# Experiments at the Margins: Ethics and Transgression in Cinema Science

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## Abstract

Science is a discipline defined by empiricism and reliable methodologies that result in predictable outcomes. Yet, cutting-edge experiments inevitably involve an element of the unknown, an aspect which science-fiction exploits for dramatic effect. Furthermore, fictional science is freed from the ethical constraints that regulate real-world experimentation and therefore often trangressive. Even as films capitalise on unethical practices and cutting edge scenarios for dramatic and commercial reasons, the origin of the filmmaker and/or place of production may affect a film's content. A film is also obviously subject to legal constraints, according to the country of origin, and classification codes in its place of exhibition. Thus, while the very nature of science fiction may cause it to appear morally unbridled, there are nonetheless multiple inhibitions entrenched in such depictions. By drawing on relevant cinematic examples, including *Prometheus*, *The Hunger Games* and *District 9*, and scientific scenarios on which these films are based, this essay explores how the unpredictable nature of advances in science, in combination with a lack of ethics, foregrounds the dangerous dimensions of science-fiction.

**Keywords** ethics, science, human experimentation, evolution, creationism,

## Introduction

This essay examines the transgressive nature of science in three recent science fiction films, *Prometheus* (Scott, 2012), *The Hunger Games* (Ross, 2012), and *District 9* (Blomkamp, 2009), and considers how fictional science, freed from the ethical constraints that regulate real-world experimentation, impacts such narratives. In itself, science as knowledge does not constitute threat, and its everyday practice ordinarily involves precision, accuracy, repeatability, sensitivity, and specificity. In other words, one can perform proven procedures over and over and always obtain a safe, predictable outcome. Conversely, cutting-edge experiments, which are normally subject to stringent ethical controls, inevitably involve an element of the unknown, an aspect which film constantly exploits for dramatic effect. A sequence in James Whale's *Frankenstein* (1931) epitomises such uncertainty, arising as Frankenstein elevates the monster on an operating table to the roof of his laboratory with the intention of animating it using lightning as the energy source. As the platform descends, a close-up of the monster's hand reveals it slowly beginning to move. The corresponding scene in Kenneth Branagh's version, *Mary Shelley's Frankenstein* (1994), is more impactful because the monster momentarily remains lifeless, before a close-up camera shot reveals its one hand suddenly becoming animated. The alarming movement is accompanied by an ominous thud which alerts the viewer that the monster is indeed 'alive'. The two productions differ in other ways, one of the most significant being that Whale's version focuses on the robotic movement of the monster, with automatism as an influencing theme and electricity as a source of life. Contrastingly, Branagh's monster is corporeal and abject, and there is more emphasis on bodily fluids than electricity. If Whale's adaptation reflected contemporaneous issues of eugenics and criminal atavism, as well as interest in, and experimentation with, the effects of technology, electricity and galvanism, then Branagh's film typifies concurrent scientific preoccupations with assisted reproduction and cloning. In its visual and narrative attention to fluidity and corporeality, it resonates with 1990s' attention to the abject body in visual culture, and illustrates how socio-cultural, as well as scientific contexts inform science fiction. Indeed, the genre's tendency to reflect co-existing scientific discovery is crucial to its continuing development and re-invigoration.

Real-world science, cutting–edge or otherwise, however, becomes dangerous when applied without ethical restraint, and is exemplified by the Manhattan Project,[1] and the Nazi experiments during the Holocaust. Despite the indifference to human suffering in these two atrocities, notions of what it means to be ethical continually change, and legal and cultural revisions therefore continuously inform newly-emerging scientific scenarios. To some extent, changes in legislation pertaining to moral issues depend on both the prevailing political power, as well as the socio-cultural and scientific zeitgeist, aspects which may also influence filmic representations of science. Even as films capitalise on unethical practices and cutting edge scenarios for dramatic and commercial reasons, the origin of the filmmaker and/or place of production may therefore further affect a film's content. A film is also obviously subject to legal constraints, according to the country of origin, and classification codes and censorship in its place of exhibition. Thus, while the very nature of science fiction may cause it to appear morally unbridled, there are nonetheless multiple inhibitions and practices entrenched in such depictions.

The crossover between science and visual culture has attained increasing attention in recent years, leading to important scholarly works in this field (including Allan, 2002; Boon, 2008; Colt et al, 2011; Erickson, 2005; Frayling, 2005; Friedman, 2004; Harper and Moor, 2005; Kirby, 2011; Reagan et al, 2007; Seale, 2002; Smelik, 2010; Stacey, 2010). Concomitantly, scientific scenarios increasingly inform a broad range of visual culture, with recent filmic examples including *District 9*, *Prometheus* and *The Hunger Games*. The first of these, *District 9*, deals with the ethical issues involved in discrimination against the alien ‘other’ through actions that recall histories of eugenics and apartheid. *The Hunger Games* too interrogates ethical concerns, primarily because it comments self-reflexively on the ethics of viewing mediated violence as a form of popular entertainment. At the same time, through the diegetic incorporation of a Darwinian ‘survival of the fittest’ paradigm, (in which children are compelled to compete with each other in a fight to the death), it offers violence as entertainment. One might therefore question its lack of principles regarding possible ‘media effects’ in the portrayal of children attacking other children (the film is classified at 12UK/PG13US). Indeed, one might question the ethics of displaying suffering in any scenario. As Bernstein contends, ‘ethical reflection on media mediated images of pain inevitably becomes an ethical reflection on that vulnerability of the human to be harmed and imaged; vulnerability to bodily harm and the ‘eyes’ of diverse media are two aspects of the same vulnerability’ (2012: xii). Bernstein’s argument is clearly justified for images of real atrocity, but becomes less relevant in a fictional context. Nonetheless, the films examined here do make reference to historical tragedies, and therefore invite contemplation of the ethical responsibilities of filmmakers. One might argue, however, that disturbing visuals, mediated through seemingly implausible narratives, such as those occurring throughout *District 9*, prompt the spectator to reflect on ethical issues and provoke a consideration of future potential problems concerning ethics. For instance, as a UK/US production with a British director, *Prometheus* explores a range of topics that reflect recent controversies in Britain, namely, body parts research and unauthorised personal data access, as well as abortion and the creationism/evolution debate. Accordingly, referring to *Prometheus, The Hunger Games* and *District 9*, and the scientific scenarios upon which these films are predicated, as well as science (and film) ethics, this essay explores how the unpredictable nature of advances in science and technology, in combination with a lack of ethics (either in the real or the fictional world), foregrounds the dangerous dimensions of their science fiction counterparts. Analysis of the film texts examines the ethical issues at stake and considers why these issues are raised, as well as the repercussions for the narrative and for real-world concerns.

