

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**TIME, TERROR AND THE TECHNOLOGICAL
IMAGINATION:
FRANKENSTEIN'S FICTIONAL LEGACY IN THE
SCIENTIFIC AGE**

**A thesis presented in partial fulfilment
of the requirements for the degree of**

**Master of Arts
in
English**

**at Massey University, Palmerston North,
New Zealand.**

Bridget Clare Herlihy

2005

ABSTRACT

There is a long-standing belief that there is an opposing discourse between science and the humanities in relation to the future of humankind. Attitudes towards the environment have changed radically in the last 200 years from a natural view to one where we dominate and re-order our environment to suit ourselves and to further the material self-interests of human beings, regardless of cultural and ecological consequences. In order for human beings to properly understand what is happening and why, we must begin to restore the balance between our relationship with Nature and our new technological worldview.

The Introduction firstly addresses issues relating to the changing relationship between human beings and their environment over the last two centuries, and how literature and film have accurately predicted our collective future. It is my objective to illustrate how Mary Shelley's *Frankenstein* has remained one of the most potent pieces of literature foreshadowing the future of humankind, and the timeless quality of the theme of the controller out of control.

The main text focuses on Mary Shelley's *Frankenstein*, and how the novel embodied humankind's growing anxieties and fears about our technological ambivalence, and I give an overview of how *Frankenstein* has paved the way for further literary and cinematic predictions of our future in artificial and synthesised environments dominated by the new frontier of genetic engineering, artificial intelligence, virtual reality and beyond, and how these technologies will impact on our cultural worldview and the future evolution of humankind.

ACKNOWLEDGEMENT

I would like to thank my supervisor and mentor Dr Scott Eastham, for all of his assistance and support, and for sharing such valuable wisdom and insight.

TABLE OF CONTENTS

Abstract	i
Acknowledgement	ii
Introduction	1
 CHAPTER ONE: The World As We Knew It	
In The Beginning...	4
The Time Is Now	7
A New Worldview: The Dawn of the Scientific Age	11
 CHAPTER TWO: The Hideous Progeny	
Stranger Than Fiction: Mary Shelley's <i>Frankenstein</i>	14
Myth and Meaning	18
Taming Nature: Harnessing Our Environment	25
Science or Magic?	29
The Imperfect Specimen	33
 CHAPTER THREE: Brave New Worlds	
Tomorrow Hit Today: The Science Fiction Film	38
Patenting the Unpredictable Future	43
The Strangest Tribe: Evolution or Devolution?	47
There Is No Gene For The Human Spirit	52

CHAPTER FOUR: The Revolution Of Evolution

That Was Then: This Is Now	59
More Human Than Human: Artificial Intelligence	65
Nothing As It Seems: Trading Reality For Fantasy	72
Biology Meets Machine	78

CONCLUSION: A New Discourse	83
------------------------------------	----

BIBLIOGRAPHY	90
---------------------	----

FILMOGRAPHY	94
--------------------	----

INTRODUCTION

Humans have always had a love/hate relationship with the tools we have created. We are enchanted with the prospect of the benefits of genetic engineering, thinking machines and entering virtual worlds. Yet frequently we are warned by detractors of this new technological worldview that these new technologies may bring about our obsolescence.

Frequently the most profound and potent insights into how technology will impact on culture stem from the literary and cinematic genre of science fiction. Critics of the science fiction genre note that that often our attitudes towards technology indicates “both an invitation and a warning; it is simultaneously fascinating and threatening, both superior to and somehow inferior to the punier humans who build, operate and are sometimes subjugated by it.”¹

Mary Shelley’s *Frankenstein* represented a “peak of fear”² not only that the technology we create will harm us, but that it will eventually supplant us, making humans redundant. In this study I am primarily concerned with the dystopian vision that has evolved in both literature and cinema directly from Shelley’s *Frankenstein*: more specifically how these literary and cinematic texts have successfully predicted the future of humankind.

