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Introduction

This book was born out of the powerful experience of watching Quentin Tarantino's film *Kill Bill* (2003).[1] This is how I remember it: 'W-h-i-m-p-e-r . . .' the animated letters escape the child's mouth. Hiding under the bed as her parents are attacked, a single tear forms as she watches the mattress above her slowly become soaked with blood, which then drips down onto her face, replacing the tears on her cheeks. In this sequence, a child witnesses the cruel murder of both her parents. There is so much blood; like steam rising, the red haze covers the screen, engulfing the scene in a way that no live-action footage could have done. Later, the girl takes her triumphant revenge through deadly sexual intercourse with the paedophile who slaughtered her mother and father.

The bold graphics with the slow-motion choreography present a surreal dance, aesthetically beautiful and yet, simultaneously and perhaps consequently, horrible. Not being familiar with Japanese anime and manga at the time, I felt the shock of the juxtaposition; it made me see animation as I had never seen it before. At the time, for me, animation had been all about fantasy, humour and memories of TV cartoons on Saturday mornings. This one scene showed me that now the potential capabilities of animation were limitless. I realised that the shocking use of animation in this particular case

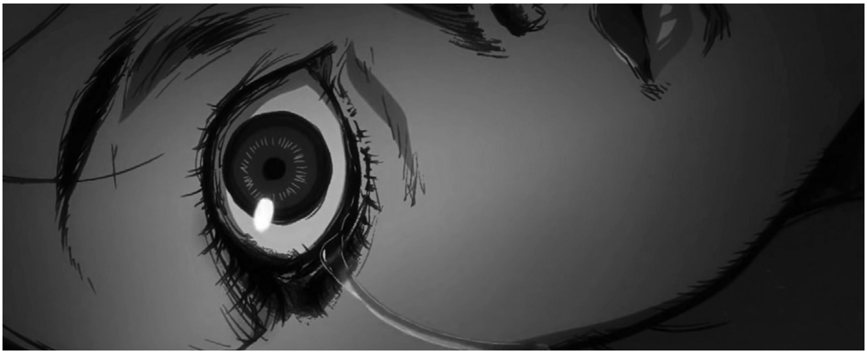

Figure I.1 Screenshot from *Kill Bill*, directed by Quentin Tarantino, 2003.

reflected a much broader and deeper change in the uses of animation today. This is what this book is about.

Even though animation has a complex, varied history, Disney's pivotal role in creating animated content meant that it was culturally understood as removed from 'the real'.[2] It was frequently associated with childhood entertainment, fantastical content, and simplified or safeguarded educational matter with which to treat 'difficult' subjects like sexual education in the 1940s, as seen in Eddie Albert's *Human Growth* (1947),[3] Disney's *Family Planning* (1968),[4] and Les Clark's *VD Attack Plan!* (1973)[5] Or the visual signification of psychological states like the nightmare sequence in Alfred Hitchcock's *Vertigo* (1958),[6] in which the spiral-themed animated sequences symbolise the protagonist's despair, repeatedly circling back to the same moment. The animated *Kill Bill* scene, however, does not symbolise a fantastical dream; it is intended to jolt viewers, making the violence so graphic that it seems almost more than real. Using animation to portray 'the real' reflects a cultural shift whereby animation departs from childhood- or fantasy-oriented imagery, to engage increasingly with factual content. This trend is most obvious in the field of animated documentaries, which has grown rapidly since 2008 when the Oscar-nominated *Waltz with Bashir*[7] gained wide critical acclaim.[8] Before 2009, contemporary examples of animated documentaries were scarce, and limited to works like *Ryan* (2004),[9] *Persepolis* (2007),[10] *Chicago 10* (2007),[11] and *Waltz with Bashir*. In 2008, animated documentary still sounded like something of an oxymoron.[12] However, since 2009, the medium has proliferated widely and as this book was going to press, a keyword search for 'animated documentary' videos on Google rendered 29.5 million results and included wide-ranging topics and media.

Animating Truth seeks to understand the reasons for this proliferation of animated documentaries. I propose that the shift in the imagery used to depict factual content is an essential aspect of what we now call the era of post-truth. Confronting such shifts in the status and aesthetics of 'the real', this book examines the rise of animated documentary in the twenty-first century, and addresses how non-photorealistic animation – that is, animation that does not attempt to look real or to resemble photographic imagery – is increasingly used both to depict and shape reality. In order to demonstrate this change, I map out the two parallel trends in animation: the expanded use of animation within documentary or non-fiction contexts, and the increasingly pervasive use of non-photorealistic animation within digital media. *Animating Truth* analyses the ways in which contemporary technoculture has transformed the relation of animation to documentary. (Technoculture indicates the co-dependence between society, culture and technology while emphasising issues of representation.)

I refer to documentary by recognising that today the boundaries between documentary and different fields of non-fiction such as journalism, forensics, education and information, are blurred.[13] Moreover, animated documentary is not a contemporary invention, and the categorisation of individual films as animated documentary depends on different, often competing, critical definitions and classificatory criteria.[14] Writing in 2005, Sheila Sofian defined animated documentaries as ‘any animated film that deals with non-fiction material’.[15] This definition raises the murky issue of ‘non-fiction’, and points back to the blurred boundaries mentioned above.

As technology shapes culture, contemporary virtual realities – ubiquitous screens and the centrality of online platforms – require new visualisation methods. Once virtual screen worlds become interactive, the *on*-screen world becomes an *in*-screen world, in which the viewer/user plays an active role. Animation has become central as a virtual aesthetic because it uses dynamic moving imagery that can respond in real time to user input. Since our contemporary mixed reality includes the virtual as well as the physical, new theorisations of documentary that transcend the capacity of photography are required; for photography both resembles and relies on material reality.[16]

This book defines three key areas relating animation to documentary: the evidentiary status of animation as documentary imagery, the relationship between animation and the prevailing technoculture, and the aesthetics of ‘the real’. My aim is to understand how this visual paradigm shift influences viewers both ethically and politically, and what epistemological ramifications this transformation in non-fiction aesthetics may evoke.

