these? What is communicated in the

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<sup>164</sup> ‘Ed Atkins “Us Dead Talk Love” at Chisenhale Gallery, London’, *Mousse Magazine*, 2012 <<http://moussomagazine.it/ed-atkins-chisenhale/>> [accessed 1 March 2019].

<sup>165</sup> Alan Cholodenko, *The Illusion of Life: Essays on Animation* (Power Publications, 1991), p. 21.

<sup>166</sup> A process of capturing movement and audio data using sensors and retrospectively applying it to a rigged 3D model.

ways—and the context within which—they are constructed and (re)presented? What is the relationship between the body of the viewer and the CGI body seen on screen?

## **Bodies in Digital Realms**

What is perhaps unique to a contemporary understanding of the human body is the way in which digital tools and networked systems extend certain aspects of sensory experience whilst suppressing others. It is a well-worn truism that digital technology has changed the ways in which we live and use our bodies—as tools of work, pleasure, communication and habitus—and moreover, how our bodies are subsequently filtered through and reorganised by these technologies, since ‘each technology not only differently mediates our figurations of bodily existence but also constitutes them’.<sup>167</sup>

Elizabeth Grosz, who has written extensively on corporeal construction and its relationship to culture, biology and gender, defines the body as being:

[A] concrete, material, animate organisation of flesh, organs, nerves, muscles, and skeletal structure which are given a unity, cohesiveness, and organisation only through their physical and social inscription as the surface and raw materials of an integrated and cohesive totality. The body is, so to speak, organically/biologically/naturally ‘incomplete’; it is indeterminate, amorphous, a series of uncoordinated potentialities which require social triggering, ordering and long term ‘administration’.<sup>168</sup>

Thus, we might think of the body as a materially cohesive whole and yet one whose boundaries are nebulous and whose malleable surface is shaped and formed through its interactions with the world. As bodies and digital devices service, sustain and produce one another in turn, these technologies can be considered, ‘prosthetic extensions of the body and their use makes possible new ways of knowing the world, along with re-formed bodies with new capacities’.<sup>169</sup> The ubiquity of ‘the cloud’ and its material impact on our lived, everyday realities, points to, as Antoine Picon argues, an erosion of the explicit division between our digital and corporeal selves. Though we are ‘inherently manifold’, Picon paints a nuanced picture of embodiment in which we are ‘existences finely distributed within various meshes, which articulate almost seamlessly the biological and the electronic.’<sup>170</sup> Why indeed, to echo

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<sup>167</sup> Vivian Sobchack, *Carnal Thoughts: Embodiment and Moving Image Culture* (University of California Press, 2004), p.136.

<sup>168</sup> Elizabeth Grosz, *Space, Time and Perversion: Essays on the Politics of Body* (New York: Routledge, 1995), p. 104.

<sup>169</sup> Ian Burkitt, *Bodies of Thought: Embodiment, Identity and Modernity* (SAGE, 1999), p. 4.

<sup>170</sup> Antoine Picon, *Ornament: The Politics of Architecture and Subjectivity* (Chichester, West Sussex: Wiley, 2013), p. 130.

Donna Haraway, ‘should our bodies end at the skin?’<sup>171</sup> These ideas are reiterated by Sara Ahmed who, in *The Cultural Politics of Emotion*, argues that an understanding of the world is formed by our interactions with other bodies; not just biological but technological, architectural, corporate: ‘Bodies take the shape of the very contact they have with objects and others’.<sup>172</sup> But what shape do bodies take when telepresence, facilitated by technologies which mediate and substitute the senses, form an increasingly dominant aspect of our ‘contact’ with the world?

What is as obvious as the fact that digital technologies have shifted an understanding of bodies and embodiment but is far less acknowledged is the way in which it privileges certain kinds of bodily being-in-the-world over others. Harry Sanderson argues that the ‘application of technology is one where distance is produced and maintained’,<sup>173</sup> thus resulting in a reality in which the visibility of certain kinds of bodies is heightened while others diminished; a process which ultimately constitutes a violent erasure. Erasure plays a foundational role in the utopian dream of digital technology as a liberating force. In particular, the dematerialisation or digitisation of the body is often represented as being an ecstatic event. This particular narrative is witnessable in the cathedral-like spaces of the Apple Store, spaces which house infallible objects-of-desire which promise greater connectivity, productivity and self-determinism, in the perceived efficiency of the Amazon platform, by which goods materialise almost instantaneously, and part of the appeal of MMOGs (massively multiplayer online games) which allow users to imaginatively embody an avatar of choice. In all such instances, a cultural imaginary is produced based on the erasure of bodies through digital technology and the decontextualising of the observing subject from the time-space constraints of the corporeal body; to transcend the body is to attain greater individual freedoms and access new forms of expression.

Yet, in an age that is also defined by fake news, deep fakes, economic precarity, ecological disaster and the ‘threat’ of automated labour, we are also acutely aware of the kinds of violence, ones which often manifest in bodies, which the screen masks. In a system where ‘distance is produced and maintained’,<sup>174</sup> identities can be fraudulently fabricated, human labour exploited, the sweat of brows outsourced to unseen workers and natural resources plundered without restraint—elsewhere—a contemporary continuation of historical practices

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<sup>171</sup> Donna Jeanne Haraway, *Simians, Cyborgs, and Women: The Reinvention of Nature* (Free Association Books, 1991), p. 178.

<sup>172</sup> Ahmed, Sara, *Cultural Politics of Emotion* (Edinburgh: EDINBURGH UNIVERSITY PRESS, 2004), p. 13.

<sup>173</sup> Harry Sanderson, ‘Human Resolution | Mute’ <<http://www.metamute.org/editorial/articles/human-resolution>> [accessed 1 Jan 2019]

<sup>174</sup> Ibid.

of colonial exploitation and extraction. Boris Groys points out that those who control the material realities which underpin all immaterial operations are those who wield the power: ‘one can say that the big communication and information technology corporations control the material basis of the internet and the means of producing of virtual reality: its hardware.’<sup>175</sup> Thus, as Bauman reminds us: ‘more than any technology that preceded it [IT] succeeds in obliterating the humanity of its human objects’.<sup>176</sup>

Arriving at both a terrifying closeness and a safe distance, the intimate connections which have evolved between the devices which enable us to digitally capture, manipulate, upload, share, compress, collage and (re)present elements of ourselves at will are also technologies implicated in vast networks of exploitation and erasure, rendering them, and us both constructive and destructive. Ultimately, narratives of transcendence through technology, the ability to overcome the inconvenience of embodiment, generates a dissonance that is lived both psychically and materially since the everyday effects of so-called immaterial systems do not just fall away but are rather deferred, distanced and complicated:

We are physically implicated in the virtual realms we inhabit, and far from divorcing ourselves from the world when we enter electronic spaces, we are more connected than we may imagine.<sup>177</sup>

### **The Body (and Soul) at Work**

It is perhaps in the changed nature of work that the intimate relationship between human body and digital technology is most readily apparent; more so as all manner of everyday processes—labour, leisure, communication, self-expression—come to be mediated through the same set of digital devices. Remote technologies manufacture a continuum between the spaces, actions and times of work and leisure, thereby eroding any distinction between them, a sentiment echoed by Atkins who tells us:

I make work alone at the computer, at the same computer that mediates pretty much my entire life, save some strongly defended areas, and there is a confusion between

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<sup>175</sup> Franco Berardi, ‘Marx After Duchamp, or The Artist’s Two Bodies - Journal #19 October 2010 - e-Flux’ <<https://www.e-flux.com/journal/19/67487/marx-after-duchamp-or-the-artist-s-two-bodies/>> [accessed 4 March 2019].

<sup>176</sup> Zygmunt Bauman, *Modernity and the Holocaust*, New (Cambridge: Blackwell Publishers, 1991), p. 115.

<sup>177</sup> Marks, p. 174.

work, leisure, and everything else that tends toward an anxiety about there being no outside.<sup>178</sup>

In *The Soul at Work: From Alienation to Autonomy*, Franco Berardi claims that there has been a shift away from industrial exploitation, the kind which ‘deals with bodies, muscles and arms’ and in which ‘bodies would not have any value if they weren’t animated, mobile, intelligent, reactive’<sup>179</sup> and towards a post-Fordist mode of production which considers ‘the mind, language and creativity as its primary tools for the production of value’.<sup>180</sup>

Here, I consider four paradigmatic examples of bodies and their relationship to this digitally mediated economy/ecology of work/leisure. First, a (seemingly) visible body, like that of a celebrity figure such as Kim Kardashian. Kardashian takes and uploads images of herself (#selfies), often featuring product endorsements (#ad), to various social media platforms for the consumption of millions of followers, a process which is, in her own words ‘literally how I make my money’.<sup>181</sup> Here, the primary role of the body is as image-making tool, mediated via the screen, in order to generate capital. Expressed through images, Kardashian is an example of what Foucault describes as Homo economicus, understood as, ‘an entrepreneur of himself, being for himself his own capital, being for himself his own producer, being for himself the source of earnings’.<sup>182</sup> To ensure continued success/revenue/likes, Kardashian both adheres to and manufactures beauty ideals and the aspirational lifestyle associated with them. Just as the stars of Golden Age Hollywood had a symbiotic relationship to the immortalising technology of film, so too is Kardashian’s image bound to and manufactured by contemporary technology. For instance, most smartphone cameras now utilise computational photography to remove noise and ‘anticipate’ the image.<sup>183</sup> Beautifying filters are algorithmically applied to ensure skin is smoothed, hair is made more glossy, eyes are brightened; in other words, images, and therefore desires and realities, are collaboratively authored by human and machine. This is not to forget, as Manovich points out, that these

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<sup>178</sup> ‘Newsmaker: Ed Atkins On His Serpentine Sackler Gallery Installation | BLOUIN ARTINFO’ <<https://www.blouinartinfo.com/news/story/1044455/newsmaker-ed-atkins-on-his-serpentine-sackler-gallery>> [accessed 1 March 2019].

<sup>179</sup> Franco Berardi, *The Soul at Work: From Alienation to Autonomy* (Semiotext(e), 2009), p. 21.

<sup>180</sup> Ibid.

<sup>181</sup> Keeping Up With The Kardashians: The Family Feud, E!, 9 September 2018, online video recording, E! online, <<http://www.eonline.com/watch/keeping-up-with-the-kardashians>> [accessed 28 November 2018]

<sup>182</sup> M. Foucault, Arnold I. Davidson, and Graham Burchell, *The Birth of Biopolitics: Lectures at the Collège de France, 1978-1979* (Springer, 2008), p. 226.

<sup>183</sup> Hito Steyerl, ‘Proxy Politics: Signal and Noise - Journal #60 December 2014 - e-Flux’ <<https://www.e-flux.com/journal/60/61045/proxy-politics-signal-and-noise/>> [accessed 28 January 2019].

outcomes are a result of decisions made by humans: ‘The new ways of media access, distribution, analysis, generation and manipulation are all due to software. Which means that are they the result of the particular choices made by individuals, companies, and consortiums who develop software’.<sup>184</sup>

Ultimately, despite the fact that Kardashian is *more* than what is represented by these images—since she too is a complex individual bound to her own corporeal precarity—an entire image-economy is built on the denial of this fact. The images that Kardashian produces belong to a larger ecology of digital media that Hito Steyerl labels ‘image spam’, images described as, ‘photochopped [sic] replicas, too improved to be true. A reserve army of digitally enhanced creatures who resemble the minor demons and angels of mystic speculation, luring, pushing and blackmailing people into the profane rapture of consumption’.<sup>185</sup> These bodies—ones that are smooth, ageless, happy or emotionless, obedient, sanitised, ideal, functional and easily consumed—are, as we all know, one-dimensional images of lived, human experience: ‘The image of humanity articulated in image spam thus has actually nothing to do with it. On the contrary, it is an accurate portrayal of what humanity is actually not. It is a negative image’.<sup>186</sup>

By way of contrast, let us consider two examples of bodies which, though connected via shared global, digital networks, are less ‘visible’. Firstly, a factory worker employed on a smart phone assembly line. Like Kardashian, the factory employee’s body is a tool which services the tech industry and in doing so generates income. The demand for their labour is a result of the demand for a constantly renewed supply for technological devices, one that is partly manufactured through policies like in-built obsolescence. However, the daily strains on and functions performed by the body are analogous to those which were first seen during the industrial revolution: namely, the ability to control bodies to work repetitively, automatically, and accurately. Here, the capacity to generate income is not based on the production of images but on the ability to be a functioning component in a system which relies on the collective labour of muscles, arms and hands augmented by automatic systems and algorithms. Secondly, we might consider the body of a motion graphics or games designer producing 3D images and worlds, a member of the so-called cognitariat working within industries: ‘modeled on contemporary post-Fordist production, which exploits the affective and cognitive capacities of its precarious workforce’.<sup>187</sup> The designer—who may or may not inhabit a common, physical,

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<sup>184</sup> Manovich, *Software Takes Command*, p. 148.

<sup>185</sup> Hito Steyerl, ‘The Spam of the Earth: Withdrawal from Representation - Journal #32 February 2012 - e-Flux’ <<https://www.e-flux.com/journal/32/68260/the-spam-of-the-earth-withdrawal-from-representation/>> [accessed 1 March 2019].

<sup>186</sup> Ibid.

<sup>187</sup> Väliäho, *Biopolitical Screens*. p. 9.

social space alongside co-workers since remote work is increasingly common—effectively forefronts ‘the mind, language and creativity as its primary tools for the production of value’.<sup>188</sup> A distance is produced and maintained between their body, which remains almost stationary save for the movement of fingers across the keyboard, their eyes scanning the screen and the mental ‘disembodied’ processes interfaced by the screen.

Finally, we might consider the example of Amelia,<sup>189</sup> a ‘digital colleague in banking, insurance, healthcare and other industries’.<sup>190</sup> Amelia is an AI platform embodied by a 3D CGI model (a real-time animation) of a young, blonde, Caucasian woman. She (it) uses ‘cognitive and emotional intelligence and machine learning’ in order to interact with customers and colleagues in largely service oriented roles. IPsoft, the makers of Amelia and a ‘world leader in Enterprise AI’, claim it is the ‘most-human digital AI colleague’. The company describes ‘her’ as ‘a virtual agent who understands what people ask -- even what they feel -- when they call for service.’<sup>191</sup> Aside from being another instance of the unimaginative and unnecessary gendering of a non-human AI system in order to conjure up the passivity and competence of women (Alexa, Siri, Cortana, et al), Amelia is intriguing because IPsoft have gone to great lengths to give, to what is essentially code, a three-dimensional-seeming human form (surface) and the personality (depth) that we expect of this particular form. In fact, Amelia’s very success relies on its ability to appear, *to feel*, real. What this amounts to is a process of humanising that which is incomprehensible to us. Though relying on a body of sorts in order to function—namely, the hardware which executes the code—no indexical, material link exists between Amelia and a human body. Thus, in merely appearing fleshly, Amelia’s surface is visible yet its essence (code) remains, if it were not for the mediation of the screen, all but invisible and illegible.

What unites these examples of bodies at work is that they are all subject to a regulation imposed by ‘a grid of technologies of power which act upon the body.’<sup>192</sup> Though the ability to work repetitively, automatically, and accurately might now be channelled through the cognitive, there is nevertheless an impact on the flesh, a process in which ‘the body is marked,

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<sup>188</sup> Berardi, *The Soul at Work*, p. 21.

<sup>189</sup> A discussion of Amelia can also be read in Aylish Wood, *Software, Animation and the Moving Image: What’s in the Box?* (Houndmills, Basingstoke, Hampshire, UK ; New York, NY: Palgrave Pivot, 2014).

<sup>190</sup> ‘IPsoft Launches Interactive AI Lab Amelia City and Amelia Marketplace’, *IPsoft*, 2018 <<https://www.ipsoft.com/2018/06/18/ipsoft-launches-interactive-amelia-city-marketplace/>> [accessed 1 March 2019].

<sup>191</sup> *Ibid.*

<sup>192</sup> Mark Poster, *Foucault, Marxism, and History: Mode of Production Versus Mode of Information* (Cambridge, UK : New York, NY, USA: Polity Press, 1985), p. 52.

positioned, temporalized, collected’.<sup>193</sup> In each instance, a *good* worker is one that, to a certain extent, maintains a high level of control over the body since to fulfil its needs—to eat, drink, defecate, have sex, be pregnant, become ill, breakdown—means a lack of productivity and thus profitability. While the body and human being as a whole is not a ‘performance machine that is supposed to function without disturbance’ in order to ‘maximize achievement’,<sup>194</sup> in a system which places profit above all else, the *best* worker is less human and more machine (or AI) and thus to be human is an almost rebellious act.

Michel Foucault famously considered the body an object of study allowing for an analysis of how power inscribes it over time, considering body movement, posture and positioning to reveal the discursive forces that shape it. In *Discipline and Punish*, he writes how discipline produces docile bodies, ‘that can be made; out of a formless clay, an inapt body [from which] the machine required can be constructed’.<sup>195</sup> Powered by ‘internal whips’, these bodies are capable of being ‘manipulated, shaped, trained’.<sup>196</sup> In an analysis of Foucault, Groys states how the production of the docile body ‘can even be seen as the main achievement of modernity, as these modernized bodies now populate contemporary bureaucratic, administrative, and cultural spaces in which seemingly nothing material is produced beyond these bodies themselves’.<sup>197</sup> Byung-Chul Han goes further, updating Foucault’s self-regulating body for the digital era. In *The Burnout Society*, he describes how we are no longer a people organised authoritatively, through the application of negativity—co-called *obedience subjects*—but, as a result of digital technologies, we are overstimulated and scatter-brained, organised through an internalised positivity—so-called *achievement subjects*. The panopticon of digital technology uniquely facilitates this voluntarily self-regulation; an obvious example being the increasing prevalence of mobile apps which allow individuals to monitor food intake, exercise, sleep and mindfulness, and our readiness to agree to terms and conditions which allow companies to harvest data from these same apps. Here, we are witness once again to the dissonance inherent to a system in which: ‘The exploiter is simultaneously the exploited. Perpetrator and victim can no longer be distinguished’.<sup>198</sup>

In these ways, both work and leisure environments are structured by digital technologies that are fundamentally based on a distancing that is both productive and violent. A desire to transcend the inconvenience and unruliness of our fleshy casings through

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<sup>193</sup> Poster, p. 52.

<sup>194</sup> Byung-Chul Han, *The Burnout Society* (Stanford University Press, 2015), p. 30.

<sup>195</sup> Michel Foucault, *Discipline and Punish: The Birth of the Prison* (Knopf Doubleday Publishing Group, 2012), p. 135.

<sup>196</sup> Ibid.

<sup>197</sup> Berardi, ‘Marx After Duchamp, or The Artist’s Two Bodies - Journal #19 October 2010 - e-Flux’.

<sup>198</sup> Han, p. 11.

technology, yet the knowledge that we are inescapably bound to the material conditions of life, is ultimately a source of great unease. Nicholas Mirzoeff calls the tension between the imperfect (real) body and the idealised (unreal) body a dis-ease and goes on to argue that it is through forms of representation that this dis-ease manifests:

The true crisis of the body is as much in its representation and the understanding of that representation, as in its substance, providing the motive force behind a transformation of representation which can as yet only be imagined.<sup>199</sup>

### CG Bodies and Their Construction

CGI bodies are, of course, not real bodies, an actuality often asserted by Atkins himself: ‘every time I talk about these figures I try to pedantically correct myself, they’re not characters, they have no backstory, they’re not real, they’re nothing.’<sup>200</sup> To insist on the unreality of 3D CG bodies is to acknowledge that, despite this fact, they often *feel* real. It is in the capacity to be *more than*—than mere image, code, representation—that the power of CGI lies. In performance-lecture *Cinema-In-The-Round* (2014) Mark Leckey talks about images which give the illusion of life, ‘things that appear as images or pictures but that somehow impose upon me a sense of their actual weight, density and volume — of their physical being’, going on to ask: ‘How can something that is as basically flat and two dimensional as a painting [...] muster something so physical and so weighty? And — in turn — channel its effect through my body?’<sup>201</sup>

The illusion of the fleshliness of the bodies which populate Atkins work (and indeed, photo-realistic CGI figures more generally) is primarily rooted in their naturalistic rendering of surface, texture and movement. More than this, it lies in their appearing to be *of space*. In *Phenomenology of Perception*, Maurice Merleau-Ponty writes how it is precisely because the body is a spatial entity that we are able to understand the world and other bodies, since: ‘To be a body, is to be tied to a certain world [...] our body is not primarily in space: it is of it’.<sup>202</sup> Not unlike the sculptors of classical antiquity who achieved naturalism by using contrapposto to accurately mimic the mass and weight of a body in space, a computer animator uses algorithms based on real-world physics, like soft-body dynamics, within 3D software to simulate the very

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<sup>199</sup> Nicholas Mirzoeff, *Bodyscape: Art, Modernity and the Ideal Figure* (London ; New York: Routledge, 1995), p. 16.

<sup>200</sup> Haus der Kunst, *Blind Faith, Artist Lecture by Ed Atkins*  
<<https://www.youtube.com/watch?v=k8tb3KiEg5o>> [accessed 1 February 2019].

<sup>201</sup> Mark Leckey: *On Pleasure Bent*, ed. by Elena Filipovic and Patrizia Dander (Köln: Verlag der Buchhandlung Walther König, 2014), p. 134.

<sup>202</sup> Maurice Merleau-Ponty, *Phenomenology of Perception* (Abingdon, Oxon ; New York: Routledge, 2013), p. 131.

same. In this way, CG bodies are both object and image, material and immaterial, since they are *of space* (in the way, say, a perspectival painting is not) and yet intangible. As Leckey states, they are more than just an image, ‘more than just a representation. These things are here, embodied in the screen, like a footprint. They may point to their physical origins elsewhere, but they are also present here’.<sup>203</sup>

Just as three-dimensionality is only perceptible through the play of light across the surface of a sculpture (unless physicality can be confirmed through touch), so too do simulated light sources cast shadows and pick out highlights on the surface of a 3D model, relaying texture, depth and volume. The function of light to transmit a kind of haptic visuality is cleverly deconstructed in Atkins single-channel video, *Warm, Warm, Warm Spring Mouths*, 2013. Throughout the animation, the avatar, ‘looks’ directly at the audience and repeatedly recites *The Morning Roundup*, a poem by Gilbert Sorrentino:

I don’t want to hear any news on the radio  
about the weather on the weekend. Talk about  
that.

Once upon a time  
a couple of people were alive  
who were friends of mine.

The weathers, the weathers they lived in!  
Christ, the sun on those Saturdays.

As the line, ‘The weathers, the weathers they lived in!’ is voiced, a blinding white light, off-screen and to the left, floods the frame, illuminating the avatars face. Like a camera flash, this excess of light momentarily eradicates all shadow, thereby flattening the image. Not only does this unmask the ‘trickery’ of 3D CGI but it also illuminates the space where the audience stands and watches, forcing one to squint, perhaps even to recall the feeling of sunlight warming the body.

Akin to using pre-scripted algorithms and software plugins to generate effects and movements, in all of his animations Atkins utilises commercially available 3D models: ‘I buy all of these models or steal them’.<sup>204</sup> Besides the professional market for custom 3D assets, off-the-shelf free and premium models are easily accessible via online platforms such as

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<sup>203</sup> Mark Leckey: *On Pleasure Bent*, p. 134.

<sup>204</sup> Haus der Kunst, *Blind Faith, Artist Lecture by Ed Atkins*.

CGTrader.com (Lithuania), TurboSquid.com (New Orleans) and clara.io (Ontario)—to name just a few and to underline their global and decentralised origins. CGTrader.com is a digital marketplace where users can package and upload the 3D models they have created. These models can then be bought, downloaded and modified by others. Entering a simple search term on CGTrader, like ‘hand’ or ‘body’, generates an idiosyncratic list of results—and, some of the very same models bought and used by Atkins and contemporary artist Kate Cooper. Two things are immediately discernible: models are based on a hierarchy in which those that display the highest level of photorealism and detail are also the most expensive—and we can thus infer more valuable to animators—and models adhere to exaggerated gender stereotypes. Artist Sidsel Meineche Hanson explores gender and the commodity status of 3D bodies in the work *SECOND SEX WAR*, 2016, an audio-visual installation that features an animation of EVA v3.0, ‘a royalty-free product sold online by TurboSquid, a company that supplies stock 3D models for computer games and adult entertainment’.<sup>205</sup>

Atkins exclusively employs white, male bodies: ‘[T]hey are clearly autobiographically coloured in some way [...] they’re always men and they’re always white. They’re in fact usually the same person, I’ve just re-skinned him every so often’.<sup>206</sup> Indeed, Atkins’ chosen 3D models are ones which conform to classical and conventional, almost idealised, notions of masculine beauty. So too are they reminiscent of the standardised male figure deployed by Ernst Neufert to formulate his *Bauentwurfslehre*,<sup>207</sup> almost a contemporary Vitruvian man.

By alluding to reskinning and duplication, the artist highlights the ‘objectification’ of data itself, an uncanny process when associated with simulation of a fleshly human form. Indeed, the endless replicability of digital artefacts like 3D models has clear associations with human reproduction and cloning. In Atkins multi-channel animation *Safe Conduct*, 2016, this particular feature of data literally plays out as a grotesque ‘Kabarett’ in which the same old 3D model, humming Ravel’s feverishly repetitive Bolero, cheerfully deconstructs his own body. Piece by piece, limbs and organs are placed into airport security trays which arrive on a revolving conveyor belt; a nod to ubiquitous yet largely invisible processes of surveillance and social control that are often only made apparent when attempting to traverse state boundaries. Through we laugh at the absurdity of the scene, the violence behind it is palpable. Rendered in a medium typically associated with Hollywood ‘froth’, content contrasts uneasily with

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<sup>205</sup> Sidsel Meineche Hansen, ‘SECOND SEX WAR (2016) Gasworks, London and Trondheim Art Museum’ <<http://www.labourpower.co.uk/work/second-sex-war-gasworks-london-2016/>> [accessed 29 January 2020].

<sup>206</sup> Haus der Kunst, *Blind Faith, Artist Lecture by Ed Atkins*.

<sup>207</sup> First published in 1936 and still used today, the first comprehensive attempt to standardise spatial data and dimensions so as to rationalise architectural design. Ernst Neufert and others, *Bauentwurfslehre: Grundlagen, Normen, Vorschriften*, (Wiesbaden: Springer Vieweg, 2015).

container. As Leslie points out, it is not uncommon for subversive subtexts to be covertly smuggled into art forms considered low, popular and easily dismissible, such as CGI and comics: ‘Comics, in the guise of innocent, wide-eyed pulp, have often been used to carry political and critical cargo’.<sup>208</sup> Using a visual language that more typically belongs to mass entertainment and commerce, *Safe Conduct* speaks about a contemporary reality in which the body, ‘considered an economic property sui generis, sold in parts for transplants, lent for bone marrow transfer’,<sup>209</sup> emerges as the first to be affected by, and one of the last points of resistance to, the commercialisation of all of life.

It was in desiring to avoid the objectification of representation that Atkins first decided to speak through a surrogate, one that nevertheless imitates his own corporal form. In an early interview, he discusses how previous work using live actors felt like a ‘latent ethical problem, insofar as shooting people and making them into use-images felt not right, particularly considering the affective demands made on the imagery and the editing it undergoes’.<sup>210</sup> As such, since CGI is linked not to any single body or subjective position, it becomes a way to circumnavigate this ethical quandary since, ‘I didn’t have to violate anyone in order to make this, and I could have a full-frontal protagonist, as it were, who would totally perform his or her structure.’<sup>211</sup> A hyper-realistic 3D CGI body thus presents itself as a way to talk about the violence of (digital) representation and the material and immaterial systems which underpin it without enacting the very same.