Frankenstein’s premise is that a being created using groundbreaking technology takes on a life of its own, surprising an unsuspecting creator, who quickly loses control of the being he created, leaving the roles of master and slave in doubt. Most importantly, the Doctor defies the Gods and the laws of Nature.

This dissertation does not set out to be a study in literary analysis or cinema criticism. It does not analyse each and every film theory or elaborate special effects techniques employed within films that may be in some way relevant to my topic. The impact of technology upon human values is a well established theme in media studies; indeed, it forms the backbone of what is today called media ecology. This dissertation draws upon that extensive literature in order to contextualise and prioritise these pressing issues.

¹ Rushing & Frenz. *The Frankenstein Myth In Contemporary Cinema*, 61.

Accordingly, I have selected specific texts that highlight and illustrate specific themes pertinent to my argument.

Throughout modern history the Arts have been trying to tell us something about the human condition; more specifically our relationship with Nature, and how this relationship determines the future of human evolution and progress. Artificial humans, robots and computers capable of thinking for themselves have dominated our screens for decades. Literature and film has had a lot to say about the irrepressible human desire for progress. This dissertation focuses on dramatic shift in our worldview, and the ways in which the selected texts have accurately predicted the future of humankind and our growing ambivalence towards the unrestricted progression of science and technology.

In the nineteenth and twentieth centuries the possibility of scientific tampering with the human body and mind broached the ethical question of whether or not humankind would benefit from such techniques. These dilemmas are important themes addressed in *Frankenstein*. Shelley wrote in a period when the ‘hard sciences’ were still considered a branch of philosophy, but were rapidly developing into disciplines of their own, with breakthrough discoveries occurring at a rate that foreshadows the explosion of knowledge of our own day.

The aims and character of human development and progress are being fundamentally transformed before our very eyes. Our fascination with Shelley’s classic tale is timeless, and perhaps even more relevant today in an age dominated by science and technology. *Frankenstein* explores the limits of the new sciences and questions the ethics associated with the human desire to play God. We have not yet learnt how to appreciate the ramifications that unimpeded experimentation with these new technologies could have on the entire human race. It is impossible to see where the fruits of such experimentation may fall.

One of the most common themes of the science fiction genre since the 1950s has been that modern science will either save us or destroy us. However, a distinct change in the social and cultural climate since the genre’s pinnacle in the ‘50s has seen this theme

² Rushing & Frenz. *The Frankenstein Myth In Contemporary Cinema*, 61.

approached in a different fashion, and as a result the audiences going to see these films has changed. Sociologist Fred Glass observes “in particular, nuclear, computer, robotics, communications and gene-splicing technologies have advanced far enough into the daily lives of large segments of the US population that social and psychological issues have emerged – both for individuals and the broader society – that require narrative symbolisation. The new science fiction films seek at various levels to meet these needs.”³

We are becoming further and further immersed in an environment dominated by technology and genetic engineering. Our world is becoming denaturalised at an alarming speed. Humankind faces the risk of falling under the control of the technology we have created: the controller slowly but surely losing control, suffering the repercussions of decades of technological ambivalence.

³ Glass, Fred. *Science As Culture*, 7.

CHAPTER ONE: THE WORLD AS WE KNEW IT

IN THE BEGINNING...

“Learn from me, if not by my precepts, at least by my example, how dangerous is the acquirement of knowledge and how much happier that man is who believes his native town to be the world, than he who aspires to become greater than nature will allow.”⁴

A great deal of art and literature through the ages has been inspired by the natural world. Both ancient and modern religions are deeply rooted in Nature. The humanities and literature have something significant to say in the ongoing debate about the demise of our relationship with Nature, and the increasing role of the sciences in our day-to-day lives. Countless works of fiction and their cinematic adaptations not only offer predictions about the future of the planet and of humankind, but have also helped shape the nature of the scientific and technological development that we are seeing unfold before us today. These texts have retained undeniable relevance and potency in the age of genetic engineering, artificial intelligence, virtual reality and beyond.