## ***Prometheus***

*Prometheus* is the fifth film of the *Alien* franchise and provides an antecedent rather than a prequel for the series. The film opens with a sequence in which a humanoid alien, (later described as an 'Engineer'), ingests a potent substance that triggers its physical decay. Subsequently, the film tracks the microscopic disintegration of the alien's DNA, which is visualised as double stranded helices, thereby signalling its preoccupation with the origins of life. Following the disintegration of the Engineer, the ensuing scene features microscopic images of replicating cells, suggesting that the Engineer's damaged DNA is evolving into new forms, and thereby further accentuating the film's Darwinian concerns.

If its plot centres on the origins of life on Earth in a futuristic setting (it opens in 2089), *Prometheus* also highlights a number of contemporaneous ethical concerns pertaining to human and animal experimentation within the real scientific world. These include: genetic profiling; artificial intelligence; end-of-life definitions and organ donation; animal/primate experimentation; abortion; body part research; the ethics of creating, cloning and indefinitely preserving life; euthanasia; and the unauthorised accessing of personal data. Such issues are articulated through the later discovery on a distant planet of remnants of the Engineers, a species which two scientific archaeologists, Elizabeth Shaw (Noomie Rapace) and Charlie Holloway (Logan Marshall-Green), believe provides a template for human existence. Their belief stems from the fact that they identify identical planetary patterns depicted in a number of ancient cave paintings (on Earth) from chronologically disparate human civilisations. These discoveries suggest a common ancestry between them and lead the pair to hypothesise the 'Engineers' as creators of human life. Thereafter, a company known as the Weyland Corporation transports the two scientists to the relevant star system to further their investigations. The expedition is funded by Peter Weyland (Guy Pearce), the corporation's ageing director who is seeking the origins of life to achieve immortality.

As the crew undergo cryostasis (hyper-sleep) during the journey there, David (Michael Fassbender), an android crew member, illicitly accesses images from Shaw's memories by placing his hand on the cryo-pod proximate to her head. The subsequent grainy visuals reveal scenes from Shaw's childhood, (apparently in a foreign country), in which she is discussing different belief systems with her father, prompted by a passing funeral procession. She enquires about the death, to which her father responds 'Their God is different than ours'. The sequence therefore establishes the creationist versus evolution debate, and raises the question of ethics regarding the access of personal data. This was a significant issue at the time of the film's production, primarily owing to the Leveson Inquiry and various global hacking scandals, the android's unauthorised access to Shaw's personal memories effectively equivalent to hacking.[2] It transpires that this intrusion into Shaw's mental imagery is a regular occurrence since David also retrieves Shaw's memories concerning the death of her father. The spectator understands the intrusion of Shaw's privacy as unethical because these memories are signalled as emotive and personal. Shaw learns about the unauthorised access following the death of Holloway when, whilst she is sedated, David comments that 'it must be very difficult for you [seeing Holloway die] after your father died under such similar circumstances'. 'How did you know that?' asks Shaw. 'I watched your dreams' responds David, revealing this violation just after she has been traumatized by both Holloway's horrific death, and the revelation of her alien pregnancy. The effect of this, in the context of the film, is to render her even more of a helpless victim, highlighting the way that media intrusion impacts on real-world scenarios of grief.