We see here how the construction of CG bodies is ambiguous since they appear to straddle the real and unreal, living and dead, unique and cloned, human and non-human. It is perhaps using ‘speculative-realist’ Levi Bryant’s notion of corporeal and incorporeal machines that we might gain some clarity:

A corporeal machine is any machine that is made of matter, that occupies a discrete time and place, and that exists for a duration. Subatomic particles, rocks, grass, human bodies, institutions, and refrigerators are all corporeal machines. Incorporeal machines, by contrast, are defined by their iterability, potential eternity, and the capacity to manifest themselves in a variety of different spatial and temporal locations at once while retaining their identity. Recipes, scores of music, numbers, equations, scientific and philosophical theories, cultural identities, novels, and so on are all examples of incorporeal machines. In discussing incorporeal machines, we must take care lest we fall into a sort of Platonic dualism where we treat these entities as subsisting ideally in some other real. All incorporeal machines require a corporeal

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<sup>208</sup> Esther Leslie, ‘Seeing with a Feeling Eye’ <<http://melaniejackson.net/wp-content/uploads/2014/01/seeing-with-a-feeling-eye.pdf>> [accessed 10 February 2020].

<sup>209</sup> Bianca Maria Pirani and Ivan Varga, *The New Boundaries between Bodies and Technologies* (Cambridge Scholars Publishing, 2009), p. 5.

<sup>210</sup> ‘Newsmaker: Ed Atkins On His Serpentine Sackler Gallery Installation | BLOUIN ARTINFO’.

<sup>211</sup> Ibid.

body in order to exist in the world. Numbers, for example, must occur in brains, computer data banks, graphite, chalk, etc. in order to exist in the world.<sup>212</sup>

As was thematised in *Softbodies*, in this conceptualisation of the world, the human body, with its ‘material vulnerability’ and connection to ‘age, decay and obsolescence’,<sup>213</sup> is aligned to other corporeal machines: wires, products, minerals and matter. By contrast, a CG body is an incorporeal machine, a representation of a real, human body; not one that is not purely ‘immaterial’ but whose material indexicality is deferred and lies elsewhere. It is amidst this ambiguity that we can locate the work of Ed Atkins.

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<sup>212</sup> Levi R. Bryant, *Speculative Realism* (Edinburgh University Press, 2014), p. 26.

<sup>213</sup> Sobchack, p. 380.

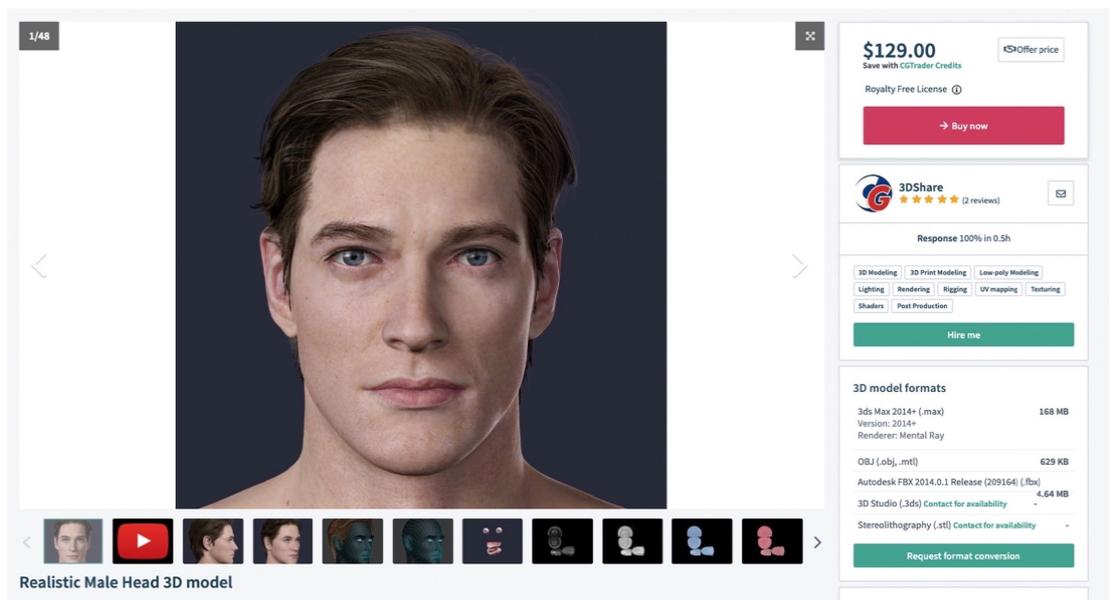
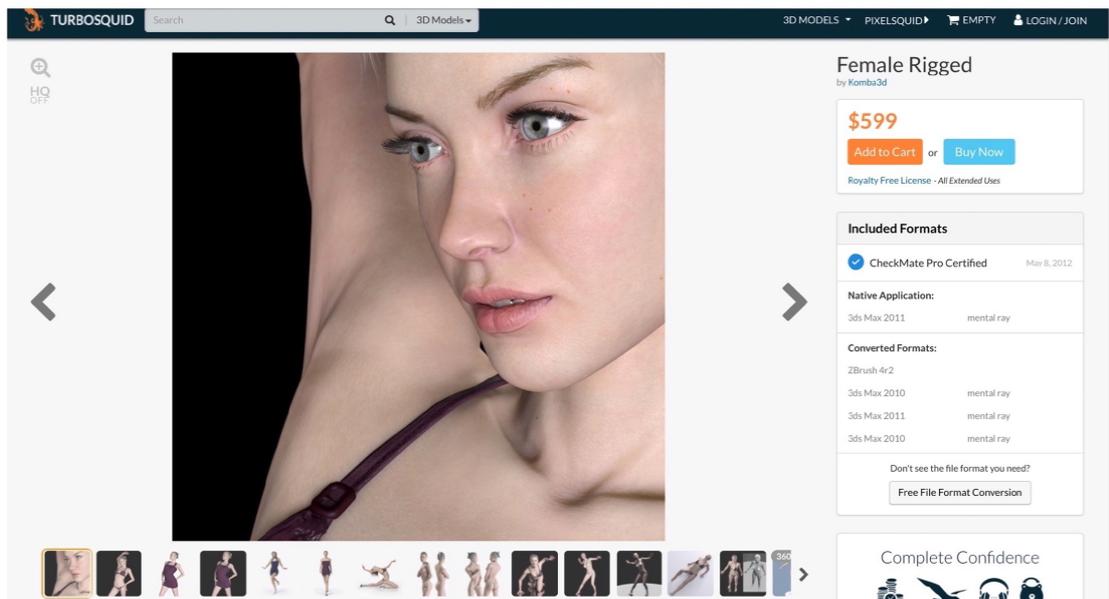


Figure 27. Screenshots from turbosquid.com and CGTrader.com showing the listings of the purchasable, downloadable 3D models. (Top) The model used by Kate Cooper in the work *Rigged*, 2014. (Below) a model used by Atkins in several works, including *Happy Birthday!!!*, 2014, and *Safe Conduct*, 2016.



*Image Removed*

Figure 29. Animation stills from (top) *Happy Birthday !!!*, 2014 (middle) *Safe Conduct*, 2016 (below) *Warm Warm Warm Spring Mouths*, 2013.

## Technology and Dualism

The ubiquity of digital technologies and their intertwining with all realms of life both extend the body and its capabilities and produce distance—between us and the world, the bodies of others and our own corporeality. This is the dualism inherent to digital technology, the kind that Bryant warns against, in which the digital becomes ‘some other real’ beyond the lived, material every day. To argue that the ‘mind cannot be separated from the body or from the ecology in which we are corporeally embedded’<sup>214</sup> is to argue against a split between mind and body. The (re)locating of the self to the mind and not flesh and blood can be traced back to multiple sources. Tiffany Atkinson suggests that the antagonism between mind and body lies with both Cartesian philosophy, one which Grosz claims instituted ‘a dualism which three centuries of philosophical thought have attempted to overcome or reconcile’<sup>215</sup> and with the emergence of the study of anatomy.<sup>216</sup> Atkinson highlights Johnathan Sawday’s research into the history of anatomy, through which the body became an object of study and of human knowledge:

The study of anatomy was the study of the organisation of space. For, if it was nothing else, anatomy was concerned with volume, and it became the testing ground for that key experience, which the transmission of three-dimensional space onto the flat surface of canvas, wood, fresco, or copper-plate.<sup>217</sup>

A split between body and its representation as political tool can also be traced to political historian Ernst Kantorowicz’s notion of *The King’s Two Bodies*. In order to sustain the ‘autocratic political structures of feudalism’ and ‘to compensate for the weaknesses’ of any single, mortal ruler, the notion of the king’s two bodies—the body natural and the body politic—was conceived as a tool of medieval political theology. Since the body natural was ‘subject to all infirmities that come by Nature’, the king was also to possess a body politic; an immaterial body, one that ‘cannot be seen or handled’, void of the imperfections of the body natural and thus a body that ‘cannot be invalidated or frustrated by any Disability’.<sup>218</sup> Thus, in the transformation from material to immaterial, from object to representation, power was able to transcend its anchor to the material world:

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<sup>214</sup> Burkitt, p. 4.

<sup>215</sup> Grosz, *Volatile Bodies: Toward a Corporeal Feminism*, p. 6.

<sup>216</sup> Tiffany Atkinson, *The Body*, 2005 edition (Houndmills, Basingstoke, Hampshire ; New York: Palgrave, 2005) pp 1–11.

<sup>217</sup> Jonathan Sawday, *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture* (London: Routledge, 1996), p. 86.

<sup>218</sup> Ernst H. Kantorowicz, *The King’s Two Bodies: A Study in Mediaeval Political Theology*, (Princeton, N.J.: Princeton University Press, 1957), p. 7.

The king (with a small k, the real individual with knees swollen by gout - the organic body) is changed entirely into his 'image' and becomes 'representation' - the King (capital K, dignity, Majesty and the political body).<sup>219</sup>

Again, we are witness to an erasure of the body and a hierarchy which places mind over matter, one uniquely reinforced by the distance produced and maintained by digital technologies. As Anna Munster states, 'the aesthetic effects of the Cartesian coordinate system were oppressive [...] digital spaces were subtended by a strong desire for control over the messiness of bodies and the unruliness of physical worlds.'<sup>220</sup> Thus, despite the ease with which digital technologies fall into narratives of material transcendence, Atkins uses CGI to insist on the very opposite. As Lucretius once articulated in his epic poem *Of the Nature of Things*:

Yet neither eyes nor nose nor even hand can exist for the soul apart from body, nor again tongue apart or ears; the souls cannot therefore feel by themselves or even exist.<sup>221</sup>

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<sup>219</sup> Louis Marin, 'The Body-of-Power and Incarnation at Port Royal and in Pascal or Of the Figurability of the Political Absolute' in *Fragments for a History of the Human Body*, ed. Michel Feher, Ramona Naddaff, and Nadia Tazi (Zone, 1989), pp. 421–447, (p. 422).

<sup>220</sup> Anna Munster, *Materializing New Media: Embodiment in Information Aesthetics* (UPNE, 2006), p. 2.

<sup>221</sup> 'Of the Nature of Things, by Titus Lucretius Carus' <<https://www.gutenberg.org/files/785/785-h/785-h.htm>> [accessed 10 February 2019].

### 17.03.17 – Ribbons

Ed Atkins, *Ribbons*, 2014. Three-channel HD video installation.

Shot of a cut glass tumbler, in and out of focus, now filled with whiskey, now something that looks like piss, now upside-down filled with smoke.

A man (topless) sitting at a bar, hair shaved close to the scalp, cigarette hanging out of the corner of his mouth. His body is scrawled with obscenities—FUCK, HATER, TROLL, I DRINK. On his forehead—BANKRUPT—only written backwards, a personal message just for him when he looks in the mirror.

Sound of glasses clinking, crisps crushed between teeth, mosquito buzzing, liquid filling a vessel (glug-glug-glug), piano cord (minor key), whoosh of air.

Shot of blue-sky (thinking!) and white clouds. Camera speeds through clouds to monumental words cast in gold—*Enfeebled, A Demand For Love, Rebuttal!*

The same man resting his hands and head (nose first so that the tip is squashed) on a sticky, wooden bar top. Surrounded by half-filled beer glasses, an unsmoked cigarette burns down between his fingers.

Lens-flare fills the frame, cut to white.

The man (him again!), this time with the abbreviation FML (fuck my life) inked onto his forehead. He looks out into what would be the camera and mutters:

“Sorry, Adam, for that one, particularly histrionic, horrible mess”.

And then his head deflates like a balloon.

## The Grotesque and Grotesque Realism

grotesque, *n.* and *adj.*

**1. *n.***

a. A kind of decorative painting or sculpture, consisting of representations of portions of human and animal forms, fantastically combined and interwoven with foliage and flowers.

b. A work of art in this style. Chiefly *plural*, figures or designs in grotesque; in popular language, figures or designs characterized by comic distortion or exaggeration. The Italian form *grottesco* (*plural grotteschi*) is sometimes used.

**2. *adj.***

a. In a wider sense, of designs or forms: Characterized by distortion or unnatural combinations; fantastically extravagant; bizarre, †quaint. Also *transf.* of immaterial things, esp. of literary style.

**3. Ludicrous from incongruity; fantastically absurd.**

### Derivatives

gro'tesque *v.* (*transitive*) to give a grotesque form or appearance to; to caricature, travesty.<sup>222</sup>

If digital technology both amplifies and facilitates narratives of transcendence, of overcoming the messiness and unruliness of bodies through dematerialisation and disembodiment, ones which are at best insincere and at worst highly damaging, then we might look to the opposite, to degradation, in particular grotesque realism, in order to find some respite from the division, erasure and regulation of bodies imposed by technocapitalism.

The grotesque is a powerful tool that has the potential to disrupt and distort hierarchical and canonical assumptions. Visually, it is characterised by ugliness and ornament, the bizarre and the ridiculous, the excessive and the exaggerated. In *Rabelais and His World*, Mikhail Bakhtin offers an astute analyses of the social, political and cultural role of the grotesque he witnesses in the penology of novels *The Life of Gargantua and Pantagruel* by the

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<sup>222</sup> 'Grotesque | Definition of Grotesque in English by Oxford Dictionaries', *Oxford Dictionaries | English* <<https://en.oxforddictionaries.com/definition/grotesque>> [accessed 1 March 2019].

French Renaissance humanist, François Rabelais. With its crudity, scatological humour and violence, Bakhtin claims Rabelais' work to have been largely misunderstood and pinpoints two key subtexts: carnivalesque, recognised as a social institution and, at its heart, grotesque realism. According to Bakhtin, the genre of the grotesque opposed medieval forms of high art and, through degradation, mockery and satire, the authority of the state and church could be challenged:

The essential principle of grotesque realism is degradation, the lowering of all that is high, spiritual, ideal, abstract; it is a transfer to the material level to the sphere of earth and body in their indissoluble unity [...]. Not only parody in its narrow sense but all the other forms of grotesque realism degrade, bring down to earth, turn their subject into flesh.<sup>223</sup>

Crucially, grotesque realism is channelled through bodies and their representation. According to Bakhtin, the grotesque body is neither separated from the rest of the world nor is it a closed unit; rather, it is unfinished, outgrowing its own limits through processes of 'copulation, pregnancy, childbirth, the throes of death, eating, drinking, or defecation'.<sup>224</sup> Grotesque realism is therefore concerned with the 'lower stratum' of the body and stresses the parts connecting with the world: those which extend out to meet the world or through which the world enters the body. Emphasis lies on the apertures and protuberances, those exaggerated and distorted: open mouths, genitals, breasts, bellies, noses. As such, the grotesque body transcends physical boundaries and inverts gender and hygiene norms. Revelling in the mortal and earthly, grotesque realism is opposed to the severance between the material world and the body. Ultimately, the 'hideous and formless' medieval body depicted by Rabelais, its tropes identified by Bakhtin, is one which does not 'fit the framework of the aesthetics of the beautiful as conceived by the Renaissance'.<sup>225</sup>

Where Bakhtin considers literary forms like the novel to be a site of resistance to authority and the place where cultural, and potentially political, change can take place, I argue that it is through animation and the possibilities offered by 3D CGI that Atkins attempts to carve out a space of resistance. In particular, it is through a form of grotesque realism that is both visual and sensual, one that grounds the subject in corporeality and that is uniquely depicted using 3D CGI, that Atkins finds this resistance.

Both ostensibly and fundamentally, Atkins' moving-image works are grotesque. The definition 'ludicrous from incongruity' gets to the very heart of this contemporary grotesque realism. It is located in the dissonance produced when the representation of a human body —

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<sup>223</sup> Mikhail Bakhtin, *Rabelais and His World* (Indiana University Press, 1984), pp. 19–20.

<sup>224</sup> *Ibid.*, p. 26.

<sup>225</sup> *Ibid.*, p. 29.

one which appears hyper-human, more-human-than-human—is in fact something so far from humanity that it can only be experienced when translated by a machine. Otherwise said, how Atkins’ work is grotesque partly lies in the perceived incongruity between body and code, matter and mathematics. For Atkins, as indeed for Rabelais before him, grotesque realism provides a way to burlesque aspects of the current status quo. The overall effect is a spectacle as compelling as it is nauseating. Atkins CGI *surrogates* are, quite plainly, both comic and pitiful. They weep, moan, snigger, sigh, smoke, drink, and vomit. They are prone to sudden emotional outbursts, often of a kind of nonsensical prose/poetry and, on occasion, they can be found humming the refrain from some crudely sentimental pop song or other. As ‘incorporeal machines’ they are immortal and yet appear as if obsessed with their own corporeality, their slow decay, their immanent death. Thus, while these avatars inspire horror and fascination, unlike the majority of CG bodies with which we are usually confronted, the kind of ‘image spam’ put to work in the service of commercial imperatives and with which (whom) it is difficult to sympathise, Atkins surrogates are both flawed and familiar. As Leslie Jamison writes, they often appear ‘to be suffering, or perhaps just insufferable’.<sup>226</sup>

The suffering of these avatars is animated using motion-capture hardware and software, meaning their expressions of pain, humour and fear mirror those of the artist. The result is something akin to an unnerving digital puppet, one that moves *almost* as intricately as a human. Atkins’ use of his own voice, speaking through the avatar like a mask, further underlines this dissonance as it produces an acousmatic synchresis where, since the source of the sound remains hidden, what is audible and what is visible are separated. The role of costumes and masking is central to Atkins’ work. In *Old Food*, costumes arrive literally, flanked by screens and wall texts. Like husks or shells, the racks of Deutsche Oper costumes which fill the exhibition space, as if waiting to be activated by an organic body. For the computer animator, this is a direct reference to how image-objects are constructed using a polygon mesh which is then ‘clothed’ using various textures. Indeed, the ventriloquising of characters using motion-capture technology is akin to masking oneself in a hyper-realistic digital skin and can be read as metaphor for how we construct and project identity in digital realms. In 1970, roboticist Masahiro Mori coined the term ‘uncanny valley’ to describe the feeling of unease caused when a simulation of a human generates a sense of ambiguity or unease in the perceiver:

Mori’s theoretical measure illustrates how, at a point along an inclining scale of realism, the audience’s level of comfort with an artificial human likeness would drastically decrease. Just prior to the point of being indistinguishable from an organic

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<sup>226</sup> Leslie Jamison, ‘I’m Not Too Sad To Tell You’, Parkett Art, 2016, Vol. 98  
<<https://www.parkettart.com/books/98-volume.html>> [accessed 10 February 2019].

being, the authenticity of the synthetic collapses under the weight of the viewer's discomfort with the unfamiliar.<sup>227</sup>

Though wholly convincing human robots are yet to fully arrive, conjecture about the roles these technologies will play in the future mean the term has been the subject of renewed focus in recent years. I argue that the unease generated by 3D computer-generated faces in particular resides in the fact that they are not *materially* what they appear to be. Rather, like a mask, they lie on top of, cover or hide an unseen reality. In describing what is unsettling about masks, in the 1985 essay 'Urban Gothic', the artist Mike Kelley writes how: 'that which lies on the surface is often not of the same material as that which lies below it'.<sup>228</sup> Thus, once the simulation is made apparent—or, once the 'mask' has been pointed out—and the underlying nature of the computer simulation is taken into account, the tendency is to feel deceived. This sense of a hidden reality also plays into ideas concerning the autonomy or agency of these images, one that unsettles, since it is both invisible and inhuman. As Alessandro Pizzorno points out in 'The Mask: An Essay': 'Both on account of the material of which it is made and on account of its image, the mask will have a reality of its own, one that is not produced by man'.<sup>229</sup>

On occasion, the suffering of Atkins' avatars is literally inscribed onto the surface of their skin, as with the obscene stick'n'poke tattoos which cover the surrogate in *Ribbons* and the bruised and damaged body of the 3D model in *Safe Conduct*. On occasion, this pain arrives in a more cartoon-like manner; the scene in *Ribbons* in which the avatar's head suddenly deflates is not only to underline the 'trick' of CGI but a nod to the plasmatic violence of early cartoons such as Tom and Jerry. These visual cues emphasise once more the ways in which the body is inscribed through technological networks and structures of power:

[S]ocial instructions are carved into the flesh by meticulous drilling, which is not only metaphorical but can act through the disciplinary power of (media) machines too. Bodies are made docile and behave in certain patterns of gesture and memory.<sup>230</sup>

It is through processes of customisation, the humanising of generic 3D assets so that they appear emotional, illogical and unstable, that Atkins is able to undermine (amongst other

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<sup>227</sup> Kristopher Purzycki, 'Book Review: The Uncanny Valley in Games and Animation', *Animation*, 14.1 (2019), 70–73 (p. 70) <<https://doi.org/10.1177/1746847719829839>>.

<sup>228</sup> Mike Kelley and Roger Conover, *Foul Perfection: Essays and Criticism* (MIT Press, 2003), p. 9.

<sup>229</sup> Alessandro Pizzorno, 'The Mask: An Essay', *International Political Anthropology* 3, 1 (2010), 5–28 (p. 23).

<sup>230</sup> Jussi Parikka, *A Geology of Media* (University of Minnesota Press, 2015), p. 89.

things) conventions such as *reference man* and Western stereotypes of masculinity. Ultimately, Atkins surrogates are caricatures of humans and humanity and it is precisely this that causes their suffering: emotional and vulnerable, *Allzumenschliches* by far.

The discomfort these avatars inspire does not end at the screen. It extends out into the viewing space, thickening the air with an emotional charge that is at odds with the sober atmosphere of the gallery/museum/screening venue and internalised audience expectations of what constitutes correct behaviour in such spaces—quietly contemplative, controlled, cerebral. This is an instance of what Jennifer Doyle describes in *Hold It Against Me: Difficulty and Emotion in Contemporary Art*, attesting to the disruptive powers of sentiment and emotion:

The sentimental stands in opposition to the codes of conduct that regulate the social spaces of art consumption, in its messiness, its direct assertion of the world of feeling, and its hopeless association with the low and the popular.<sup>231</sup>

What is visually and audibly grotesque in Atkins works is often a result of tropes directly borrowed from ‘low’ and ‘popular’ media. Internet artefacts are rehashed as impotent loading bars, gif-like words endlessly rotate and insipid text-slang acronyms skitter across the screen. An excess of visual ornamentation, the kind usually deployed in grand media spectacles, manifest as dust particles, lens flares and a constantly shifting depth-of-field. These details create what Roland Barthes dubbed the ‘reality-effect’, understood as: ‘The small details of person, place, and action that while contributing little or nothing to the narrative, give the story its atmosphere, making it feel real.’<sup>232</sup> Such embellishments are directly lifted from contemporary moving-image production techniques, whose aim is often to simulate the tactility—the perceived authenticity—of analogue cinema. Much of what we are presented with is visual and aural noise, a nonsensical decadence that flies in the face of efficiency. Any semblance of a coherent narrative is lost in the excess of detail and technical effect. Atkins harnesses excess intentionally, introducing imperfection to the precision of the digital. Ultimately, this is a humanising process, one which revels in the madness of vision, a tactic of employing, ‘whatever means that I could to describe technology’s presence’.<sup>233</sup>

Bakhtin writes that in Rabelais’ novels, ‘there is scarcely a single page in his book where food and drink do not figure, if only as metaphors and epithets. These images are closely interwoven with those of the grotesque body’.<sup>234</sup> So too does Atkins consistently use food and drink—and notions of their absence, decay and consumption—as a metaphor for the

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<sup>231</sup> Jennifer Doyle, *Hold It Against Me: Difficulty and Emotion in Contemporary Art* (Duke University Press, 2013), p. 77.

<sup>232</sup> ‘Reality-Effect - Oxford Reference’ <<https://doi.org/10.1093/oi/authority.20110803100407783>>.

<sup>233</sup> Haus der Kunst.

<sup>234</sup> Bakhtin, p. 279.

fullness / emptiness of 3D CGI. In the installation *Old Food*, first shown in 2017 at the Martin-Gropius-Bau, Berlin, and later refigured as *Olde Food* in 2018 at Cabinet Gallery, London, we are privy to a series of images which have been transferred to ‘the material bodily level, to the level of food, drink, sexual life, and the bodily phenomena linked with them’.<sup>235</sup> Clues are scattered throughout the exhibition. Before entering, we are made to reflect on our own corporeality, a wall text announcing how our body is ‘important to museums...’ and that it will soon be subject to ‘the digestive tract of the rooms, walls silently kneading you’. Our ‘protagonists’, the CGI baby, boy and man, are rendered photorealistic but distorted: open mouthed and constantly weeping, proportionally exaggerated and costumed. Another wall text (all of which were written in collaboration with Contemporary Art Writing Daily, a satirical art writing website riffing off Contemporary Art Daily) intentionally overplays how the image of digital food is here used to think through the immateriality of CGI: ‘Old food is of course a misnomer. There is no old in the digital. No refrigeratory negligence. It is decided to appear as such. Food is newly mouldy, already digitally embalmed. And CGI characters of course have no body thus no use for food.’<sup>236</sup> Existence, of course, cannot be thought of without consumption and here food is used to make explicit connections between the ability of the human body to transform (plant) matter into energy and flesh: ‘we, ourselves, become the material world, and vice versa, through the artificial transformations of matter to taste and its ingestion for pleasure and cellular nourishment’.<sup>237</sup>

A series of animated advert-length vignettes accompany the exhibition. Atkins borrows from the conventions of fast food advertising—commercials which feature rotating, glistening, close-up, slow-motion burgers, fresh from the grill—but here uses them to show us the step-by-step construction of a range of surreal and disgusting sandwiches. On top of a slice of spongy, white bread drops, as if from nowhere, an increasingly absurd range of fillings. With each new addition there is an equally gut-churning noise: lettuce *\*whap\** tomato *\*squelch\** babies *\*squeak\** shit *\*squirt\** chairs *\*clatter\** pianos *\*clang\**; crude, scatological and violent indeed.

It is not unsurprising to read, in almost all interviews Atkins gives about his work, of the influence of Czech ‘militant surrealist’ animator Jan Švankmajer. Švankmajer’s career spanning dedication to exploring visual tactility, one that eschews ocularcentrism in favour of grounding the viewer in the pleasure and pain of bodily sensation, is clearly witnessable in his short and feature length works in which matter—clay, household objects, food, animal parts—

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<sup>235</sup> Bakhtin, p. 309.

<sup>236</sup> Press Release Martin Gropius Bau, ‘Ed Atkins, Old Food, 2017’.

<sup>237</sup> Benjamin H. Bratton, ‘Another Matter: Notes on Worldeating’, in *Being Material*, Boucher and others, p. 40.

is animated in a variety of, often domestic, scenes. Švankmajer similarly deploys the grotesque as a tool for subversion and, as Paul Wells writes, it is through animation that the artist ‘seek[s] to disrupt or refute socially determined and ideologically charged forms of representation’,<sup>238</sup> a statement one could readily apply to Atkins work. Atkins discusses how, in Švankmajer’s 1994 feature-length film *Faust*, one which combines live-footage and animation, satire is present in the story but ‘more saliently – and certainly more thrillingly for me – within the form’.<sup>239</sup> He goes on to say how, in Švankmajer’s animations: ‘Every movement is laboured, and the illusion of animation is made structurally available through misapplication – its heretical use on living bodies – turning life into some horrible, base manipulation’.<sup>240</sup> Somewhat ironically, when asked his views on digital animation, Švankmajer describes having ‘reservations about computer animation’, grounded in that fact that, ‘virtual reality has no tactile dimension. It is an “untouched reality”. It is therefore not charged by strenuous human emotions. It is a stillborn child’.<sup>241</sup> For Švankmajer, the lack of direct contact between the body and the stuff of 3D visualisation software—the absence of tactile immediacy—constitutes a failure of the digital as an artistic means by which to express something of the human spirit. In this way, computer animation is simply another instance of the mediation between self and world that digital devices engender. As Flusser writes:

We live in an expanding universe: the media offer us more and more things of which we can have no immediate experience, and take away, one by one, the things with which we can communicate directly.<sup>242</sup>

Yet, though our experience of computer animation may not be physically immediate and its material basis occluded, computer-generated imagery still has the power to ‘move’ and impact the senses in tangible ways. The ability to touch and be touched jumps across material and immaterial borders. It is precisely here—in the ambiguity of a tactile, bodily dimension, through an ‘immaterial’ medium that is nevertheless capable of representing life so convincingly—that Atkins work is situated.