The aims and character of human development and progress is being fundamentally transformed and manipulated before our very eyes. Twenty-five years ago, the term genetic engineering was something few people had heard of let alone understood. Many critics of the new technology swept aside any doubts they had regarding the possible negative outcomes of biotechnology. They believed that the use of this technology was at least a hundred years away. And yet at the dawn of the twenty-first century animals have been cloned (and even possibly the first human), and the human genome is being mapped with the help of supercomputers. Our environment is rapidly becoming less and less natural more synthetic. Humankind is becoming controlled by what it has created. The *controller* is rapidly losing control.

In order to properly understand the place of humankind in Nature and the relationship we have with our environment, and the way in which we manipulate this relationship to our

advantage, we need to search the humanities, specifically classical references and literature. Modern film, especially the science fiction genre, also offers a number of suggestions regarding the complicated and tumultuous relationship between humans and their environment. For decades cinema, in a sense our collective dream life, has been telling us a great deal about our future. Literature and film that approaches the controversial topic of the creation of artificial human life, from the myth of Prometheus to Pinocchio to *Gattaca* and *The Matrix*, have challenged the very idea, let alone the idealism, of humanity in its natural form.

However, the answers we are looking for would be incomplete without the help of the sciences to properly illustrate what we know about the physical and biological nature of our environment. In this case both of these very different streams of thought and theory are complementary; subjective and objective approaches together paint a more complete picture of humankind's relationship with Nature. The analysis of data is the task of scientists, whereas evaluating our reactions and feelings towards this debate is the realm of the humanities. Among various other topics, the humanities convey the way in which humans perceive their place in Nature, and the way they interact with it. Sociologists Schneider and Morton advocate that "we need to analyse our feelings about Man's place in Nature before we can properly understand our present environmental and related technological crisis, for these emotions are the driving force behind the changes that can create or alleviate such crises."⁵

Cinema effectively embodies many aspects of the modern, western worldview. The perception that we now have of ourselves is nothing like the way we saw ourselves a thousand years ago. Humankind presented and perceived itself in several varying dimensions; we had a multi-perspectival perception. This is no longer the case. Modernity put an end to this. Science and technology have provided us with a new worldview that has seemingly surpassed and replaced faith and religion. Yet in an attempt to comprehend the ever-changing, technology-driven environment in which we live, we continue to turn to the humanities, namely literature and film, in an attempt to try and understand what is unfolding around us, and to perhaps even catch a glimpse of our uncertain future.

⁴ Shelly, Mary. *Frankenstein*, 313.

Katherine Newey⁶ evaluates the relationship between the humanities and the sciences, commenting “in the last years of the twentieth century sciences and the humanities are represented in opposite terms: the study of literature is seen to be subjective and interpretative, while scientific studies are apparently rational and objective. As readers of literature, apart from appreciating the conveniences of advanced technology, we tend to be distanced from the philosophy and practice of science, and the study of literature and are generally seen as separate pursuits.”⁷ Literature has offered a number of predictions for the future of the sciences and humankind whole.

⁵ Schneider and Morton. *The Primordial Bond: Exploring The Connections Between Man and Nature*, 78.

⁶ Newey is a renowned literary critic and Lecturer of English at Wollongong University in New South Wales, Australia. One of her areas of expertise is Mary Shelley’s *Frankenstein*.

⁷ Newey, Katherine. *Mary Shelley’s Frankenstein*, 16.

THE TIME IS NOW

“All of our perceptions of self and world are mediated by the way we imagine, explain, use, and implement time. Time is at once both dazzling and versatile, enigmatic and vexing. We can look ahead of ourselves, we can steal our way back into the past, and we can detach ourselves from the moment and look at ourselves from a distance. Our clocks and schedules, our science and technology, allow us to leap on top of the undifferentiated tempos of the biological and physical world.”⁸