Having landed on a distant moon, LV-223, which forms part of the planetary system depicted by the aforementioned cave paintings, Shaw and Holloway, accompanied by a scientific team, and directed by mission leader, Meredith Vickers (Charlize Theron), gain entry to a gigantic pyramidal structure. Here, they discover the remains of an 'Engineer', whose body has been decapitated. The team transport its head back to the spaceship for further study, thereby illustrating a further unethical element of the film's narrative, namely, unauthorised, non-consensual experimentation on human(oid) body parts. Led by Shaw, they attempt to artificially reactivate the brain of the Engineer by inserting electric probes into its head in order to 'trick its nervous system into thinking it is still alive' (Elizabeth Shaw). They scan the head to discover that it is enclosed by a helmet type structure, which, upon removal, reveals a humanoid physiognomy. An extreme close-up of its pale, Greek god-like features discloses its eyes opening, then a black fluid exuding from its temples. Spectator attention is further directed towards its forehead, which, seen in close-up, seems to move involuntarily (the motif of primordial 'livingness' is a persistent visual feature, with close-ups of organic, moving material recurring throughout, perpetually signalling an evolution/creation co-existence). The use of close-ups also accentuates the unprincipled nature of the experiment, particularly because, as the scientists continue to increase the electric current, the Engineer's facial features contort as if it is in agony. The expression of suffering clearly denotes this as a transgressive act, especially as the head then explodes, and subsequent DNA analysis reveals its content to correspond exactly to human DNA. Aside from the obvious negative implications of inflicting pain to satisfy scientific curiosity (and spectator pleasure), the subtext of the sequence raises several areas of concern for real-world scenarios, specifically, the storage of, and unauthorised research on body parts and the unauthorised accessing of genetic material. These aspects may resonate particularly with a British audience given that such mediations reflect real-life accounts of medical neglect and of doctors ‘playing god’ in recent decades. Examples include numerous high-profile medical controversies of the 1990s, particularly the ‘Bristol baby hearts’ scandal when cardiac surgeons James Wisheart and Janardan Dhasmana caused the unnecessary deaths of infants by continuing to operate on them despite an unacceptably high failure rate; and the body parts controversy at Alder Hey Hospital, when body organs were harvested for research, partly for financial gain (all UK hospitals were subsequently screened for unauthorised human tissue storage). The revelations promoted widespread controversy and resulted in the formation of the Human Tissue Authority and the Human Tissue Act (2004) (Mepham, 2008: 358) which aimed to control illicit organ storage. A further source of controversy that arises in the fictional context is the genetic proximity of the Engineers to humans, which draws attention to equivalent questionable ethics in experimentation on primates (certain primate experimentation is banned in the UK and elsewhere, but is subject to on-going revision [Mepham, 2008: 203]). Indeed, we learn that the Engineers pre-date humans and that ‘we come from them’ (Elizabeth Shaw), further enforcing such an analogy. As has been proven, primates are able to communicate using sign language, and ‘the differences between us and the non-human animals are differences of degree, not of kind’ (Singer, 1994: 171). Therefore, if the film exploits unethical scenarios for dramatic effect, it may also heighten awareness of such concerns. At the core of such concerns lies the concept of a ‘denaturing and de-territorialisation’ of the body (Sharp 2002) - in other words, the way in which contemporary science considers the body as a series of fragmented entities rather than a unified whole. Such fragmentation arises in real world scenarios in the way that blood products and organs may be commercialised, either illegally through organ trafficking, or legitimately in the production of commodities such as foetal material for research.

The notion of cerebral livingness depicted in the film raises questions too about defining the point of death in real life. The continued controversy over what actually constitutes death is highlighted by a number of medical experts working in the field (Blank, 2001; Lock, 2002; Sharp, 2002; Singer, 1994). The problem arises in relation to defining the actual moment of death. Traditionally, death results from the irreversible failure of cardio-pulmonary functions. Since technology can now prolong those functions, determination of death currently depends on brain function. Even this is fraught with ambiguity and uncertainty, since whole brain death is difficult to ascertain and brain stem death can prevail whilst other areas of the brain or isolated brain cells continue to function (Blank, 2001: 194).

In relation to the film, the response of the decapitated head to electrical stimulus raises questions about the technology available to different societies and the way that the technology is deployed. For instance, point of death in the UK is generally defined through lack of response to certain physical stimuli whereas in the US, a flat EEG is used as the determining criterion. The film therefore opens the possibility that future technological developments will further confound the uncertainties of ascertaining death.

While a biological premise underpins the film, it is also concerned with the debate between creationism and Darwinism. Richard Dawkins explains this relationship as one of a ‘God Hypothesis’, whereby ‘*there exists a superhuman, supernatural intelligence who deliberately designed and created the universe and everything in it, including us’* versus a Darwinian perspective, which espouses the belief that ‘*any creative intelligence, of sufficient complexity to design anything, comes into existence only as the end product of an extended process of gradual evolution* [original italics]’ (2006b: 31). Such discussion underpins the film’s narrative, which explores the fact that one might simplistically assume that ‘God’ is moral. Because of her religious beliefs, Shaw especially assigns an implicit morality to creationism that proves actually not the case as the Engineers, (who are depicted as God-like entities), ultimately kill humans without provocation. Moreover, despite her secular convictions, Shaw surgically aborts the alien offspring within her, illustrating the paradox of her faith. The centrality of ethics to the narrative is made even more apparent when David questions Holloway about the extent to which he would go in order to get answers to his quest to discover the origins of life. ‘Anything and everything’ responds Holloway, whilst David simultaneously hands Holloway a drink that he has deliberately contaminated with fluid obtained from a canister brought back from the Engineers’ colony. In other words, David is too conducting a ‘scientific’ experiment that has dire consequences, explained by his android origin which does not accord him human emotions or morals. Ironically, this inhumane experimentation is no different to that conducted on the decapitated head and likewise interrogates the ethics of testing on human subjects.

The initial outcome of the substance ingestion is that Holloway’s eyes, which are seen in extreme close-up, appear to contain writhing maggot-like creatures (again, the visual implication is one of a primordial existence, suggestive of the origin of life as an evolutionary process). These effects become apparent to the rest of the crew as his entire body becomes obviously contaminated, leading Vickers to incinerate him with a flamethrower in an act akin to euthanasia conducted during the Holocaust when diseased individuals were likewise eliminated. Indeed, like the other films discussed here, and arising because of a common narrative tendency for immoral, inhumane and illegal human(oid) experimentation, there are persistent references to, and analogies with the Nazi's Final Solution. In this case, Fifield (Sean Harris) and Millburn (Rafe Spall), who are temporarily abandoned on the Engineers' colony, encounter a tangled pile of Engineers' bodies, leading them to comment on their resemblance to a Holocaust painting. The comparison highlights a parallel between human (lack of) ethics and those of the Engineers. The implications of references to the Holocaust, on the one hand, raise the question about whether such allusions are appropriate in film as a commercial vehicle, but on the other hand, enable the ongoing memorialisation of a significant event, important for the generation to whom the film is directed.

