1. Introduction

The analysis of documentary film and television has been problematized in a number of ways in recent decades. The production environment has changed dramatically, for instance, with on the one hand an explosion in the spaces for documentaries to be screened and viewed around the world on dedicated channels, but on the other an increased exposure of documentary to the pressures of commercial screen production, competition for audiences, and concentration of production into the hands of a small number of companies with concomitant impacts on what kinds of documentaries can be made. Related to this, new genres have challenged the status and position of documentary as a primary site of factual screen content and increasingly hybridised formats have appeared blending elements of documentary with genres such as reality television, game shows, and even soap operas, into new types of factual entertainment (see Kilborn 2003 for a discussion). Criticisms of these developments have come from all quarters. Documentary makers complain about commercial imperatives and the need for spectacle to attract audiences undermining quality and standards in factual screen content production (Palfreman 2002; Ellis 2005; Byrne 2007). Paralleling these problems, and perhaps a reflection on them, scholarship has developed in ways which have fundamentally challenged documentary’s “claims to the real” (Winston 1995), with particular strands of documentary research rejecting outright even the possibility of the documentary project, as in Trinh T. Minh-Ha’s oft-cited claim “there is no such thing as documentary” (Minh-Ha 1993: 90).

One distinctive contemporary development that further complicates the discussion and analysis of factual screen content has been the trend for an increasing use of Computer Generated
Imagery (CGI) in documentary and factual entertainment. Whilst CGI had been utilised before in documentaries, alongside conventional drawn imagery and animation, the production of *Walking With Dinosaurs* (UK, 1999) by the BBC represented a seminal moment in the potential for the use of CGI in factual entertainment. By placing CGI as the central visual component of its representation of dinosaurs the series took a significant risk with the technology but its reception by audiences, breaking records for factual programme viewing in Britain, showed CGI was not only not a barrier to audiences, but a potential means of attracting them. The proliferation of programmes utilising CGI since can be directly linked to the new commercial environment, in its capacity “to expand the scope of documentary representation and to make it more visually seductive, raising the bar in terms of primetime documentary spectacle” (Hight 2008: 22). The use of CGI is also of analytical interest, as it is possible to consider the extent to which CGI “has the capacity to enhance and extend [...] the epistemological potentiality of the documentary form” (Honess Roe 2011: 225). This chapter is concerned with the analytical challenges posed by documentary and factual entertainment programmes that utilise CGI extensively. Specifically it is concerned with how such texts relate (if at all) to traditional analytical approaches to understanding documentary and factual entertainment, and what analytical approaches are needed to understand and interpret the variety of uses of CGI in such programmes.

In order to focus the discussion the chapter concentrates on programmes concerning scientific subjects. A focus on scientific topics foregrounds the intrinsic questions surrounding the documentary project, and its claims to the real, which have often been equated with scientific goals. The tensions between scientific documentaries, often seen as the most conservative of documentary forms with their emphasis on authoritative exposition of scientific knowledge, and the use of techniques considered by many to be antithetical to documentary’s potential claims to the real, serve as a clear point of analytical interest. For instance, natural history programmes are widely heralded as exemplars in public discourses around television quality [1] whilst at the same being
critiqued by scholars as not documentaries (Bousé, 2003) and as not proper science programmes (Jeffries 2003), issues which will be returned to later in the chapter.

Science documentary and factual entertainment programmes have also been the main type of factual programmes that have begun to utilise CGI extensively over the last decade or so. Just as Walking With Dinosaurs made evident, the potential for CGI to be used to visualise subjects in ways impossible for conventional photography to capture is of particular potential benefit to scientific topics where the core subject matter, or elements of the subject matter (such as dinosaurs in “life”), may be of this kind, and thus it is not surprising to have seen a whole plethora of scientific programmes appearing that use CGI. As well as paleontological topics, scientific disciplines such as archaeology, medical and forensic sciences, geological and meteorological sciences, and astronomy have all seen CGI increasingly utilised in documentaries and factual entertainment programmes. Examples of some of these will be discussed in this chapter.

In routinely depicting impossible pictures — whether it be extinct animals in motion, galaxies in deep space, or biological processes in human cells — scientific programmes offer a particularly significant challenge to making sense of the images that are produced. Whilst models for attempting to understand the use of animation in general and computer animation in particular in documentary have been developed, these have tended to focus on trying to relate CGI and animation to established notions of how conventional documentaries attempt to construct their claims to the real. In other words the focus has been on how to relate the CGI to representational modes either exclusively within documentary, or on occasion in relation to other modes of visual information design (Hight 2008). What these approaches don’t do however, is to consider whether there are other representational traditions that might be having an identifiable influence on the construction, positioning and framing of CGI within these programmes. These might include the representational traditions within particular sciences themselves, and how they have traditionally converted their subject-specialist knowledge for wider public consumption. Additionally, these
might also include the representational traditions within the particular subcategory of documentary/factual programmes that the programme occurs within. Finally, these might include the representational traditions of other genres in which the subject matter regularly appears and/or which are explicitly being drawn on by the programmes. In order to make sense of CGI and the factual programmes that contain it, all of these elements need to be included in the analysis as this chapter will show through a consideration of a number of distinctive scientific topics and their treatment in a variety of documentaries and factual entertainment programmes that utilise CGI. Before discussing the use of CGI in specific documentaries and factual entertainment programmes, the chapter will begin by exploring the relationship between documentary, animation and CGI.