Waltz with Bashir – about Israeli soldiers’ recollections of war – was an important trigger for this study because it is a contemporary example of animated documentary that stimulated much academic research.[17] It is also a good starting point to interrogate animation’s evidentiary value, the kind of realities it portrays, and its conventions of documentary aesthetics. The film addresses trauma, memory loss and reconstruction, and ends with the animation dissolving into live-action photographic footage of the aftermath of the Sabra and Shatila massacre during the 1982 Lebanon War. This move from animation to live action in the final scene is similar to the animated opening scene in *Kill Bill*, for it acts as a visual bombshell. However, the significance is quite different. Whereas some may see the last scene in *Waltz with Bashir* as validating the otherwise animated film’s documentary value, others may see it as having the opposite effect. By using photographic footage at the end of the film as evidence of ‘the real’, the constructed nature of the animated representation is emphasised, and the reality portrayed in the rest of the film is potentially undermined. The changing documentary aesthetics also question the nature of the reality with which the film engages, accentuating the personal

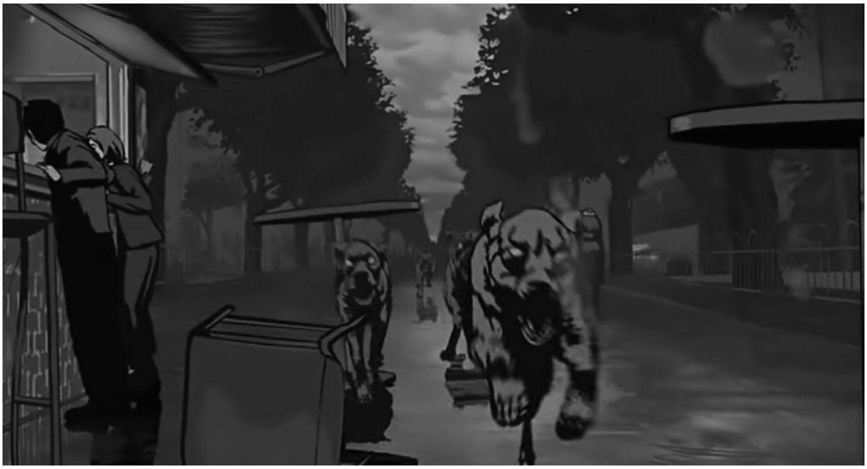

Figure I.2 *Waltz with Bashir*, animated by David Polonsky and directed by Ari Folman, 2008.

exploration of the protagonist's lost memories rather than any objective search for facts. Furthermore, the animated imagery in *Waltz with Bashir* is indirectly used to question the difference between animation and photography, and to reflect upon different modes of representation that are accepted as credible, legitimate documentation. 'It's fine as long as you draw, but don't film', retorts one of the characters when asked about the possibility of recording their meeting. The imperative 'don't film' articulates an ironic and central theme of the work, namely, that photography is 'real' whereas animation is not. Not only has animation been historically linked to the portrayal of fantasy worlds, it is often stylised very differently from photorealism, and its production is based on the construction rather than the capture of imagery. These features have contributed to animation's reputation for artificiality, and thus explain why it may be considered as beyond the borders of 'the real'.

Almost a decade later, these issues persist, as seen in the award-winning animated documentary *Tower*[18] about America's first mass shooting in 1966 at the University of Texas, Austin. Here, too, animation is combined with live action to interrogate the difficult question of memory and to emphasise the trauma and surreal quality of the events, like the portrayal of war in *Waltz with Bashir*.[19] Soldiers who were interviewed as part of the research for this book, reported that the representations of war in *Waltz with Bashir* actually seemed to them more, rather than less, realistic in comparison to live footage. They explained that only unconventional representation can come close to embodying the extraordinary and bizarre emotions inherent in these horrific events that cannot be compared to anything else, and they can only be understood by those who have experienced them personally. In this sense, the realism of both films inheres in their success in enabling viewers to grasp some aspect of reality that would otherwise be inaccessible.

However, in contrast to *Waltz with Bashir*, the varied documentary aesthetics in *Tower* continually change, shifting between black and white photographic footage of the actual event, contemporary photographic colour footage of the location today, rotoscoped animation based on actors portraying the survivors' experiences and interviews with survivors, to name but a few. Thus, in *Tower* the distinction between animation and photography is blurred from the start, demonstrating the diversity and cross-pollination of documentary aesthetics today, as opposed to the stark contrast in *Waltz with Bashir* that underscores the assumed contradiction between fantasy-animation and fact-photography. It is noteworthy that Maitland described his apprehension about reaching out to survivors with: 'Hey, you don't know me, but I want to make a movie about the worst thing that ever happened to you 50 years ago, and it's going to be a cartoon. Let's talk!'[20] His unease about people's reactions to the portrayal of tragic events in animated form reveals that despite the recent rise of animated documentaries – and the vast range of topics animation now covers – something of animation's assumed link to fiction, childhood, humour and light-heartedness persists.[21] Thus, questions related to the nature of the reality being depicted, and the most suitable means for its truthful portrayal, play a central role in these two films. Similar themes underpin the theoretical basis of *Animating Truth* and the rise of animated documentary in contemporary culture.

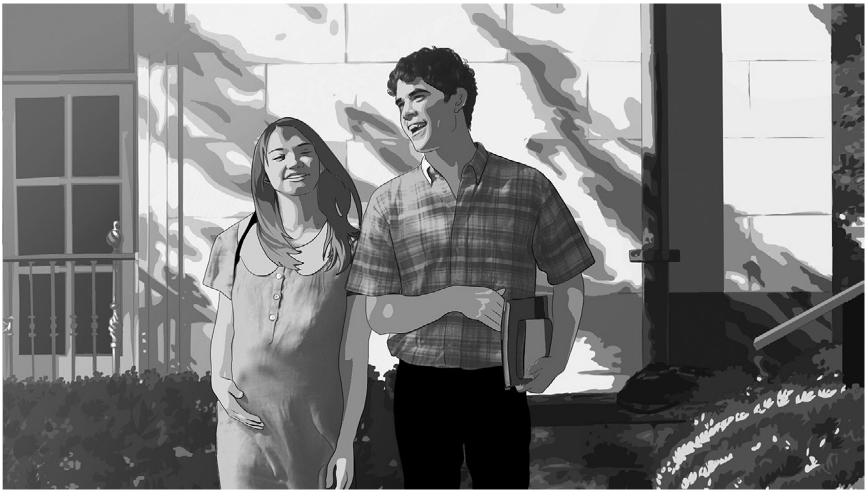

Figure I.3 *Tower,* directed by Keith Maitland, 2016.