As a result of her relationship with Holloway, David scans Shaw for similar contamination to find that she is pregnant with an alien being. Thereafter, Shaw surgically self-aborts her alien foetus using a 'med-pod', (an automated surgical device. While such a case might be considered by some as a (morally acceptable) act of negative eugenics, there are several aspects that occur in this fictional context that illuminate real-world possibilities. If Shaw had not had access to technology, she would not have realised that she was pregnant so soon, would not have realised the foetus was 'abnormal', and would not have been able to perform the self-caesarean. Aside from the questions prompted by the legitimate killing of 'abnormal' beings, a situation accepted in Western society, as Singer notes, '[t]he use we make of our increasing ability to detect abnormal fetuses during pregnancy is another indication of the way in which the legitimacy of abortion has become an assumption of medical practice (1994: 92). Furthermore, the practice of killing a viable 'foetus', points to the issue of infants being considered as consumer goods (Mepham, 2008: 131), a situation emerging in Western culture because of DNA profiling. The film highlights the ethical issues at stake by depicting the abortion as a horrific event. Shaw is conscious as the surgery begins, and the incision is viewed in extreme close-up from her point of view, perhaps a reflection on back street abortions when the procedure was not available legally. She then deliberately kills the screaming, writhing alien foetus, which is visualised as a living independent entity even though only conceived a few hours earlier. Thereafter, the dead foetus is viewed in extreme close-up, thereby inviting viewer sympathy, and highlighting the ethical concerns of late stage abortion. At the same time, the fact that the foetus is a threat to Shaw suggests that the surgery is justifiable. Even so, it is achieved by instantaneous decision for dramatic purposes, whereas in reality, it is a complex ethical issue. More fundamentally, the film implies that Shaw believes that human life is more valuable than other forms of life (since she clearly thinks she will die if she fails to abort the alien), thus returning to the debate concerning the sanctity of human life over other life forms, a premise which permeates all three films examined here.

If the nature of humanity is a recurrent theme in science fiction, then *Prometheus* ends by remarking on the ethical aspects of such humanity. Towards the end of the film, Shaw and David contemplate the immoral actions of the Engineers. ‘They created us. Then they tried to kill us. They changed their minds’ says Shaw and continues, ‘I deserve to know why’. ‘The answer is irrelevant’ David responds, and asks her ‘Does it matter why they changed their minds?’ ‘Yes it does’, Shaw tells him to which David says, ‘I don’t understand’. ‘Well, that’s because I’m a human being .... and you’re a robot’ she answers, presumably indicating the moral integrity supposedly inherent in the human species. The irony is that Shaw is prepared to sacrifice herself and others in order to satisfy a personal quest concerning the morality of her creator, signifying the inherent transgressiveness of science orchestrated by humans in a fictional context. At the same time, her mindset reflects critically on real-world scientists who pursue scientific goals for their own ends.

## ***District 9***

The narrative of *District 9*, a film set and produced in South Africa, concerns the country’s infiltration by an alien species, whose spaceship hovers over the city of Johannesburg where it remains for several decades. The South African military police force entry to the spaceship where they discover hundreds of malnourished creatures which they refer to as ‘prawns’, thereby inferring derogatory analogies with lower forms of life. Even though it transpires that the aliens have a sophisticated intelligence far superior to that of humans, they are treated as inferior beings. The film’s location in South Africa, the nationality of the director, and the title itself, which refers to a slum settlement where the ‘prawns’ are detained, infers obvious parallels with apartheid. ‘Expert’ talking heads (all of whom are white) within the film’s mock-documentary style of presentation (which conveys the film’s events through flashback), describe the aliens as ‘unhealthy’, ‘extremely malnourished’ and ‘aimless’, constructing a negative view of them akin to the ways that various ‘others’ have also been maligned (see Said, 2003). The *mise-en-scène* and cinematography persistently contribute to such a portrayal through repulsive imagery. However, this situation is reversed as the film progresses and, indicated by their complete lack of scientific scruples humans are revealed to be cruel and inhumane.