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<sup>238</sup> Paul Wells, ‘Kinoeye | Czech Horror: Jan Svankmajer & “agit-Scare” Tactics’  
<<https://www.kinoeye.org/02/16/wells16.php>> [accessed 12 March 2019].

<sup>239</sup> ‘Figural Realism. A Screening to Accompany Ed Atkins, “Old Food”’  
<<https://www.facebook.com/events/figural-realism-a-screening-to-accompany-ed-atkins-old-food/138105633601090/>> [accessed 12 March 2019].

<sup>240</sup> Ibid.

<sup>241</sup> ‘Tactility and Film, Interview with Jan Švankmajer’, *Cinesthetic Feasts*, 2013  
<<https://cinestheticfeasts.wordpress.com/2013/06/16/tactility-and-film-interview-with-jan-svankmajer/>> [accessed 12 March 2019].

<sup>242</sup> Flusser, *Writings*, p. 27.

Ultimately, Atkins' grotesque realism can be understood as a form of ritual masking, a communicative tool that in fact unmask narratives of digital immateriality. It is by insisting on a corporeal reengagement with the messy, material origins and realities which underpin digital culture that 'the real becomes visible'.<sup>243</sup> By degrading that which is 'high, spiritual, ideal, abstract',<sup>244</sup> Atkins presents us with a representation that defies mere data and an excess that defies the mere prosaic. Ultimately, to take bodies which are constructed, disciplined, perfected, consumable, automated and downloadable and make them grotesque—human—is an act of defiance and resistance.

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<sup>243</sup> Lone Riisgaard and Bjørn Thomassen, 'Powers of the Mask: Political Subjectivation and Rites of Participation in Local-Global Protest', *Theory, Culture & Society*, 33.6 (2016), 75–98 (p. 93) <<https://doi.org/10.1177/0263276416651685>>.

<sup>244</sup> Bakhtin, p. 19.

*Image Removed*

Figure 30. Top: Still from stop-motion animation, *Darkness, Light, Darkness*, Jan Švankmajer, 1989. Bottom: Installation shot of *Ribbons*, Ed Atkins, 2014, at the Serpentine Sackler Gallery.

*Image Removed*

Figure 31. Illustrations from Rabelais' *The Life of Gargantua and of Pantagruel* by Gustave Doré, published in *Œuvres de Rabelais* (Paris: Garnier Freres) 1873.

*Image Removed*

Figure 32. Digital teaser image for *Old Food*, Ed Atkins, 2017

## Corpsing

corpse, n.

Etymology: Middle English *corps*

†1. The body of a man or of an animal; a (living) body; a person. Obsolete (before the spelling *corpse* was established.)

2. esp. The dead body of a man (or formerly any animal).

a. with epithet *dead*, *lifeless*, etc. (now felt to be pleonastic in ordinary speech).<sup>245</sup>

corpse, v.

1. *transitive*. To make a corpse of, to kill. *vulgar*. 1884—1884

2. *Actors' slang*. To confuse or 'put out' (an actor) in the performance of his part; to spoil (a scene or piece of acting) by some blunder.<sup>246</sup>

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<sup>245</sup> 'Corpse, n.', *OED Online* (Oxford University Press) <<https://www.oed.com/view/Entry/41860>> [accessed 6 February 2020].

<sup>246</sup> 'Corpse, v.', *OED Online* (Oxford University Press) <<https://www.oed.com/view/Entry/41861>> [accessed 6 February 2020].

## Conclusion (La Perruque)

It is widely acknowledged amongst CGI professionals that, due to their intricacy, the two most difficult things to render accurate, the so-called ‘holy grails’ of photorealism, are hair and eyes. It is almost impossible to trick the human eye into believing a simulation of our own corporeality since it is the matter with which we are most intimately acquainted; even more so these particular features of the human body, ones which appear to demarcate something *more than* mere matter—to embody the soul itself. So too can these features add hours—if not days and weeks—to render times, as for every individual surface (polygon) within a scene, the computer must calculate the way light interacts between it and everything else.

Despite—or rather, in spite of—this, hair features excessively in Atkins’ *Warm, Warm, Warm Spring Mouths*, 2013. In it, the CGI protagonist appears submerged, perhaps sunk to the bottom of the sea or floating in some dark, amniotic fluid. From his head and suspended in the liquid that surrounds him, flows long, lustrous hair. In one scene, it streams behind him like the tail of a hirsute tadpole, while in another it drapes luxuriantly forward to cover his face. On occasion, thick sheets of hair wipe across the screen itself, reminiscent of a screen transition between frames or the drawing of a velvet theatre curtain made strange and corporeal. Here, hair constitutes another instance of the grotesque in Atkins’ work: exaggerated, excessive, bodily. Owing to its highly tactile and uniquely personal nature, as a visual trope it induces a physical, visceral response. To touch another’s hair is an intimate, sometimes political, act and since hair is both generative—renewing itself constantly—and dead—dying as soon as it leaves the scalp—it conjures questions of hygiene and feelings of disgust: we are reminded of an unwanted thread lurking in a bowl of soup, the damp mass that clogs the plughole, the persistent strand on the surface of the tongue. Moreover, it is a marker of identity, pleasure and luxury; to *let down one’s hair* is to behave decadently, freely and without inhibitions.

Yet, beyond visceral response and cultural significance, Atkins also uses hair, and the unique ability of 3D CGI to render it hyper-real, as a marker of excess itself. This hair, like a wig, is artificial. In serving no distinct narrative function, what it rather indicates is a complete excess of surface, of image, of computing power, of technology, of representation. Non-productive, useless and resource intensive, is it the very embodiment of excess itself. Here Atkins is, literally and figuratively, letting down the hair of CGI. The same kind of excess is witnessable in the monologues of his surrogates which, while on the surface seem coherent, poetic even, are upon closer scrutiny devoid of concrete meaning; in the multi-layered digital lens-flares that dazzle; in the fragments of sound and music which \*crunch-splat-throb\* throughout. Perhaps then, these are representations of humanity which appear *full*, but like language without meaning and bodies without matter, are in fact hollow or meaningless.

While excess can mask a void, a surface without depth, it can also be a form of resistance. In *The Practice of Everyday Life*, Michel de Certeau offers an analysis of *la perruque* (the wig), a French idiomatic expression meaning ‘the worker’s own work disguised as work for his employer’.<sup>247</sup> Defined as everyday resistance behind a screen of conformity, de Certeau construes the idea as a socio-cultural trope of sorts, in which the socially weak (workers) make use of the socially strong (managers/owners) by carving out an independent domain within the circumstances imposed upon them:

Accused of stealing or turning material to his own ends and using the machines for his own profit, the worker who indulges in *la perruque* actually diverts time (not goods, since he uses only scraps) from the factory for work that is free, creative, and precisely not directed toward profit. In the very place where the machine he must serve reigns supreme, he cunningly takes pleasure in finding a way to create gratuitous products whose sole purpose is to signify his own capabilities through his work and to confirm his solidarity with other workers or his family through *spending* his time in this way.<sup>248</sup>

By using the framework of the institution, *la perruque* is a form of resistance and diversion that moves away from systems which dehumanise and rather, by ‘working with its machines’ moves towards ‘objects that signify an art and solidarities’. ‘In these ways’ writes de Certeau, ‘we can subvert the law that, in the scientific factory, puts work at the service of the machine and, by a similar logic, progressively destroys the requirement of creation [...]’.<sup>249</sup>

I argue that by grotesque-ing both 3D CGI—a ‘socially determined and ideologically charged form[s] of representation’—and the kinds of bodies typically represented by CGI, Atkins is performing a version of *la perruque*—within software, within the dominant work / leisure sphere produced by digital technology and within the kinds of visible / invisible representation they produce and continually reproduce.

If it is impossible to operate outside the digital systems which manufacture our material realities, ones in which each of us is simultaneously ‘perpetrator and victim’, then resistance must be found within. To saturate ‘data’ with an excess of humanity is to subvert the dehumanising processes of technological capitalism, to employ a mode of *techne* that undoes manipulative power in an attempt to poetise a world in the clutches of utility. That all of this might begin, take place and return to the body and how it is represented is no surprise since: ‘The body is at once the final point of resistance to the global imperatives of postmodernism and the first to be affected by them’.<sup>250</sup>

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<sup>247</sup> Michel de Certeau, *The Practice of Everyday Life* (University of California Press, 2011), p. 25.

<sup>248</sup> *Ibid.*

<sup>249</sup> *Ibid.*, p. 28.

<sup>250</sup> Mirzoeff, p. 1.

Ultimately, grotesque realism offers Atkins a way of burlesquing humanity, technology and representation. 3D CGI, a hybrid mode of visioning the contradictions of digital life is the container which holds this expression together. Atkins uses it as a way of ‘corpsing’ (disrupting) not only his fellow actors—us, the only real bodies in the room—but technological capitalism itself. To give a computer-generated image a vulnerable corporeality is to disrupt its dominant narratives, to highlight the ways in which it is violent and to tell a story ‘that might extend to all bodies and against all this apparent immateriality’.<sup>251</sup>

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<sup>251</sup> Ed Atkins ‘A Questionnaire on Materialisms’, p. 7.

## **Chapter 3**

### **Becoming 3D: Fluid Pasts, (Re)Constructed Presents, Imagined Futures**

## Imaging and Imagining: Forensic Architecture & Sondra Perry

In *Biopolitical Screens: Image, Power, and the Neoliberal Brain*, Pasi Väliäho examines the politics of digital imaging technologies which have emerged from what he dubs the ‘military-entertainment-financial complex’, one which, ‘defines our present and that machinates the political reality of our lives’.<sup>252</sup> Despite the dominant social role played by this complex, the spatial, material and temporal ambiguities inherent to digital networks and artefacts mean that just how is constructed, and its various elements enmeshed, often remain imperceptible. Following Väliäho, I contest that one of the ways by which these connections might yet be parsed is through the study of an imaging and imagining technology shared by them all—3D computer-generated imagery:

The visible domain of pictures and screens evokes the invisible realm of visualisations, beliefs, and affective engagements, and it is at the intersection of these two—the visual economy—that power becomes established and that political rule over territories and the minds and bodies of people is implemented.<sup>253</sup>

In this chapter, starting from this understanding of 3D CGI as a prominent and visible manifestation of the material impacts of digital technologies, I analyse the work of research group, Forensic Architecture (FA), and artist, Sondra Perry. As such, I attempt to broaden an analysis of how 3D CGI is capable of making visible, tangible and bodily the effects and affects of digitisation begun in Chapters 1 and 2 by asking: How do these two distinct practices employ, present and thematise 3D CGI as a way of materialising that which is imperceptible and seemingly immaterial? How is use of 3D CGI as an artistic methodology a product of, and a critical reflection on, the global flow of images, bodies, products and identities that digital technologies engender?

Founded by Eyal Weizman in 2010 at the Centre for Research Architecture, Goldsmiths, University of London, Forensic Architecture is an amorphous group of architects, software developers, filmmakers, investigative journalists, scientists, lawyers and artists, with a self-defined mandate to ‘develop, disseminate, and employ new techniques for evidence gathering and presentation in the service of human rights and environmental investigations and in support of communities exposed to state violence and persecution’.<sup>254</sup> Utilising architectural tools and techniques, over the past decade, FA has developed a range of innovative methodologies to analyse and visualise instances of corporate and state violence. 3D

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<sup>252</sup> Väliäho, *Biopolitical Screens*, p. x.

<sup>253</sup> Väliäho, *Biopolitical Screens*, p. 6.

<sup>254</sup> Forensic Architecture, ‘Agency ← Forensic Architecture’ <<https://forensic-architecture.org/about/agency>> [accessed 3 December 2019].

computer-generated models, images and animations are central to this practice, one which uses ‘aesthetic means as investigative tools or as modes of investigation for analyzing political processes and their consequences’.<sup>255</sup>

Such is the hybridised nature of Forensic Architecture that their work has been presented across a highly diverse range of platforms, including international courtrooms, parliamentary inquiries, citizens’ tribunals, in print and finally, art exhibitions. Though their nomination for the 2018 Turner Prize reignited debate regarding what constitutes art, with some critics warning against the blurring of contemporary art and other more ‘serious’ disciplines,<sup>256</sup> Forensic Architecture build on an established tradition of collaboration between artists and human rights organisations. Weizman claims this association started with the ‘birth of the human rights movement in the mid-1970s’<sup>257</sup> when activists mobilised visual material to bolster their arguments: ‘Registering this entangled development, the lobbies of human rights organizations are almost exclusively dedicated to art exhibitions depicting personal stories filtered through different documentary practices’.<sup>258</sup> Of particular interest to this study is how Forensic Architecture’s practice constitutes a compelling example of how 3D CGI can be used in ways that diverge and divert away from the dominant ‘military-entertainment-financial complex’ and towards, to reference de Certeau once more, ‘objects that signify an art and solidarities’.

Born 1986 in New Jersey, Sondra Perry is an interdisciplinary artist who uses moving-image, computer animation, sculpture and performance to create large-scale installations which explore personal and collective notions of identity, in particular those pertaining to African American life. Perry’s work is, in her own words, a densely woven mesh of ‘entanglements that are hard to parse’,<sup>259</sup> an assemblage of analogue and digital artefacts that is intricate out of necessity since, as artist and curator Aria Dean writes: ‘There is no articulable ontology of blackness, no essential blackness, because blackness’s only home is in its circulating representations’.<sup>260</sup> Like Forensic Architecture, Perry focusses on how power is filtered through, amplified and refracted by digital technologies, presenting an interpretation of

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<sup>255</sup> Forensic Architecture (Project) and others, *Forensis: The Architecture of Public Truth* (Berlin: Sternberg Press, 2014), p. 13.

<sup>256</sup> ‘Forensic Architecture Winning the Turner Prize Would Risk Turning Sensitive Investigative Work into Insensitive Entertainment’, *Dezeen*, 2018 <<https://www.dezeen.com/2018/05/04/forensic-architecture-turner-prize-warning-phineas-harper/>> [accessed 1 December 2019].

<sup>257</sup> Forensic Architecture (Project) and others, p. 13.

<sup>258</sup> *Ibid.*

<sup>259</sup> ‘Ill Suns: Arthur Jafa and Sondra Perry, *Mousse Magazine*’ <<http://moussemagazine.it/arthur-jafa-sondra-perry-dean-daderko-2017/>> [accessed 3 December 2019].

<sup>260</sup> Aria Dean, ‘Poor Meme, Rich Meme’, *Real Life* <<https://reallifemag.com/poor-meme-rich-meme/>> [accessed 3 December 2019].

the digital realm that is ambiguous and multifaceted. Perry invites the audience to consider the new ways-of-being that digital life proposes whilst simultaneously showing us how it is deficient, reductive and abstracting.

I begin by charting the aesthetic territory out of which the work of Forensic Architecture and Perry emerges—commercial architectural visualisation and computer game worlds—and the social, political and cultural implications of these two dominant image streams. I detail how FA use the spatial and material qualities of 3D CGI to ‘reverse the forensic gaze’,<sup>261</sup> a process of taking that which is ‘at the threshold of detectability’<sup>262</sup> and making it both perceptible and convincing. In part two, I broaden these contextual underpinnings by tracing how Perry uses shared tactics of spatial and material imaging to construct her multi-layered installations. I argue that Perry deploys and dissects CGI, not to make truth claims about the state of the world, but rather, to unpick, edit and (re)present facets of pasts and presents anew. For Perry, 3D CGI is a cipher through which African American identity is represented, politicised and made visible and also a means by which it might be undone, liquidised and reconstituted. In both instances, 3D CGI—a contemporary visual regime that emerges out of the ‘military-entertainment-financial complex’—allows for the collapsing and constructing of images, worlds and narratives.

### **The Not-Yet**

Beyond those familiar instances of 3D CGI worlds produced by Hollywood and commerce, there exist two dominant strands through which computer-generated landscapes enter the unceasing stream of contemporary visual media: architectural visualisations (also known as architectural renderings) and computer game worlds. The former are CG images of the *not-yet*,<sup>263</sup> visualisations which mediate ‘between architects and the people they ultimately serve’.<sup>264</sup> Lev Manovich claims that the shift in architectural working practices which took

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<sup>261</sup> Eyal Weizman, ‘Forensic Architecture: Political Practice, Activism, Aesthetics’, in *The SAGE Handbook of the 21st Century City* (55 City Road: SAGE Publications Ltd, 2017), 630–52, (p. 630) <<https://doi.org/10.4135/9781526402059>>.

<sup>262</sup> Eyal Weizman, *Forensic Architecture: Violence at the Threshold of Detectability*, (Brooklyn, NY: ZONE BOOKS, 2017).

<sup>263</sup> While the title of this sub-chapter and the idea of the not-yet constructed here shares its name with Ernst Bloch’s conceptualisation of the *Noch-Nicht*, Not-Yet, it is in name only. Bloch’s utopian ontology outlined in his three-volume magnum opus, *The Principle of Hope*, can be understood as a dialectical analysis of the past which illuminates the present in the hope of directing humanity towards a better future. Though architectural visualisation might share in the notion of an architecture of hope, it radically diverges in practice, since, as we will see, it exist far outside a reality of socialist Marxism envisaged by Bloch.

<sup>264</sup> Kyle May, *Rendering* (New York, NY: Clog, 2013), p. 5.

place in the 1990s and which saw analogue drafting techniques subsumed by methods of 3D computer-aided design (CAD) ultimately led to new ways of thinking about space and form: ‘architects working with the media of 3D computer graphics started to imagine different things than their predecessors who used pencils, rules, and drafting tables’.<sup>265</sup> However, architectural visualisation, unlike CAD, is not typically part of the design process but rather a means by which architects communicate their visions to non-specialists and stakeholders: ‘design competitions, client presentations, press releases, and other such public forums’.<sup>266</sup> As such, the aim of an architectural visualisation is to convey a convincing materiality, and thus confer a legitimacy of intent to a speculative structure. Wrapped up in these rich, computer-generated visualisations are the concomitant lives, affects and emotions that architecture—and images—have the power to produce.

Though final outputs are often layered composites of a variety of software and styles, architectural visualisation most commonly refers to still images and animations, often photo- or hyper-realistic, of architecture made using 3D software such as Blender, SketchUpPro, 3DS Max, and Cinema4D. What CGI renderings offer above the physical models they have largely replaced is the ability to automatically generate a number of different perspectives at once and to allow the viewer to virtually walk or fly through spaces. In this way, they propose nothing less than an embodied and materially embedded experience of the future. For example, EVE Images GmbH, an architectural visualisation company with offices in Oslo, Berlin and Budapest, claim to create images and animations that are ‘aesthetically pleasing, photorealistic’,<sup>267</sup> upholding a correlation between realism and value by ensuring that they, ‘include small subtleties to capture the appropriate emotions of the architecture’ and by doing so, ‘achieve images which present themselves as reality’. Here, EVE confirm Pat Power’s assertion that: ‘Realism and naturalism, ideas of art as an imitation of reality, are currently the primary ethos of 3D animation culture and technology’.<sup>268</sup>

At its most utopian, architectural visualisation is a powerful imaginative tool which makes tangible some of the endless possible configurations of matter in space. Three-dimensional, navigable image-objects are manifestations of potential futures and alternative ways of existing in the world. The tradition of speculative and playful architecture collaged together by Archigram in the 1960s is today continued by groups like The Bartlett School of Architecture’s Unit 24: ‘architectural storytellers employing design, film, animation, drawing,

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<sup>265</sup> Manovich, *Software Takes Command*, p. 291.

<sup>266</sup> May, p. 5.

<sup>267</sup> ‘EVE IMAGES - About | Specialists in Photorealistic Exterior & Interior’, EVE IMAGES <<https://www.eve-images.com/about/>> [accessed 3 December 2019].

<sup>268</sup> Power, p.108.

virtual and augmented reality and physical modelling’, and who ‘seek the magical possibilities arising from their merger’.<sup>269</sup> CGI thus allows architects to literally and figuratively ‘see beyond’ the existing; a feature which refutes a criticism frequently levelled at digital media, namely, that it breeds a form of visual and cultural myopia.<sup>270</sup>

However, despite the capacity of 3D CGI to present tangible visions of alternative futures, architectural visualisation is far more commonly put to work by capital, namely the real estate industry. In these digitally rendered images, metal, glass and concrete structures are softened by carefully simulated sunlight, made verdant by landscaped gardens, and populated by smiling stock people. Such images appear not only on the web and via social media but across urban space too; pasted onto the temporary fences which shield construction sites from view, they offer a three-dimensional vision of how the environment is to be transformed. Depicting both the quotidian and the aspirational, from modern housing estates and supermarkets to shopping centres and luxury apartments, market forces typically manifest in a generic architectural vernacular of globalisation. According to Francisco Villeda, these images ‘play a major role in the homogenization of architecture’,<sup>271</sup> revealing broader trends in digital production.

In *Extrastatecraft*, Keller Easterling relates 3D CGI to the wide-ranging computational logic which has given rise to novel kinds of urban infrastructure, so-called smart cities and Special Economic Zones where technology, architecture and capital aggregate:

Now not only buildings and business parks but also entire world cities are constructed according to a formula—an infrastructural technology. [...] Computer-generated videos that fly through shining skylines have become a standard signal of aspirations to enter the global marketplace.<sup>272</sup>

Here we see how the sleek and persuasive visualisations that 3D CGI has the ability to conjure are essential to the logic of acquisition. Computer-generated images assume the role of debt in a system of financial speculation, one predicated and powered by trading on the future possible. As Väliaho points out: ‘The world of finance appears as the outcome of conjuring and speculation, where the future needs first to be successfully imagined before it can become

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<sup>269</sup> ‘Bartlett Design Anthology | Unit 24’, Issuu

<[https://issuu.com/bartlettarchucl/docs/design\\_anthology\\_unit24](https://issuu.com/bartlettarchucl/docs/design_anthology_unit24)> [accessed 8 November 2019].

<sup>270</sup> David Cooperstein, ‘A Cure For Digital Myopia’, Forbes

<<https://www.forbes.com/sites/davidcooperstein/2013/06/27/a-cure-for-digital-myopia/>> [accessed 3 December 2019]; Langis Michaud, ‘Too Much Screen Time Linked to an Epidemic of Myopia among Young People’, The Conversation <<http://theconversation.com/too-much-screen-time-linked-to-an-epidemic-of-myopia-among-young-people-111599>> [accessed 3 December 2019].

<sup>271</sup> May, p. 49.

<sup>272</sup> Keller Easterling, *Extrastatecraft: The Power of Infrastructure Space*, Reprint (London New York: Verso, 2016), p. 12.

reality'.<sup>273</sup> As such, architectural visualisations are not only a means to an end but an end in themselves; 3D CGI as product and reality.

It is in these renderings of the not-yet, where space, time and matter are intertwined and abstracted, that we see also see the abstraction of life. The people represented—copy-paste figures known as ‘scalies’<sup>274</sup>— smile, chat and shop. In the pursuit of the architectural ideal, scalies are redacted versions of reality which edit out everyday inconvenience and wilful disobedience—dirt, grime, graffiti, poverty, unruly flora and fauna, natural disasters, unpalatable politics. Thus, contrary to the depth suggested by their three-dimensionality and the liveliness of animation, these images often serve to flatten the contours of human experience, speculating not only on capital and space but behaviour too.<sup>275</sup> As such, through digitisation, architecture and life come to be rationalised in new ways.

### **The No-Longer**

The architecture and infrastructure in computer games,<sup>276</sup> typically far more expansive than that represented in architectural visualisations, extends horizontally and vertically to form navigable, interactive environments. Yet, just as 3D CGI representations of architectural worlds have the ability to produce the material and immaterial conditions of life, video game architecture’s primary aim is to direct gameplay and to shape the mental and physical responses of the player. *Open World* style games go further still and use space as a rhizomatic, rather than linear, narrative device. Here, an illusion of boundlessness is instilled through the design of freely traversable landscapes and structures and the use of visual ‘tricks’ such as Z-buffer fog; rendering depth cues so that edges and borders do not end abruptly but gently fade into a distance never reached.

Like architectural visualisations, computer game landscapes render the imagination spatially and materially and, in doing so, both emulate and abstract elements of physical reality. Though essentially free of real-world constraints, game world materials are often assigned physically accurate properties—glass filters light, gravity grounds matter, metal deflects bullets. However, where these computer-generated images of the built environment

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<sup>273</sup> Väliäho, *Biopolitical Screens*, p. 24.

<sup>274</sup> Rob Walker, ‘To Sell the Future, Find the Right “People Textures” for the Sketch’, *The New York Times*, 4 February 2011, section Magazine <<https://www.nytimes.com/2011/02/06/magazine/06fob-consumed-t.html>> [accessed 19 December 2019].

<sup>275</sup> The aesthetic and material implications of architectural visualisation have been the subject of several moving image artworks. See: Hito Steyerl, *How Not to be Seen: A Fucking Didactic Educational .MOV File*, 2013; Alan Warburton, *Z*, 2012; Guerilla Architects, *Die Sprache der Spekulation*, 2019.

<sup>276</sup> Not to be confused with the underlying structure / code of computer games, the so-called ‘back-end’ that is also sometimes referred to as the game’s architecture.

radically differ is in how, unlike their ideal and aspirational counterparts, they are more typically landscapes of ruin and destruction; images of the *no-longer*.

The *Fallout* series (1997), the *S.T.A.L.K.E.R.* series (2007--), and *The Last Of Us* (2013) are all examples of games in which the player must negotiate dystopian landscapes whose visual and spatial tropes are often plundered from across science fiction, art history and popular visual culture. Game series' such as *Grand Theft Auto* and *Call of Duty* locate the user in pseudo-fictional decaying worlds where the ruins of the recent past and present mimic our own. Emma Fraser connects ruin in game worlds to older forms of Ruinenlust,<sup>277</sup> visions of decay which see 'ruins as spaces of lament and melancholia, testament to the creative powers of man to construct beauty and the sublime power of nature to invade and overawe humankind'.<sup>278</sup> Fraser traces these digital representations of architectural ruin back to Piranesi's etchings of the ruins of Rome, Caspar David Friedrich's Romantic sublime ruins, photographs of destruction from World War II and the later emergence of post-industrial 'ruin porn'. Further parallels can be drawn between the newly-ruined architecture in video games and the sham ruin follies popularised in the 18<sup>th</sup> Century, ornamental structures designed to 'valorize the very decay of the classical artifact'.<sup>279</sup> As such, 3D computer-generated ruin in video games belongs to a much older cultural imagination, one now made strange through digitisation. CGI game worlds are evidently not subject to the same processes of decay which characterise life on earth. As such, their 'newly ruinous' appearance is a result of careful design considerations and resources. It is only with the increased processing power of personal computers that the complexity of ruin—moss, dust, dirt particles, patina, scattered material fragments—is capable of being rendered. Thus, the more sophisticated hardware and software becomes, the more convincingly humanity can virtually render the decline of the physical world. This idea is compounded by links between the virtual ruin of the game world and the status of the game as consumer product. Crumbling architecture, waste and the physical fragments of human society in the game mirror the ecologically disastrous consequences of ever-accelerating consumption IRL. Furthermore, they hint at the inevitable and immanent obsolescence of the game itself as players abandon it and move on to new platforms and inhabit new virtual spaces. This is an example of what Paul Dobraszczyk dubs the

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<sup>277</sup> Emma Fraser, 'Ruin Representations: Understanding Meaning Making in Video Games through Urban Ruins, Allegory and Trope Theory' <[https://www.academia.edu/24362253/Ruin\\_Representations\\_Understanding\\_meaning\\_making\\_in\\_video\\_games\\_through\\_urban\\_ruins\\_allegory\\_and\\_trope\\_theory](https://www.academia.edu/24362253/Ruin_Representations_Understanding_meaning_making_in_video_games_through_urban_ruins_allegory_and_trope_theory)> [accessed 30 October 2019].