I will paint a broad picture in order to contextualise this book. While the debates of the twentieth century involved the crisis of representation, it is now less clear where or if any boundaries exist between what is 'real' and what is represented. In today's visual culture with its rapidly changing imaging technologies, the role of the visual requires reconsideration. For example, when people rely on animated gifs and emojis to communicate, they replace their actual physical appearance and facial expressions with simplified, cartooned, clichéd representations. As such, users amplify the role of animation in their daily interactions by using animation to symbolise 'the self' and various modes of self-expression. Similarly, in the era of Snapchat filters, many choose to represent themselves as a cuddly animal, or an airbrushed perfect self, differentiating their actual physical appearance from these online visual portraits. The proliferation of such representations has even developed into 'Snapchat dysmorphia', a surprisingly common phenomena whereby millennials are seeking surgery to help them appear like the filtered, or 'perfect', versions of themselves, thus replicating image-manipulation techniques in real life. In the past, the physical appearance of referents influenced what was deemed to be a realistic visual representation, but today it is no longer clear what is shaping what. The changing relations between imagery and the reality it claims to depict are rapidly transforming. This is the result of contemporary technoculture where omnipresent screens prize visual means of communication and create dual or multiple realms of activity so that the physical domain, and the way it looks, becomes just one among many. The ubiquity and mundane use of non-photographic animated imagery to engage with current realities is also a result of constantly evolving imaging technologies, such as Nvidia's 2018 GeForce RTX graphics chips, which create real-time, highly realistic animation that could be confused with photographic footage. Such technologies blur the boundaries between more traditionally accepted aesthetics of 'the real', like photography, and what animation has become today. Finally, the wider informational media environment of post-truth also contributes to these transformations in visual culture. When information overload prevails, animated imagery, which summarises and simplifies information and processes it through stylisation – even in exaggerated or inaccurate ways – has a growing place in today's visual depictions of actual events. Why not trust animated documentary to portray current events when 'news' falls victim to disinformation, poor images and image manipulation, often resulting in the ubiquitous claim of 'fake news'? Is animation in these cases any less real or credible than alternative depictions?

Realism is the believable articulation of 'the real', highlighting the fact that the status of representations' veracity is in constant flux. What is deemed appropriate and reliable representation is a fundamental motif in documentary studies. Documentary is a genre that emerges in a time of crisis[22] and it is therefore no surprise that documentary is prevalent in today's rapidly changing technological world characterised by post-9/11 surveillance, the refugee crisis, global pandemics, rising nationalism and unstable geo-political alliances, among many others. The continuing interest in documentaries shows that, despite the haziness of their claims to 'truth', there is still a belief that they are a credible way to search for meaning in troubled times. It therefore also makes perfect sense that realism is not only an aesthetic approach but also a political goal that aims to shape realities rather than merely reflect them. Many of the works discussed in this book are cinematic rather than film *per se*. The complexity and multiple uses of animation in contemporary culture demonstrate that animated documentary must be understood in proximity to other disciplines. *Animating Truth* therefore draws together film, art, cultural and media studies, posthumanism, gaming studies, semiotics and philosophy to shed new light on the topic of animated documentary, and underscore the fact that this interdisciplinary analysis benefits from a mix of media and fields.

The goal of the book is to advance the perspectives through which animated documentary is studied by presenting it in a way that differs from previous analyses, and by reaching into other fields of cultural enquiry by examining animation as a visual language that appears in various fields of non-fiction in contemporary visual culture. This ubiquitous use of animation results in its changing status as believable representation in documentary contexts since viewers have become accustomed to receiving factual content in animated form in a wide variety of fields, and they now rely on such content in their daily lives.

What follows includes a theoretical discussion of realism and the evidentiary status of animation through its technological, aesthetic, and narrative uses in contemporary documentary and non-fiction rather than the presentation of a historical model or argument as provided, for example, in Annabelle Honess Roe's excellent 2013 book on the topic. As technological developments change the production and uses of animation in documentary, new theorisations are necessary. Interestingly, although the topic of experimental documentary has received scholarly attention in the fields of contemporary art and journalism, the related topics of animation, digital gaming and virtual culture are often overlooked.[23] At a time when both animation and documentary are changing, they transcend their emergent status as documentary animation cinema, and operate across broader platforms and contexts of digital expression, application and exhibition, thus further underscoring the need for new approaches. Although the scope may be ambitious, by extending the discussion across many disciplines and using a cross-platform analysis, the definitions of both 'animation' and 'documentary' are rethought, and the topic of animated documentary as a dominant form of non-fiction visualisation becomes pertinent to a variety of contemporary debates.[24] The parameters of this research include animated documentaries of physical events, those that focus on virtual realms, and works that reflect upon the combination of documentary and animation in varied ways.[25]

In today's visual culture, animation is at an interesting turning point, poised between fiction and fact, perhaps combining the two. We are confronted with ubiquitous animated images, videos and gifs, for example, on smartphones, computers, in airplanes, doctors' offices, schools, and many more, that are all used uncritically to represent or express real events, feelings, processes and interactions. This makes the topic important and timely. Animation's traditional association with fiction has become less dominant, but that does not mean that animation is no longer a form of escapist, artificial, spectacular and often child-oriented entertainment.

In-flight safety films offer an example of the unique capabilities of animation to cross between fact and fiction. They are a useful means of conveying information and dealing with critical issues in a way that is clear, memorable and easily digestible.[26] However, they also highlight the possibility of a plane crash, yet no one reacts to them as such. Why? The reception of in-flight safety films illustrates how viewing animated non-fiction can isolate the cognitive internalisation of information (how to act in an emergency) from the emotional reaction (panic) to that information. Since animation is still associated with fantasy, it can be stylised in a particular way to appear friendly and unthreatening. In the context of international travel, which caters to various cultures and languages, animation more readily conveys the message. In today's globalised, highly visual culture, new forms of imagery are needed to handle the avalanche of data we continually encounter, and thus the animation of data (or data visualisation) becomes a regular feature of contemporary information culture. In other words, animation today embodies a double allusion to both fiction and fact.

This mixture of fact and fiction is also apparent in recent fictional entertainment-based animated films that involve varying degrees of factual data visualisation. This is the case in Pixar/Disney's *Inside Out* (2015),[27] which personifies emotions and artistically visualises the structure of the mind, innovatively if loosely based on different psychological theories and neuropsychological findings.[28] Similarly, Disney's *Ralph Breaks the Internet* (aka *Wreck-It Ralph 2*) (2018)[29] visualises the internet in a spatial–urban–architectural mode for the sake of the film's narrative. Since animation excels at visually simplifying complex systems and processes, it is used pervasively as a means of data visualisation. These cinematic examples demonstrate how fiction, fused with factual infographic data visualisation, is expanding the borders between fact and fiction. This is particularly evident in animated documentaries.

Ralph Breaks the Internet is also a compelling example of the multi-layered use of animation in visual culture in which multiple realms are each depicted in a different animated style: (1) the supposedly non-animated 'real' world of people using the internet; (2) the users' online animated representations portrayed as box-headed avatars; (3) the well-known fictional animation characters, such as Ralph himself or Disney's princesses. It is worth noting that the princesses are quickly redressed less formally, thus distancing them from their fictional worlds through visual choices that represent them in a more contemporary manner, and thus also bearing closer resemblance to the internet users depicted in the film, and to the viewers themselves. Comparably, *Ralph Breaks the Internet*'s illustration of Twitter resembles the bluebirds in Disney's 1937 *Snow White and the Seven Dwarfs* (1937),[30] merging recognisable fictional animated imagery of the past with contemporary animated data visualisation and popular logos. This complex use of animation blurs the difference between the representational choices most often used in the past and thus differentiates between the fantastical animated world and the live-action portrayal of the viewers' world. In earlier examples, such as *Mary Poppins* (1964)[31] and *The Water Babies* (1978),[32] the break between fantastical worlds and the so-called 'real' was well-defined and stylistically unmistakable. By contrast, there is a merging of multiple animation styles that symbolise the physical 'real' world of the viewer, viewers' online virtual actions and fantastical content, complicating the many uses, significations and meanings of animation. *Ralph Breaks the Internet* is but one example.