2. Documentary, Animation and CGI

The tensions over the boundaries of the category of documentary, and more fundamental claims to the real of “factual” film and television programmes, are particularly well illustrated by attempts to make sense of the use of animation in documentary. Despite animation featuring in documentary throughout film and television history, scholarly attention on its use is relatively recent (e.g. DelGaudio 1997; Wells 1997; Strøm 2003; Hight 2008; Bordwell 2009; Honess Roe 2011). One immediate issue for scholars addressing the use of animation in documentary, and entirely (or predominantly) animated documentaries, has been a perceived need to validate the labelling of such material as documentary. For instance, Ward says that the problem with doing this is “that there is a tendency to view documentary as a mode of discourse that will not allow such subjective, expressive aspects as we associate with [...] animation” (Ward 2005: 82). More fundamentally, DelGaudio notes that since “an animated film “exists” only when it is projected — there is no pre-existing reality, no pro-filmic event captured in its occurrence — its classification as documentary can be problematic” (DelGaudio 1997: 190). Honess Roe states:
The authenticity of a documentary and the power of its claim to be such a type of film are deeply linked to notions of realism and the idea that documentary images bear evidence of events that actually happened, by virtue of the indexical relationship between image and reality. (Honess Roe 2011: 216)

This notion of *indexicality* is a core requirement of documentary, and whilst traditional animation might be problematic in terms of its fit with this definition (Honess Roe 2011: 216), the use of CGI more intrinsically challenges the centrality of indexicality. Indexicality:

[...] relies on the capacity of the photographic image, and of sound recording, to replicate what we take to be distinctive qualities of what they have recorded. That this is an *assumption* [...] becomes increasingly clear as we bear in mind the ability of digitally produced sounds and images to achieve a similar effect: the sound we hear and the image we behold seem to bear the trace of what produced them. (Nichols 2001: 35, original emphasis)

Bordwell’s discussion of the problem of animation in documentary links indexicality to a second possible assumption of the documentary viewer that events depicted are “unstaged by the filmmaker” and that given “these two intuitions, unstaged events and direct recording of them, it would seem impossible to consider an animated film as a documentary” (Bordwell 2009). However, he argues that neither of these are necessary conditions for the classification of a text as a documentary, given that the use of scripted scenes and graphics are routinely used in texts “presented and labelled as documentaries” (Bordwell 2009). He argues that if “we see documentary films as tacitly *asserting* a state of affairs to be factual, we can see that no particular sort of images guarantees a film to be a doc” (Bordwell 2009, emphasis mine).

Strøm goes further arguing for a shift from simplistic notions of photographic/documentary *truth* to notions of *trust*, in that whilst it may no longer be “possible to believe in photography as a
guarantee for truth” given the inherent manipulation of all images in documentary texts, “that does not mean we cannot trust the photography” rather it is “the context it is presented in and the credibility of the medium that presents it” which is more important (Strøm 2003: 54). Similarly Nichols asserts that it is the expectations raised through the documentary that what will be depicted is a “discourse of sobriety” (another being science) where viewers “expect to learn or be moved, to discover or be persuaded of possibilities that pertain to the historical world” (Nichols 2001: 39).

The very label of “documentary” arguably carries a level of cultural and intellectual credibility that other genres of media content do not to the point where it is not only producers who clearly want to associate their texts with documentary (to elicit audience trust) but also scholars in trying to incorporate animated works into documentary analysis approaches, for instance attempting to position them within or in relation to Nichols’ model of documentary “modes” [2]. Nichols’ modes have been reformulated over time but remain a paradigmatic focus of much documentary scholarship due to their versatility in encompassing the variety of techniques that have emerged in documentary (see Nichols 2001). An evident problem here is that “there seems to be a tendency to “squeeze” [a text] into a frame of reference in order to validate it, that is to say that if we manage to fit an animated film into one of Nichols’ categories we have, so to speak, proven that it is a documentary” (Rozenkrantz 2011). This problem is evident in the lack of consensus over which modes documentary animation belongs in, with claims that animation sits in the “reflexive” mode (DelGaudio 1997: 193), the “performativie” mode (Strøm 2003: 52), and the “interactive” (or participatory) mode (Ward 2005: 95). Interestingly none of these attempts to fit animation into Nichols’ modes centre on its usage in the “expository” mode, even when they acknowledge the potential for its usage as such (e.g. Strøm 2003: 53; Ward 2005: 86). Yet, as the discussion below will show, the use of CGI for exposition alongside and in combination with other modes is a prevalent feature of contemporary science documentaries and factual entertainment programmes.
Another approach has been to try to develop a set of distinctive modes within animated documentary (Wells 1997). Wells’ model reflects a scholarly emphasis on the subjective and expressive uses of animation at the expense of nuanced uses of animation for exposition, with three of his four modes, the “subjective”, the “fantastic” and the “postmodern” being closely overlapping modes focused on aesthetic experimentation, expression of inner states, surrealism and other exotic uses of animation (Wells 1997: 43-5). Only the first mode, the “imitative” is concerned with use of animation in ways that “conform to “naturalist” representation and use the generic conventions of some documentary forms” (Wells 1997: 41). Honess Roe suggests, particularly with the inclusion of a postmodern mode, that Wells’ modes reflect a “trend in scepticism regarding the documentary project” contemporary to Wells’ development of his modes (Honess Roe 2011: 225). Here the lack of interest in or attention to animation for exposition can be related to some scholars’ rejection of the capability of even “conventional documentary representation (as in, live action) to access or show reality” (Honess Roe 2011: 225) let alone animation.