<sup>278</sup> Carlos López Galviz and others, 'Reconfiguring Ruins: Beyond Ruinenlust', *GeoHumanities*, 3.2 (2017), 531–53, (p. 532) <<https://doi.org/10.1080/2373566X.2017.1374874>>.

<sup>279</sup> Brian Dillon, 'Fragments from a History of Ruin | Brian Dillon' <<http://cabinetmagazine.org/issues/20/dillon.php>> [accessed 19 November 2019].

*aesthetisation of cataclysm*, here evoking Ruskin to point out the material realities that lie behind such images:

Ever since John Ruskin attacked Victorian picturesque images of ruin as indulging a delight that suspended any human implications, images of ruins have run the risk of obscuring the human loss that is always part of their story.<sup>280</sup>

Point-and-shoot titles such as *Call of Duty* mimic the detached nature of modern warfare powered by remote communications, satellite imaging and weaponised drones. Here 3D CGI is quite clearly figured as product, part and driver of the ‘military-entertainment-financial-complex’, a surreal confluence of the reality and fictionalisation of war through technology. In the moving image series *Serious Games*, 2009-10, Harun Farocki thematises these links, highlighting the connections between war and its representations, and tracing the technologies shared by video games and the state military in order to both train soldiers to kill and to rehabilitate PTSD survivors. As Väliäho writes: ‘Computer-generated animations are used, first of all, to train motor skills, including almost reflex-like shoot or no-shoot decisions [...]’.<sup>281</sup>

While at first glance the relationship between architectural visualisation and game world ruin might appear one of linear progression—a passage from construction to collapse—what they actually invoke are cyclical transformations between various states of becoming. For example, video game ruin, whether man-made or otherwise, can be constructive in that it can interrupt the veneer of control that architecture bestows on everyday social practices. ‘To imagine the ideal city is to invite the counter imaginary of the city in decline, in ruin’,<sup>282</sup> writes Fraser, suggesting that visioning urban decay is a tactic by which to defy rationalisation. In this way, ruin can provide respite from the unceasing optimisation of life that technocapitalism machinates. One might also conceive of the 3D CGI ruin as a dream of architectural visualisation never eventuated, a failed speculative financial gamble. Alternatively, it speaks of the reality of erasure that lies behind all sleek architectural visualisations, since real estate speculation cannot materialise without changing the conditions of reality: ‘[...] demolition serve[s] to make the urban environment a *tabula rasa* for the interests of developers, the first

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<sup>280</sup> Paul Dobraszczyk, ‘Petrified Ruin: Chernobyl, Pripjat and the Death of the City’, *City*, 14.4 (2010), 370–89, (p.381) <<https://doi.org/10.1080/13604813.2010.496190>>.

<sup>281</sup> Väliäho, *Biopolitical Screens*, p. 65.

<sup>282</sup> Fraser, p. 9.

step in the refashioning of central districts in the city and the removal of local residents to the periphery'.<sup>283</sup>

Through these instances of 3D computer-generated worlds, the entropy of progress pushes up against the liveliness of animated, continually changing realities. Each maintain a 'fragile equilibrium between persistence and decay'<sup>284</sup> and embody, as Georg Simmel once wrote, a sense of both the 'striving upward and the sinking downward'<sup>285</sup> of the human spirit. It is between the inherent potentiality of the *not-yet* and the *no-longer*, a gap activated by a 3D CGI that emerges from the 'military-industrial-entertainment-complex', that Forensic Architecture—and as we will later see, Sondra Perry—use CGI to construct spaces and stories which extend far beyond the screen and its so called immaterial field of influence.

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<sup>283</sup> Daryl Martin, 'Introduction: Towards a Political Understanding of New Ruins', *International Journal of Urban and Regional Research*, 38.3 (2014), 1037–46 (p. 1042)  
<<https://doi.org/10.1111/1468-2427.12116>>.

<sup>284</sup> Dillon, p. 7.

<sup>285</sup> Georg Simmel, 'Two Essays', *The Hudson Review*, 11.3 (1958), 371–85 (p. 383)  
<<https://doi.org/10.2307/3848614>>.

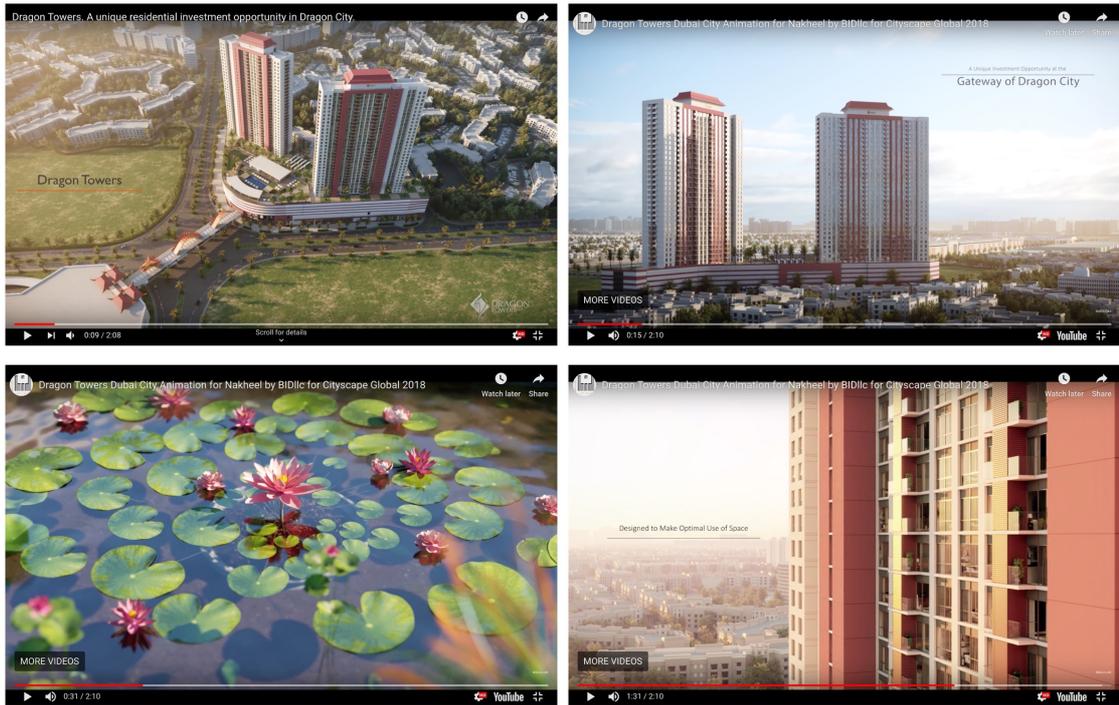


Figure 33. Screenshots from the architectural visualisation animation *Dragon Towers. A unique residential investment opportunity in Dragon City, Dubai*, uploaded by Nakheel developers, May 22nd 2019.



Figure 34. A screenshot of the city in ruin from the game *The Last of Us 2*, 2020, Sony Interactive Entertainment.

## PART 1 – Forensic Architecture

### Ruins in Reverse / Architecture in Reverse

In the 1969 essay, ‘A Tour of the Monuments of Passaic, New Jersey’, Robert Smithson recounts a psychogeographic drift through his hometown. Smithson characterises the landscape as one where an encroaching suburbia pushes up against the monumental remnants of nineteenth-century industry; together they form, ‘a place of entropy and ruination, possessed by a toxic picturesque’.<sup>286</sup> A key theme that emerges is one of ruins in reverse; a material, temporal shift in which, as with video game ruin, ‘buildings don’t fall into ruin after they are built but rather rise into ruin before they are built’.<sup>287</sup> Here, the artist perceives the American landscape as one in a continual process of destruction and renewal. As Andrew Menard argues, in objecting to ‘any simplistic notion that the nineteenth-century landscape was somehow more organic or “natural” than the modern landscape’,<sup>288</sup> Smithson belies both illusions of unencumbered progress and recourse to pastoral nostalgia. So too did Smithson illustrate his text with photographs of the landscape he captured using a Kodak Instamatic camera, images in which the ‘Noon-day sunshine cinema-ized the site’,<sup>289</sup> making of it an ‘over-exposed’ picture. Thus, like our digitally mediated present, Smithson attempts to use technology to understand the ways in which it has transformed the surface of the earth.

Forensic Architecture evoke Smithson’s rhetorical turn in referring to their investigative practice as one of architecture in reverse. This describes the application of hybrid architectural methodologies from which spatial, tangible narratives emerge: landscapes which rise, as it were, out of ruin. Here, ruin becomes a site of immanent potential since, ‘the ruin has an “architecture” in which controversial events and political processes are reflected and from which they might be reconstructed and analysed’.<sup>290</sup> Crucially, Forensic Architecture deal with ruin not only at the level of *surface*—that is, on the ground locations where crumbling architecture, ecological disaster and the disintegration of everyday life is the norm—but also on the level of information: visual, auditory and textual. Tasked with establishing a picture of events that have already taken place, like all historians and indeed all forensic scientists and criminologists, Forensic Architecture is the study of ruin: of data that is fragmented,

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<sup>286</sup> Robert Smithson, ‘The Monuments of Passaic’ <<https://www.artforum.com/print/196710/the-monuments-of-passaic-36680>> [accessed 6 February 2020].

<sup>287</sup> Smithson, ‘The Monuments of Passaic’.

<sup>288</sup> Andrew Menard, ‘Robert Smithson’s Toxic Tour of Passaic, New Jersey’, *Journal of American Studies*, 48.4 (2014), 1019–40, (p. 1022) <<https://doi.org/10.1017/S0021875814000620>>.

<sup>289</sup> Smithson, Smithson, ‘The Monuments of Passaic’.

<sup>290</sup> Eyal Weizman, ‘Eyal Weizman: Forensic Architecture / Radical Philosophy’, *Radical Philosophy* <<https://www.radicalphilosophy.com/article/forensic-architecture>> [accessed 6 February 2020].

testimonies that are incomplete and artefacts that only ever paint a partial picture of the events they have witnessed. This fragmentation is further compounded by the fact that FA investigate violations of human rights and environmental laws that have been committed by states, militaries and private corporations. As such, key information needed to construct a timeline of events is often not readily accessible, marked as classified and/or distorted according to the dominant narrative. Here, the contemporary omnipresence of surveillance equates not an expansion but a contraction of vision through control. As such, what is known as negative evidence—a physical, material or mental gap, a lack or an absence—is commonly invoked by those who wish to deny the occurrence of an event or crime yet it is through a process of uncovering how, even though imperceptible, every action in the world leaves material trace that Forensic Architecture attempt to counter the mobilisation of absence.

FA seek out information from three primary sources. Firstly, media from official outlets that is assumed to be, and occasionally proven to have been, filtered, doctored and edited, such as news reports and government websites. Their second informational source, similarly subject to bias and redaction of all kinds, is far more dispersed and amateur: private CCTV feeds, smart phone images and videos shared on social media, anonymous YouTube uploads and eye witness reports. Much of this information is assembled by open-source intelligence (OSINT) platforms such as independent journalism and research collective, Bellingcat.<sup>291</sup> Finally, their third source of information is publicly accessible but privately run and often costly satellite imagery. Taken together, theirs is a truly contemporary kind of forensics, one that exists only due to, with and though the digital sphere, the artefacts it produces and the traces left behind. Though ephemeral, low resolution and intangible, Weizman likens the process of sifting and sorting this data to the material practice of archaeology, acknowledging that: ‘archaeology is not always undertaken by direct contact with the materiality under analysis, but with images of it’.<sup>292</sup>

FA characterise this informational occlusion not as a type of immateriality but as that which lies ‘at the threshold of detectability’. Understood as ‘the state of visibility at which an object teeters on the brink of being observable or not observable’,<sup>293</sup> it concerns both the materiality of the thing-in-the-world and the materiality of the thing-representing-the-world, be it a photograph, a satellite image or a digital model. Key here is the simultaneous perception and scrutiny of both ‘material state and the mechanical means whereby this condition is

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<sup>291</sup> ‘About’, *Bellingcat* <<https://www.bellingcat.com/about/>> [accessed 6 February 2020].

<sup>292</sup> ‘Interview Eyal Weizman’ <<http://www.full-stop.net/2012/06/14/interviews/mikecarla/eyal-weizman/>> [accessed 6 February 2020].

<sup>293</sup> Forensic Architecture and others, p. 752.

archived/witnessed.<sup>294</sup> Instances in which the world is registered ‘either in high resolution or recorded at such a low resolution that there is nothing to be seen’,<sup>295</sup> only one aspect of this reality can be examined; either the object represented or the surface of its representation. Thus, it is with a forensic precision and a variety of novel digital tools that FA are able to enlarge, extend and expand what are mere traces, bestowing on them once more a cohesion and unity—person, building, city—that is antithetical to the fragmentation of ruin. In this way, FA use digital imaging technologies, including 3D CGI, to produce a record of the world not hastily assembled and ephemeral but spatial, material, complex and meticulous.

### **Forensic Aesthetics**

Reconstructing geographical sites, urban architectures and individual artefacts using 3D modelling is one of Forensic Architecture’s key analytical and presentational techniques. Indeed, 3D CGI has been used in almost all of their projects to date<sup>296</sup> in order to create images which are, ‘more than mere three-dimensional representations of proposed structures – as they are typically used in architectural practice – but rather function as analytical or operative devices’.<sup>297</sup> FA’s first three projects, and indeed the initial impetus for the formation of the agency, concern the geopolitics of occupied Palestinian territories. *Stopping The Wall in Battir*, commissioned by human rights lawyer Michael Sfard, is an investigation of a now abandoned plan by the Israeli state to build a wall through the ancient Palestinian village of Battir. Lying south of Jerusalem and near the 1949 Green Line which demarcates the original borders of the state of Israel, in 2014 Battir was designated UNESCO World Heritage site due to its unique stepped gardens and irrigation channels dating back to the Roman era. Arguing that both the landscape and local community would have been effaced by the erection of the proposed wall, FA’s intervention, though simple, lays the groundwork for their later investigations and presentations. Using satellite images and ground measurements, the team created a 3D animation of Battir which includes the proposed wall. Here, the spatial and material *not-yet* of architectural visualisation is deployed not to persuade the viewer of the virtues of the proposed structure but the inverse. Though low-resolution and blocky, when positioned side by side with video footage of the unencumbered landscape, the animation clearly reveals the physical and psychological imposition that the structure would cause. This

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<sup>294</sup> Ibid.

<sup>295</sup> Forensic Architecture and others, p. 752.

<sup>296</sup> As of January 2020, 49 investigations are documented on the website of Forensic Architecture, ‘Investigations ← Forensic Architecture’ <<https://forensic-architecture.org/>> [accessed 6 February 2020].

<sup>297</sup> ‘ICA | Operative Models’ <<https://www.ica.art/operative-models>> [accessed 6 February 2020].

project thus constitutes FA’s first attempt to mobilise a ‘detailed examination of material reality’ in order to argue for what ‘larger force fields and networks of relations that are folded into it’.<sup>298</sup> It also contains the blueprints for one of FA’s key presentation formats—namely, a digital video, approximately 10 minutes in length, which features voiceovers giving key information, open source satellite images, infographic overlays, interviews with activists and researchers and 3D CGI models and animations. Indeed, the informationally and materially rich way in which Forensic Architecture present their work can be considered a key tactic in defying the opacity which necessitates their existence.

FA categorises its areas of enquiry<sup>299</sup> and investigative methodologies<sup>300</sup> into thematic groups, yet most of their projects represent a hybridisation of these. Novel combinations not only require new terminology but ultimately equate to a new aesthetic regime: Forensic aesthetics. Lev Manovich writes how: ‘the result of the hybridization process is not simply a mechanical sum of the previously existing parts but a new “species”—a new kind of visual aesthetics that did not exist previously.’<sup>301</sup> Forensic aesthetics is defined as:

the gestures, techniques, and technologies of demonstration, methods of theatricality, narrative, and dramatization; image enhancements and technologies of projection; the creation and demolition of reputation, credibility, and competence.<sup>302</sup>

Here, it constitutes a new approach reflecting the changed conditions of media production. 3D CGI, a spatial way of constructing, navigating and knowing the world, is at the very centre of this distinctly material approach. In order to outline just how FA make tangible and visible that which is seemingly immaterial, I will now briefly detail how 3D CGI plays a role in two distinct investigative methodologies: video-to-space analysis and witness testimony.<sup>303</sup>

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<sup>298</sup> ‘Interview Eyal Weizman’.

<sup>299</sup> Categorised as: Airstrikes, At Sea, Borders, Chemical Attacks, Detention, Disappearance, Environmental Violence, Fire, Forensic Oceanography, Heritage, Land Rights, Migration and Police Violence.

<sup>300</sup> Categorised as: 3D Modelling, Audio Analysis, Data Mining, Fieldwork, Fluid Dynamics, Geolocation, Ground Truth, Image Complex, Software Development, Machine Learning, OSINT, Pattern Analysis, Photogrammetry, Reenactment, Remote Sensing, Situated Testimony and Synchronisation.

<sup>301</sup> Manovich, *Software Takes Command*, p. 259.

<sup>302</sup> Forensic Architecture and others, p. 258.

<sup>303</sup> There are many other examples of how Forensic Architecture apply 3D CGI. The two selected represent a broad variety of how and why.

## Video-to-Space

Digital impressions of the world captured by individuals are partial by nature. Video shot from a single POV often means key moments occur off camera. Moreover, along with the ‘action’, visual and aural noise is also recorded, muddying information streams with data that is deemed excess to requirement. As such, one of the key analytical methods available to FA is to aggregate these partial fragments of data and use them to generate a 3D model of the space(s) that is more replete with information than any one single piece of media.

As in the investigation, *The killing of Tahir Elçi*,<sup>304</sup> work often begins by comparing and synchronising available footage of the incident. As such, *synchronisation* describes a process of matching and arranging the available audio and visual information so that it forms a timeline of events. In this particular investigation, the team used spatial information identified in the footage and archival drawings of the area of Yenikapı Street to create a 3D model of the immediate vicinity using the architectural software Rhinoceros 5.0 and Cinema 4D. This small scale model was subsequently positioned within a larger one of the district of Sur, one generated using the commercially available *DEM Earth* plug-in for Cinema 4D. This software component allows users to automatically generate dynamic Digital Elevation Models of real-world coordinates, lifting DEM (topographical) data from satellites such as Esri, I-cubed, NASA and USGS to generate highly detailed three-dimensional landscapes. FA uses open-source and commercially available<sup>305</sup> satellite data platforms which gather data from the likes of Earth Observing System, an online programme of NASA that provides public access to imagery from multiple satellites. FA must work on the assumption that these visual representations of the earth are accurate; satellite images, like all such operational images, present themselves as objective. However, as Manuel De Landa points out, computers have been:

[R]outinely used to correct for distortions made by satellite’s imaging sensors and by atmospheric effects, sharpen out-of-focus images, bring multicolored single images out of several pictures taken in different spectral bands, extract particular features while diminishing or eliminating their backgrounds altogether [...].<sup>306</sup>

Once populated with the key known actors, vehicles and street furniture, a 3D model allows for an analysis of the relationship between objects and bodies in time and space. Thus,

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<sup>304</sup> This is just one of many examples of Video-to-Space analysis implemented by FA. ‘The Killing Of Tahir Elçi ← Forensic Architecture’ <<https://forensic-architecture.org/investigation/the-killing-of-tahir-elci>> [accessed 18 February 2020]

<sup>305</sup> Low resolution images on EOS.com are free; high-resolution images must be bought.

<sup>306</sup> Manuel De Landa, *War in the Age of Intelligent Machines* (New York: Zone Books, 1991), p. 200.

3D CGI here becomes a spatially and temporally precise diorama where comparison between ‘actors’ and objects can happen long after the event has taken place. As such, 3D CGI is a material database where evidence is assembled, arranged, processed and cross-referenced, one that is a unique site of enquiry and of presentation. Where the decisive actions of just a few moments, witnessed from partial perspectives, 3D CGI is used to pause, stretch and expand aspects of the *no-longer*.

### **Situated Testimony**

Situated Testimony describes an interviewing technique designed to aid the recollection of memory, often of traumatic events. 3D CGI is here particularly apt since: ‘Animation is particularly salient for exploring issues related to memory because it often foregrounds creativity, embodiment and the subjective, which are fundamental to memory’.<sup>307</sup> In investigations where evidence is severely limited—where there is no access to the location or the ruins left behind and no photographs of the site save an indistinct satellite image of the area—FA are often left with only descriptions given by witnesses. 3D CGI is here used in order to reconstruct the scene of the action as an animated model; in doing so, a spatial, navigable and material artefact emerges out of the witness memories.

Using the same walk-through techniques used in commercial architectural visualisations, ones which allow for embodied experiences of virtual spaces, FA enables witnesses to access and order memories, recollecting them to reconstruct a spatial timeline of events in a safe and controlled environment. It is through 3D CGI, an intermediary, visual tool by which trauma is accessed, that architecture and memory are ‘entangled in a way that cannot be easily divided into subject and object, testimony and evidence, matter and memory’.<sup>308</sup>

Spatial reconstruction and (re)embodiment also form the basis of therapy for PTSD sufferers, a condition in which the ‘patient experiences the persistent recurrence of images or memories of the event’.<sup>309</sup> Väliäho discusses *Virtual Iraq*, an application of Virtual Reality Exposure Therapy (VRET) developed for US army veterans. In this, locations and events associated with traumatic memories are reconstructed and mediated in 3D CGI and augmented by a VR headset: ‘its operational purpose is to modulate affect and to pattern behaviour or, in more general terms, to produce, manage, and channel psychic and somatic flows’.<sup>310</sup> As in

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<sup>307</sup> Victoria Grace Walden, ‘Animation and Memory’ in *The Animation Studies Reader*, ed. Nichola Dobson and others (Bloomsbury Publishing USA, 2018), p. 88.

<sup>308</sup> Weizman, *Forensic Architecture*, p. 47.

<sup>309</sup> ‘Post-Traumatic Stress Disorder - Oxford Reference’  
<<https://doi.org/10.1093/oi/authority.20110803100339838>>.

<sup>310</sup> Väliäho, *Biopolitical Screens*, p. 68.

Forensic Architecture's technique of situated testimony: 'By reproducing and recycling mental imagery in the form of computer-generated animations, what is being managed and shaped is, first and foremost, how one is able to relate to one's past and thereby to oneself'.<sup>311</sup> Situated testimony, like VRET, uses 3D CGI to reinsert life—a tangible materiality—into spaces that have been voided of humanity.

### **Part 1 Conclusion – On CGI and Half-Truths**

When in 2017, Amnesty International released a report<sup>312</sup> detailing instances of alleged torture by the Syrian state in Saydnaya Prison, a response posted on the blog 'Land Destroyer Report' questioned the validity of its contents. Written by 'independent American geopolitical analyst' Tony Cartalucci, the headline reads: 'Amnesty International Admits Syrian "Saydnaya" Report Fabricated Entirely in UK'.<sup>313</sup> Information and images contained within the report had indeed been generated in London, in the offices of Forensic Architecture. Since no images of Saydnaya Prison exist in the public realm and the access to the site is denied to journalists and monitoring groups, FA's primary information came from witness testimonies given by five survivors. The group used this information to construct 3D models of the prison architecture as a way of visualising the inmates' experiences of detention. Cartalucci includes a screenshot from FA's own video report on the investigation, an image which features a figure sat in front of an LCD screen filled with the familiar grey interface of 3D software, underneath which a caption reads: 'Technology used for creating Hollywood dinosaurs and aliens, or an architectural proposal for a vacant lot, is now being used to fabricate evidence for politically motivated reports when no actual evidence exists'.<sup>314</sup> The post concludes that the report uses 'techniques of classical deception' in order to 'target and manipulate audiences emotionally'.<sup>315</sup> Though the source may be unsubstantiated, this criticism raises wider existential issues relating to the production and visual presentation of evidence as art / art as evidence within a 'post-truth' landscape. Indeed, it communicates much older antagonisms between vision and truth, one identified by Johnathan Crary as the rationalist and empiricist

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<sup>311</sup> Pasi Väliäho, 'Animation and the Powers of Plasticity', *Animation*, 12.3 (2017), 259–71 (p. 269) <<https://doi.org/10.1177/1746847717740093>>.

<sup>312</sup> 'Saydnaya Document'

<<https://www.amnesty.org/en/documents/document/?indexNumber=mde24%2f5415%2f2017&language=en>> [accessed 6 February 2020].

<sup>313</sup> Tony Cartalucci, 'Land Destroyer: Amnesty International Admits Syrian "Saydnaya" Report Fabricated Entirely in UK', *Land Destroyer* <<http://landdestroyer.blogspot.com/2017/02/amnesty-international-admits-syrian.html>> [accessed 21 November 2019].

<sup>314</sup> Cartalucci.

<sup>315</sup> *Ibid.*

thought that ‘observation leads to truthful inferences about the world’.<sup>316</sup> Today, the ongoing crisis of vision is one in which Hollywood fantasy, architecture, military vision, info graphics, advertising, and here evidence of human rights abuses, all share a computer-generated aesthetic and emerge not out of direct inference with the world but out of information.

There is, of course, truth in both the original report and in the blog post. Member of Forensic Architecture and artist, Susan Schuppli, highlights Hannah Arendt’s 1971 essay, ‘Lying in Politics’, in which Arendt argues that acts of lying and transformation are intimately tied to the capacity to imagine:

[C]hange would be impossible if we could not mentally remove ourselves from where we are physically located and imagine that things might as well be different from what they actually are. In other words, the ability to lie, the deliberate denial of factual truth, and the capacity to change facts, the ability to act, are interconnected; they owe their existence to the same source, imagination.<sup>317</sup>

Thus, like the promise of renewal held within the ruin and of the destruction inherent to the architectural visualisation, every act of presenting a new or different truth holds within it an act of negation and vice versa. Schuppli goes on to argue that this paradox is an inevitable part of reality and it is art’s capacity to handle this ambiguity that is its strength: ‘I have always maintained that art’s political potential resides in its aesthetic agency to imagine a different version of events to that of the present’.<sup>318</sup> Ultimately, by summoning the powerful imaginative and persuasive capacity of 3D CGI and exploiting its material and spatial qualities, Forensic Architecture is able to present an alternative narrative of the past in the present, and by doing so, perhaps influence the course of future:

Sometimes from that great, messy flood of testimonies and pixels, from the contradictions and unknowables, it is possible to assemble, with some effort, a more or less coherent narrative (or a counter narrative) that is cognisant of the problem of truth-telling, and claim, “This is what happened here”.<sup>319</sup>

Thus, CGI is here an instance of digitally visioning that which cannot be understood through strict dichotomies of true/false, material/immaterial, not-yet/no-longer. What we are left with is that which Väliäho describes as, ‘a crisis concerning who has the power to

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<sup>316</sup> Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the 19th Century* (Cambridge, MA: The MIT Press, 1992), p. 29.

<sup>317</sup> Hannah Arendt, ‘Lying in Politics: Reflections on The Pentagon Papers’, 18 November 1971, <<https://www.nybooks.com/articles/1971/11/18/lying-in-politics-reflections-on-the-pentagon-paper/>> [accessed 1 February 2020].

<sup>318</sup> Susan Schuppli, ‘Half-Truths | Mute’ <<https://www.metamute.org/community/reviews/half-truths>> [accessed 21 November 2019].

<sup>319</sup> Weizman, *Forensic Architecture*, p. 128.

determine the parameters of reality'.<sup>320</sup> In this case, it is those who have the resources to produce digital artefacts which are sophisticated, believable and, seemingly, material.

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<sup>320</sup> Väliäho, 'Animation and the Powers of Plasticity', p. 262.