The aliens, like many South Africans who were similarly segregated, are placed in a militarised holding zone, called District 9, with plans to relegate them to a more distant settlement, District 10. Ironically, ordinary black citizens of Johannesburg comment on the fact that ‘at least they are separated from us’, whilst the ‘experts’ continue, ‘before we knew it, it was a slum’ just as a medium close-up frames one of the aliens hacking what appears to be raw flesh. Sound effects contribute to the abject implications of the scene and the persistent reference to the prawns’ consumption of raw flesh suggests primitive cannibalistic traits. Signage in the film further recalls previous histories of segregation, with the aliens banned from various locations, indicated by signs that state ‘no non-human loitering’, whilst news reports detail riots and attempts to evict the aliens from the townships. The ‘documentary’ also entails interviews with black South Africans as a means to suggest a critique of racism, and a non-racist agenda within the diegetic world. Insofar as the issues raised, however, there are clear parallels between the treatment of the aliens and the past victimisation of black South Africans. The protagonist, Wikus Van De Merwe (Sharlto Copley), who is charged with evicting the prawns to the new camp, reports, in direct address to the camera, on the ‘nice new facility’ to which they will be transferred, just as a close-up frames razor wire encircling the camp (provoking semblances to Guantanamo Bay as well as more historicised associations with the Nazi concentration camps). Moreover, the eviction is conveyed as a major military exercise, with close-ups of missiles deployed by the army, and low level framing displaying a huge cache of weapons for implementation against the aliens. As the military fly overhead in helicopters, the camera assumes one gunnery sergeant’s perspective, so that the spectator’s viewpoint is directed down a rifle barrel aimed toward the prawns on the ground below. In other words, the spectator is initially invited to identify with the humans. At ground level, sequences repeatedly disclose the aliens engaged in destructive and abject actions while their mode of communication is conveyed as animalistic and primitive. Such an analogy is furthered by their obsession with consuming cat food, which the military exploit in an effort to entice them into resettlement. The *mise-en-scène* comprising the locations for the prawns mostly entails piles of decaying rubbish, and the film often deploys long shots to accentuate their situation amidst the garbage. Initially, therefore, the spectator is encouraged to consider the prawns as disgusting ‘others’. However, even though they appear to communicate in unintelligible grunts, there is clearly mutual understanding between them and De Merwe, and subtitles indicate their intelligent humanoid communication. Moreover, their stature is upright, their movement is human-like, and they display tenderness towards their offspring. In a conversation between two of the aliens as they sift through the garbage, one comments that ‘human technology is useless’ thereby beginning to reverse the allusions that had hitherto manifested. One alien, Christopher

Johnson, is able to read an eviction notice served by de Merwe and his ‘human’ name reinforces his humanoid nature. Although physically repellent, they are made progressively more endearing through their emotional capacity and protective attitude towards each other. In addition, the use of close-ups, which had earlier tended to assume side-on framing in order to focus on their disgusting facial tentacles and various bodily appendages, now seems to centre on their enormous eyes through frontal framing, thereby exploiting neotenic tropes (Stokes, 2007: 367). Their ability to perform complex chemical experimentation also becomes evident, through close-ups of sophisticated chemical apparatus and advanced technology amidst the surrounding debris.

Even as the film initially mediates their living environment and habits as repellent, human actions soon outweigh such repugnance. For example, a sequence of close-ups focuses on the use of dying animals to supply gestational nutrition to the prawns’ embryos, which are then deliberately destroyed by De Merwe. Just as De Merwe turns to smile at the camera, he disconnects the eggs’ source of nutrition and comments, ‘The nice little guy has gone to a nice little sleep now’. Screaming sounds are audible, and, as he hands a piece of ‘abortion’ equipment to one of the team, he tells him, ‘you can take that. Keep it as a souvenir for your first abortion’. ‘Population control’ thereafter involves the use of a flame thrower to incinerate the embryos, the scene accompanied by De Merwe’s ongoing inappropriately enthusiastic commentary regarding the popping sound that the eggs make as they are burnt (he compares it to popcorn). This sequence clearly condemns procedures pertaining to in-vitro embryo destruction by suggesting that embryos are sentient beings. However, as Singer explains, determination of the beginning of life is as ethically ambiguous as determining its end. Partly this is because of technological advances which now enable a foetus to survive at 22 weeks’ gestation. It is complicated even more by the fact that if life is taken as the first signs of brain activity, this commences at ten weeks’ gestation when there is ‘neuro-neuronal integration in the cortical plate zone’, whereas others suggest that life begins with the first signs of EEG activity at 14 weeks (Singer, 1994: 104). Singer further contends that ‘The fact that the embryo has a certain potential does not mean that we can really harm it, in the sense in which we can harm a being who has wants and desires or can suffer’ (1994: 97). Through the deployment of abject sequences in which De Merwe trivialises life, the film therefore points towards the complex considerations of embryo destruction in real science.

During the course of the evictions, De Merwe comes across a concealed canister, the contents of which contaminate him. Thereafter, he undergoes extreme bodily dysfunction, to the extent that his one arm transforms into a claw, black fluid runs down his nose, and parts of his body begin to physically disintegrate. The later revelation that the liquid contains alien DNA indicates that his genetic constitution has been compromised (which the film expresses as contagion). The narrative implication of the mutation is that his own DNA, which has combined with alien DNA, enables him to operate alien weaponry (which is engineered to function only in conjunction with alien DNA). The ability to do so causes the Department of Alien Affairs (which is also a weapons manufacturer), ironically named Multi-National United (MNU), to hunt him down in order to harvest the recombinant DNA from his body tissues. Consequently, he becomes a fugitive, at the same time appearing progressively more disfigured as he transforms into an alien being. He also resorts to scavenging in the same manner as the prawns and his figure behaviour therefore resembles theirs. Aside from 'racial' discrimination, the film therefore raises several other ethical issues, namely, vivisection and experimentation on living beings without consent, and the implications of genetic engineering. It interrogates these concerns through alignment with experimentation in the Nazi concentration camps, the most obvious parallel being the forced experimentation on the aliens, which is conveyed as torture. In one such scene, De Merwe realises a similar fate awaits him too. Here, in a laboratory setting that reveals dismembered alien corpses and body parts, a scientist, who is holding a drill above a fully conscious De Merwe, states 'pain threshold, commencing test one'. He then uses a cattle prod in order to force De Merwe to shoot an alien despite his screams of 'I'll shoot a pig but I won't shoot a prawn', thereby, like *Prometheus*, pointing to the prioritising of human life. As they prepare to dismember De Merwe's body whilst he is still conscious, another scientist comments, 'What happens to him isn't important. What's important is that we harvest from him what we can right now. This body represents billions of dollars worth of biotechnology'. This scenario thus illustrates the concept of denaturation and de-territorialisation of the body to a much greater degree than does *Prometheus* in its overt commercialisation of body parts. Later in the film, when De Merwe and Johnson return to the lab to recover the alien fluid (narratively, to fuel the spaceship), Johnson encounters a prawn body that has been tortured beyond recognition and long shots display a bloody form that recalls experimentation on humans without their consent as occurred widely to the Jews during the Holocaust. Concurrently, and given our transformed perception of the prawns, the horrific representation of laboratory testing likely reflects on animal experimentation. Experimentation on both animals and humans now involves stringent ethical precautions, but this has not always been the case. As Briggle and Mitcham note, 'the first studies of human beings that [...] began to practice something like systematic experimentation on humans other than oneself took place on slaves and the poor'