Honess Roe rejects this position, proposing that animation in documentary can be more usefully analysed in terms of its functions within particular documentaries, and suggests these manifest themselves “in three key ways: mimetic substitution, non-mimetic substitution, and evocation” (Honess Roe 2011: 225). Mimetic substitution is where “animation illustrates something that would be very hard, or impossible, to show with the conventional live-action alternative and often it is directly standing in for live-action footage” (Honess Roe 2011: 226). In effect this is a use of animation akin to the documentary technique of using dramatic reconstructions where footage is not, or could not be, available, and where the animation is “made to closely resemble reality, or rather, the look of a live action recording of reality” (Honess Roe 2011: 226). A seminal example of this would be the series *Walking With Dinosaurs* which included scenes such as having the cameraman “hide” behind trees to avoid the gaze of the computer-generated dinosaurs and having a T.Rex “spit” on the camera “lens” (Honess Roe 2011: 226). Honess Roe’s other functions relate to the use of animation in ways which explicitly do not attempt verisimilitude but instead offer visual
interpretations of other elements in the content, with “non-mimetic substitution” relating to visuals tied to specific documentary elements such as using images of animals linked to interviewees’ voices, and “evocation” referring more to visualisation of individuals’ subjective experiences (Honess Roe 2011: 226-7). Although developing the focus to acknowledge that “animation is not used in the same way in all animated documentaries” (Honess Roe 2011: 225), Honess Roe’s functions betray a predisposition against thorough scrutiny of mimetic modes of representation, and a far greater interest in aesthetic experimentation and expression (i.e. the non-mimetic and evocative). Honess Roe does not elaborate on issues relating to which specific representational tropes are being reproduced in any given mimetic substitution, for instance, and as the discussion in this chapter will indicate this is a crucial additional factor to incorporate into analytical frameworks for this type of content. What counts as a mimetic image depends on the specific representational tradition images are being presented within, and is not necessarily simply equitable with documentary live action footage, particularly given that some things that are being visualised in science programmes are beyond the capacity of humans to visually witness “live” in an unmediated fashion, as is evident from the use of time-lapse, high-speed, infra-red and night vision cameras for instance. These visual techniques are sometimes reproduced in CGI in some of these programmes as well, blurring the potential for identifying clear boundaries between mimetic, non-mimetic and evocative functions of CGI further still.

The final approach considered here attempting to codify animation in documentary focuses specifically on digital animation (Hight 2008). Hight’s model whilst in some ways usefully overlapping with models previously discussed, adds additional elements taking the development of analytical frameworks for such programmes somewhat further. Hight makes an important distinction between computer mediated images, and computer generated images as illustrative of a continuum along which computer animation techniques may be utilised (Hight 2008: 13). At one end of the continuum, computer mediated images are “elements of the indexical and photographic [placed] within animation and morphing sequences during post-production” (Hight 2008: 13). This
might consist of, for instance, compositing of text captions over live action footage or manipulation of live action footage to highlight particular components of the image or sound (e.g. the speed, colour/sound balance or focus might be altered to direct the viewers’ attention to particular elements within the image). Many of the traditional techniques of documentary montage are now done using computers, and have been augmented by sophisticated (and largely invisible to the viewer) computer mediation techniques, such as compositing. At the other end of the continuum are entirely computer generated images where key components in an image have been created within the computer (Hight 2008: 13) such as the dinosaurs in Walking With Dinosaurs (and which may be much more obvious to the viewer).

Crucially, Hight recognises that the use of computer imagery from mediation to generation intersects with a “discursive continuum within animation more generally, that between photorealism and the exploration of purely symbolic or abstract forms” (Hight 2008: 13). This second continuum extends from “symbolism” at one end, focusing on “iconic and metaphoric forms of representation” (Hight 2008: 13) to “photorealism” at the other end with a goal of making the images otherwise indistinguishable from conventional documentary live action footage. Hight notes how this goal focuses on achieving photorealism, that is “replicating cinematography rather than human perception and experience of reality itself” (Hight 2008: 13). In the discussion of the programmes analysed in this chapter the “inherent tension” (Hight 2008: 13) between documentary claims to the real and representational conventions of how claims to the real are made in documentary are shown to be particularly foregrounded by science programmes where imagery is a product of negotiation between the competing narratives and representational traditions of documentary (and factual entertainment) as well as those of the sciences covered.