Although 'animated documentary' may still sound like a contradiction in terms to some, animation has often been used to illustrate what cannot be seen. Animation literally means 'bringing to life' and thus it expands the aesthetics of documentary by giving life to sounds and images that cannot be recorded, such as memories, subjective perspectives, nano-particles, scientific visualisations, censored events or non-physical online realities. Animation extends the boundaries of moving-image visual culture by providing the visual means for what may otherwise remain unrepresentable. In response to scholarly debates regarding the definition of animation, I define animated imagery as 'movement only visible on-screen', as explained in detail in Chapter 2. Some may criticise this definition for sidestepping the specificities of animation techniques and styles. I agree that specific styles matter, but they are not the emphasis of this book since they are as varied as the animators' methods and levels of creativity. Rather than a semantic argument, this purposely broad view of animation emphasises the fact that it can no longer be considered from a narrow perspective since it is now visible in innumerable cultural fields. This definition aims to incorporate the many technologies and fields relevant to the topic, such as digital and data-driven art, gaming, architectural, scientific or forensic visualisations, virtual reality (VR) and augmented reality (AR) research, to name just some of the often under-represented fields in animation studies; it also includes the wider philosophical questions that these related disciplines raise. In other words, this definition intentionally expands the research paradigms involved in animated documentary analysis in an era when animation has become truly 'pervasive', to borrow from Suzanne Buchan's 2013 aptly named book.[33] *Animating Truth* is not about sub-cultures of animation such as anime, which clearly influenced the above-mentioned films of Tarantino and Folman; rather, it explains how animation has been reinterpreted on a global mainstream level, becoming ubiquitous in everyday visualisations. The book focuses on the rise, and growing truth-value, of non-photorealistic animation in the form of diverse new digital imaging techniques that function as a stylistically diverse alternative to photorealism, with a shifting relationship to photography as the more traditional documentary aesthetics.

I recognise this is a broad visual paradigm shift in contemporary visual culture. Since animation can only be seen on screen rather than in the physical realm, it is ostensibly distinguished from photography: the argument follows that animation is generated while photographs are recorded. However, my central topic is the relation between the concurrent rise of animated documentary and of animation in digital media; my focus is on the technocultural context for the increase in, and changing believability of, animated images. Taken together with my definition of animation as movement that is visible only on screen, I situate screen culture and the moving-image nature of animation centre stage and choose to focus on the complex convergence of animation and photography, rather than on the historical correlation between animation and other visualisation methods, which would require an entirely separate project.

In fact, my definition points to the complex contemporary convergence of animation *with* photography. Digital imaging technologies blur distinctions between animation, live-action cinema, synthetic performances, post-production visual effects and digital puppetry, among others. For example, James Cameron's *Avatar* (2009)[34] used photorealistic synthetic CG sets/environments into which live performances recorded through MoCap were incorporated, complicating the connection between the animated on-screen world, the off-screen world and the physical referent. This is also the case with animation techniques such as machinima and real-time animation, which all modify the relationship between animation and photography, and between animation and physical referents. These developments in image-production technologies potentially alter animation's evidentiary status and resulting believability, requiring new theorisations of the topic and redefinitions of animation.

Animating Truth focuses on animated documentary because it is here that an enduring tension exists between animation as it was most often used in the past, in relation to fiction, and its growing use today, in non-fiction. Aware of such culturally conceived biases, many animated documentaries supplement novel animated imagery with supporting materials associated with documentary conventions, for example, audio interviews and/or photography, in an apparent effort to garner viewer acceptance. Understanding the proliferating uses of animation and its uncertain position as credible visualisation demands a reconsideration of the status of animation in contemporary visual culture.

Animation was considered a niche field, mostly associated with the film industry and the Disney/Pixar animation studios. However, it has expanded exponentially into myriad non-fiction fields, and is now ubiquitous – on our GPS systems,[35] in film, journalism, forensics, online gaming, data and scientific visualisations and more.[36] Full coverage of these multiple and varied non-fiction fields is beyond the scope of this research, but wider visual culture acts as a context for the rise and reception of animated documentary. That said, my focus is on how technological innovation affects documentary aesthetics, using all the above to expand the way animation is analysed and to understand its implications for theorisations of documentary. The widespread use of non-naturalistic animation in varied fields of non-fiction suggests that the signification of 'the real' is no longer tethered to photorealism, and that animation may be deemed real and believable even if its appearance belies this.

Today animation is often used to depict data, to re-enact events, such as in journalistic coverage, or to simulate scientific theories. It is sometimes referred to as theoretical photorealism since it is based on accurate data and calculations but involves unobserved occurrences or otherwise un-visualisable content, for example, phenomena in space.[37] In short, animation is often used by authoritative sources to depict 'dry facts'. This diminishes a sense of the constructedness of animation and encourages uncritical acceptance. Many viewers watch animated sequences without questioning what they actually depict, how, why they were made to appear as they do, and what truth-value they actually contain. In an era of rising populism and politics often based on misinformation, this has huge implications. Animated images that might be attention-grabbing and easily stylised for maximum effect are capable of informing and documenting, but can also sway opinion through their emotional impact. Despite animation's complex history, does its enduring relation to childhood entertainment infantilise serious content, as in Disney's 1941 *Seven Wise Dwarfs*,[38] which features the dwarfs of Disney's 1937 *Snow*

White and the Seven Dwarfs marching to the post office in order to purchase war savings certificates? Or does the discrepancy between so-called 'childish' aesthetics and potentially difficult subject matter strengthen our reactions of horror, as could be argued about the animated adaptation of Martin Rosen's 1978 *Watership Down*?[39] How may this influence viewers ethically and politically? Non-photorealistic animation can aestheticise violence and overshadow urgent content, relegating actual horrific events to the realm of fantasy. Alternatively, animation can do just the opposite by jolting viewers out of their numbness, provoking a fresh response to, and new insights into, a well-worn topic. Animation can also be seen to anonymise people by portraying protagonists without identifying them. Sometimes it may be a conscious choice to respectfully conceal the identity of individuals, especially when their traumatic experiences are depicted; but it can also have potentially dangerous ethical ramifications when real people are visually reduced to cartoons. This book examines the complex uses and possible implications of using animation in non-fiction, demonstrating that an in-depth analysis is needed in order to properly understand this newly proliferating form of imagery increasingly used to depict and consequently shape current reality.