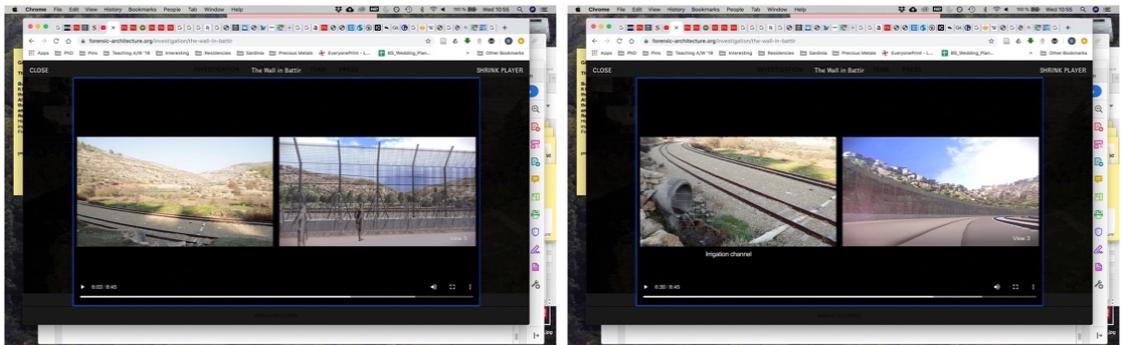


Figure 35. Screenshots from *I.1 Stopping the Wall in Battir*, published 2015 by Forensic Architecture.

## PART 2 – Sondra Perry

### At Sea

Founded in the wake of the European migrant crisis, the research agency Forensic Oceanography, a branch of Forensic Architecture, investigate human rights abuses happening on a site where change takes on new meaning; at sea. Here, the cyclical processes of ruin and regeneration that characterise life on land, those which leave evidence as material trace, are liquefied and accelerated:

If geography expresses in its very etymology the possibility to write and therefore read the surface of the earth, the liquid territory of the sea seems to stand as the absolute challenge to spatial analysis.<sup>321</sup>

At the level of visible surface and within its invisible depths, the sea constantly shifts, swells and swirls. As it does so, it effectively erases all trace of the past, thus preserving it ‘in a kind of permanent present’.<sup>322</sup> As such, Forensic Oceanography’s investigative methodologies rely to an even greater extent on what can be gleaned from so-called immaterial—and for the most part invisible—digital communications technologies: ‘Buoys measuring currents, optical and radar satellite imagery, transponders emitting signals used for vessel tracking and migrants’ mobile phones [...]’.<sup>323</sup> By assembling—and crucially interpreting—this data, a tangible (three-dimensional) picture of the no-longer emerges out of a liquid territory.

What, however, of sea events that belong not to the recent but to a far more distant past, those which happened long before digital networks cast their imperceptible net across the globe? When considered not in terms of the split second but the *longue durée*, the passage of time paradoxically renders certain stories, artefacts, bodies and images invisible whilst others solidify in the popular imagination as historical truths and go on to (in)form the not-yet for years to come. In her work, Sondra Perry deals with both fleeting traces and deeper excavations of personal and collective histories to question how identities, politics and cultures manifest through digital technologies. In this section, though I consider several of Perry’s works, I largely focus on *Typhoon Coming On*, 2018, a multimedia installation in which the artist asks what has the sea witnessed and how this witnessing is represented through images. *Typhoon Coming On* begins with the Middle Passage, a human-rights atrocity that extends from the early sixteenth up to the nineteenth century; through various explorations and presentations of 3D computer-generated animation, Perry begins to unveil how the effects of

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<sup>321</sup> Forensic Architecture (Project) and others, p. 657.

<sup>322</sup> Ibid.

<sup>323</sup> Ibid, p. 658.

the distant past still cause waves on the shores of the present. As such, Perry understands the not-yet and the no-longer not as isolated nodes along a linear timeline but as part of a vast temporospatial continuum in which pasts, presents and futures are considered malleable. Perry's installations are often an amalgamation of moving-image in its many forms; the textures of 3D CGI animations and original footage, often shot using a mobile phone, rub up against fragments of found footage harvested from YouTube, news channels and social media. In this way, like all producers of digital content, Perry is both author and editor, one who slices, crops and rearranges to create meaning through a process of selection and sequencing. As such, the work here discussed is not only a study of the myriad kinds of moving-image, including 3D CGI, that make up our contemporary, global, networked mediascape, but also the bodies and the hardware which transmit these images: LCD screens small and large attend each room, some suspended from sculptural screen-armatures, some mounted to devices reminiscent of gym equipment, and vast floor-to-ceiling projections wrap around the inner walls of the gallery serving as a permanently visible and vibrating backdrop to the content within. Taken together, Perry's work teases out complexities in the imagining and imaging of blackness across time.

### **Typhoon coming on**

A key conceptual starting point for the work, and the painting from which the exhibition's title is lifted, is J.M.W. Turner's most celebrated and divisive: *The Slave Ship*, or, as it was originally titled, *Slavers Throwing overboard the Dead and Dying—Typhoon coming on*.<sup>324</sup> First exhibited in 1840—just seven years after the Slavery Abolition Act of 1833 made the trade of enslaved people illegal within the British Empire but did not end it in practice<sup>325</sup> — it is claimed that Turner was inspired by the story of the Zong massacre as recounted in *The History and Abolition of the Slave Trade* by Thomas Clarkson.<sup>326</sup>

In September 1781, the merchant ship Zong, its captain, crew and 442 enslaved African men, women and children, the monetary value of the latter insured as cargo by

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<sup>324</sup> 'Slave Ship (Slavers Throwing Overboard the Dead and Dying, Typhoon Coming On)' <<https://collections.mfa.org/objects/31102/slave-ship-slavers-throwing-overboard-the-dead-and-dying-t;jsessionid=B02B7A624775BFC5519A13FD3000A522>> [accessed 6 February 2020].

<sup>325</sup> 'Former slaves were bound, as apprentices, to their former masters for periods up to a further six years, 1838'. The National Archives, 'Abolition of Slavery' <<http://www.nationalarchives.gov.uk/slavery/about.htm>> [accessed 23 October 2019].

<sup>326</sup> Thomas Clarkson, 'The History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave-Trade by the British Parliament', *Cambridge Core*, 2010 <<https://doi.org/10.1017/CBO9780511740121>>.

underwriters in England, left Accra, Ghana, for Jamaica. This leg of the triangular transatlantic trade route known as the Middle Passage, one which carried goods, raw materials and people between the continents of Europe, Africa and the Americas, has been labelled by AbdouMalik Simone as an ‘ontological nothingness’<sup>327</sup>; a space-time of abstraction and dehumanisation in which the enslaved lost their lands, their communities and their gods. As was often the case on such vessels, unsanitary conditions and malnutrition meant illness soon visited the overcrowded Zong. Protected by law, the captain and crew were aware that the ‘natural death’ of slaves was uninsurable and so, claiming that a shortage of drinking water justified their actions, murdered 133 people by throwing them overboard. Once back in England and upon filing their insurance claim, the owners were sued—not, however, for mass murder but over the validity of their claim. In this way, the value of the slaves was framed not, as Ian Baucom writes in *Spectres of the Atlantic*, in terms of ‘their continued, embodied, material existence’, but was tied instead to ‘their speculative, recoverable loss value’.<sup>328</sup> This constitutes a forced transition from human to abstract financial value; a foundational pillar of modern capitalism. Today, it is a similar colonial logic of use and expendability, one driven by the need for relentless market expansion, that means Accra is one of several final destinations for electronic waste in the global south. Exploitation is perpetuated as precious metals are extracted for use in digital devices, which, once obsolete, are shipped back to the shores of Africa, where their chemical toxicity is released through unsafe recycling practices having dangerous consequences for the land and its people.

The story of the Zong is understood to have bolstered the politico-religious abolitionist movement of the 18<sup>th</sup> century, one which culminated in the presentation of an abstract of evidence relating to the slave-trade and its violations of human rights before a select committee in the House of Commons in 1790/91. This document, principally comprised of fragmented testimonies from witnesses, was augmented by a series of technical drawings of the Brookes slave ship. Commissioned by Thomas Clarkson and produced by the artist James Phillips in 1789, the print is said to have caused, ‘an immediate and international sensation’.<sup>329</sup> It depicts the hull of the ship filled with row upon row of abstracted bodies. Notably, its design, ‘obeys very closely the techniques for depicting a naval vessel set down in late-eighteenth-century naval architecture guides’.<sup>330</sup> According to Marcus Wood, this combination

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<sup>327</sup> AbdouMalik Simone, ‘Harvard Design Magazine: The Black Beach’  
<<http://www.harvarddesignmagazine.org/issues/39/the-black-beach>> [accessed 15 October 2019].

<sup>328</sup> Ian Baucom, *Spectres of the Atlantic: Finance Capital, Slavery, and the Philosophy of History* (Durham: Duke University Press, 2005), p. 139.

<sup>329</sup> Marcus Wood, *Blind Memory: Visual Representations of Slavery in England and America, 1780-1865* (Manchester University Press, 2000), p. 17.

<sup>330</sup> Marcus Wood, p. 26.

of technical plan with visceral depiction of the human form was ‘a superb semiotic shock tactic’;<sup>331</sup> a methodology of visually, spatially and materially presenting information which set clear precedents for the techniques employed by Forensic Architecture.

Turner casts the delicate masts of the *Zong* against a vibrant, jewel toned sky. White-crested waves and, in his own words, an ‘angry setting sun and fierce-edged clouds’<sup>332</sup> warn of the storm to come and the massacre that has already taken place. On the dark surface of water float scattered artefacts and the bodies of those drowned: a human hand, a manacled leg and black metal chains, all beset by monstrous fish and sea birds. No testimony of the event was ever recorded or given in legal proceedings and no ruins of the massacre remain. As such, Turner’s is a work of the imagination. In ‘Of Truth of Water’, a passage from *Modern Painters Vol. I*, John Ruskin, champion of Turner and the first owner of the painting, writes how: ‘the whole picture dedicated to the most sublime of subjects and impressions [...] the power, majesty, and deathfulness of the open, deep, illimitable Sea’.<sup>333</sup> Critics, in particular the writer and poet David Dabydeen,<sup>334</sup> have since questioned whether Turner’s painting, and Ruskin’s appraisal of it, point to an aestheticisation of cataclysm and the uncomfortable idea of truth glossed over in the pursuit of the sublime. As Wood writes:

Art which describes or responds to trauma and mass murder always embodies paradox. [...] How is it possible to make something beautiful out of, and to perceive beauty within, something which has contaminated human values to such a degree as to be beyond the assumed idealisations of truth and art, beyond the known facts and beyond manipulations of rhetoric?<sup>335</sup>

Elizabeth Alexander suggests that portrayals of violence against black bodies are part of a much longer tradition, one that is perpetuated to this day: ‘Black bodies in pain for public consumption have been an American national spectacle for centuries’.<sup>336</sup> It is against this tumultuous backdrop—and with an understanding of how historical instances of racial violence are reproduced through their representations—that Perry begins her work. Perry’s task then, as Anselm Franke writes, is to uncover a violence that is ‘not visible as such’, but one that must be ‘recovered from beneath the veil of sublime beauty’.<sup>337</sup>

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<sup>331</sup> Marcus Wood, p. 27.

<sup>332</sup> ‘Slave Ship (Slavers Throwing Overboard the Dead and Dying, Typhoon Coming On)’.

<sup>333</sup> John Ruskin, *Modern Painters* (J. Wiley, 1848), p. 378.

<sup>334</sup> Dabydeen assumes the voice of a drowned slave to question Turner’s depiction of suffering in David Dabydeen, *Turner: New and Selected Poems* (Leeds: Peepal Tree Press Ltd., 2002).

<sup>335</sup> Marcus Wood, p. 7.

<sup>336</sup> Elizabeth Alexander, *The Black Interior: Essays* (Saint Paul, Minn: Graywolf Press, 2004), p. 177.

<sup>337</sup> Forensic Architecture and others, p. 484.

## Blown Up and Liquidised

Upon entering the gallery space where *Typhoon Coming On* is installed, the viewer is immediately greeted by a floor-to-ceiling projection of a sleek digital seascape, yet one with an unmistakably ‘analogue’ texture. Perry has in fact zoomed into and chopped up Turner’s waves, applying the painting as a texture to an animated 3D plane which mimics the surface of an undulating sea. Here, the storm and drang of Turner’s ocean is brought to life through movement. The foundational principle of animation, one played out quite literally in video games, is evoked: stillness as death, movement as vitality. The process by which bodies, images and ideas are fixed over time is framed by Leslie as a kind of solidification: ‘Things that once moved, but over time are stilled into stoniness, become petrified’.<sup>338</sup> As such, Perry’s gesture, taking that which is frozen and reanimating it, points to the duality of animation, since: ‘Animation is not a matter of movement alone, but a matter of movement set in relation to stillness’.<sup>339</sup> Here, the fixity of almost two-hundred-year old oil paint is liquefied and reactivated once more and, by extension, the trauma it represents. This is not a case of ruins in reverse but rather, petrification in reverse. As the former manipulability of paint morphs into the plasmatic potential of CGI, we do not get a retelling of events but a suggestion of how digital fluidity can be a productive force.

Turner depicted the Zong on a horizon that tips, lurches and threatens to upend entirely. In ‘Freefall’, an essay reprinted by Perry in her *Roomba zine*,<sup>340</sup> Hito Steyerl suggests that the volatile perspective depicted by Turner reflected spiritual and material shifts taking place across Victorian society:

At the sight of the effects of colonialism and slavery, linear perspective—the central viewpoint, the position of mastery, control, and subjecthood—is abandoned and starts tumbling and tilting, taking with it the idea of space and time as systematic constructions. The idea of a calculable and predictable future shows a murderous side through an insurance that prevents economic loss by inspiring cold-blooded murder.<sup>341</sup>

Perry’s CGI rendition does away with the horizon entirely, effectively submerging the viewer in a knowing digital sublimity. Without recourse to up and down, start and end, the

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<sup>338</sup> Esther Leslie, ‘Animation’s Petrified Unrest’, in *Pervasive Animation*, pp. 73–93, (p. 76).

<sup>339</sup> Ibid.

<sup>340</sup> ‘Sondra Perry at Serpentine Galleries – Art Viewer’ <<https://artviewer.org/sondra-perry-at-serpentine-galleries/>> [accessed 6 February 2020].

<sup>341</sup> Hito Steyerl, ‘In Free Fall: A Thought Experiment on Vertical Perspective - Journal #24 April 2011 - e-Flux’ <<https://www.e-flux.com/journal/24/67860/in-free-fall-a-thought-experiment-on-vertical-perspective/>> [accessed 6 February 2020].

greatness of ‘matter, space, power, virtue, or beauty’<sup>342</sup> is mobilised in pixels, allowing Perry to effectively reject systematic, inherited constructions of space and time: ‘the ability to strip, expand, or abstract content of its form/identity, material, geological, digital, cultural and physical [...] has the ability to be a radical act’.<sup>343</sup>

The large-scale projection which envelops the space switches between the reinvigorated Turner and a horizonless seascape in a fierce, violet colour, one that casts the gallery in a cold, alien light. It is made using the ‘sea modifier’ tool from the 3D software, Blender. Violet is the default colour automatically applied by the programme to indicate when a texture is missing. This not only reveals the digital trickery beneath the animation but draws our attention to notions of what is depicted and what remains absent, namely, the victims of the slave trade made voiceless thrice—objectified as goods, silenced by death, painted—but which are present nevertheless.

Perry’s use of Blender also reveals issues relating to the working practices of artists who use digital tools such as 3D CGI:

I animate it with a 3-D rendering program called Blender that’s open source. You don’t have to install it on your computer in order for it to work, which is important to me because I’m such a transient being. I put the program on a zip drive that I can pick up and take somewhere else. It’s important to me to have this kind of mobility, conceptually and actually.<sup>344</sup>

That Blender is open source is significant since the expense of 3D software is often prohibitive.<sup>345</sup> Blender allows anyone with access to a computer to generate radically material images. Thus, the liquidity that Perry evokes is aesthetically and conceptually mirrored in her working practices. CGI presents itself as agile and particularly apt in Perry’s contemplation of how identity is formed and reformed over time and through technology:

I’m interested in thinking about how blackness shifts, morphs, and embodies technology to combat oppression and surveillance throughout the diaspora. Blackness is agile.<sup>346</sup>

In the essay ‘The Black Beach’, the Martiniquais writer Édouard Glissant describes a beach—that first material landing site after the abyss that is the Middle Passage—with a

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<sup>342</sup> Ruskin, p. 41.

<sup>343</sup> ‘Electronic Arts Intermix: SONDRRA PERRY: Screening and Artist Talk’  
<<https://www.eai.org/supporting-documents/910/a.13148.35>> [accessed 6 February 2020].

<sup>344</sup> ‘Ill Suns: Arthur Jafa and Sondra Perry • Mousse Magazine’.

<sup>345</sup> For instance, as a student I have the ability to use Cinema4D for free but, as of January 2020, a perpetual license costs €3,451. ‘Cinema 4D’, *MAXON | 3D FOR THE REAL WORLD*  
<<https://www.maxon.net/de/buy/>> [accessed 6 February 2020].

<sup>346</sup> ‘Sondra Perry at Serpentine Galleries – Art Viewer’.

‘subterranean, cyclical life’, that of Le Diamant: ‘During the rainy season, hibernage, it shrinks to a corridor of black sand that you would almost think had come from the slopes above, where Mont Pelée branches out into foliage of quelled lava’.<sup>347</sup> Perry draws similar parallels between psychic and physical sites of trauma and the body in a further projected work. Here, the waves of Turner’s ocean morph once more, this time into an ultra-close-up CGI rendering of Perry’s skin, a digital depiction of what Frantz Fanon designated the overdetermined site for the fact of blackness, a ‘racial epidermal schema’<sup>348</sup> in which the black body comes to be objectified. Glissant describes how: ‘The black sand glistens under the foam like peeling skin’.<sup>349</sup> Like the angry sun, sea and sky in Turner’s rendering, Perry’s depiction is cast in a raw and angry array of reds, pinks and browns, a bubbling, three-dimensional skin texture that simultaneously evokes ocean, flesh and lava. As such, Perry takes both material and abstract notions of trauma and its sites—of sea, skin, flesh—and renders them anew using 3D CGI.

### **CKB / BSOD / BWOS**

Perry further destabilises the viewer and the conventions of viewing moving images—whilst simultaneously pointing to how technology can serve to reframe and refract dominant narratives—through the use of Chroma Key Blue (CKB). Optically akin to International Klein Blue, a shade of ultramarine used by conceptual artist, Yves Klein, to express the evanescence and spirituality of life and ideas of transcendence, immateriality and boundlessness, Chroma key blue is used in visual effects to composite two different images or video streams together.

In Perry’s work, CKB arrives both within and outside of the screen. Moving image artworks are conventionally shown in what Noam M. Elcott calls artificial darkness, spaces where darkness is a controlled technology utilised to create a ‘spacelessness’<sup>350</sup> in which corporeality is suspended. Perry rejects both black box and white cube, choosing instead to position her work within a gallery space that is entirely Chroma key blue. This not only denies the suspension of corporality theorised by Elcott but actively foregrounds the body of the viewer, one who finds themselves in a dynamic space of possibility in which both context and/or self can be ‘keyed out’—either dissolving completely or being formed anew—at will and at any moment.

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<sup>347</sup> Édouard Glissant, *Poetics of Relation* (University of Michigan Press, 1997), p. 122.

<sup>348</sup> Frantz Fanon, *Black Skin, White Masks* (Pluto Press, 1986), p. 112.

<sup>349</sup> Glissant, p. 124.

<sup>350</sup> Noam M. Elcott, *Artificial Darkness: An Obscure History of Modern Art and Media* (University of Chicago Press, 2016), p. 8.



## Artefacts and Avatars

In *It's In The Game*, 2017, Perry further explores how computer-generated imagery reveals the ways in which the military-entertainment-financial-complex fragments and co-opts black lives, bodies and their representation. Appearing in various different iterations since 2017, the work is comprised of a single-channel moving image loop and an assortment of screen-sculptures distributed around a Chroma key blue space. As the title suggests, the work makes particular reference to the arena of competitive sports, a forum where political and social tensions are often played out on a grand scale. The work sees Perry situating personal, familial connections within a broader social narrative: 'As my family and I are working on these things together, I have to keep reminding folks that this is not just a theoretical understanding of how Black people interact—it's always been this way'.<sup>351</sup>

*It's In The Game* begins with the story of a series of class action lawsuits filed by former National Collegiate Athletic Association (NCAA) athletes against the NCAA and the multi-billion-dollar video game company, Electronic Arts Inc. (EA). The athletes claimed that characters in the basketball video game *NCAA March Madness* had, without consent or compensation, been fashioned after their likenesses; Perry's twin brother was one of the former players involved in the case. The single-channel video at the centre of the work begins with an intimate slideshow of childhood photos of Perry and her brother. Smiling and posing for the unseen photographer, these nostalgic images are disrupted by superimposed digital 3D models of ancient artefacts; rendered not in full colour but a flat CKB, they slowly rotate in the centre of the screen. In the background, from a stretched out and slowed down version of The Stylistics 1971 track, 'You Are Everything', a haunting voice sings: 'Today I saw somebody, Who looked just like you'. The frame cuts to contemporary scenes of Perry and her brother walking through the Metropolitan museum. They, like many of today's museum visitors, use their mobile phones to take photographs of objects in glass vitrines. An automated voiceover reads information on these artefacts, now stripped of their original context and function:

Object type: Figure. Museum number: 0C18691005.1 Title: Object Hoa Hakananai'a, lost or stolen friend. Moai, ancestor figure, made of basalt. Acquisition notes from Wikipedia: Hoa Hakananai'a is a moai (Easter Island statue) housed in the British Museum in London.

The artefacts on screen are mirrored by screen-sculptures that sit around the exhibition space. Indeed, the work's 2017 iteration featured a series of moving image clips shown on small LCD screens atop white plinths and under glass vitrines. The 2018 version rather

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<sup>351</sup> 'Ill Suns: Arthur Jafa and Sondra Perry •Mousse Magazine'.

displayed these screens attached to photography armatures, each structure reminiscent of an angular and warped human form. These screens show ‘behind-the-scenes’ shots from 3D visualisation software, namely, the interiors of 3D CGI bodies. Like all CGI volumes made using planes, these bodies are hollow shells that only appear convincingly robust when viewed from the outside, a fact not usually revealed to an audience. Viewed from the inside out, like images captured by an antroscope, these close-up surfaces are, like all bodies regardless of skin colour, a pinkish, grotesque mass. We are privy once more to the potentially invasive, reductive and violent nature of digital representation. Aligned with the museum artefacts we see on screen, their display as artefact and as bodily fragment, underlines how such technologies merely perpetuate systems of objectification and abstraction.

The various narrative strands of the work come together in a scene where Perry’s brother, controller in hand, cycles through characters in the game. Each player, restlessly twitching with its assigned ‘idle animation’—the inconsequential movements a computer game character goes through when it is not in play—is identified either by name or by number: SF #32, PG #3 etc. Albeit with slight variations in body size and skin tone, the avatars are otherwise homogenous in their digital abstraction. However, as he lands on each player in turn, Perry’s brother offers information about the people upon which each avatar is based: ‘Hard working. Never took a play off’; ‘Just a good guy on and off the court’; ‘That’s Kenneth Ward. That was my roommate’. Through this process of personal recollection, attributes and characteristics are reassigned to people that have, without their consent, been coopted and abstracted by a multibillion dollar tech industry. Though now dealing in digital media, that which is seemingly immaterial in nature, this constitutes a dehumanising process that has chilling parallels with the transatlantic slave trade. To offer personal information about the bodies behind the 3D models, personhood are partially restored and, as in the work of Ed Atkins, data is ‘humanised’ so that it comes to matter.

Finally, we see four game characters facing one another and standing in the centre of the generic, gridded ‘non-space’ of 3D animation software. This staging is not insignificant since, as we have already seen, the viewport of 3D software is a zone of inherent possibility that offers the potential to craft alternative visions of the world. A voiceover begins to read the abstract legal language from the aforementioned NCAA case and the characters react; visibly agitated, they shake their heads and toss their arms. Thus, unlike typical video game characters, these CGI bodies are unruly and emotional, engaged in a form of nonviolent civil disobedience intended to assert autonomy and resist becoming, as the abstraction in the game would have it, an automaton cast into an externally imposed shape.

Ultimately, Perry reveals how the museum, the game and the 3D space are, as Natascha Marie Llorens writes: ‘contexts that pretend to be able to represent the infinite dimension of the human being from an institutional or algorithmic perspective, and yet each is

riven with ideological violence, especially in the prerogative of each to decontextualise black and brown life without consent or negotiated justification'.<sup>352</sup> Perry therefore presents us with a body of work that shows how social structures, institutions and the popular media, in particular 3D CGI, can abstract bodies, artefacts, images and people by placing them in the logic of acquisition.

## **Part 2 Conclusion - Vodun**

In a transcribed conversation between the artists Arthur Jafa and Sondra Perry, Jafa proclaims of Perry's work: 'Yeah, there's techno savvy, and technology and media, but my impression was, "Wow, this is very Vodun, digging peoples' bodies up and reanimating them"'. Vodun (also Vodoun, Voodoo), deriving from the Fon word for 'spirit' or 'God', is a religion emanating from West Africa. It holds that the spirits of the dead live amongst the living and that there exists a delicate balance between all things living and dead, animate and inanimate. As Rachel Beauvoir-Dominique writes, like the oceans, Vodun is both dynamic and fluid, a religion that is:

[I]nformed by a common vision of self in which manoeuvrable human spiritual entities flow in relationship with other forces, all intermingling in the essence of a higher power. The vision emerges from a constantly evolving world and the possibility of adaption, change, and amelioration.<sup>353</sup>

As Jafa points out, by weaving together the stories of bodies, images, devices and technologies from both the past and present, Perry brings the material and immaterial into equivalence, pointing to the ways in which constantly evolving digital technologies play a key role in the shaping of contemporary notions of Blackness. Spatially and materially ambiguous, capable of shapeshifting and morphing, CGI becomes a unique way to soften, restage and reanimate that which has hardened over time. Liquefying Turner's masterpiece, blowing up and animating skin textures, presenting the plundered artefacts in Western museums as 3D scans and interrogating how black bodies are abstracted through popular media such as video games: all these are tactics through which Perry dissects the present whilst avoiding both technological utopianism and pre-digital nostalgia. In this way, like FA, Perry uses 3D CGI to restore something of what is lost, to give shape and form to an anonymous but interconnected

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<sup>352</sup> 'Sondra Perry - Features - Art-Agenda' <<https://www.art-agenda.com/features/241047/sondra-perry>> [accessed 11 February 2020].

<sup>353</sup> Rachel Beauvoir-Dominique, 'Underground Realms of Being: Vodoun Magic', in *Sacred Arts of Haitian Vodou*, ed. by Donald Cosentino, Los Angeles University of California, and Fowler Museum of Cultural History (Los Angeles, California: UCLA Fowler Museum of Cultural History, 1995), p. 166.

diaspora. Perry shows us that through CGI and other, related technologies, there exists the possibility for adaption and amelioration:

Digital technology can be future-oriented, rejecting the visual language, commodification and abject narration of the past. What kind of bold and unruly bodies can we be?<sup>354</sup>

Through these nuanced multimedia installations, Perry shows just how computer-generated imagery can be used in the formation of alternative narratives, ones that insist on the material realities of the present. Like Forensic Architecture, Perry calls on us to look not only at what the image shows—what is visible—but what it doesn't show, namely, the invisible conditions of its existence, distribution and reception. Perry plays with how identity is made up of (computer-generated) images and modes of seeing and being seen that simultaneously render us accomplice and victim. This is an attempt to reverse not only the fragmentation of lives imposed by technocapitalism but the fragmentation that is a consequence of technology, since: 'Technology tends to view the world—including, perhaps especially, that of "individuals"'—as a collection of fragments'.<sup>355</sup>

Both Perry and Forensic Architecture take traces of the *no-longer*—fragments from the past, images, words and data about landscapes, bodies and the stories they tell—and, through 3D CGI, attempt to (re)assemble them to form new narratives. To manipulate 3D CGI is not only to impact thought but to influence the material reality of the *not-yet*. Digital animation is uniquely qualified to achieve this in that it gives dimensional, perspectival body—a graspable tangibility—to what is, or what cannot, be physically present. The tools of Hollywood and the Pentagon, these images are cast with both a seriousness and a flippancy that gives them a unique standing within visual culture. All these things are hidden within 3D CGI as a social hieroglyph, a curiously paradoxical tool that is simultaneously full and flat, weighty and hollow, soft and hard, bound by the wider power structures and systems it exists within yet capable of visioning new realities.