Hight utilises this schematic approach to identify three key modes evident in the use of digital animation. The first is called the “symbolic expositional” mode and refers to the use of informational graphics and animations [...] and “simplistic three-dimensional modular
reconstructions of events” (Hight 2008: 14). The value of this analytical category is that such imagery does not involve the imitation of or mimetic substitution for live action footage but is fundamentally expository in terms of intent and design, and reflects long-used conventions in certain types of documentary. As Hight notes, in historical documentaries for instance, the “animated map” has become a convention used to the point of cliché” (Hight 2008: 14), and the use of diagrams and graphs is widespread in science documentaries (such as the contentious “hockey stick” graph in programmes about global warming). Being widely recognised tools for the simplified conveying of sometimes “complex natural and social phenomena” (Hight 2008: 14) beyond documentary, their use has always been part of the evidential claims to the real made by documentary. Digital animation techniques provide far greater scope, however, for both variation in the visual design and display of such information, and its incorporation into other elements of the documentary image, such as superimposing a computer generated map onto live action footage of a location (a common technique in archaeological documentaries, for instance).

The second mode Hight identifies is called the “graphic verité” mode (Hight, 2008: 17) whereby digital animation is utilised in photorealistic dramatic reconstructions. Here, just as with conventional dramatic reconstructions in documentary, events are created in the absence of, or impossibility of acquiring, live action footage but with the aim of invoking the indexicality of live action footage. Hight notes a paradox here in such programmes appearing to both want to invoke the claims to the real of the representational strategies being so painstakingly reproduced through using this mode, whilst at the same time often being promoted and marketed in a way that foregrounds their artifice and constructed nature (Hight 2008: 18-19; see also Scott and White 2003).

The third mode Hight identifies is called the “invasive surveillance” mode, and refers to the addition of digital animation techniques to existing technologies that “extend the range and penetration of the documentary lens”’ (Hight 2008: 19). Existing techniques that might be
augmented (or reconstructed) by computer imagery include “special effects such as time-lapse photography, time-slice photography and motion-control photography within primetime nature documentary, the use of surveillance tools within investigative reporting” and also the variety of techniques that extend surveillance “into the interior of the human body” (Hight 2008: 19) such as x-rays, endoscopes, MRI scanners etc. Hight considers this as a kind of “penetrative voyeurism” which utilises “an intimacy mediated through the comforting sterility of digital technologies, perfectly matching the dispassionate penetration of the gaze of medical science itself” (Hight 2008: 21) [3].

These three modes may be used discretely or in combination, and the interplay of these approaches provides important opportunities for critical analysis in terms of how and where these techniques are utilised, whether they are used in different ways across different types of programmes, and in this case across different sciences. As indicated earlier, however, once we begin to look at specific examples, it is possible to see how these approaches need to incorporate the additional representational traditions that contribute to the way CGI is used and incorporated into documentary and factual entertainment, in order to identify and make sense of differences between sub—categories of programmes, and individual programmes. To illustrate this, the chapter now discusses three examples in three distinctive areas of science, placing a consideration of each example’s use of CGI in the context of documentary conventions, external generic influences, and representational traditions of the sciences on display.

3. Planet Dinosaur

*Planet Dinosaur* (UK, 2011), a six part primetime series, is a recent and typical example of the “extinct animal show” (Campbell 2009) sub-category of programmes that have proliferated in the decade or so since the success of *Walking With Dinosaurs*. A defining characteristic of extinct animal shows is the use of extended sequences of photorealistic CGI depicting extinct animals as if
captured by live location filming. Like its precursor *Walking With Dinosaurs*, *Planet Dinosaur* is predominantly presented in its overall style like a “blue chip” natural history documentary, “programmes devoted to observing “spectacular” animal behaviour displayed within “timeless” natural habitats and all relatively “untainted” by human intervention, whether presenters in front of the camera, producers or animal trainers behind them, or humans interacting with, or on, the “pristine” animal habitats depicted” (Cottle 2004: 83). Typical examples of these in conventional natural history programmes are the BBC programmes presented by David Attenborough, such as the contemporaneous *Frozen Planet* (UK, 2011), and these types of programmes carry with them a high level of authority with audiences (Jeffries 2003: 527). As mentioned earlier, blue chip natural history programmes are not an unproblematic category though, having been widely criticised in scholarship of natural history on screen for presenting a largely “romantic image of the natural world” (Jeffries 2003: 543), and offering “period piece” fantasies that leave out the people and politics that contribute to how the natural world is, in favour of a concentration on the spectacle of the animals and landscapes on display (Bousé 2000: 14–5). *Planet Dinosaur* thus attempts to frame its CGI depictions of extinct animals within a particular representational style of natural history films that have high audience appeal and trust, even though that category is highly contested in terms of its claims to the real.