All these examples illustrate the changing relations between ideas of reality and representation, or, in other words, how the concept of realism has been transformed. The collapse of what we consider realism into what we regard as fantasy is a central motif in this book and a recurring theme in documentary discourses. Animation embodies this transformation of aesthetics of 'the real' in an era preoccupied with the nature, importance, depiction and misuse of facts.[40] Rethinking what animation is and how it is used in documentary today is a perfect lens through which to examine bigger current questions about the credibility of imagery, image referentiality and realism. The three parts of the book are organised according to these themes: (1) the evidentiary status of non-photorealistic animation as documentary imagery; (2) the relationship of animation to technoculture, and (3) disputing the aesthetics of 'the real'.

Starting Points: The Evidentiary Status of Animation as Documentary Imagery

Dai Vaughan claims that '[w]hat makes a film a "documentary" is the way we look at it; and the history of documentary has been the succession of strategies by which filmmakers have tried to make viewers look at films this way'.[41] The active role of the viewer as arbiter of what constitutes a documentary thus becomes paramount, shifting the focus to the viewer's persuasion and experience of the work. What, then, establishes an image's truth-value? Part I sets the stage and introduces the topic of animation's truth-value by providing historical and theoretical context. Chapter 1 takes up the question of animation's recent proliferation and current technoculture's effects on the believability of documentary imagery in relation to shifting conceptualisations of visual realism. Here I engage with various philosophical, technological, ontological and epistemological aspects of the immense discourse on realism but mainly approach the theorisation of realism from the perspective of art, film and animation studies in order to examine its relation to animation and the fluid credibility ascribed to changing documentary aesthetics. Chapter 2 discusses animation's changing relation to photography and the evidentiary status of imagery in an era of mixed realities.

The assumed 'artificiality' of animation rests on its comparison with photography since animation is generally seen to break the physical link with, and likeness to, the represented physical object embodied in analogue photography. Part I, therefore, begins by focusing on the relation between animation and photography, the contested yet persistently leading aesthetic of documentary. Through numerous debates in media and animation circles, it has become clear that in digital culture, the binary between animation and photography no longer holds;[42] Chapters 1 and 2 focus on the blurred and fluid boundaries between the two. Nonetheless, a certain duality between animation and photography acts as a structuring element throughout the book, and is used to highlight two major criteria for the acceptance of photography: I use visual realism in Chapter 1 and indexicality in Chapter 2 to analyse how they relate to contemporary animation in documentary and its apparent believability.

The discourse surrounding indexicality, which relates to questions of evidence and is grounded in photography, has been highlighted by theorists such as Rosalind Krauss, James Elkins and Mary Ann Doane. Indexicality has been used in theorisations of photography and animation before, but I engage with it in a new way that includes both the trace and deictic index in relation to physical and virtual realities. Thus, what is offered is an expanded view of animation's evidentiary status and the translation of off-screen movement into on-screen movement. Placing this work within discussions of visible evidence, as well as debates surrounding new imaging techniques by media, science and technology theorists, I refer to a *post-photographic documentary aesthetic* in Chapter 2. In contemporary non-fiction animation, the logic of the analogue photographic evidentiary status based on the indexical trace of the physical referent (as a link between the image and what it represents) is maintained, though not the photographic aesthetics of photorealism that rely on resemblance to the physical referent. In other words, the importance of the link between image and physical referent persists while new and diverse aesthetic styles are used;

this is post-photographic since it relies on evidentiary assumptions of the past while incorporating new visualisation techniques and styles.

To illustrate the above, a 2018 advert for the online world of *Second Life* (*SL*) features an image of fairly realistic-looking animated avatars kissing, and includes a credit that states ‘photo by . . .’. Is this indeed a photograph, as the credit asserts? Does this image function in the same way that a photo may have done in the past, as a document? If so, what exactly does it document? Is it a photo of an animated scenario, or is animation now photographic because it can both achieve hyper-realistic imagery and capture footage of what happens on screen, capturing people’s actions that are now regularly mediated through screens and graphic interfaces? Does this animated image/ photo depict an actual experience, albeit not in the physical world but rather online; and can such differentiations be upheld in an era of mixed realities? The many questions that such visualisation raises demonstrate the blurred boundaries that exist today. Not only are real and virtual experiences combined in these contexts, the aesthetics used, how they are defined and how this influences viewer expectations regarding the imagery’s functions and believability are also unclear. New debates are thus clearly essential.

ANIMATION AND TECHNOCULTURE: THE VIRTUALISATION OF CULTURE AND VIRTUAL DOCUMENTARIES

Which aspects of today’s realities require new visualisation methods, and why? *Animating Truth* is a study of the credibility of contemporary animated documentary in a culture that is increasingly virtualised and dependent on animated information. Part II examines present developments in technoculture, focusing on how these changes have influenced our understanding of evidence, documentation and new uses of animation in documentary. The current virtualised computer culture uses various forms of animated imagery to render abstract data and processes visible. As daily actions are increasingly screen mediated, new visual representations are needed to construct and transmit information in these digital-virtual worlds, as discussed in Chapter 3. This not only explains animation’s proliferation, but also impacts the reception of similar imagery in non-fiction contexts. Additionally, in today’s mixed realities, the physical itself becomes less central in virtualised digital culture since a substantial part of contemporary experience takes place through computerised interfaces and networked platforms based on code, rather than material actions.[43] Chapter 3 engages with central elements of digital culture that have changed the face of contemporary realities, which now include both the physical and the virtual. This part of the book includes the theorisations of virtuality, the changing characteristics of screen culture, the shifting status of materiality in digital culture and the growing field of online games.

It is worth clarifying how gaming fits into the topic of animated documentaries. The field of gaming has grown exponentially in recent decades. Beyond being the leading form of popular entertainment today, it has evolved into a rich and complex medium that encompasses vast fields ranging from experimental art, scientific research, military training, education, journalism, economics, psychology, anthropology and more. Gaming's main visual language is animation since animation enables moving imagery that can respond in real time to user input, essential for an interactive, screen-mediated field. It is no surprise, then, that animation studies, and film studies more generally, have in recent years begun to overlap with the field of gaming. This is evident, for example, in the proliferation of games symposia, scholarly interest groups for animation and video games and the fact that many film festivals also include gaming or VR segments. Clearly, there has been a cross-pollination and blurring of boundaries that reflect the larger phenomenon whereby fields of study traditionally situated within film, such as animation, have extended beyond these confines and now require a reconsideration of their traditionally demarcated disciplines. Furthermore, the huge popularity of gaming means that animation production has been developing exponentially within these industries and, as a result, is also influencing research into animation. These production methods include virtual puppeteering, MoCap or machinima, which are all relatively new and have emerged from – or are closely related to – the gaming industries that, in turn, have influenced the production of animation and animated documentary today. The relation of contemporary games to the field of animation is, therefore, characterised by a growing convergence. It would be impossible to cover the vast current research into gaming, and that is not the intention of this book. However, approaching gaming from the perspective of animation and documentary leads to new insights into the changing uses, production and interaction between the fields, shedding new light on wider issues in contemporary digital culture.