Ultimately, the stakes of being able to mobilise digital imaging techniques such as 3D CGI becomes a question of authorship, self-determinism and agency. Through their work, Perry and FA show how 3D CGI can be used to deny the ways in which people are either cast as being too visible, helplessly tethered and quantified or else invisible, cut-adrift and excluded. As such, both despite and in spite of its being a product of the military-financial-

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<sup>354</sup> Manuel Arturo Abreu and others, *Sondra Perry: Typhoon Coming On*, ed. by Amira Gad (Köln: Koenig Books, 2018), p. 22.

<sup>355</sup> David Lyon, 'Liquid Surveillance: The Contribution of Zygmunt Bauman to Surveillance Studies', *International Political Sociology*, 4.4 (2010), 325–38 (p. 334) <<https://doi.org/10.1111/j.1749-5687.2010.00109.x>>.

entertainment complex, 3D CGI is a unique visual mode by which to liquidate partial pasts, to construct occluded presents and to imagine alternative futures.

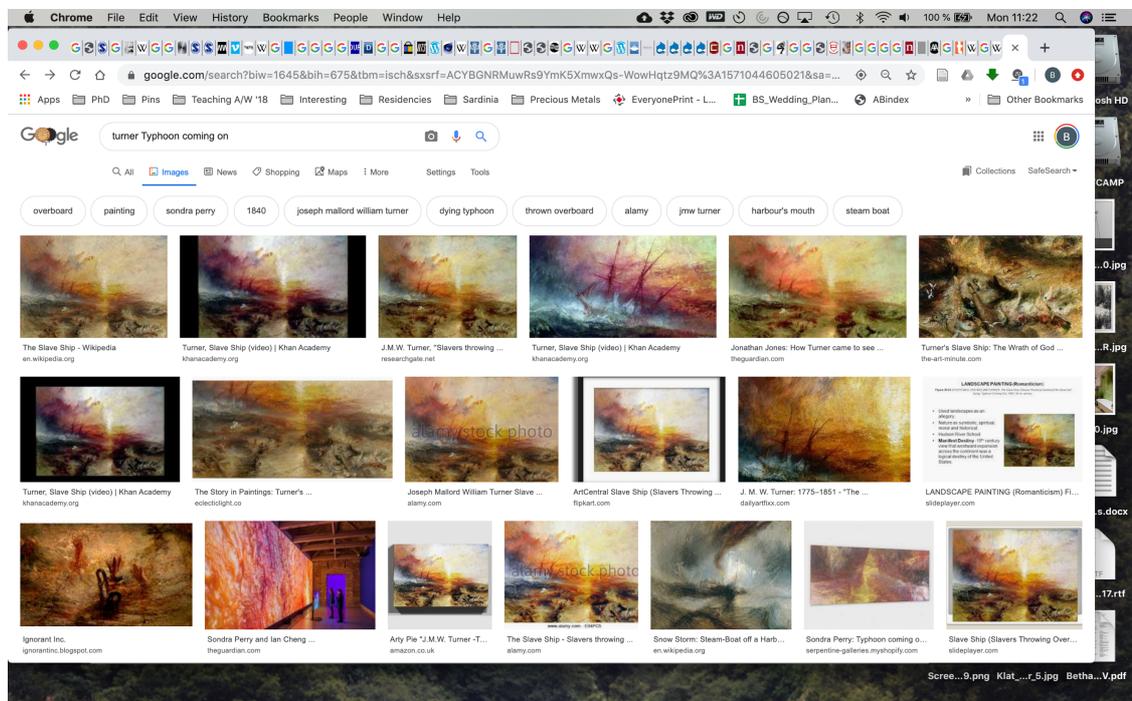


Figure 36. Google image search showing digital reproductions of Turner's masterpiece and in the bottom left hand corner, Perry's installation of the same name.

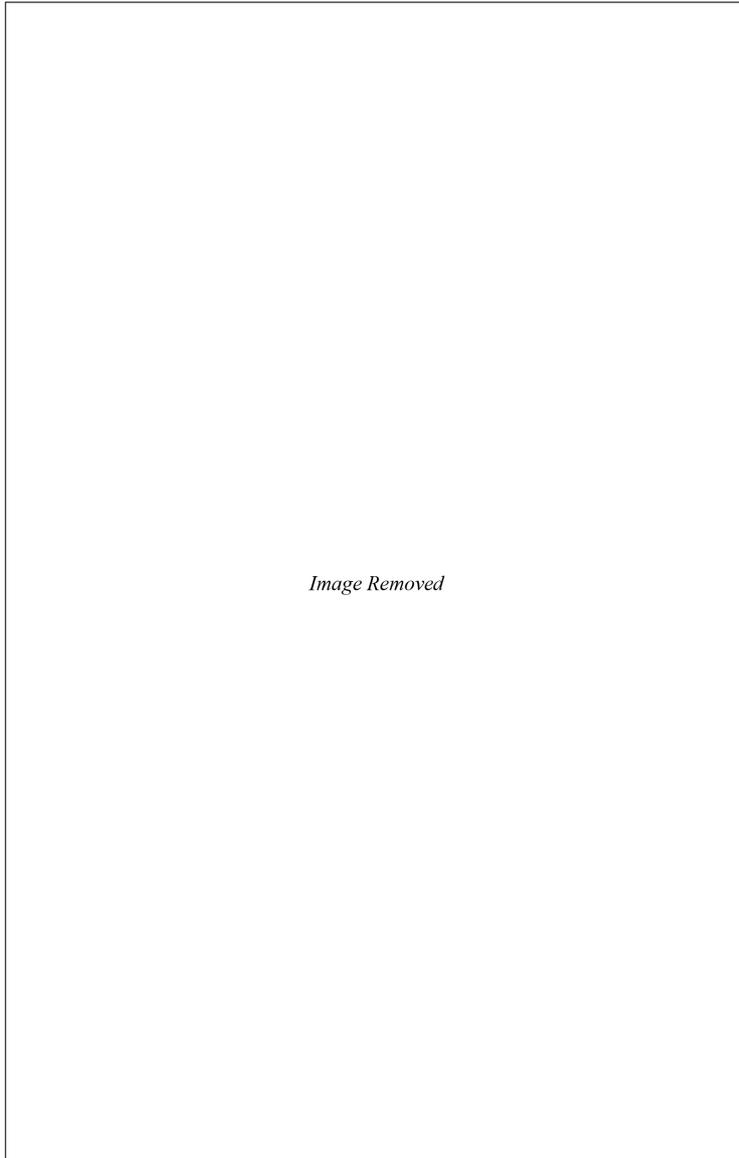


Figure 37. Installation shot of *IT'S IN THE GAME '17 or Mirror Gag for Vitrine and Projection*, 2018, shown at Les Atelier de Rennes, 2018.

## Conclusion

This thesis has concerned artworks made with and through three-dimensional computer-generated images. Alongside my own work, I have centred practices which I believe typify a broader impulse within contemporary art, namely, the desire to apply digital tools in such a way that speaks to our rapidly changing present without leaning towards nostalgic ideas of halcyon, pre-digital pasts nor one-dimensional visions of technocapitalist futures.

The task has been to show whether, and if so, how, contemporary art produced and conceptualised using 3D CGI offers the chance for critical reflection on the ways in which digital technologies have altered the relationship between imagination and material reality, possibility and practice.

As we have seen, when put to work by Hollywood, advertising and commerce, 3D computer-generated images are often used to celebrate unbridled consumption at the expense of material fact. In these dominant image realms, ones where body, device and matter is distanced from thought, effect and process, the weight of materiality is staged as an inconvenience to be overcome. And yet, these industries, and indeed my own practice and the practices of Mark Leckey, Ed Atkins, Sondra Perry and Forensic Architecture are, like all practices embedded in the digital, undoubtably and undeniably anchored to the material world.

The question that remains, therefore, is whether an art form borne out of the ‘military-entertainment-financial complex’ is capable of sufficiently disrupting the slick surface of CGI business-as-usual and the systems upon which it relies or whether it merely reproduces the very same. Can a mode of imaging and imagining the world so embedded in and wielded by technocapitalism meaningfully articulate something about the current state of art and life?

Ultimately, I believe that it is precisely because 3D CGI is so intertwined with, to quote Väliaho once more, a contemporary reality that ‘defines our present and that machinates the political reality of our lives’,<sup>356</sup> that it is a compelling and critical mode of artistic expression. I contest that the artistic practices discussed in this thesis serve to unveil some of the underlying paradoxes in the narrative of digital technologies and our experience of them; namely, that they confuse and complicate those connections between the worlds of the soft and the hard, the material and immaterial. As stated in the foreword of this thesis, working with and through 3D visualisation software—and perceiving the computer-generated images it produces—embodies and complicates the paradoxes of digital life absolutely since it is a mode of expression which renders bodies and images simultaneously dynamic and static, creative and highly prescribed, material and intangible, three-dimensional and flat. As such, by looking

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<sup>356</sup> Väliaho, *Biopolitical Screens*, p. x.

beyond the smooth, rendered surface of the image and to the complex conditions of production and consumption—global networks of hardware, software and labouring bodies—which lie beneath them, my aim, through both practice and theory, has been to indicate these often unseen and unacknowledged realities.

While 3D CGI is a mode of image-making that is capable of representing matter untethered from the realm of the physically possible, it is also one that strives for a material realism and authenticity. Furthermore, like all digital technologies, it is bound to the world of the *hard*—a world of raw matter, e-waste, places, and people. As such, 3D CGI is ideally positioned to unpick the paradoxes that are now part of everyday life. Here, the inherent potential of 3D CGI to argue for something *more than* what technocapitalism presents us with—a more just, more empathetic, more embodied, more complex version of reality—comes to the fore. A mode of visualising and constructing images, objects and worlds with a novel depth and materiality, CGI reframes that which is all too easily branded immaterial anew, thus allowing artists to insist on the humanity that underlies all digital systems.

Whether using 3D CGI to emphasise the stuff upon which digitisation rests (Hughes), to deny the ways in which it rationalises and hollows out bodies (Atkins), to challenge the dominant racial schema replicated by digital technologies (Perry), to underscore the collusion between digital technologies and oppression (Forensic Architecture), or to satirise the idea of technocapitalist transcendence (Leckey), artists are capable of presenting and disentangling the various idiosyncrasies, and in some cases injustices, of our digitally mediated present.

These are practices which, while it still remains possible to do so, aim to manipulate the material ambiguity of 3D CGI to point out and flag up those aspects of contemporary reality which one could say are hiding in plain sight. An image world made familiar through popular culture, the magical, digital squash and stretch of CGI is here used to entice the audience to look closer before the veil is lifted; once the façade has fallen away, is *called out*, we are privy to the bodies, systems, industries, raw materials, and operators that lie behind.

As such, though it does not always succeed in doing so, where a contemporary art practice utilising this highly proscribed and determined form can diverge from the spectacular, otherwise said, move away from merely replicating the contemporary technocapitalist moment, is not in its ability to mirror reality but to slow it down, interject, defamiliarise and distort it, give it a volume and a depth that belies mere surface, momentarily pausing the constant flow of images to create a space of reflection and contemplation.

In a rebuke to the narrowing of life through digitisation, each of the practices presented is one which generates a graspable, material body of work out of the so-called immaterial ether, using CGI not to optimise or commercialise but the very opposite: ‘If we still believe that art is something which is anti-productive, anti-utilitarian, the computer artist can

be defined as designer of bad interfaces: interfaces which are inefficient, wasteful, confusing'.<sup>357</sup>

Though the future direction of 3D computer-generated imagery is uncertain, what is undeniable is that there will continue to be an intertwining of art and technology—mediums such as 3D printing, VR, augmented reality, real-time graphics and machine learning—but only as long as the ‘corporeal machines’ that facilitate them continue to exist too. What remains to be seen is whether contemporary art will, or will be able to, carve out a meaningful space of influence and critical reflection within these larger systems.

As of now, I believe that to study and create three-dimensional computer-generated images, to observe them from multiple perspectives before they morph into something new, is a step towards understanding just how digital technologies have already and will continue to transform our material realities.

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<sup>357</sup> Lev Manovich, ‘The Engineering of Vision and the Aesthetics of Computer Art’, *ACM SIGGRAPH ART SHOW ARCHIVES* <<https://digitalartarchive.siggraph.org/writing/5802/>> [accessed 1 January 2020].

## Bibliography

- Ahmed, Sara, *Cultural Politics of Emotion* (Edinburgh: Edinburgh University Press, 2004)
- Alexander, Elizabeth, *The Black Interior: Essays* (Saint Paul, Minn: Graywolf Press, 2004)
- 'Algorithm - Oxford Reference' <<https://doi.org/10.1093/oi/authority.20110803095402315>>
- Amnesty International, 'Saydnaya Prison Document'  
<<https://www.amnesty.org/en/documents/document/?indexNumber=mde24%2f5415%2f2017&language=en>> [accessed 6 February 2020]
- 'An Abstract of the Evidence Delivered Before a Select Committee of the House of Commons: The Abolition of Slavery Project' <[http://abolition.e2bn.org/source\\_18.html](http://abolition.e2bn.org/source_18.html)> [accessed 12 November 2019]
- Apter, Emily, Ed Atkins, Armen Avanesian, Bill Brown, Giuliana Bruno, Julia Bryan-Wilson, and others, 'A Questionnaire on Materialisms', *October* (2016), 3–110  
<[https://doi.org/10.1162/OCTO\\_a\\_00243](https://doi.org/10.1162/OCTO_a_00243)>
- Astbury, Janice, 'Nature Rebounding in the Peri-Urban Landscapes That the Industrial Revolution Left Behind: North West England's Carbon Landscape', *The Nature of Cities*, 2019 <<https://www.thenatureofcities.com/2019/01/03/nature-rebounding-peri-urban-landscapes-industrial-revolution-left-behind-north-west-englands-carbon-landscape/>> [accessed 30 January 2020]
- Atkins, Ed, Andreas Weisser, and Julia Stoschek, *GENERATION LOSS: 10 Years Julia Stoschek Collection* (Bielefeld: Kerber, Christof, 2017)
- Atkinson, Sarah, 'Deepfakes: What Fairies and Aliens Can Teach Us about Fake Videos', *The Conversation* <<http://theconversation.com/deepfakes-what-fairies-and-aliens-can-teach-us-about-fake-videos-102747>> [accessed 13 March 2019]
- 'Automation', in *World Encyclopaedia* (Philip's)  
<<https://www.oxfordreference.com/view/10.1093/acref/9780199546091.001.0001/acref-9780199546091-e-846>> [accessed 2 October 2019]
- Bakhtin, Mikhail, *Rabelais and His World* (Indiana University Press, 1984)
- Barad, Karen, 'Posthumanist Performativity: Toward an Understanding of How Matter Comes to Matter', *Signs*, 28.3 (2003), 801–31 <<https://doi.org/10.1086/345321>>
- Barthes, Roland, *Mythologies* (Hill and Wang, 1972)
- 'Bartlett Design Anthology | Unit 24', *Issuu*  
<[https://issuu.com/bartlettarchucl/docs/design\\_anthology\\_unit24](https://issuu.com/bartlettarchucl/docs/design_anthology_unit24)> [accessed 8 November 2019]
- Baucom, Ian, *Specters of the Atlantic: Finance Capital, Slavery, and the Philosophy of History* (Durham: Duke University Press, 2005)
- Bauman, Zygmunt, *Liquid Modernity* (Cambridge, UK: Malden, MA: Polity, 2000)

- — —, *Modernity and the Holocaust* (Cambridge: Blackwell Publishers, 1991)
- Bellingcat, 'About', *Bellingcat* <<https://www.bellingcat.com/about/>> [accessed 6 February 2020]
- Benjamin, Andrew, ed., *Walter Benjamin and History* (London: Continuum, 2005)
- Benjamin, Walter, *Illuminations: Essays and Reflections*, ed. by Hannah Arendt, trans. by Harry Zohn (New York: Schocken Books, 1969)
- — —, *Selected Writings: 1938-1940* (Harvard University Press, 1996)
- Bennett, Jane, *Vibrant Matter: A Political Ecology of Things* (Duke University Press, 2010)
- Berardi, Franco, 'Marx After Duchamp, or The Artist's Two Bodies - Journal #19 October 2010 - e-Flux' <<https://www.e-flux.com/journal/19/67487/marx-after-duchamp-or-the-artist-s-two-bodies/>> [accessed 4 March 2019]
- — —, *The Soul at Work: From Alienation to Autonomy* (Semiotext(e), 2009)
- Berger, John, 'Threepenny: Berger, A Place Weeping' <[https://www.threepennyreview.com/samples/berger\\_su09.html](https://www.threepennyreview.com/samples/berger_su09.html)> [accessed 23 September 2019]
- — —, *Ways of Seeing* (London: Penguin Classics, 2008)
- 'Berliner Künstlerprogramm | Biography: Atkins, Ed' <<http://www.berliner-kuenstlerprogramm.de/en/gast.php?id=1259&p=1>> [accessed 13 March 2019]
- Betancourt, Michael, 'Automated Labor: The "New Aesthetic" and Immaterial Physicality | CTheory' <[http://ctheory.net/ctheory\\_wp/automated-labor-the-new-aesthetic-and-immaterial-physicality/](http://ctheory.net/ctheory_wp/automated-labor-the-new-aesthetic-and-immaterial-physicality/)> [accessed 6 February 2020]
- — —, *The History of Motion Graphics* (Wildside Press, 2013)
- Bishop, Claire, 'Digital Divide: Contemporary Art and New Media' <<https://www.artforum.com/print/201207/digital-divide-contemporary-art-and-new-media-31944>> [accessed 12 June 2018]
- Bishop, Ryan, and Kristoffer Gansing, *Across & beyond - A Transmediale Reader on Post-Digital Practices, Concepts, and Institutions* (Berlin: Sternberg Press, 2017)
- Blanchot, Maurice, *The Space of Literature: A Translation of 'l'Espace Littéraire'* (University of Nebraska Press, 2015)
- Boucher, Marie-Pier, Stefan Helmreich, Leila W. Kinney, Skylar Tibbits, Rebecca Uchill, and Evan Ziporyn, *Being Material* (MIT Press, 2019)
- Bourriaud, Nicolas, *Parkett no. 71: (Im)material?* (Zürich: Parkett-Verlag, 2004)
- Boym, Svetlana, *The Off-Modern* (Bloomsbury Publishing USA, 2017)
- Braidotti, Rosi, *The Posthuman* (Cambridge, UK ; Malden, MA, USA: Polity Press, 2013)
- Brown, Bill, *Things* (Chicago: University of Chicago Press Journals, 2004)
- Bruno, Giuliana, *Public Intimacy: Architecture and the Visual Arts*, Writing Architecture Series (Cambridge, Mass: MIT Press, 2007)

- — —, *Surface: Matters of Aesthetics, Materiality, and Media* (Chicago ; London: University of Chicago Press, 2014)
- Bryant, Levi R., *Speculative Realism* (Edinburgh University Press, 2014)
- Buchan, Suzanne, *Animated Worlds* (Indiana University Press, 2007)
- — —, *Pervasive Animation* (Routledge, 2013)
- Buchli, Victor, *An Archaeology of the Immaterial* (Routledge, 2015)
- Bukatman, Scott, *The Poetics of Slumberland: Animated Spirits and the Animating Spirit* (Berkeley: University of California Press, 2012)
- Burgin, Victor, 'Tank Magazine', *Tank Magazine* </issue-76/features/victor-burgin/> [accessed 5 February 2020]
- Burkitt, Ian, *Bodies of Thought: Embodiment, Identity and Modernity* (SAGE, 1999)
- Burnham, Jack, 'Art and Technology: The Panacea That Failed', <[https://monoskop.org/images/4/4e/Burnham\\_Jack\\_1980\\_Art\\_and\\_Technology\\_The\\_Panacea\\_That\\_Failed.pdf](https://monoskop.org/images/4/4e/Burnham_Jack_1980_Art_and_Technology_The_Panacea_That_Failed.pdf)> [accessed 10 December 2019]
- Carmo, Mario, *The Alphabet and the Algorithm* (Cambridge, Mass: The MIT Press, 2011)
- Cartalucci, Tony, "“Fake News” and Crimes against Humanity: Amnesty International Admits Syrian “Saydnaya” Report Fabricated Entirely in UK", *Global Research*, 2017 <<https://www.globalresearch.ca/fake-news-and-crimes-against-humanity-amnesty-international-admits-syrian-saydnaya-report-fabricated-entirely-in-uk/5573847>> [accessed 3 December 2019]
- — —, 'Land Destroyer: Amnesty International Admits Syrian “Saydnaya” Report Fabricated Entirely in UK', *Land Destroyer* <<http://landdestroyer.blogspot.com/2017/02/amnesty-international-admits-syrian.html>> [accessed 21 November 2019]
- Cateforis, David, Steven Duval, and Shepherd Steiner, *Hybrid Practices: Art in Collaboration with Science and Technology in the Long 1960s* (University of California Press, 2018)
- Certeau, Michel de, *The Practice of Everyday Life* (University of California Press, 2011)
- Chandler, Daniel, and Rod Munday, 'Computer-Generated Imagery', in *A Dictionary of Media and Communication* (Oxford University Press, 2016) <<https://www.oxfordreference.com/view/10.1093/acref/9780191800986.001.0001/acref-9780191800986-e-458>> [accessed 6 November 2019]
- Cholodenko, Alan, *The Illusion of Life: Essays on Animation* (Power Publications, 1991)
- Christov-Bakargiev, Carolyn, and Marianna Vecellio, *Ed Atkins* (Milano: Skira Editore, 2017)
- 'Cinema 4D', *MAXON | 3D FOR THE REAL WORLD* <<https://www.maxon.net/de/buy/>> [accessed 6 February 2020]
- Clark, Timothy J., 'Art History in an Age of Image Machines', *EurAmerica*, 38, 1–30 <[http://www.ea.sinica.edu.tw/euramerica/ch\\_index.php](http://www.ea.sinica.edu.tw/euramerica/ch_index.php)> [accessed 7 January 2020]

Clarke, Desmond M., and Catherine Wilson, eds., *The Oxford Handbook of Philosophy in Early Modern Europe* (Oxford University Press, 2011)  
 <<http://oxfordhandbooks.com/view/10.1093/oxfordhb/9780199556137.001.0001/oxfordhb-9780199556137>> [accessed 28 August 2019]

Clarkson, Thomas, 'The History of the Rise, Progress, and Accomplishment of the Abolition of the African Slave-Trade by the British Parliament', *Cambridge Core*, 2010  
 <<https://doi.org/10.1017/CBO9780511740121>>

Clement, Gilles, 'The Third Landscape' <<http://www.gillesclement.com/art-454-tit-The-Third-Landscape>> [accessed 31 October 2019]

'Coal Fired Computers | YoHa' <<http://yoha.co.uk/cfc>> [accessed 6 February 2020]

Connor, Steven, 'Pulverulence | Steven Connor'  
 <<http://cabinetmagazine.org/issues/35/connor.php>> [accessed 6 February 2020]

Cooperstein, David, 'A Cure For Digital Myopia', *Forbes*  
 <<https://www.forbes.com/sites/davidcooperstein/2013/06/27/a-cure-for-digital-myopia/>>  
 [accessed 3 December 2019]

'Corpse, n.', *OED Online* (Oxford University Press)  
 <<https://www.oed.com/view/Entry/41860#eid8195532>> [accessed 6 February 2020]

'Corpse, v.', *OED Online* (Oxford University Press)  
 <<https://www.oed.com/view/Entry/41861>> [accessed 6 February 2020]

Cosentino, Donald, Los Angeles University of California, and Fowler Museum of Cultural History, eds., *Sacred Arts of Haitian Vodou* (Los Angeles, California: UCLA Fowler Museum of Cultural History, 1995)

Crary, Jonathan, *Techniques of the Observer: On Vision and Modernity in the 19th Century* (Cambridge, MA: The MIT Press, 1992)

Crogan, Patrick, 'San Andreas and the Spiralling of the Analogico–Digital Animated Image', *Animation*, 12.3 (2017), 334–49 <<https://doi.org/10.1177/1746847717729595>>

Cubitt, Sean, *Finite Media: Environmental Implications of Digital Technologies* (Duke University Press, 2016)

Cussans, John, and Alex Kitnick, *Mark Leckey: On Pleasure Bent*, ed. by Elena Filipovic and Patrizia Dander (Köln: Verlag der Buchhandlung Walther König, 2014)

Darley, Andrew, *Visual Digital Culture: Surface Play and Spectacle in New Media Genres* (Routledge, 2002)

Davis, Mark, 'Hurried Lives: Dialectics of Time and Technology in Liquid Modernity', *Thesis Eleven*, 2013 <<https://doi.org/10.1177/0725513613500268>>

De Landa, Manuel, *War in the Age of Intelligent Machines* (New York: Zone Books, 1991)

Dean, Aria, 'Poor Meme, Rich Meme', *Real Life* <<https://reallifemag.com/poor-meme-rich-meme/>> [accessed 3 December 2019]

Deleuze, Gilles, *The Fold* (A&C Black, 2006)

DEM Earth 3, 'DEM Earth 3 For Cinema 4D', *Helloluxx*  
 <<https://helloluxx.com/product/tools4d-dem-earth/>> [accessed 3 December 2019]

Derian, James Der, *Virtuous War: Mapping the Military-Industrial-Media-Entertainment-Network* (New York: Routledge, 2009)

Dillon, Brian, 'Fragments from a History of Ruin | Brian Dillon'  
 <<http://cabinetmagazine.org/issues/20/dillon.php>> [accessed 19 November 2019]

Dobraszczyk, Paul, 'Petrified Ruin: Chernobyl, Pripjat and the Death of the City', *City*, 14.4 (2010), 370–89 <<https://doi.org/10.1080/13604813.2010.496190>>

Dobson, Nichola, Annabelle Honess Roe, Amy Ratelle, and Caroline Ruddell, *The Animation Studies Reader* (Bloomsbury Publishing USA, 2018)

Dourish, Paul, 'Algorithms and Their Others: Algorithmic Culture in Context', *Big Data & Society*, 2016 <<https://doi.org/10.1177/2053951716665128>>

Doyle, Jennifer, *Hold It Against Me: Difficulty and Emotion in Contemporary Art* (Duke University Press, 2013)

Druckrey, Timothy, and Alluquere R. Stone, *Electronic Culture: Technology & Visual Representation* (New York: Aperture, 1997)

Easterling, Keller, *Extrastatecraft: The Power of Infrastructure Space* (London New York: Verso, 2016)

'Ed Atkins', *Fondation Louis Vuitton* <<https://www.fondationlouisvuitton.fr/en/the-collection/artists/ed-atkins.html>> [accessed 12 March 2019]

'Ed Atkins "Us Dead Talk Love" at Chisenhale Gallery, London', *Mousse Magazine*, 2012 <<http://moussemagazine.it/ed-atkins-chisenhale/>> [accessed 1 March 2019]

Elcott, Noam M., *Artificial Darkness: An Obscure History of Modern Art and Media* (University of Chicago Press, 2016)

'Electronic Arts Intermix: SONDRRA PERRY: Screening and Artist Talk'  
 <<https://www.eai.org/supporting-documents/910/a.13148.35>> [accessed 6 February 2020]

'EVE IMAGES - About | Specialists in Photorealistic Exterior & Interior', *EVE IMAGES*  
 <<https://www.eve-images.com/about/>> [accessed 3 December 2019]

'Eyal Weizman' <<http://www.full-stop.net/2012/06/14/interviews/mikecarla/eyal-weizman/>>  
 [accessed 6 February 2020]