*Planet Dinosaur* also uses the trope from *Walking With Dinosaurs* of breath and fluids from the dinosaurs appearing to hit the lens of the camera (for a discussion of this in *Walking With Dinosaurs* see Scott and White 2003), and in this case specks of blood from a carnivore’s kill not only hit the lens but are morphed into the programme’s logo on the title screen of each episode, making it a signature trope of this series (Figure 1). Other programmes have taken this conceit of presence further, for instance by placing an on-screen “time-travelling” presenter shown supposedly interacting with extinct animals, and in the series *Prehistoric Park* (UK, 2006) even having people bring extinct animals back to the present day. Such conceits themselves relate to a distinct category of natural history programmes with on-screen explorers like Jacques Cousteau and Steve Irwin, but
both these and the use of blood on the lens type shots are invoking a particular trope of natural history films. The trope asserts a notion of authenticity or authority through the proximity of the filmmaker to the subject exemplified by the close-up, though this has been criticised as a kind of ‘false intimacy’ in natural history films (Bousé 2003) eliding the degree of construction and artifice evident in natural history film narratives that would be seen as unethical or problematic were the subjects human rather than animals (for a detailed critique see Bousé 2000: 20-28). In Frozen Planet, for instance, the revelation that a sequence of a polar bear mother giving birth to cubs in a den were shot in a zoo, rather than in the wild as the original sequence implied, drew some significant public criticism (Singh 2011). So, even though the use of blood on the lens shots foregrounds the artifice of CGI extinct animal shows (the animal, the blood and the lens all being computer generated) what is being reconstructed is this illusion of intimacy, the conceit of allowing viewers to see animals “from stroking distance” (Bousé 2003: 124) widespread in natural history films.

Figure 1: Blood on the Lens in Planet Dinosaur
An area of criticism and controversy in extinct animal shows in paleontological terms has been the veracity of the CGI reconstructions on display. This raises underlying questions about the relationship between these programmes and the representational tradition within palaeontology, paleoimagery, and in the specific case of Planet Dinosaur some interesting issues relating to the other aspect of its use of CGI. The paleontological questions such programmes raise relate to two levels of representational choices — choices of how periods of prehistory and their animals have been selected, and on a more immediate level choices relating to the specific ways in which extinct animals have been represented. In terms of the more immediate level, critics have questioned the representation of extinct animals filmed in life involving the incorporation of speculation, such as the sounds, colours, and behaviours of animals. Walking With Dinosaurs was particularly criticised in this sense with concerns that there were no attempts to explain or validate the decisions made behind the representations made within the programmes (see Campbell 2009 for a discussion). A separate “making of” programme was produced, and there was a similar supporting programme made for Planet Dinosaur (called How to Build a Dinosaur) but where this more recent series differed from its predecessor is that it includes clear sequences designed to address the veracity of the photorealistic CGI sequences presented. Unlike some other extinct animal shows that broke up the CGI sequences with presenters or experts explaining the science behind the depictions, Planet Dinosaur uses a different strategy. Retaining the voice-of-god narration (from actor John Hurt) photorealistic CGI sequences are followed by explanatory sequences using computer generated and mediated imagery clearly in a symbolic expositional mode (Figure 2). Photographic images of fossilised bones are depicted as if on a computer-screen’s window display, augmented with text, graphs, and other imagery as the narration explains the evidence behind the depictions just witnessed. The change in the type of imagery here is interesting, in showing a clear shift from asserting the validity of the depictions of dinosaur behaviour through reproducing natural history film styles, to using scientific display techniques when the goal is validating the scientific basis of those depictions.
A final point is worth making about the representational choices made in a programme like *Planet Dinosaur*. Analysis across extinct animal shows has found that they exhibit clear patterns in their representation of periods of prehistory that reflect the representational traditions of paleoimagery, the specific practice of reconstruction of extinct animals based on the available scientific knowledge of the day (Campbell 2009). *Planet Dinosaur* conforms to several of these identifiable paleoimagery frames (see Campbell 2009 for a detailed discussion). For instance, these programmes (much like blue chip natural history in general) have a tendency to focus on *megafauna* — the largest and most exotic animals — but the predominance of megafauna is largely unquestioningly accepted by audiences and critics. Even when parallels between extinct animal shows and fiction films like *Jurassic Park* (USA, 1993) have been made, it has been the shared use of CGI rather than the shared focus on megafauna that has drawn commentary and critique. *Planet Dinosaur* begins with a programme about two dinosaur predators bigger than *T.Rex* and references to this and other — presumed to be already familiar — dinosaurs, like *Diplodocus* and *Allosaurus*, are made throughout the series. These assumptions of knowledge on the part of the audience are overt.
examples of ingrained paleoimagery frames in producers, content, and audiences. Other paleoimagery frames are also present in *Planet Dinosaur*, such as a particular focus on species illustrating evolutionary change, with a whole episode on feathered dinosaurs, and throughout the series there’s an evident focus on extinction, with animals reconstructed often only to show their demise at the end of episodes as their environment changes pushing them to extinction. In terms of the use of CGI, the point here is that the choices that have been made in terms of what and how to reconstruct extinct animals through CGI have also been shaped by representational traditions within paleoimagery that stretch over time, across different types of media (art, sculpture, film) and different types of content (scientific illustration, fiction film, factual entertainment television).