(2012: 134). They go on to explain that beings who were ‘uncivilized if not less than human’ were the objects of such experimentation, and manifested ultimately in the Nazi’s experiments on concentration camp victims. Briggle and Mitcham reveal that, ‘Jewish and other prisoners were forced to undergo medical experiments that commonly resulted in death, permanent disability, or disfigurement and as such would be more accurately described as medical torture’ (2012: 135). In real world situations preceding the Holocaust, global medical ethics regarding the control of human experimentation were either vague or absent – the first attempts to establish guidelines followed the Second World War and led to a code of ethics known as the Declaration of Helsinki in 1964 (Briggle and Mitcham, 2012: 136) which has since undergone numerous revisions. Despite these guidelines, there have been discrepancies in medical treatments available for less developed countries, exemplified by the use of AZT for HIV in the US, drugs which were not made accessible in Africa and therefore contravened the ethical guidelines of the International Organization of Medical Sciences (Briggle and Mitcham, 2012: 139). More recently, an effective Ebola vaccine is undergoing development only because of imminent global threat, despite the previous presence of the disease in Africa, thereby following a similar pattern to the lack of HIV drug availability for Africans – a topic that *District 9* seems to iterate through its association of contagion with the ‘other’, whilst at the same time indicating the potential consequences of genetic modification unrestrained by ethical considerations. One might question the ethics of a filmmaker depicting his fellow countrymen in such negative ways, and expressing their suffering for the purposes of entertaining audiences. Yet, the horrific imagery deployed accentuates issues of vivisection, and human experimentation. At the same time, it shifts spectator perception in favour of the prawns and demonstrates how mediated images, presented as documentary, might influence one’s views.

### *The Hunger Games*

*The Hunger Games*, a film in which children are forced to fight to the death to provide a gladiatorial style of reality entertainment, takes place in Panem, a post-apocalyptic setting, where one social stratum of society is dominated by another. Like *District 9*, the oppressed groups are restricted to specific zones and almost every aspect of their lives is monitored. Each zone or district, of which there are twelve, is ordained to select two ‘tributes’, one girl and one boy, to fight in the ‘Hunger Games’, and the film focuses on those two chosen from District 12, Katniss Everdeen (Jennifer Lawrence) and Peeta Mellark (Josh Hutcherson). The games take place annually in a vast forested arena and are mediated on television as mass entertainment. While the arena appears a natural landscape, it is, in fact, carefully manipulated in terms of providing challenges to the tributes' survival. Those controlling the tributes' fight for survival are affluent whilst the tributes are from working class backgrounds. Class therefore differentiates the two opposing groups, with the wealthy classes ruling the twelve poorer districts, and selecting the tributes for the Hunger Games. The way of life in the districts is simple and austere, suggested by their mode of dress, modest homes, and killing of wildlife as a means of survival and contrasts with the excesses of the ruling classes of the Capitol, whose whims are enforced by an army of white-uniformed soldiers. The film therefore involves several ethical issues: it self-reflexively addresses the production of violent films and viewing violence as pleasure; it explores biological ethics implicit in the narrative's reference to social evolution as a means of survival; it examines the ethics of the ruling class governing the working class by imposing a Darwinist experiment on human participants against their will; and finally, it draws attention to the moral principles of artificially manipulating an environment (as in genetic engineering and climate change).

Insofar as the media-violence debate is concerned, the film's content initially appears to promote violence and narratively illustrates how the progressive amplification in the graphic nature of media violence as a result of societal acclimatization results in a scenario where 'real' violence comes to replace fictional violence (Surette, 1998: 130). Indeed, current real-world technologies have broadened the capacity for enjoying violence to the extent that one may legitimately participate in simulated aggression. The film extends this scenario in that participants are required to exercise real violence as a form of mass entertainment and thereby prompts a consideration of the issues sustaining the media-violence controversy. On one side of this debate, a vast array of evidence suggests that watching violence can induce violence in certain individuals (Kirsh, 2012; Surette, 1998). Moreover, there is widespread recognition of mounting anecdotal evidence which suggests that copycat crime is an extensive phenomenon and that mediated violence can influence predisposed individuals, especially children who are prone to imitative behaviour (Bandura, Ross and Ross, 1963). *The Hunger Games* is directed at those aged 12 and above and cinematographic strategies of subjective viewpoint and empathic narrative encourage spectator identification with Katniss, who is ostensibly the winner by virtue of being its most effective killer. One might therefore question the ethics of a film that promotes child murder in a society where there are multiple reports of similar violence.