Rhythm is the most central and most basic human experience. Time and rhythm are the crucial factors that permeate our biological systems governing our entire existence. Time measures and orders our personalities and behaviour: it is a powerful force behind the creation of cultures. Despite the central role that time plays in our daily lives, humankind is becoming increasingly ambivalent towards the concept of time. Calendars, clocks, schedules and computers largely govern the environment in which we live. However, we are often unaware of the fact that machines of one sort or another already largely control our lives. Only by comparing the relationship that we have had with biological time and rhythm can we fully understand and appreciate our relationship and perception of time in the present.⁹

The artificially accelerated pace of our culture has brought about the alienation of humans from the rhythms of Nature, rhythms which once ordered many aspects of human life. This gap between humans and their environment only continues to widen. Our ancestors once listened and adhered to the rhythms of Nature, using these rhythms as patterns to live by. They were once in tune with the rising and falling of the tides, the lunar cycle, the rising and setting of the sun, and the changing of the seasons. Instead of following such natural guidelines about how to live, we have evolved into a society rigidly controlled by a vast array of time-keeping devices which control the way that we live a great deal of our lives. This has resulted in a fast, efficient, safe and overly predictable existence.

⁸ Rifkin, Jeremy. *Time Wars*, 9.

⁹ Rifkin, Jeremy. *Time Wars*, 5.

Jeremy Rifkin¹⁰, renowned biotechnology critic and President of the Foundation on Economic Trends, has been a strident voice on the issue of genetic engineering, from the genetic enhancing of crops to the patenting of genes. He has written 16 books to date dealing with the impact of scientific and technological changes on society, the environment and the economy. One of Rifkin's more recent books, *The Biotech Century*, addresses future trends in science and technology, specifically biotechnology. Rifkin insists "The modern age has been characterised by a Promethean spirit, a restless energy that preys on speed records and shortcuts, unmindful of the past, uncaring of the future, existing only for the moment and the quick fix. The earthly rhythms that characterise a more pastoral way of life have been shunted aside to make room for the fast track of an urbanised existence. Lost in a sea of perpetual technological transition, modern man and woman find themselves increasingly alienated from the ecological choreography of the planet."¹¹ Rifkin advocates that in our haste to become as technologically advanced as we possibly can, we have lost touch with the Earth's natural rhythms, instead becoming dependent on the machines we ourselves have made to run our lives as efficiently as possible. Our relationship with Nature, once an unbreakable bond, has faded away. Nature has fallen victim to human ambition, power and the overwhelming human desire for knowledge.

Schneider and Morton, on the other hand, suggest that although these new technologies are becoming an integral part of our collective existence, it may be extremely difficult, if not impossible, to break our bond with Nature. "Are we decoupling ourselves from the natural world, substituting instead the emoluments of a technologically *advanced* culture? Our mechanical and electronic gadgets are some of the most obvious symbols of this attempt at separation. But are they merely new symbols in a futile, old pattern in which other *objects* – gods to be placated, for example – had the central role? Are we attempting the impossible by trying to extricate ourselves from a bond in which we are inextricably bound? And will we degrade the quality of our environment in the attempt? Might we even threaten our own survival?"¹²

¹⁰ Rifkin's books have proven to be a rich source of information for my dissertation, and I make regular references to several of his more renowned books throughout this dissertation.

¹¹ Rifkin, Jeremy. *Biotech Century*, 21.

¹² Schneider and Morton. *The Primordial Bond: Exploring the Connections Between Man and Nature Through the Humanities and Science*, 5.

Each individual culture has its own individual set of temporal rhythms, which defines that group and the way in which they live. “Our clocks and schedules, our science and technology, allow us to leap on top of the undifferentiated tempos of the biological and physical world. We ride hard on the periodicities of Nature. We tame, harness, and regiment. We brand our temporal biases onto the ancient rhythms of the universe, in hope of sequestering time, the elusive phenomenon that always seems to escape our grasp.”¹³ It is virtually impossible to properly understand our respective cultures and ourselves if we do not properly understand the way in which we perceive time. Time defines our existence; therefore we need to define time.