4. Perfect Disasters

Another prominent sub-category of documentary and factual entertainment programmes to have begun to use CGI extensively involves the depiction of extreme weather and disasters relating to natural hazards. Unlike natural history programmes, however, trends in factual programmes on weather and natural hazards (earthquakes, volcanoes etc.) have generally met with some significant public criticism, even as audiences respond favourably to them. Television critics have derogatively dubbed many of these programmes “weather porn” (Boddy 2000). Series such as *Stormchasers* (USA, 2009-2012) which follows tornado hunters in the USA, or the *Witness* series of programmes from National Geographic which uses minimal captioning/narration over visual imagery entirely captured by amateurs caught up in the midst of disasters, are criticised for placing the emphasis increasingly on the voyeuristic spectacle of extreme weather and natural disaster footage, rather than attempting to contextualise and explain either the sciences behind such events, or their socio-economic and cultural consequences.

CGI has provided film-makers with the opportunity to extend the scope of depicting extreme weather events and natural disasters beyond the timeframe of the history of filmic and photographic
capture. Alongside extinct animal shows regularly depicting the asteroid strike that wiped out the dinosaurs, a series of programmes have gone back in time to recreate environmental disasters from prehistory all the way back to events such as the creation of the Earth and the Moon (via a massive collision in the early solar system) in series such as Prehistoric Megastorms (USA, 2008) and Catastrophe (UK, 2008). Perfect Disasters (UK/USA, 2006) is an example of a subset of programmes that go in the other direction using CGI to depict hypothetical disasters occurring in the future, and had as one of its promotional taglines “this is not science fiction, this is science prediction”.

Produced by Impossible Pictures, the company that made Walking With Dinosaurs for the BBC, the series’ format consisted of a number of hypothetical near-future scenarios mixing talking head sequences with experts explaining the science behind these scenarios intercut with dramatizations of groups of characters experiencing the events. The six episodes respectively hypothesise a “Super Tornado” hitting Dallas, Texas, a “Solar Storm” affecting New York City, a “Mega Flood” engulfing London, Sydney experiencing a “Firestorm”, Montreal facing an “Ice Storm”, and Hong Kong being buffeted by a “Super Typhoon”.

CGI used in the series relates to all three of Hight’s modes (2008). First, photorealistic CGI is used to depict the natural hazards and their material consequences within the dramatized sequences of the hypothetical events. Second, the expository sequences, via narration and expert talking heads, are accompanied by symbolic expositional schematic CG visualisations, for instance using CG maps to illustrate how a super typhoon might begin, and why Hong Kong might be a likely location to be hit by one. Third, embedded within some of the dramatic sequences are examples of CGI as invasive surveillance. On occasion the dramatic sequences are effectively placed “on pause”, shifting from the narrative exposition of the disaster events to highlight the science of a particular experience, such as sequences where images of actors depicting particular traumas, such as drowning or hypothermia, are replaced with x-ray like schematics of their bodies whilst the narration explains the effects of those difficulties on the human body.
As with *Planet Dinosaur* there appears to be a clear differentiation between the use of CGI for different kinds of claims to the real, with photorealism being used in dramatized sequences where verisimilitude is paramount (Figure 3), and more symbolic and invasive CGI being used for scientific exposition (Figure 4). A fuller explication of the uses of CGI in *Perfect Disasters* requires addressing other contributing factors however. As mentioned above, extreme weather and disaster programmes have been noted, and criticised, for particular aesthetic trends, and the use of speculative dramatizations in *Perfect Disasters*, in part a choice arguably shaped by those trends, additionally brings in the potential influence of dramatic representational traditions, specifically those of the disaster movie. Considering first the representational tropes of weather and disaster programmes one can contrast their development with the natural history film context of *Planet Dinosaur*. In natural history film-making the difficult, effortful and often risky process of capturing imagery is part of such programmes’ specific appeal and the expertise of wildlife camera-people is often explicitly foregrounded in such programmes. “Spit on the lens” in conventional natural history films is a marker of the skill of the cameraperson to have got so close to the animals being filmed. In weather programmes, the notion of validity from a degree of intimacy through presence — imagery captured during the extreme weather event or disaster from “within” the event — is also evident but here the validity is not related to the perceived professionalism or expertise of the cameraperson. In fact, it is arguably quite the reverse, that it is amateur footage captured spontaneously, even accidentally, that entreats a sense of authenticity in weather and disaster programmes. Linked to the relative unpredictability of disaster events, and thus the difficulty in getting professional footage of events as they happen (save news footage, though here it’s more often of the immediate aftermath of events), amateur footage often stands as the only available footage of disasters as they occur (as in the multiple instances of home video footage of the Boxing Day Tsunami). At one level then, the use of dramatized sequences enables *Perfect Disasters* to offer imagery which can reproduce this increasingly dominant visual trope within weather and disaster programmes of disasters “as-they-happen”, even deliberately constructing elements in imitation of the amateur
recording of events such as clunky camera movements and focusing problems, to try and associate the contents with the perceived authenticity such imagery has with audiences.