On the other side of the debate are the facts that, first, the majority of individuals watch both fictional and real violence on screen without ever inflicting it on others, and second, scientific data concerning media ill-effects is inherently lacking in rigour because of the ethical, scientific, and legal challenges of inducing violence in individuals, especially children, under controlled conditions (Barker, 2001; Boyle, 2005; Gauntlett, 2001). Furthermore, as a futuristic film, *The Hunger Games* has many implausible elements, whilst its violence is stylized, aspects which arguably mitigate any latent negative influences (Kirsh, 2012: 176). Indeed, its portrayals of violence are subject to fast-motion editing and fragmented sequencing, thereby sustaining an unreal effect, and both the Games and those that organize them are depicted in negative ways. For example, the ruling classes encompass caricatured individuals, their hair, costume, and figure behaviour being exaggerated to extreme effect. Effie Trinket (Elizabeth Banks), the woman in charge of District 12 typifies such portrayal, providing a stark contrast to the images presented by the humble lifestyle of District 12's inhabitants. Close-ups of Trinket's face and hair, particularly frontal close-ups, which draw attention to her made-up face, and exaggerated 'cupid's bow' lip line, accentuate a difference to the natural beauty of Katniss. Trinket also delights in material wealth and an extravagant lifestyle, and, like the Games organisers, promotes a culture of excess associated with celebrity. In one such scene, images of the tributes brutally killing each other in previous games intermittently flash up on television screens, the commentators describing these instances as 'very exciting' and 'a moment that you never forget'. However, Katniss appears disgusted by the visuals, and therefore one might equally argue that the film encourages criticism of its violent content.

In particular, the manner in which the affluent classes exploit Darwinian thought as a rationalization for sustaining class inequality is conveyed as morally questionable, although, in itself, Darwin's theory of 'the survival of the fittest' involves altruistic behaviour. Darwinian theory articulates a model of evolution by natural selection whereby variation in a species, together with gradual change in the environment, tends to favour the survival of the best adapted variants (the fittest). That Darwinist principles structure the film's narrative trajectory is first suggested when, in one scene, the comment is heard, 'we have two very fit 16 year olds here'. Thereafter, the survival of the tributes in the Hunger Games depends on a related ability to adapt. Indeed, the team controlling the Games, directed by the affluent Capitol, artificially manipulates the experimental conditions of the tributes' 'environment' by introducing potential threats in order to monitor the latter's ability to survive, thereby ensuring further entertainment value. At the same time, their artificial alteration of the Games environment implies a critique of geo-engineering. Principally, the manipulation of the Games arena makes it a more dangerous place, suggested by the introduction of ferocious hounds, a forest fire, and lethal, genetically engineered wasps and correlating with scholarly thought on real-world scenarios concerning geo-engineering (Briggle and Meacham, 2012: 315).

Paradoxically, despite an expectation that 'survival of the fittest' might depend on a species outwitting or outlasting its rivals, Darwinian theory also accommodates opportunities for ethical practices in ensuring continued existence, (aspects which are reflected in the film's plotline). In other words, methods of perpetuating the species do not necessarily entail the deliberate killing of another, but may operate through social evolutionary pathways (including cooperation, selfishness, altruism and spite [Bourke, 2011: 30]). Even though, as Bourke continues, these derive from social actions, it is their effects with which biologists are concerned. To further clarify, Bourke, referring to Dawkins, notes that 'all genes are selfish, in the sense that they are selected to maximise their rate of transmission to the next generation, but genetic selfishness may manifest itself as selfishness or altruism (or cooperation or spite) at the organismal level' (2011: 29).

According to Bourke, selfishness 'is pervasive within species in the natural world, being manifested in various forms of aggression (cannibalism, infanticide, territorial exclusion) (2011: 30). He goes on to describe altruism as 'cooperative colony founding [...] and cooperative foraging' (2011: 30), and spite 'whereby the actor [not in the filmic sense] undergoes a loss of offspring in order to inflict such a loss on the recipient' (2011: 30). As Bourke explains, the theory of altruism developed as a means of clarifying a scenario that 'seemed to contradict the Darwinian expectation that all organisms should seek to maximise their offspring output' (2011: 30).

All four of these social elements come into play in *The Hunger Games*. For example, evidence of broad cooperation occurs in the way that the tributes tend to form groups. However, the underlying intentions of the groupings are not always fully altruistic, one obvious reason being that they do not share the same gene pool. Second, their reasons for cooperation are sometimes revealed as selfish in the sense that most members are solely interested in their own survival rather than species survival. For example, the spectator learns that the group with whom Peeta becomes affiliated are merely befriending him in order to kill Katniss, who presents their biggest threat (both because of the impression she created during the opening ceremony of the games and because of her shooting skills). In contrast, the pairing of Katniss and a younger participant, Rue (Amandla Stenburg) has distinct cooperative aspects, since they try to protect each other. They also share food, and are not competitive, but assist each other. One sequence in particular illustrates this, which occurs when the two girls conspire to attack Cato’s ‘group’. Katniss takes refuge in a tree to evade the latter, who are asleep at its base waiting for her to descend. Rue, situated in an adjacent tree, signals to Katniss the presence of an insects’ nest (containing ‘tracker-jackers’ which, the spectator is informed by Games organiser, Caesar Flickerman [Stanley Tucci], are genetically engineered wasps that have a lethal sting) hanging in the tree above the sleeping group. As Katniss cuts down the nest, long shots show the group below engulfed by the swarming attacking wasps, leading to their deaths. Thereafter, Rue and Katniss form a friendship that is non-exploitative and co-operative – for example, Rue applies leaves to the stings on Katniss’s arms and neck, they share food, and sleep together for warmth, thereby forming a mutually beneficial relationship as well as a friendship. They also work together to outwit Cato’s (Alexander Ludwig) group by planning to steal their depot of food. However, Rue is killed and her death is protracted, with lingering close-ups of her face that encourage the spectator to empathise emotionally with Katniss. The sadness of her death is amplified by melodramatic extra-diegetic music and the ceremonial ritual of placing flowers around her body, an act which mitigates the film’s potentially harmful message regarding violence.