Animating Truth discusses pictorial worlds that use real-time animation to reflect interactive user input, such as online games, which are fully animated realms of virtual activity. The book's innovation inheres in the claim that animation now functions in a way that departs from previous theorisations. It is no longer a visual interpretation for personal states of mind (as in *Waltz with Bashir*), nor does it only depict events that could have been photographed but were not (such as *The Sinking of the Lusitania*, 1918).[44] Rather, it is a direct capture of these virtual worlds as they appear to users. An example is *Molotov Alva and His Search for the Creator* (2007)[45] about an avatar's/player's experience in the *SL* online world.

I have identified three kinds of virtual documentaries that demonstrate the new uses and need for animation as a documentary language in today's virtualised culture, and blur the boundaries between today's mixed realities: (1) documenting animated virtual game realities (Chapter 4) by following the historical progression of animation in games and offering a more up-to-date historical perspective to animated documentary that is not provided by existing historical surveys; (2) the in-game/virtual depiction of physical realities that show how the two converge (Chapter 5); (3) the use of virtual aesthetics, such as interactivity and real-time animated visualisation, to depict physical events for example in documentary games and VR documentary simulations (Chapter 6). These three categories demonstrate the immense influence of wider technocultural characteristics on changes to animation in documentary production and theory.

THE POWER OF ANIMATION: DISPUTING THE AESTHETICS OF 'THE REAL'

Part III discusses the status of truth as a discourse, and assesses the potential political and ethical implications of using animation in contemporary documentary, taking into account viewers' increasing familiarisation with such visualisation in non-fiction contexts. What exactly are the aesthetics of documentary, and how do they relate to current debates surrounding realism and post-truth? Since 'the real' is always mediated through representation, realism is always based on convention. Whereas theorists such as Bill Nichols and Michael Renov have engaged with the problematic nature of documentaries and their fluid forms of realism, these questions persist and have become more urgent in an era of post-truth. Documentary studies are a way to approach the relation between reality and realism as representations of 'the real', by questioning what aesthetics of 'the real' were, what they are and what they may become. Since realism is linked to credibility but also relates to viewers' understanding of reality as shaped by documentary representation, this has various ethical, epistemological and political ramifications. This book engages with the technologised realities and 'realism(s)' of today and aims to understand the forms that realism takes in animated documentaries.

Animation's relation to realism is complex. On one hand, animation's break with visual realism is a recurring theme that supposedly problematises animation's realism and truth-value. It is, therefore, necessary to engage with visual realism, or mimesis, in order to understand how it relates to animation's growing visibility in contemporary documentary. This is the technological context for such developments and consequent changes in theorisations of realism and documentary today (Chapter 1). On the other hand, realism extends beyond mimesis and photorealism. Therefore, animation's relation to, and referencing of, the reality portrayed has been defined in various ways.[46] Stephen Rowley, for example, lists various types of realism in animated depictions, including visual and aural realism, as well as the realism of motion, narrative and character, and social realism.[47] Most commonly, animation has been used in documentaries to depict personal perspectives, feelings and memories that cannot otherwise be represented in a moving image, thus exposing the myriad ways in which reality can be seen, and demonstrating diverse perspectives. Examples include *Snack and Drink* (1999)[48] about autism; *An Eyeful of Sound* (2010)[49] about synaesthesia; *Last Day of Freedom* (2015)[50] about battle-worn soldiers and mental health, and many others. But what about other contemporary phenomena that shed new light on the realism inherent in animated depictions, both as an aesthetic and as a sociopolitical goal? Viewing this issue from a technological and philosophical perspective means taking account of the wider cultural context that explains changes in what constitutes a believable representation of 'the real'. Accordingly, this book argues that the proliferation of non-naturalistic animation in contemporary documentary and non-fiction is a consequence of various defining features of the networked information age. Contemporary phenomena such as virtuality, interactivity, machine vision, surveillance culture, wearable technology and the augmentation of human perception, the changing role of the physical in digital culture, new representational technologies, and suspicion of information in an era of 'fake news' make animation in documentary realistic in new ways, despite its non-mimetic appearance. Examining the unresolved and multiple nature of realism illustrates the many potential forms it might take in animated documentary. Rather than producing a defence of animation's realism, however, my goal is to track the ways in which that realism may be positioned in relation to past and new theorisations of what amounts to an ever-changing framework of representation.

As animation flourishes in documentary and covers challenging content such as war (*Samouni Road*, 2018, about Gaza),[51] the plight of refugees (*It's Like That*, 2003,[52] about refugee children, and *1000 Voices*, 2010,[53] about asylum seekers), two salient questions arise: (1) Will animation de- or re-sensitise viewers, as discussed in Chapters 7 to 8? (2) If animation's links to actuality are fluid and often unclear, will viewers potentially believe nothing or everything? And can these binaries be broken down as representations continually change, as argued in Chapter 8? I propose that animated documentaries are masked, self-reflexive documentary aesthetics that can both hide and expose information, foregrounding issues of truth verification versus disinformation, and thus acting as a perfect form of representation for the zeitgeist. Does the power of animation lie in its ability to evoke reflection and critical contemplation in viewers, and what must occur for this potential to persist?

Although documentary conferences and film festivals have included screenings and sessions devoted to animated documentary since the early 1990s, academic research on animated documentaries has only recently gained momentum.[54] Earlier research was mostly written from the perspective of animation rather than documentary studies.[55] Since 2011, however, a number of publications and events may be considered indicative of a growing academic interest in the topic.[56] As this interest expands, so too does the range of questions being asked. To date, research into animated documentaries has included the history of animated documentary,[57] contemporary production, animation's ability to stand in for un-photographed or un-photographable footage of real-world events, and its inclusion of subjective or fantastical accounts of a range of experiences.[58] By contrast, this book offers a new look at animated documentaries as a sign of the times.

Focusing on the technocultural reasons for this shift towards pervasive animation in documentary aesthetics, *Animating Truth* specifically examines how the virtualisation of culture fundamentally impacts the rise and theorisation of animated documentaries. It is impossible to comprehend animation's use and role in documentary today without considering the technological modifications in new media that have reshaped the contemporary world and the wider depiction of non-fiction information.[59] By evaluating animation's intersection with varied fields of contemporary visual culture, my goal is to expand the theoretical scope for analysis of animation as documentary visualisation, and introduce new approaches to the meaning and impact of the animated image in our time. Animation serves as an interface for our increasingly complex relations to data and thus becomes part of a constitutive change in ways of seeing one's world. As imagery of 'the real' and theorisations of realism change, competence in image analysis is essential to enhance our understanding of how technologies have changed realities, referentiality and reception. *Animating Truth* is an invitation to engage with – and a critical tool for understanding – emerging forms of informational representation and their wide-ranging epistemological and ethical implications, as they shape and are shaped by contemporary culture.