Figure 3: Disaster as it happens in *Perfect Disasters*

![Figure 3: Disaster as it happens in *Perfect Disasters*](image1)

Figure 4: Symbolic Exposition in *Perfect Disasters*

![Figure 4: Symbolic Exposition in *Perfect Disasters*](image2)
Another element here is the notion of authority of the non-expert witness to events, and whilst this too can be traced to trends in weather documentaries favouring not only amateur footage but also survivor stories as central content, it is arguably also a reflection of wider generic influences on the representation of weather and disaster in documentary and factual entertainment. Like *Walking With Dinosaurs* following in the wake of *Jurassic Park*, CGI disaster documentaries have followed a resurgence of the disaster movie, also linked to the use of CGI in films such as *Twister* (USA, 1996). Disaster movies have a long pedigree and have specific generic conventions (see Keane 2006) that are reproduced quite closely in *Perfect Disasters*’ dramatized sequences. For example, disaster movies are typically focused around a group of protagonists clearly identifiable as heroes (often scientists or specialists like fire-fighters) and villains (often politicians recklessly ignoring the disaster risk), and *Perfect Disasters* does this as well. Heroes are depicted rescuing their families, or escaping the perils of the disasters, for instance, in the episode “Ice Storm” this includes a power engineer driving through a cascading collapse of electricity pylons. Spectacular scenes of mass destruction occur, however, these are reserved for the built environment, with hardly any scenes depicting human deaths (even of the villains), and perhaps the shifts in life-threatening scenes from dramatization to invasive CGI and sober expository discourse are as much a response to the potential problem of not delivering the disaster movie trope of protagonists’ deaths alongside the other tropes of disaster movies, as they are about shifting the focus from spectacular dramatizations to scientific exposition [4].

5. *Crime 360*

The final example to be considered here is the true crime series *Crime 360* (USA, 2008-) which depicts police investigations into criminal (usually murder) cases from initial report to arrest of the prime suspect with the distinctive selling point of using CGI to depict the contribution of crime scene forensics to the investigations. The series draws on two distinctive strands within true crime
documentary and factual entertainment in its overall composition. First, crime shows have been amongst the most prevalent to combine techniques of documentary with reality television formats often taking advantage of the increasing use of routine recording of police work, such as through cameras in police helicopters, cars, interview rooms and booking rooms, allowing the production of series such as *World's Wildest Police Videos* (USA, 1998-2002). Shows like the long running *COPS* (USA, 1989- ) take a different approach through using embedded camera-people producing verité-style live action footage of on-duty officers, though again the appeal of such shows is their presentation of real cops in real police situations. *Crime 360*, like similar series *The First 48* (USA, 2004- ), focuses on murder detectives working specific cases, and uses a predominantly verité style, augmented by scenes with the investigating police officers offering the core exposition of the procedures of the case through unscripted but at least partially staged sequences, such as discussions between the investigating officers about their next line of enquiry, or discussions between the detectives and forensic scientists that offer explanations of procedures like obtaining latent fingerprints through using superglue. It is notable that such programmes invest in a kind of authority, and accompanying visual style, quite distinct from that of either extinct animal shows like *Planet Dinosaur*, or disaster shows like *Perfect Disasters*. Here, claims to authority and authenticity relate to the degree to which the imagery and the narrative that accompanies it are seen to be focalised around or coming from literally the “Authorities”- the exposition coming from the police themselves at the crime scene, in the police station, and on the streets.

Unlike the other two programmes discussed in this chapter, photorealistic CGI is not extensively used with live location footage dominating the content. However, the series’ title relates to a very specific application of photorealistic digital imaging technology used by the crime scene investigative teams that have been appropriated by the programme-makers and included as part of the distinctive appeal of the series. The series specifically follows cases where the crime-scenes are captured using either 3-D laser scanners and/or 360 degree digital cameras. These produce photorealistic images of crime scenes that can be navigated around and are used as part of the
criminal investigation, for instance by comparing a suspect’s account of events with the crime scene imagery, or to consider the possibility of single or multiple suspects being sought. Interestingly there’s no overt reflexivity in this series about tensions over images as evidence, these new tools are treated as merely helpful extensions of existing crime scene imagery (like traditional crime scene photos, suspect mug-shots etc.).

The main use of CGI in the series occurs in relation to the criminal forensics components of the cases. A typical example would be the use of CGI to depict a victim’s body in outline, perhaps with the skeleton on view, showing the trajectory and damage of a bullet or weapon as it entered the body. Like *Perfect Disasters* then, there’s clear evidence of invasive surveillance of the body in this series, although here photographic and film images of dead bodies are not shied away from, and the CGI clearly does function as a form of penetrative voyeurism, rather than as a side-stepping of depictions of the dead as it arguably is in *Perfect Disasters*. These sequences often start with an image from the 360 degree camera or 3-D scanner, or a more conventional crime scene or autopsy photograph, before replacing that image with a wire-frame representation, picking out particular aspects, such as items over a body dumped in a car trunk, in symbolic expositional mode, then moving to further invasive CGI of victims’ bodies. The one other type of CGI evident in the series occurs in episode openings where the original audio of the phone call to police that initiates the investigation is used, and is accompanied by a rotating image of a bright green audio waveform as a background image, a rare instance of a more overtly expressionistic use of CGI amidst otherwise highly expository use of CGI.