If Bourke describes altruism as ‘cooperative colony founding [...] and cooperative foraging’ (2011: 30), then this applies to the bond formed between Peeta and Katniss, especially since they originate from the same districts and are therefore more likely to share the same gene pool. Moreover, their relationship is more than cooperative, becoming one of heterosexual love, thereby assuring the fecundity of the ‘species’ in Darwinian terms. In this case, Katniss kills another tribute in order to obtain first aid treatment from a central point in the arena, (known as the Cornucopia) for Peeta’s injuries At first, Katniss, viewing the depot from a distance, observes another tribute collect a pack, but does not shoot her. In other words, she does not kill without cause. However, when she is then attacked by another tribute, Clove (Isabelle Fuhrman), she retaliates although the attack is depicted through rapid editing and extreme close-ups, thus limiting the amount of apparent real violence (for the extra-diegetic spectator). Katniss tends to Peeta’s wound by applying the healing cream, but Peeta insists that Katniss also attends to her own wound, a knife cut that Clove had inflicted earlier. From a biological perspective, they therefore cooperate altruistically, not only in order to assure their survival as individuals, but also as a species. Even as extreme close-ups of the two disclose caring looks between them, thus emphasising the notion of heterosexual love (likely to be appealing to extra- as well as intra-diegetic spectators), ostensibly, their actions are explained scientifically by the ‘survival of the fittest’ paradigm.

The most obvious form of survival in the film is selfishness which ‘is pervasive within species in the natural world, being manifested in various forms of aggression (cannibalism, infanticide, territorial exclusion)’ (Bourke 2011: 30). While several of the participants, including Thresh (Dayo Okeniyi), Rue, Peeta and Katniss show compassion, most of the others kill each other in order to survive. All display aggression motivated by the desire to avoid being killed themselves.

Whilst the scenario ‘whereby the actor [not in the filmic sense] undergoes a loss of offspring in order to inflict such a loss on the recipient’ (Bourke, 2011: 30) does not arise in the film, there are analogous situations where individual tributes are prepared to sacrifice themselves in order to prevent another’s survival. Such an example occurs towards the end of the film when Katniss and Peeta, alongside Cato, are the only surviving tributes. The team at the Capitol begin to adjust the arena’s environment, their manipulations becoming apparent to Katniss and Peeta as an early onset of evening, but they also introduce a number of digitally generated wild animals (in order to test the ability of Katniss and Peeta to adapt). Peeta first helps Katniss to climb onto the structure of Cornucopia in order to evade the beasts, and then Katniss attempts to pull him up. Extreme close-ups of the hounds biting Peeta’s legs, accompanied by rapid editing, exacerbate their sense of imperilment. In addition, they are attacked by Cato, who holds Peeta around the neck, leading Katniss to aim her bow at him. ‘Go on. Shoot. Then we’d both go down and you’d win’ shouts Cato, indicating that he is prepared to take Peeta with him to his death. Katniss shoots him to save Peeta, thereby again exhibiting altruistic behaviour, but then, as Cato is savaged by the hounds, Katniss kills him as an act of humanity.

The imposition of a Darwinian model in the diegetic world therefore causes a different set of biological ethics to emerge involving altruistic behaviour that aims to promote survival of a species. Correspondingly, science fiction in this context *is* dangerous, but is so by virtue of evolutionary instincts rather than lack of morals. Even so, the film still explores values relevant to real world scenarios by its implicit critique of those that promote violence for pleasure rather than for survival.

## Conclusion

If science in the real world is controlled and ‘disciplined’ by ethical considerations, one might expect that science fiction is freed from such dilemmas (though narratively may often accentuate these). Indeed, the disregard of moral aspects in film promotes narrative disruption by enabling the dangerous dimensions of science to flourish for dramatic effect. In the case of

*District 9*, discrimination against the ‘prawns’ extrapolates South African histories of apartheid and segregation. In the *Hunger Games*, a ‘survival of the fittest’ paradigm is deployed to provide spectatorial pleasure for the elite ruling classes, reflexively addressing the ethics of viewing violence for pleasure. *Prometheus* too concerns the exclusion or eradication of the other, and also comments on the gulf between creationism and Darwinism, the narrative exploring the possibilities of their co-existence, through visual allusions to both primordial scenes of primitive life, counterpointed by images of God. Unbridled by ethical concerns, the films variously envisage transgressive acts of abortion and discrimination, implicitly of race and class, and present the observation of the survival of the fittest as an elitist past-time. Bernstein suggests that one might question the ethics of conveying suffering in a fictional context, especially when this obviously parallels real-world events (2012: xii). However, the films examined here communicate important scientific and ethical issues and, through sometimes disturbing visuals and horrific narratives, uncover complex ethical debates. These continue to take new turns according to the prevailing political and socio-cultural zeitgeist, and technological and scientific advances, which, together, influence a sense of what is morally right.

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[1] The Manhattan Project led to the development of the atom bomb and the consequent destruction of Hiroshima and Nagasaki

[2] Similar scenarios emerged during the Leveson Inquiry when moments of personal grief were documented by the press (Madiano, 2013: 185).