NOTES

1. *Kill Bill*, film, directed by Quentin Tarantino (USA: A Band Apart, 2003).
2. For theorists who engage with animation's assumed fictitious nature, see Ward, 'Animating with Facts', p. 294; Skoller, 'Introduction to Special Issue', p. 207; Cavell, *World Viewed*, p. 167. See also Holliday and Sergeant, *Fantasy/Animation*. It

may be argued that animation has concerned itself with the 'real' for a long time and in varied ways, as seen in examples such as Norman McLaren's *Neighbors* (1952), Disney's *Seven Wise Dwarfs* (1941), which featured the *Snow White* (1937) dwarfs marching to the Post Office to purchase wartime savings certificates, or Jimmy Murakami's *When the Wind Blows* (1986), based on Raymond Briggs's graphic novel of the same name. Esther Leslie's *Hollywood Flatlands: Animation, Critical Theory and the Avant-Garde*, about animation, politics and modernist criticism is an important book to mention in this context. That said, these examples (1) emphasise the blurred boundaries between the representational, the fantastical, the educational, interpretive, documentary, propaganda, etc., and (2) are the minority in a field that has more commonly been considered niche, associated with fantasy and researched under that guise.

3. *Human Growth*, film, directed by Eddie Albert (USA: Wexler, 1947).
4. *Family Planning*, film, directed by Les Clark (USA: Walt Disney, 1968).
5. *VD Attack Plan!*, film, directed by Les Clark (USA: Walt Disney, 1973).
6. *Vertigo*, film, directed by Alfred Hitchcock (USA: Alfred J. Hitchcock Productions, 1958).
7. *Waltz with Bashir*, film, directed by Ari Folman (Israel, Germany and France: Bridgit Folman Film Gang, Les Films d'Ici and Razor Film Produktion, 2008).
8. The film won a Golden Globe Award for Best Foreign Language Film, an NSFC Award for Best Film, a César Award for Best Foreign Film and an IDA Award for Feature Documentary, and it was nominated for an Academy Award for Best Foreign Language Film, a BAFTA Award for Best Film Not in the English Language and an Annie Award for Best Animated Feature.
9. *Ryan*, film, directed by Chris Landreth (Canada: Copperheart Entertainment, 2004).
10. *Persepolis*, film, directed by Marjane Satrapi and Vincent Paronnaud (France and Iran: Celluloid Dreams, CNC, France 3 Cinéma, The Kennedy/Marshall Company and Région Ile-de-France, 2007).
11. *Chicago 10*, film, directed by Brett Morgan (USA: Consolidated Documentaries, Participant Productions, River Road Entertainment and Curious Pictures, 2007).
12. This is not to say that animated documentaries do not have an earlier history, they do. However, in a wider cultural sense, the rise in mainstream attention that animated documentaries received after *Waltz with Bashir* was unprecedented. See for example, Scott, 'Inside a Veteran's Nightmare'.
13. See Balsom and Peleg, *Documentary across Disciplines*.
14. In attempting to offer a critical overview of an emerging and increasingly complex field, it is useful to begin by considering how definitions of animated documentary have changed and shifted. For more on attempts at definitions see Skoller, 'Introduction to Special Issue', p. 208.
15. Sofian, 'Truth in Pictures'.
16. It is important to clarify that I am not discussing techniques such as cel animation or experimental film whereby the relationship between the photographic

aspect and the capture of physical referents may vary. Instead I refer to the manner in which photography was used in the more traditional sense within documentary contexts as a counterpart to the recent rise of non-photorealistic animation as documentary imagery.

17. For more information see Honess Roe, *Animated Documentary*; Morag, *Waltzing with Bashir*; Stewart, 'Screen Memory'; Peaslee, 'It's Fine as Long as You Draw'; Murray, 'Waltz with Bashir'; Landesman and Bendor, 'Animated Recollection'; Stav, 'Nakba and Holocaust'; Ten Brink, 'Animating Trauma'; Land, 'Animating the Other Side'; Kraemer, '*Waltz with Bashir* (2008)'; Bolaki, 'Animated Documentary'.
18. *Tower*, film, directed by Keith Maitland (USA: Go-Valley and ITVS, 2016).
19. This may explain the use of the film *Waltz with Bashir* as part of a training program of Natal, Israel's Trauma Centre for Victims of Terror and War. Therapists specialising in war trauma watch the film to better understand their patients' experiences and use it as part of their treatment. See Schäuble, 'All Filmmaking', p. 211.
20. Ebiri, 'Keith Maitland'.
21. The longstanding assumption that animation must stand in complicated relation to documentary stems from a persistent bias associating animation with fantasy and humour, due to the worldwide dominance of American commercial animation. See Strøm, 'Animated Documentary', p. 48.
22. Lind and Steyerl, *Greenroom*, 12.
23. See, for example, Lind and Steyerl, *Greenroom*; Cramerotti, *Aesthetic Journalism*.
24. See Bruckner *et al.*, *Global Animation Theory*.
25. This research examines a broad range of visual material from around the world, including North America, Australia, Europe, Asia and the Middle East, and looks at examples from the fields of art, film, gaming, scientific visualisation and news coverage. Although I aim to introduce a corpus of relevant works, this is not intended as a geographically comprehensive review or an attempt to form a 'typology' of contemporary animated documentaries. The examples chosen illustrate specific points of my argument about animation's changing role in today's visual culture and its ramifications in the field of documentary.
26. For more information on animation's ability to create memorable and captivating depictions see Ostherr, *Medical Visions*, p. 35.
27. *Inside Out*, film, directed by Pete Docter (USA: Walt Disney and Pixar, 2015).
28. Judd, 'A Conversation'.
29. *Ralph Breaks the Internet*, film, directed by Rich Moore and Phil Johnston (USA: Walt Disney, 2018).
30. *Snow White and the Seven Dwarfs*, film, directed by David Hand (USA: Walt Disney, 1937).
31. *Mary Poppins*, film, directed by Robert Stevenson (USA: Walt Disney, 1964).
32. *The Water Babies*, film, directed by Lionel Jeffries (UK and Poland: Ariadne Films and Studio Minitaur Filmowych, 1978).
33. Buchan, *Pervasive Animation*.