The second main strand of true crime reflected in the series relates to its particular focus on criminal forensics. Moreover, the particular use of CGI in this series reflects the complex interplay between factual and fictional screen representations of forensic science. *Crime 360* follows a distinct tradition of documentaries concerned with criminal forensics series such as *The New Detectives* (USA, 1996-2005) and *Forensic Files* (USA, 1996- ). The success of these documentaries in
the late 1990s directly influenced the development of the fictional television series *CSI: Crime Scene Investigation* (USA, 2000-) in which forensic science became the focus of a police procedural drama series, rather than an incidental background component as it had been in earlier crime dramas. Where *CSI*, and a subsequent plethora of rival forensics-oriented police dramas, differ from the factual programmes lays in the presentation of the forensics. *Forensic Files, The New Detectives* and the like, tended to depict the forensics in relatively straightforward documentary fashion, using dramatic reconstructions for scenes from/relating to the crime, crime scene photography and film where available, and talking head interviews with those involved with the case, including the forensic experts explaining their techniques and the outcomes of their investigations in the respective cases. The processes of forensic investigation could be edited into the time frame of a television programme through the focus on completed cases even though it was often acknowledged that investigations took place over many years in some cases, and that some particular types of forensic investigation routinely take weeks and months to complete. *CSI* and its ilk, however, need greater immediacy and a sense of urgency typical of the “race against time” type scenarios of police procedurals, and take significant dramatic licence with the time it takes to conduct forensic investigations, speeding them up using special effects and CGI to make the forensics themselves part of the dramatic and visual spectacle, a typical example being tracing the flight of a bullet into a body and visualising the internal damage done to organs. The impact of the “race against time” investigative format of police dramas has impacted on the style and format of factual series, such as *The First 48*, and one could argue that *Crime 360*’s significant use of CGI to augment the sequences concerning forensic components of investigations is a direct recognition of audiences’ familiarity and enjoyment of *CSI*-type programmes and their depiction of criminal forensics. Here then, symbolic exposition might be the surface goal of much of the CGI here, but it also explicitly makes references to uses of this kind of CGI in popular fiction where the usage is primarily for spectacle and dramatic effect not scientific exposition. *Crime 360* then, gives the audience a visual spectacle of genuine criminal forensics but through what has become a highly
recognisable representational frame of crime drama, not of conventional science documentary. Like CSI, Crime 360 elides the procedures and processes of criminal forensics for narrative impetus and visual drama, even whilst at the same time asserting an expository position through its use of CGI contextualised by its other documentary and factual entertainment representational aspects.

6. Conclusion

Impossible pictures are becoming a routine feature of documentary and factual entertainment programmes through the widespread and multi-faceted usage of CGI. Attempts to make sense of such imagery have concentrated on intrinsic features of the CGI itself and relating these to models of representational modes in documentary. The examples discussed here demonstrate how the use of CGI is in fact influenced by a range of factors beyond conventions within CGI and documentary. First, the subject matter itself brings with it representational conventions shaping the relationship between the use of CGI and claims to the real, investing different levels of credibility and authority in different types of representation, such as reconstructions of dinosaurs in palaeontology or of crime scenes in forensic science, impacting on how CGI is used across different subjects. Second, these inter-relate with the conventions and specific tropes which have developed as markers of authenticity and authority within factual programmes in subject areas, such as the authenticity invested in amateur footage in weather and disaster programmes, and need to be incorporated into analysis. Third, and perhaps with the greatest implications given the trends in factual film and television production, whilst CGI can be used to extend the scope of visual representation in factual programmes, from flying through galaxies to flying through the human body, and reconstructing lost civilisations and extinct animals, the examples discussed here show that programme-makers draw at least as much on the tropes and conventions of fictional genres as they do those of documentary and the subject matter when designing their CGI. Impossible pictures appear, then, not from an unproblematic application of
computer technologies to discrete documentary representational modes, but from a complex
interplay of representational traditions, with the dramatic and narrative conventions of fiction and
factual entertainment having a significant impact, and needing to be incorporated into attempts to
analyse and understand them.
Endnotes

[1] The face of BBC flagship natural history programmes, David Attenborough, was voted most trusted celebrity in Britain in 2006 by Reader’s Digest, for instance.

[2] As Rozenkrantz (2011) has suggested this may be in as much an effort to validate the credibility of the analyses themselves, as much as it is anything to do with validating the notion of animation in/as documentary.

[3] This contrasts with the superficially similar concept of “penetrative animation” (Wells in Ward 2005: 93) referring to the capacity of animation to visualise other types of “internal” states, such as states of mind.

[4] Whether the producers were concerned about scenes of death taking the voyeurism of future disasters too far, or whether this is simply to ensure the widest possible sales through conforming to variations in international broadcasting taste and decency guidelines, is unclear.
Bibliography


Byrne, Ciar 2007 Top film-makers rally to save BBC documentaries. The Independent, 8th September, 11.


DelGaudio, Sybil 1997 If truth be told, can ‘toons tell it? Documentary and animation. Film History 9(2): 189-199.


http://www.telegraph.co.uk/culture/tvandradio/bbc/8950070/Frozen-Planet-BBC-faked-polar-bear-birth.html.