Fanon, Frantz, *Black Skin, White Masks* (Pluto Press, 1986)

Feher, Michel, Ramona Naddaff, and Nadia Tazi, *Fragments for a History of the Human Body* (Zone, 1989)

Ferguson, Bruce W., Reesa Greenberg, and Sandy Nairne, *Thinking About Exhibitions* (Routledge, 2005)

‘Figural Realism. A Screening to Accompany Ed Atkins, “Old Food”’

<<https://www.facebook.com/events/figural-realism-a-screening-to-accompany-ed-atkins-old-food/138105633601090/>> [accessed 12 March 2019]

Finch, Christopher, *The CG Story: Computer-Generated Animation and Special Effects* (New York: The Monacelli Press, 2013)

Flusser, Vilém, *Shape of Things: A Philosophy of Design* (Reaktion Books, 2013)

— — —, *Towards a Philosophy of Photography* (Reaktion Books, 2013)

— — —, *Writings* (University of Minnesota Press, 2002)

Forensic Architecture, ‘Agency ← Forensic Architecture’ <<https://forensic-architecture.org/about/agency>> [accessed 3 December 2019]

— — —, ‘Drone Strike In Mir Ali ← Forensic Architecture’ <<https://forensic-architecture.org/investigation/drone-strike-in-mir-ali>> [accessed 6 February 2020]

— — —, ‘Investigations ← Forensic Architecture’ <<https://forensic-architecture.org/>> [accessed 6 February 2020]

Forensic Architecture, Anselm Franke, Eyal Weizman, and Haus der Kulturen der Welt, eds., *Forensis: The Architecture of Public Truth* (Berlin: Sternberg Press, 2014)

‘Forensic Architecture Winning the Turner Prize Would Risk Turning Sensitive Investigative Work into Insensitive Entertainment’, *Dezeen*, 2018

<<https://www.dezeen.com/2018/05/04/forensic-architecture-turner-prize-warning-phineas-harper/>> [accessed 1 December 2019]

Foucault, Michel, *Discipline and Punish: The Birth of the Prison* (Knopf Doubleday Publishing Group, 2012)

Fraser, Emma, ‘Interfacing the (In)Visible: Urban Encounters in the Hidden City / Emma Fraser, Clancy Wilmott’, *Leonardo Electronic Almanac*, 2019

<<https://www.leoalmanac.org/interfacing-the-invisible-urban-encounters-in-the-hidden-city-emma-fraser-clancy-wilmott/>> [accessed 28 October 2019]

— — —, ‘Ruin Representations: Understanding Meaning Making in Video Games through Urban Ruins, Allegory and Trope Theory’

<[https://www.academia.edu/24362253/Ruin\\_Representations\\_Understanding\\_meaning\\_making\\_in\\_video\\_games\\_through\\_urban\\_ruins\\_allegory\\_and\\_trope\\_theory](https://www.academia.edu/24362253/Ruin_Representations_Understanding_meaning_making_in_video_games_through_urban_ruins_allegory_and_trope_theory)> [accessed 30 October 2019]

Friedman, Michael, and Wolfgang Schäffner, eds., *On Folding: Towards a New Field of Interdisciplinary Research* (Bielefeld: Transcript-Verlag, 2016)

Furuhata, Yuriko, ‘Rethinking Plasticity: The Politics and Production of the Animated Image’, *Animation*, 6.1 (2011), 25–38 <<https://doi.org/10.1177/1746847710391226>>

Gaafar, Rania, and Martin Schulz, *Technology and Desire: The Transgressive Art of Moving Images* (Intellect Books, 2014)

- Galviz, Carlos López, Nadia Bartolini, Mark Pendleton, and Adam Stock, 'Reconfiguring Ruins: Beyond Ruinenlust', *GeoHumanities*, 3.2 (2017), 531–53  
 <<https://doi.org/10.1080/2373566X.2017.1374874>>
- Garcia, Tristan, *Form and Object: A Treatise on Things*, trans. by Mark Allan Ohm and Jon Cogburn (Edinburgh: Edinburgh University Press, 2014)
- Geraci, Robert M., *Apocalyptic AI: Visions of Heaven in Robotics, Artificial Intelligence, and Virtual Reality* (Oxford University Press, 2012)
- Glissant, Édouard, *Poetics of Relation* (University of Michigan Press, 1997)
- Gottlieb, Baruch, 'Baruch Gottlieb | Flusser Studies'  
 <<http://www.flusserstudies.net/person/baruch-gottlieb>> [accessed 3 February 2020]
- Grayson, Richard, 'Art Monthly : Article : Talkin' 'bout Their g-g-g-Generation – Richard Grayson on the Ends of Post-Internet Art'  
 <<https://www.artmonthly.co.uk/magazine/site/article/talkin-bout-their-g-g-g-generation-by-richard-grayson-september-2015>> [accessed 12 June 2018]
- Gresley, William Stukeley, *A Glossary of Terms Used in Coal Mining* (E. & F.N. Spon, 1883)
- Gronlund, Melissa, 'Cold New World', *Sight & Sound*, 24.9 (2014), 72–73  
 — — —, *Contemporary Art and Digital Culture* (London ; New York: Routledge, 2016)
- Grosz, Elizabeth, *Architecture from the Outside: Essays on Virtual and Real Space* (MIT Press, 2001)  
 — — —, *Space, Time and Perversion: Essays on the Politics of Body* (New York: Routledge, 1995)  
 — — —, *Volatile Bodies: Toward a Corporeal Feminism* (Indiana University Press, 1994)
- 'Grotesque, n. and Adj.', *OED Online* (Oxford University Press)  
 <<http://www.oed.com/view/Entry/81794>>
- Grubinger, Eva, and Jörg Heiser, eds., *Sculpture Unlimited 2: Materiality in Times of Immateriality* (Berlin: Sternberg Press, 2015)
- Gurevitch, Leon, 'Computer Generated Animation as Product Design Engineered Culture, or Buzz Lightyear to the Sales Floor, to the Checkout and Beyond!', *Animation*, 2012  
 <<https://doi.org/10.1177/1746847712438133>>
- Han, Byung-Chul, *The Burnout Society* (Stanford University Press, 2015)
- Haraway, Donna Jeanne, *Simians, Cyborgs, and Women: The Reinvention of Nature* (Free Association Books, 1991)
- Harries, Dan, ed., *The New Media Book*, Reprint (London: British Film Institute, 2004)
- Harris, Miriam, Lilly Husbands, and Paul Taberham, *Experimental Animation: From Analogue to Digital* (Routledge, 2019)

Haus der Kunst, *Blind Faith, Artist Lecture by Ed Atkins*  
 <<https://www.youtube.com/watch?v=k8tb3KiEg5o>>

Higgins, Hannah, ed., *Mainframe Experimentalism: Early Computing and the Foundations of the Digital Arts* (Berkeley: University of California Press, 2012)

Hill, Jonathan, *Immaterial Architecture* (Routledge, 2006)

Hoelzl, Ingrid, and Remi Marie, *Softimage: Towards a New Theory of the Digital Image* (Bristol; Chicago: Intellect, 2015)

Hui, Yuk, *On the Existence of Digital Objects* (University of Minnesota Press, 2016)

‘ICA | Operative Models’ <<https://www.ica.art/operative-models>> [accessed 6 February 2020]

Iles, Chrissie, ed., *Dreamlands: Immersive Cinema and Art, 1905-2016* (Yale University Press, 2016)

‘Ill Suns: Arthur Jafa and Sondra Perry’, *Mousse Magazine*, 2017  
 <<http://moussemagazine.it/arthur-jafa-sondra-perry-dean-daderko-2017/>> [accessed 14 October 2019]

‘Imagination - Oxford Reference’ <<https://doi.org/10.1093/oi/authority.20110810105125503>>

IPsoft, ‘IPsoft Launches Interactive AI Lab Amelia City and Amelia Marketplace’, *IPsoft*, 2018 <<https://www.ipsoft.com/2018/06/18/ipsoft-launches-interactive-amelia-city-marketplace/>> [accessed 1 March 2019]

‘KALEIDOSCOPE – Mark Leckey’ <<http://kaleidoscope.media/mark-leckey-art-stigmergy/>> [accessed 11 March 2019]

Kantorowicz, Ernst H., *The King’s Two Bodies: A Study in Mediaeval Political Theology*, (Princeton, N.J.: Princeton University Press, 1957)

Kelley, Mike, and Roger Conover, *Foul Perfection: Essays and Criticism* (MIT Press, 2003)

Keynes, John Maynard, *The Collected Writings of John Maynard Keynes 30 Volume Paperback Set*, ed. by Elizabeth Johnson, Donald Moggridge, and Austin Robinson (Cambridge England ; New York: Cambridge University Press, 2013)

Kholeif, Omar, ed., *You Are Here: Art After the Internet* (Manchester : London: Cornerhouse Publications, 2013)

Kozloff, Max, ‘The Multimillion Dollar Art Boondoggle’  
 <<https://www.artforum.com/print/197108/the-multimillion-dollar-art-boondoggle-34013>> [accessed 6 December 2019]

— — —, ‘The Poetics of Softness’, in *Renderings: Critical Essays on a Century of Modern Art*, ed. by Max Kozloff (London: Studio Vista, 1970)

Krauss, Rosalind, ‘Video: The Aesthetics of Narcissism’, *October*, 1 (1976), 51–64  
 <<https://doi.org/10.2307/778507>>

Krysa, Joasia, ed., *Curating Immateriality: The Work of the Curator in the Age of Network Systems* (Brooklyn, NY: Autonomedia, 2006)

- LaMarre, Thomas, *The Anime Machine: A Media Theory of Animation* (University of Minnesota Press, 2009)
- Latour, Bruno, *On the Modern Cult of the Factish Gods* (Durham NC; London: Duke University Press Books, 2010)
- , *Pandora's Hope: Essays on the Reality of Science Studies* (Cambridge, Mass: Harvard University Press, 1999)
- , *We Have Never Been Modern* (Harvard University Press, 2012)
- Leslie, Esther, *Hollywood Flatlands: Animation, Critical Theory and the Avant-Garde* (Verso, 2004)
- , *Liquid Crystals: The Science and Art of a Fluid Form* (Reaktion Books, 2016)
- Leslie, Esther, and Joel McKim, 'Life Remade: Critical Animation in the Digital Age', *Animation*, 12.3 (2017), 207–13 <<https://doi.org/10.1177/1746847717740841>>
- 'Liam Young, Renderlands' <<http://www.grahamfoundation.org/grantees/5589-renderlands>> [accessed 13 February 2020]
- Lippard, Lucy R., *Six Years: The Dematerialization of the Art Object from 1966 to 1972* (Berkeley: University of California Press, 1997)
- Lucretius, 'Of the Nature of Things' <<https://www.gutenberg.org/files/785/785-h/785-h.htm>> [accessed 10 February 2020]
- Lynn, Greg, *Fold, Bodies and Blobs: Collected Essays* (Bruxelles: Ante Post asbi, 1998)
- Lyon, David, 'Liquid Surveillance: The Contribution of Zygmunt Bauman to Surveillance Studies', *International Political Sociology*, 4.4 (2010), 325–38 <<https://doi.org/10.1111/j.1749-5687.2010.00109.x>>
- Mackenzie, Adrian, *Cutting Code: Software and Sociality* (Peter Lang, 2006)
- Manovich, Lev, 'After Effects, or Velvet Revolution', *Artifact*, 1.2 (2007), 67–75 <<https://doi.org/10.1080/17493460701206744>>
- , 'Automation of Sight: From Photography to Computer Vision' <<http://manovich.net/index.php/projects/automation-of-sight-from-photography-to-computer-vision>> [accessed 22 November 2017]
- , *Software Takes Command* (New York; London: Bloomsbury Academic, 2013)
- , 'The Engineering of Vision and the Aesthetics of Computer Art', *ACM SIGGRAPH ART SHOW ARCHIVES* <<https://digitalartarchive.siggraph.org/writing/5802/>> [accessed 9 February 2020]
- , *The Language of New Media* (Cambridge, Mass.: MIT Press, 2002)

- 'Mark Lecky Katalog Vorschau', *Issuu*  
 <[https://issuu.com/haus\\_der\\_kunst/docs/141202\\_marklecky katalog\\_vorschau](https://issuu.com/haus_der_kunst/docs/141202_marklecky katalog_vorschau)> [accessed 13 March 2019]
- Marks, Laura U., *Touch: Sensuous Theory And Multisensory Media* (Minneapolis, Minnesota: University Of Minnesota Press, 2002)
- Maroja, Camila, and Caroline Menezes, *The Permanence of the Transient: Precariousness in Art* (Cambridge Scholars Publishing, 2014)
- Martin, Daryl, 'Introduction: Towards a Political Understanding of New Ruins', *International Journal of Urban and Regional Research*, 38.3 (2014), 1037–46  
 <<https://doi.org/10.1111/1468-2427.12116>>
- Marx, Karl, *Grundrisse: Foundations of the Critique of Political Economy (Rough Draft)* (Harmondsworth: Penguin Books, 1973)
- Marx, Karl, and Friedrich Engels, *Capital: A Critique of Political Economy v.1* (Chicago: Kerr, 1906)
- Massumi, Brian, *Parables for the Virtual* (Duke University Press, 2002)
- May, Kyle, *Rendering* (New York, NY: Clog, 2013)
- Menard, Andrew, 'Robert Smithson's Toxic Tour of Passaic, New Jersey', *Journal of American Studies*, 48.4 (2014), 1019–40 <<https://doi.org/10.1017/S0021875814000620>>
- Merleau-Ponty, Maurice, *Phenomenology of Perception* (Abingdon; New York: Routledge, 2013)
- Meyers, Diana Tietjens, *Feminist Social Thought: A Reader* (Routledge, 2014)
- Michaud, Langis, 'Too Much Screen Time Linked to an Epidemic of Myopia among Young People', *The Conversation* <<http://theconversation.com/too-much-screen-time-linked-to-an-epidemic-of-myopia-among-young-people-111599>> [accessed 3 December 2019]
- Mills, Albert J., Gabrielle Durepos, and Elden Wiebe, *Encyclopedia of Case Study Research: L - Z; Index* (SAGE, 2009)
- Mirzoeff, Nicholas, *Bodyscape: Art, Modernity and the Ideal Figure* (London ; New York: Routledge, 1995)
- Mitchell, William J., *The Reconfigured Eye: Visual Truth in the Post-Photographic Era* (Cambridge, Massachusetts: The MIT Press, 1992)
- — —, *What Do Pictures Want?: The Lives and Loves of Images* (University of Chicago Press, 2013)
- Munster, Anna, *Materializing New Media: Embodiment in Information Aesthetics* (UPNE, 2006)
- Murray, Timothy, *Digital Baroque: New Media Art and Cinematic Folds* (Minneapolis: University Of Minnesota Press, 2008)
- Nancy, Jean-Luc, *Corpus* (Fordham Univ Press, 2008)

- Neufert, Ernst, Matthias Lohmann, Patricia Merkel, Mathias Brockhaus, and Johannes Kister, *Bauentwurfslehre: Grundlagen, Normen, Vorschriften* (Wiesbaden: Springer Vieweg, 2018)
- ‘Newsmaker: Ed Atkins On His Serpentine Sackler Gallery Installation | BLOUIN ARTINFO’ <<https://www.blouinartinfo.com/news/story/1044455/newsmaker-ed-atkins-on-his-serpentine-sackler-gallery>> [accessed 1 March 2019]
- ‘No Safe Mode’, *Flash Art*, 2017 <<https://flash---art.com/article/sondra-perry/>> [accessed 15 October 2019]
- Noheden, Kristoffer, ‘The Imagination of Touch: Surrealist Tactility in the Films of Jan Švankmajer’, *Journal of Aesthetics & Culture*, 5.1 (2013), 21111 <<https://doi.org/10.3402/jac.v5i0.21111>>
- Norden, Linda, ‘Jordan Wolfson’, *Chisenhale Gallery* <<https://chisenhale.org.uk/exhibition/jordan-wolfson/>> [accessed 12 June 2018]
- Osborne, Peter, *Anywhere or Not at All: The Philosophy of Contemporary Art* (London; New York: Verso Books, 2013)
- Panofsky, Erwin, *Perspective as Symbolic Form*, trans. by Christopher S. Wood (New York, NY: Zone Books, 1996)
- Parikka, Jussi, *A Geology of Media* (University of Minnesota Press, 2015)
- — —, ‘Dust and Exhaustion: The Labor of Media Materialism’, *CTheory*, 2013 <<https://journals.uvic.ca/index.php/ctheory/article/view/14790>> [accessed 7 January 2020]
- — —, *The Anthrobscene* (University of Minnesota Press, 2014)
- — —, *What Is Media Archaeology?* (John Wiley & Sons, 2013)
- Paul, Christiane, *A Companion to Digital Art* (John Wiley & Sons, 2016)
- — —, ed., *New Media in the White Cube and beyond: Curatorial Models for Digital Art* (Berkeley: University of California Press, 2008)
- Pilling, Jayne, ed., *A Reader In Animation Studies* (Indiana University Press, 1998)
- Pirani, Bianca Maria, and Ivan Varga, eds., *The New Boundaries between Bodies and Technologies* (Cambridge Scholars Publishing, 2009)
- Plant, Sadie, *Zeroes and Ones: Digital Women and the New Technoculture* (New York: Doubleday, 1997)
- Poster, Mark, *Foucault, Marxism, and History: Mode of Production Versus Mode of Information* (Cambridge, UK: New York, NY, USA: Polity Press, 1985)
- ‘Post-Traumatic Stress Disorder - Oxford Reference’ <<https://doi.org/10.1093/oi/authority.20110803100339838>>
- Power, Pat, ‘Animated Expressions: Expressive Style in 3D Computer Graphic Narrative Animation’, *Animation*, 4.2 (2009), 107–29 <<https://doi.org/10.1177/1746847709104643>>

‘Press Release Old Food Ed Atkins’ <[https://www.artefakt-berlin.de/fileadmin/files/archiv/Immersion2017/pdfs\\_EN/Pressemappe\\_Ed\\_Atkins\\_Old\\_Food\\_Englisch\\_27.09.2017.pdf](https://www.artefakt-berlin.de/fileadmin/files/archiv/Immersion2017/pdfs_EN/Pressemappe_Ed_Atkins_Old_Food_Englisch_27.09.2017.pdf)> [accessed 8 February 2020]

Purzycki, Kristopher, ‘Book Review: The Uncanny Valley in Games and Animation’, *Animation*, 14.1 (2019), 70–73 <<https://doi.org/10.1177/1746847719829839>>

Quaranta, Domenico, *Beyond New Media Art* (Lulu Press, Inc., 2014)

‘RealFlow Home’, *RealFlow* <<http://www.nextlimit.com/realflow/>> [accessed 9 February 2020]

‘Reality-Effect - Oxford Reference’ <<https://doi.org/10.1093/oi/authority.20110803100407783>>

Reichardt, Jasia, and Institute of Contemporary Arts London, *Cybernetic Serendipity: The Computer and the Arts* (London: Studio International, 1968)

Reichert, Ramón, Mathias Fuchs, Pablo Abend, Annika Richterich, and Karin Wenz, eds., *Digital Culture & Society (DCS): Vol. 4, Issue 1/2018 – Rethinking AI: Neural Networks, Biometrics and the New Artificial Intelligence* (Transcript-Verlag, 2018)

‘Render, v.’, *OED Online* (Oxford University Press) <<https://www.oed.com/view/Entry/162386>> [accessed 9 February 2020]

‘Rendering Real(i)Ty: Architectural Visualization, Real Estate and the Image of the Twenty-First Century City – SVA MA Design Research’ <<https://designresearch.sva.edu/research/rendering-reality-architectural-visualization-real-estate-and-the-image/>> [accessed 19 December 2019]

Riisgaard, Lone, and Bjørn Thomassen, ‘Powers of the Mask: Political Subjectivation and Rites of Participation in Local-Global Protest’, *Theory, Culture & Society*, 33.6 (2016), 75–98 <<https://doi.org/10.1177/0263276416651685>>

Ruskin, John, *Modern Painters* (J. Wiley, 1848)

Sanderson, Harry, ‘Human Resolution | Mute’ <<http://www.metamute.org/editorial/articles/human-resolution>> [accessed 1 March 2019]

Sawday, Jonathan, *The Body Emblazoned: Dissection and the Human Body in Renaissance Culture* (London: Routledge, 1996)

Schuppli, Susan, ‘Half-Truths | Mute’ <<https://www.metamute.org/community/reviews/half-truths>> [accessed 21 November 2019]

— — —, ‘Susan Schuppli: Deadly Algorithms / Radical Philosophy’, *Radical Philosophy* <<https://www.radicalphilosophy.com/commentary/deadly-algorithms>> [accessed 3 December 2019]

Serres, Michel, *Atlas*, trans. by Michael Bischoff (Berlin: Merve Verlag GmbH, 2005)

Simmel, Georg, ‘Two Essays’, *The Hudson Review*, 11.3 (1958), 371–85 <<https://doi.org/10.2307/3848614>>

Simone, AbdouMaliq, ‘Harvard Design Magazine: The Black Beach’  
 <<http://www.harvarddesignmagazine.org/issues/39/the-black-beach>> [accessed 15 October 2019]

Sito, Tom, *Moving Innovation: A History of Computer Animation* (Cambridge, Massachusetts: MIT Press, 2013)

‘Slave Ship (Slavers Throwing Overboard the Dead and Dying, Typhoon Coming On)’  
 <<https://collections.mfa.org/objects/31102/slave-ship-slavers-throwing-overboard-the-dead-and-dying-t;jsessionid=B02B7A624775BFC5519A13FD3000A522>> [accessed 6 February 2020]

Smith, Vicky, and Nicky Hamlyn, eds., *Experimental & Expanded Animation* (Springer, 2018)

Smithson, Robert, ‘A Sedimentation of the Mind: Earth Proposals’  
 <<https://www.artforum.com/print/196807/a-sedimentation-of-the-mind-earth-proposals-36602>> [accessed 6 February 2020]

— — —, ‘The Monuments of Passaic’ <<https://www.artforum.com/print/196710/the-monuments-of-passaic-36680>> [accessed 6 February 2020]

Sobchack, Vivian, ‘Animation and Automation, or, the Incredible Effortfulness of Being’, *Screen*, 50.4 (2009), 375–91 <<https://doi.org/10.1093/screen/hjp032>>

— — —, *Carnal Thoughts: Embodiment and Moving Image Culture* (University of California Press, 2004)

‘Soft Bodies | Maya | Autodesk Knowledge Network’  
 <<https://knowledge.autodesk.com/support/maya/learn-explore/caas/CloudHelp/cloudhelp/2016/ENU/Maya/files/GUID-20790C1E-D32E-457C-A867-BC2345EF707C-htm.html>> [accessed 2 May 2017]

‘Sondra Perry - Features - Art-Agenda’ <<https://www.art-agenda.com/features/241047/sondra-perry>> [accessed 11 February 2020]

‘Sondra Perry at Serpentine Galleries – Art Viewer’ <<https://artviewer.org/sondra-perry-at-serpentine-galleries/>> [accessed 6 February 2020]

‘Sondra Perry Press Pack’ <[https://www.serpentinegalleries.org/sites/default/files/press-releases/sondra\\_perry\\_-\\_full\\_press\\_pack.pdf](https://www.serpentinegalleries.org/sites/default/files/press-releases/sondra_perry_-_full_press_pack.pdf)> [accessed 19 February 2020]

Stam, Jos, *The Art of Fluid Animation* (Boca Raton, Florida: A K Peters/CRC Press, 2015)

Steyerl, Hito, ‘In Defense of the Poor Image - Journal #10 November 2009 - e-Flux’  
 <<https://www.e-flux.com/journal/10/61362/in-defense-of-the-poor-image/>> [accessed 4 February 2020]

— — —, ‘In Free Fall: A Thought Experiment on Vertical Perspective - Journal #24 April 2011 - e-Flux’ <<https://www.e-flux.com/journal/24/67860/in-free-fall-a-thought-experiment-on-vertical-perspective/>> [accessed 6 February 2020]

— — —, ‘Proxy Politics: Signal and Noise - Journal #60 December 2014 - e-Flux’ <<https://www.e-flux.com/journal/60/61045/proxy-politics-signal-and-noise/>> [accessed 28 January 2019]

— — —, ‘The Spam of the Earth: Withdrawal from Representation - Journal #32 February 2012 - e-Flux’ <<https://www.e-flux.com/journal/32/68260/the-spam-of-the-earth-withdrawal-from-representation/>> [accessed 1 March 2019]

Steyerl, Hito, and Franco Berardi, *E-Flux Journal: The Wretched of the Screen*, ed. by Julieta Aranda, Brian Kuan Wood, and Anton Vidokle (Berlin: Sternberg Press, 2012)

Stiegler, Bernard, *Automatic Society: The Future of Work* (John Wiley & Sons, 2018)

— — —, *The Neganthropocene*: (Open Humanities Press, 2018)

<<http://www.openhumanitiespress.org/books/titles/the-neganthropocene/>> [accessed 9 February 2020]

Stiegler, Bernard, Philippe Petit, and Vincent Bontens, *Economie de l’hypermatériel et psychopouvoir* (Paris: Mille et une nuits, 2008)

Švankmajer, Jan, *Touching and Imagining: An Introduction to Tactile Art* (London: Tauris, 2014)

Swalwell, Melanie, and Jason Wilson, eds., *The Pleasures of Computer Gaming: Essays on Cultural History, Theory and Aesthetics* (McFarland, 2015)

‘Tactility and Film, Interview with Jan Švankmajer’, *Cinesthetic Feasts*, 2013

<<https://cinestheticfeasts.wordpress.com/2013/06/16/tactility-and-film-interview-with-jan-svankmajer/>> [accessed 12 March 2019]

Tate, ‘Les Immatériaux or How to Construct the History of Exhibitions: Landmark Exhibitions Issue – Tate Papers’, *Tate* <<https://www.tate.org.uk/research/publications/tate-papers/12/les-immateriaux-or-how-to-construct-the-history-of-exhibitions>> [accessed 29 August 2019]

‘The Double Negative » Mark Leckey: Transformed by the Digital Realm’

<<http://www.thedoublenegative.co.uk/2013/04/mark-leckey-transformed-by-the-digital-realm/>> [accessed 12 June 2018]

The National Archives, ‘Abolition of Slavery’

<<http://www.nationalarchives.gov.uk/slavery/about.htm>> [accessed 23 October 2019]

‘Thresholds Not Frames: Interview with Mark Leckey’, *Mark Fisher ReBlog*

<<http://markfisherblog.tumblr.com/post/17036480170/thresholds-not-frames-interview-with-mark-leckey>> [accessed 28 January 2019]

Tischleder, Babette Bärbel, and Sarah L. Wasserman, eds., *Cultures of Obsolescence: History, Materiality, and the Digital Age* (Houndmills, Basingstoke, England; New York, NY: Palgrave Macmillan, 2015)

Turan, Neyran, and Stephen Ramos, *After Zero* (Harvard University Press, 2009)

Valéry, Paul, and Jean-Clarence Lambert, *Écrits sur l’art* (Club des libraires de France, 1962)

Väliäho, Pasi, 'Animation and the Powers of Plasticity', *Animation*, 12.3 (2017), 259–71  
<<https://doi.org/10.1177/1746847717740093>>

— — —, *Biopolitical Screens: Image, Power, and the Neoliberal Brain* (MIT Press, 2014)

Walker, Rob, 'To Sell the Future, Find the Right "People Textures" for the Sketch', *The New York Times*, 4 February 2011, section Magazine

<<https://www.nytimes.com/2011/02/06/magazine/06fob-consumed-t.html>> [accessed 19 December 2019]

Weizman, Eyal, 'Eyal Weizman: Forensic Architecture / Radical Philosophy', *Radical Philosophy* <<https://www.radicalphilosophy.com/article/forensic-architecture>> [accessed 6 February 2020]

— — —, 'Forensic Architecture: Political Practice, Activism, Aesthetics', in *The SAGE Handbook of the 21st Century City* (55 City Road: SAGE Publications Ltd, 2017), pp. 630–52  
<<https://doi.org/10.4135/9781526402059>>

— — —, *Forensic Architecture: Violence at the Threshold of Detectability* (Brooklyn, NY: ZONE BOOKS, 2017)

Wells, Paul, 'Kinoeye | Czech Horror: Jan Svankmajer & "agit-Scare" Tactics'

<<https://www.kinoeye.org/02/16/wells16.php>> [accessed 12 March 2019]

Wells, Paul, and Johnny Hardstaff, *Re-Imagining Animation: The Changing Face of the Moving Image* (Bloomsbury Publishing, 2008)

'Wetlands' <<https://www.wigan.gov.uk/Docs/PDF/Resident/Planning-and-Building-Control/Wetlands.pdf>> [accessed 6 February 2020]

Wolmark, Jenny, ed., *Cybersexualities: A Reader in Feminist Theory, Cyborgs and Cyberspace* (Edinburgh University Press, 1723)

Wood, Aylish, 'Behind the Scenes: A Study of Autodesk Maya', *Animation*, 2014

<<https://doi.org/10.1177/1746847714546247>>

— — —, *Software, Animation and the Moving Image: What's in the Box?* (Houndmills, Basingstoke, Hampshire, UK; New York, NY: Palgrave Pivot, 2014)

Wood, Marcus, *Blind Memory: Visual Representations of Slavery in England and America, 1780-1865* (Manchester University Press, 2000)

Woodward, Kathleen, *The Myths of Information: Technology and Postindustrial Culture* (Madison, WI: Indiana University Press, 1983)

Young, Liam, ed., *Machine Landscapes: Architectures of the Post Anthropocene* (John Wiley & Sons, 2019)

Zimmermann, Jérémie, 'La Surveillance Est Massive et Généralisée'

<<https://www.philomag.com/les-idees/jeremie-zimmermann-la-surveillance-est-massive-et-generalisee-8096>> [accessed 6 February 2020]

## Appendix I: Documentation of Practice

### About

This appendix chronologically documents practice-led research undertaken as part of this PhD. Each section contains technical details and installation photographs. Where applicable, it also lists details of relevant public presentations and a link/s to view animations online. I ask the reader to bear in mind that though links are provided, these animations were not made with the express intention of being shown outside the context of the particular exhibition / installation to which they belong.