34. *Avatar*, film, directed by James Cameron (USA: Lightstorm Entertainment, Dune Entertainment and Ingenious Film Partners, 2009).
35. GPS stands for Global Positioning System, a satellite-based navigation system.
36. This raises the murky issue of 'non-fiction', and points in turn to the blurred boundaries between documentaries, journalistic, informational, educational, and even propaganda works. Although the terms 'fiction' and 'non-fiction' are usually associated with literature, in this study 'non-fiction' refers to an expansion of the documentary field to include other disciplines that engage with factual content and its varied visual representations, such as journalism, serious games, data and scientific visualisations. For more on contemporary documentary practices that reach across media and disciplines see Erika Balsom and Hila Peleg, *Documentary across Disciplines*.
37. See Warburton, 'Goodbye Uncanny Valley'.
38. *Seven Wise Dwarfs*, film, directed by Richard Lyford (Canada: Walt Disney, 1941).
39. *Watership Down*, film, directed by Martin Rosen (UK: Nepenthe Productions, 1978).
40. Clearly, animated documentaries have an earlier history, as described by Annabelle Honess Roe in her excellent book *Animated Documentary*, but the recent rise of the sub-genre and the current technocultural setting shed new light on the use of animation in non-fiction contexts.
41. Vaughan, *For Documentary*, pp. 84–5.
42. For more on these debates see Paul Wells (*Basics Animation*, p. 12); Lev Manovich (*Language of New Media*, p. 295; *Software Takes Command*. p. 294); Alan Cholodenko ('"First Principles" of Animation', p. 99); Tom Gunning (2014: 37–53).
43. This is not to say that reality is always solely physical. Chapter 1 deals with aspects of this discourse although it is a vast ontological-philosophical realm of research that is beyond the scope of this study. Nonetheless, in a culture mediated by screens where interactivity is possible, the role of the physical and one's physical surroundings constitute one sphere of action among many, as discussed in Chapters 3–4.
44. *The Sinking of the Lusitania*, film, directed by Winsor McCay (USA: Jewel Productions, 1918).
45. *Molotov Alva and His Search for the Creator*, film, directed by Douglas Gayeton (USA: Submarine Channel and VPRO, 2007).
46. In 1997, Paul Wells outlined four modes of categorisation for animated documentaries and their relationship to reality: the 'imitative mode', the 'subjective mode', the 'fantastic mode' and the 'post-modern mode'. See Wells, 'Beautiful Village and True Village'. In 2004, Eric Patrick proposed four different categories of animated documentaries' capacity for storytelling: The 'illustrative structure' depicts 'events based on historical or personal evidence'. The 'narrated structure' uses a script and voiceover to narrativise the events represented. The 'sound-based structure' also relies on an aural link to the depicted reality but, unlike the narrated structure, uses found or unmanipulated sound recordings as a basis for representation. The 'extended structure', in line with Wells's

postmodern approach, emphasises subjectivity, the symbolic, the surreal and metaphoric in order to consider traditional storytelling techniques in animated documentaries, expanding the epistemological possibilities through creative approaches. See Patrick, 'Representing Reality'. In 2011, Honess Roe proposed three key functions of animated documentaries: Mimetic and Non-mimetic Substitution, and the Interpretive Function. See Honess Roe, 'Absence, Excess and Epistemological Expansion', p. 215. For more information on categorisations of animated documentary see Honess Roe, *Animated Documentary*. Whereas these theorisations demonstrate animated documentary's varied relation to the reality it depicts, the emphasis in this book is on the technocultural context of this question that sheds new light on the topic.

47. Rowley, 'Life Reproduced in Drawings', pp. 70–1.
48. *Snack and Drink*, film, directed by Bob Sabiston (USA: Flat Black Films, 1999).
49. *An Eyeful of Sound*, film, directed by Samantha Moore (Canada, Netherlands and UK: Sapiens Productions, 2010).
50. *Last Day of Freedom*, film, directed by Dee Hibbert-Jones and Nomi Talisman (USA: Living Condition, 2015).
51. *Samouni Road*, film, directed by Stefano Savona (France and Italy: Dugong Production, Picofilms and Alter Ego Production, 2018).
52. *It's Like That*, film, directed by SLAG (Australia: SLAG, 2003).
53. *1000 Voices*, film, directed by Tim Travers Hawkins (UK: Ctrl.Alt.Shift, 2010).
54. It is important to mention Otto Alder, program curator of international animation festivals and director of the animation programme from 1993 to 2007at the Leipzig Festival, where he established the animated documentary (Animadoc) section. For more information on film festivals that spearheaded the inclusion of animated documentaries in their repertoire, see Strøm, 'Animated Documentary', p. 48.
55. Earlier research on the topic, between the years 1997 and 2005, includes (in chronological order): Wells, 'Beautiful Village and True Village'; DelGaudio, 'If Truth Be Told'; Renov, 'Animation: Documentary's Imaginary Signifier'; Strøm, 'Animated Documentary'; Patrick, 'Representing Reality'; Ward, *Documentary*.
56. A partial list of these would include the following. In 2011, Suzanne Buchan and Jeffrey Skoller edited a special issue of *Animation: An Interdisciplinary Journal* dedicated to animated documentary. Also in 2011, the first conference on animated documentary, 'Animated Realities' (a collaboration between the University of Edinburgh, Edinburgh College of Art and the Edinburgh International Film Festival) was organised by Jonathan Murray and myself in Edinburgh, including presentations by over forty international speakers. In 2012, filmmakers Alys Scott-Hawkins and Ellie Land set up the regularly updated Animated Documentary blog (www.animateddocumentary.com, accessed 4 August 2020) about the production and research of the sub-genre. In 2013, Annabelle Honess Roe published the first scholarly monograph on the topic of animated documentaries. In 2016, the *International Journal of Film and Media Arts* was launched with a special issue dedicated to animated documentary and the Society for Animation

Studies blog also focused on the topic. In 2016 and 2017, the Royal College of Art in London hosted 'Ecstatic Truth', a symposium on animated documentary. The first anthology of essays on the topic, *Drawn from Life*, edited by Jonathan Murray and myself, was published by Edinburgh University Press in 2018.

57. Wells, 'Beautiful Village and True Village'; DelGaudio, 'If Truth Be Told'; Strøm, 'Animated Documentary'; Patrick, 'Representing Reality'; Honess Roe, *Animated Documentary*; Mihailova, 'Before Sound, There Was Soul'.
58. Annabelle Honess Roe describes how animation is used to represent subjective experiences and memories, for example, and Lilly Husbands explains animation as a means of representing otherwise un-photographable science. See Honess Roe, *Animated Documentary*; Husbands, 'Meta-physics of Data'. It is also important to note that varied representational devices, such as writing, painting and drawing, can also depict what is unrepresentable in photography. However, the uniqueness of animation is movement, which bestows a sense of 'life' and a form of realism to the representation. This topic will be further developed in Chapters 1, and 4–6.
59. This research thus refers to the technologised world and digital cultures available to those with access to lithium-based internet technology. The fact that billions of individuals around the globe still have no access to these technologies only accentuates the potential schism that may develop between those with and those without such technology, based on the changes I claim are developing in ways of perceiving, believing and conceptualising realities through changes in visual information. This topic also raises additional environmental, economic, political and cultural issues associated with global capitalism – issues that are crucially important but beyond the scope of this project.