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1.

**Softbodies, 2017**

Latex, scaffold, digital inkjet print on Kozo paper (A0), LCD screens showing 3D rendered animation loops, text

Solo exhibition: Project Space, University of Leeds, March 2017

Group exhibition: Cut Cloth, The Portico Library & Gallery, Manchester, June 2017

Group exhibition: Bankley Gallery, Manchester, October 2017

Animation loop extract: <https://vimeo.com/bethanhughes/softbodies>



Image 1. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.



Image 2. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.



Image 3. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.



Image 4. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.

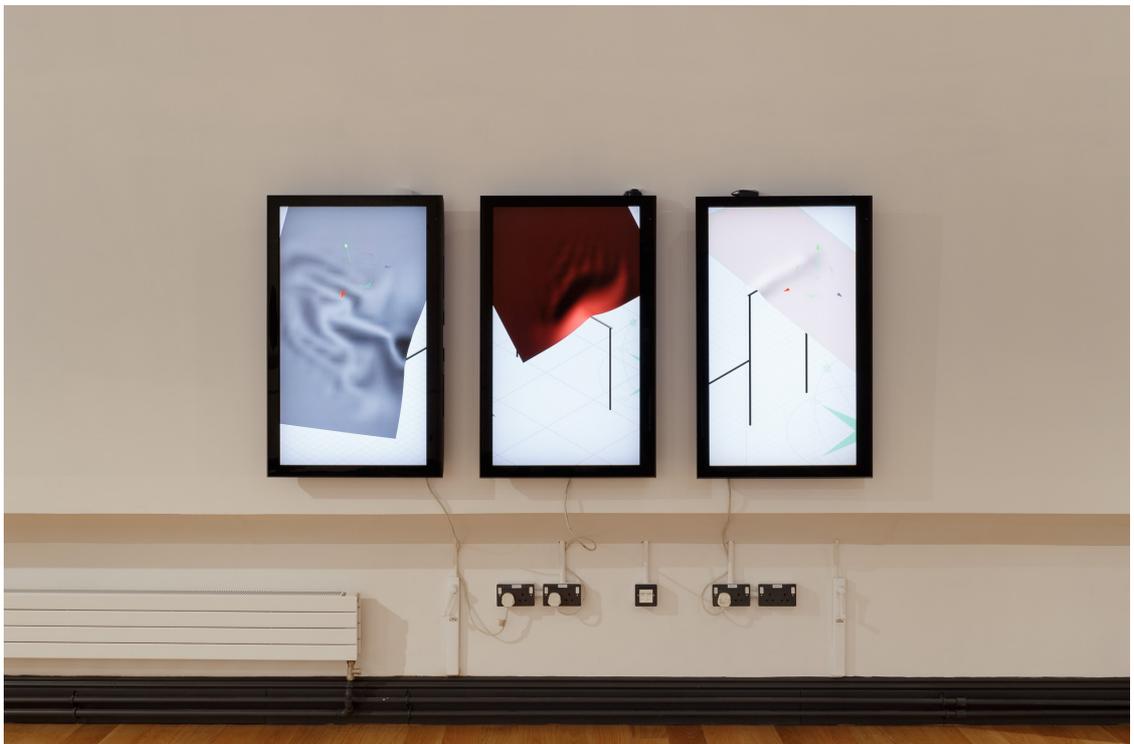


Image 5. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.



Image 6. *Softbodies*, 2017. Project Space, Leeds. Photography Jules Lister.



Image 7. *Softbodies*, 2017. Portico Library and Gallery, Manchester. Photography Harry Meadley.



Image 8. *Softbodies*, 2017. Portico Library and Gallery, Manchester. Photography Harry Meadley.

2.

**Plasmatic, 2017**

Latex, digital inkjet print on Hannemühle photographic paper (A2), cracked LCD screen showing 3D rendered video loop

Group exhibition and conference: *Post-digital printmaking*, Eugeniusz Geppert Academy of Fine Arts, Wrocław, Poland, 2017



Image 9. *Plasmatic*, 2017. Photography Jules Lister.



Image 10. *Plasmatic*, 2017. Photography Jules Lister.



Image 11. *Plasmatic*, 2017. Photography Jules Lister.



Image 12. *Plasmatic*, 2017. Photography Jules Lister.



Image 13. *Plasmatic*, 2017. Photography Jules Lister.

3.

**Bodies of Water, 2017**

Latex, scaffold, photocopies, risoprint (A4), cracked LCD screen showing 3D rendered video loop, text written in collaboration with Caitlyn Stobie, plastic bags, water, bowl

Solo exhibition: serf studios, Leeds, June 2017

Screen loop: <https://vimeo.com/bethanhughes/bodiesofwater>



Image 14. *Bodies of Water*, 2017. serf studios, Leeds. Photography Jules Lister.



Image 15. *Bodies of Water*, 2017. serf studios, Leeds. Photography Jules Lister.



Image 16. *Bodies of Water*, 2017. serf studios, Leeds. Photography Jules Lister.



Image 17. *Bodies of Water*, 2017. serf studios, Leeds. Photography Jules Lister.



Image 18. *Bodies of Water*, 2017. serf studios, Leeds. Photography Jules Lister.

4.

**Precarity (Y), 2017**

Scaffold, cracked LCD screen showing 3D rendered gradient loop

Screen loop: <https://vimeo.com/bethanhughes/precarity>



Image 19. *Precarity (Y)*, 2017. School of Fine Art, History of Art and Cultural Studies, University of Leeds. Photography Jules Lister.

5.

**Read These Leaves, 2017**

Text written in collaboration with Caitlyn Stobie, 3D rendered animation, 05:00, Risograph printed publication, A5, edition of 50

Group exhibition: *In the Open*, Sheffield Institute of Arts Gallery, 2017

Journal contribution: *In the Open: collaborative artworks around place, landscape and environment*, Plumwood Mountain, 2018

Animation: <https://vimeo.com/bethanhughes/readtheseleaves>



Image 20. *Read These Leaves*, 2017. Text by Caitlin Stobie. Photography Jules Lister.



Image 21. *Read These Leaves*, 2017. Text by Caitlin Stobie. Photography Jules Lister.



Image 22. *Read These Leaves*, 2017. Text by Caitlin Stobie. Photography Jules Lister.



Image 23. *Read These Leaves* (Publication), 2017. Text by Caitlin Stobie.

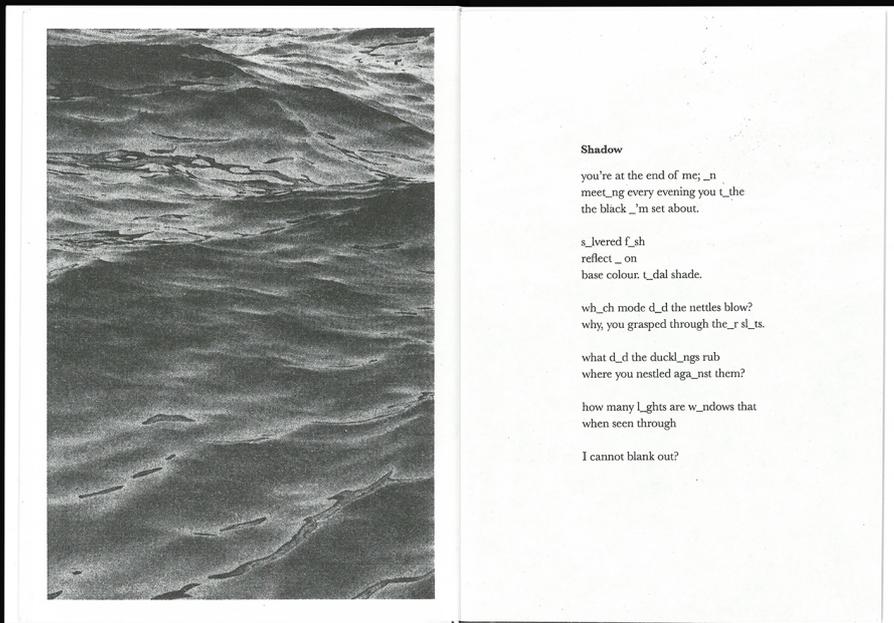


Image 24. *Read These Leaves* (Publication), 2017. Text by Caitlin Stobie.

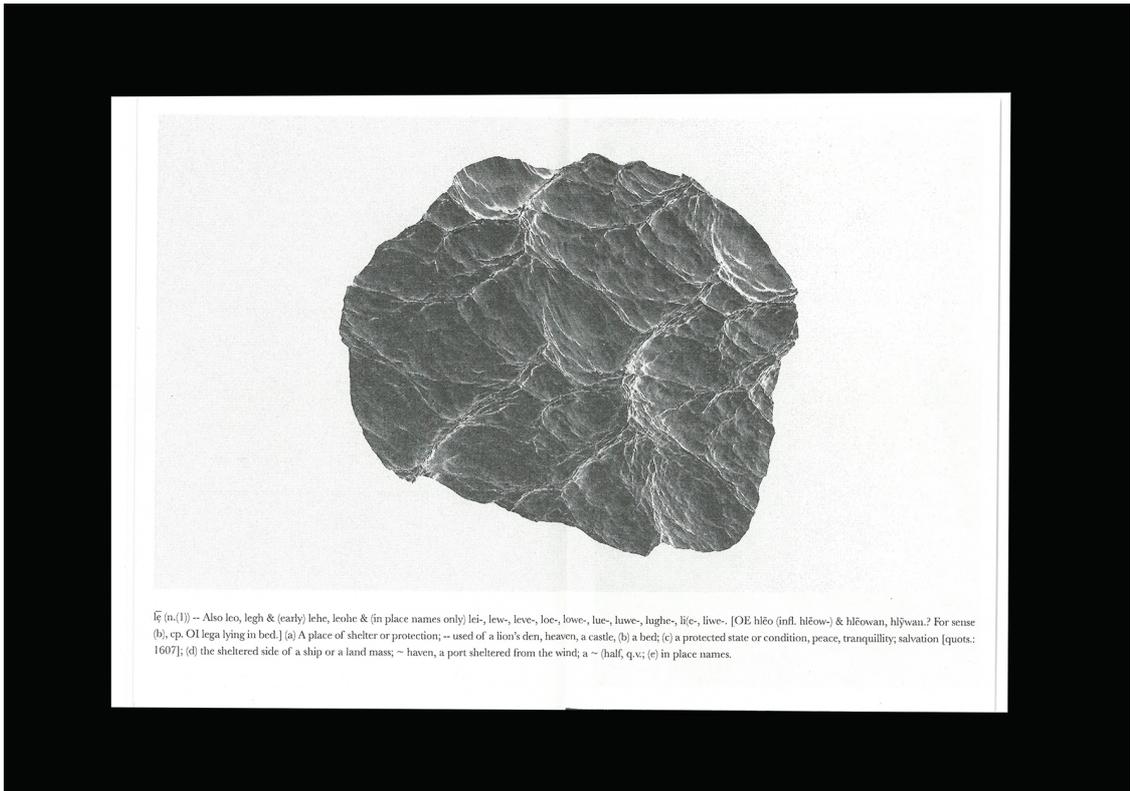


Image 25. *Read These Leaves* (Publication), 2017. Text by Caitlin Stobie.

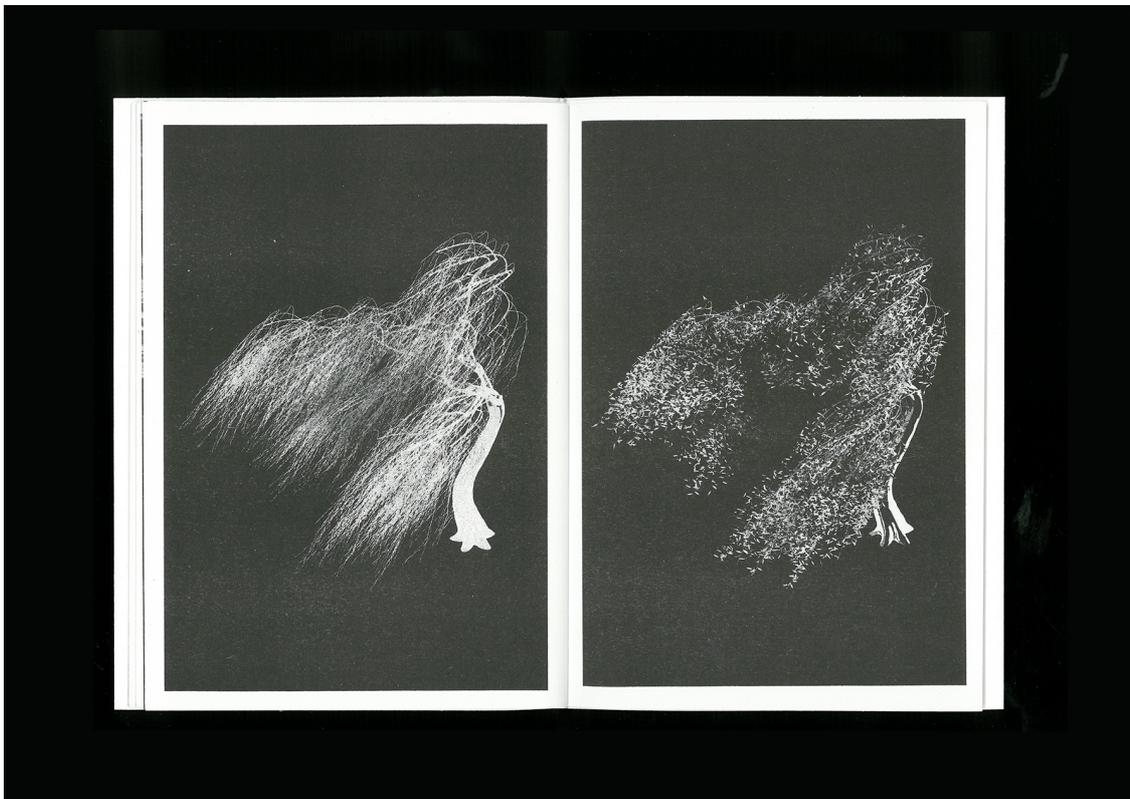


Image 26. *Read These Leaves* (Publication), 2017. Text by Caitlin Stobie.

6.

**Do Nothing, 2018**

Latex, powder-coated steel, digital inkjet print on latex, LCD screen showing 3D rendered loop (sound: Sad Rave: XII)

Solo exhibition: The CASS School of Art, Design and Architecture, Open Field residency, 2018

Screen loop: <https://vimeo.com/bethanhughes/donothing>



Image 27. *Do Nothing*, 2018. The CASS School of Art, Design and Architecture. Photography Bethan Hughes.



Image 28. *Do Nothing*, 2018. The CASS School of Art, Design and Architecture. Photography Bethan Hughes.



Image 29. *Do Nothing*, 2018. The CASS School of Art, Design and Architecture. Photography Bethan Hughes.



Image 30. *Do Nothing*, 2018. The CASS School of Art, Design and Architecture. Photography Bethan Hughes.

7.

**Oberfläche, 2018**

Folded publication made up of a series of 3D rendered images, offset print on newspaper, edition of 20

Publication series: AmBruno project, Cover, 2018



Image 31. *Oberfläche*, 2018.

8.  
**SAD LAMP I & II, 2018**

3D rendered image digitally printed onto mesh, custom powder-coated steel lightboxes, daylight lamps, structure designed and built in collaboration with Sean Kerr.

Group exhibition: *Photography and Print*, East Bristol Contemporary, 2018

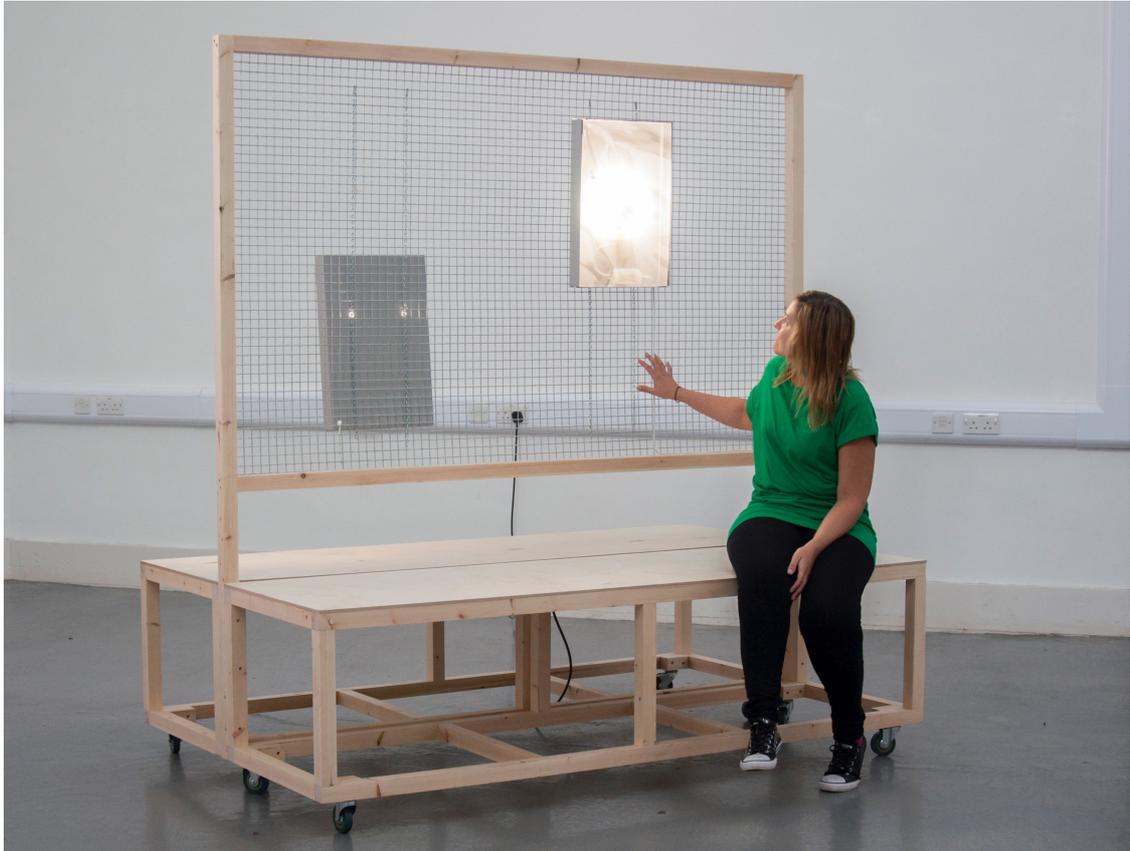


Image 32. *SAD LAMP I & II*, 2018. East Bristol Contemporary. Photography Karanjit Panesar.



Image 33. *SAD LAMP I & II*, 2018. East Bristol Contemporary. Photography Karanjit Panesar.



Image 34. *SAD LAMP I & II*, 2018. East Bristol Contemporary. Photography Karanjit Panesar.

9.

**The Flashes, 2019**

Version 1: 3D rendered animation, 05:00, weeds, LCD screen on pallet, steel bar, screenprint with coal dust (65cm x 95cm). Version 2: 3D rendered animation, 10:00

Group exhibition: *Bauhaus Studio 100*, Weimar, Germany, 2019

Screening: *An Eye To Notice Them*, Yorkshire Sculpture International, Hyde Park Picture House, 2019

Group exhibition: *Not Photography*, Bankley Gallery, Manchester, 2019

Solo exhibition: Kreuzstraße 67C, Braunschweig, Germany, 2020

Version 1: <https://vimeo.com/bethanhughes/theflashes>

Version 2: <https://vimeo.com/bethanhughes/theflashes2>



Image 35. *The Flashes*, 2019. Kreuzstraße 67C. Photography Bethan Hughes.



Image 36. *The Flashes*, 2019. Kreuzstraße 67C. Photography Bethan Hughes.



Image 37. *The Flashes*, 2019. Kreuzstraße 67C. Photography Bethan Hughes.

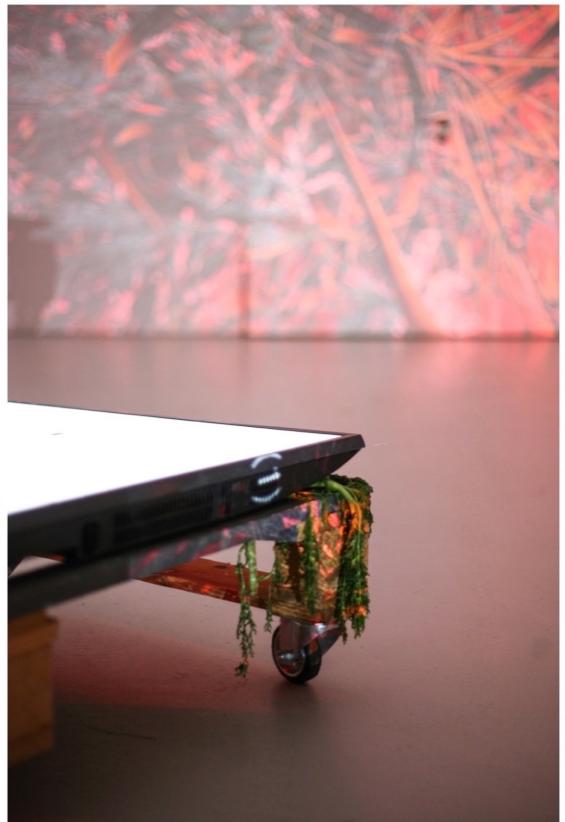


Image 38-42. *The Flashes*, 2019. Kreuzstraße 67C. Photography Bethan Hughes.



Image 43. *The Flashes*, 2019. Bankley Gallery, Manchester. Photography David Penny.

## Appendix II: VIVA Installation

Due to the Covid-19 pandemic, the presentation of the installation *The Flashes*, which was due to take place at Yorkshire House, Leeds, in the week beginning 20<sup>th</sup> March 2020, was cancelled. In lieu of presenting the work in this physical space and meeting the examiners, Professor Esther Leslie and Dr. Sam Belinfante, in person, the viva took place via remote video call. To provide the examiners with an impression of the installation as it had been intended, I produced the following series of 3D CGI renderings and a written description detailing the context, content and composition of the installation. A full analysis of this particular work can be read in Chapter 1, ‘Part 3: On Material Transformations and Rendering in *The Flashes*’, pp. 64 - 78. Furthermore, photographic documentation of previous iterations of this work can be seen in the Appendix: Documentation of Practice, ‘9. *The Flashes*’, pp. 201 - 204.

### Installing *The Flashes* at Yorkshire House: Context and Composition

#### **The Flashes, 2019**

3 LCD screens showing segments of *The Flashes* v.2, 10:00, no sound, looped; wall projection of *The Flashes* v.1, 05:00, sound, looped; steel hardware; latex curtain; rubberised plants; black MDF panels; two versions of *The Flashes* screen-print, coal dust on Kozo paper, 65 x 95 cm; coal.

Yorkshire House is a seven floor office block located in the centre of Leeds’ financial district. Between 2016 and 2018, the building was refurbished by developers, FORE Partnership. With a particular focus on technology start-ups, several of its floors are now occupied by a variety of businesses; others remain empty. While awaiting tenants, these spaces have been temporarily leased to Skippko, an organisation that works with artists in the local community. Temporary spaces like these are part of a larger scheme in which businesses allow arts organisations and charities to use inner city venues—offices, shops and other commercial properties—at little to no cost. In return, developers are able to claim tax relief until the space is commercially let.

*The Flashes* is installed on the third floor of Yorkshire House and spreads across 261 m<sup>2</sup> of open plan office space. On the floors above and below, employees sit at desks, working on computers and chatting with colleagues. The space is painted white and windows fill one entire wall. Through these windows people can be seen working in the adjacent buildings, busy in conference rooms and meetings.

As is common in modern offices, this space is designed in a modular fashion, ready to be customised by its next tenants. Installed overhead is infrastructure to support a dropped ceiling. However, whilst vacant, this is not yet in place and suspended cabling tracks, lighting runners and ventilation ducts are visible. Underfoot, there is a raised floor system which sits 20 cm above the concrete floor proper. It is made up of 60 x 60 cm aluminium panels on extendable struts, allowing for wiring to run, unseen, beneath the entire. This combination of ceiling and floor are used as the compositional starting point for the installation.

In two locations, rows of floor tiles have been removed, creating holes which reveal the concrete below. Next to each hole, the removed tiles have been stacked on top of one another in neat piles. Three 55" LCD screens, each rotated 90°, are distributed around the space. Each screen, resting on its lower edge, is held up by two lengths of steel rope which loop around the mounting screws at the back of the unit and up to the ceiling where they are fastened to the exposed infrastructure above. The first screen is positioned on the raised metal floor; the second screen has been lowered into one of the holes created by removing the tiles so that the image it shows is partially obscured; the third sits on a stack of tiles so that it is raised by 50 cm. As such, each screen is on a different Y-axis.

The monitors show edited segments of the 3D CGI animation, *The Flashes v. 2*, on a loop. Using sun and sky assets within in the software Cinema 4D, a period of 24 hours is compressed into these 10 minute animations. In them, a simulated sun rises on wetlands inspired by their physical counterparts. Models of grasses, reeds and weeds gently sway in the breeze and dust particles drift by as the sky transforms from night to day and back again. The camera cuts between long shots of the landscape and close-up scenes of dense vegetation.

At one end of the space, two black MDF boards, roughly 2.50 m high and 1.20 m wide, lean side by side against the wall. A print is affixed to the surface of each. The image is a single frame from the *The Flashes* animation showing a tangled mass of vegetation. It has been screen-printed onto a thin, semi-transparent paper using coal dust. The printed dust has a rich velvety texture that absorbs light; more has been applied to one of the prints so that the crisp lines of the original image have become fuzzy and it fades into black.

At the opposite end of the room, parallel to the windows, a semi-transparent, latex curtain is suspended from the ceiling. Blocking the incoming sunlight, on the other side of the curtain a projection several meters wide plays *The Flashes v.1* on a loop. Small speakers positioned on stands flank the projection. They fill the space with a soundtrack which is sometimes suggestive of wind or birdsong or water and other times white noise.