Time is a dimension of reality that humans have never quite been able to tame and manipulate to their advantage, so that the theoretical compression of time has become one of the great desires of Western civilisation, and indeed a majority of the developed world. Time is now perceived as a rare and precious ‘resource’ that can be used to shape cultures in new and more efficient ways; time has become a tool with which we can enhance our own well-being, along with the well-being of our respective cultures.

As we become further embedded in our high-speed society a growing number of groups are offering alternatives to this artificially accelerated environment. Rifkin comments “these heretics are challenging the notion that increased efficiency and speed offer best time values to advance the well-being of the species. They argue that the artificial time worlds that we have created only increase our separation from the rhythms of Nature. They would begin the process of reintegrating ourselves back into the periodicities that make up many physiological time worlds of the earth organism.”¹⁴ These groups are not interested in assuming power over time; instead they advocate the reunion of the bond between humans and Nature. By understanding and following the natural rhythms of the planet we are able to offer humankind real hope for the future.

Ancient civilisations perceived Nature as a powerful force to be treated with great respect, as it was crucial to follow the rhythms of Nature to ensure the survival of the species. Nature was a powerful force that humankind did not fully comprehend, and was therefore treated with respect, as the laws of Nature were not to be tampered with by

¹³ Rifkin, Jeremy. *Time Wars*,10.

mere mortals. The most obvious difference between the ancient and modern worlds is that ancient civilisations had a much greater dependence on the natural world as well as a much stronger bond and intimacy with natural cycles. “To early humans, without scientific knowledge and with a very simple technology, Nature was a formidable ‘Other’. From the vantage point of early scattered groups of human beings, Nature was a vast, mysterious, dangerous, and uncontrollable force, which humans, unable to live without chaos, anthropomorphised. In other words, humans created a counter-intellect to mirror their own. They populated Nature with gods, monsters, spirits, trolls, mermen, and other humanlike, but not quite human, creatures.”¹⁵

It is likely that hunter-gatherer groups saw Nature as a benevolent force. These groups were dependent on a balance in Nature; if they depleted their resources, they faced shortage in the future, placing their very existence in jeopardy. The development of agricultural societies marked a significant move away from humankind’s complete dependency on the forces of Nature. These societies, which were more technologically advanced, did not work in harmony with Nature, but instead tended to view Nature as a dangerous force that put their new lifestyle and cultural practices in jeopardy, and therefore attempted to confront and control Nature. As a result, the Agricultural Revolution was an attempt to harness Nature by having the land carved up and transformed into a cultural space for development. Creatures of folklore, such as fairies, dwarfs, and pixies symbolised the uneasy relationship that existed between Nature and the emerging agricultural societies. These beings personified the unpredictable forces of Nature that could not be tamed, but more importantly they indicated that humankind was still subordinate in relation to Nature. Although the Agricultural Revolution was seen as a great step forward for human progress, humankind was no longer living in harmony with Nature.

¹⁴ Rifkin, Jeremy. *Time Wars*,15.

¹⁵ Schelde, Per. *Androids, Humanoids And Other Science Fiction Monsters: Science and Soul in Science Fiction*,14.

A NEW WORLDVIEW: DAWN OF THE SCIENTIFIC AGE

The scientific worldview did not properly emerge until the second half of the nineteenth century. Science explained complicated phenomena in entirely new terms: those of chemistry, biology and physics. Most importantly, science explained events in terms of cause and effect. Science was the power that began to destroy the bond between humans and the deities and the supernatural, and the once strong link between humans and their environment was changed forever. Humans rapidly found that with their scientific knowledge they had acquired a new power, and Nature was steadily pushed into a subordinate role. Man used his gift of ingenuity to expand his strength against Nature. “Ingenuity has been used to figure out new technological *weapons* to field in the constant warfare. Each of these *weapons* – the plough, the steam engine, and so on – has allowed humans to multiply and to carve out a bigger piece of the cake. The bone of contention has always been *knowledge*. Super naturals and gods had knowledge and powers denied to humans, but humans had intelligence and determination to use to acquire that knowledge and that power. The root of the conflict is the human desire to become more knowing, more powerful, and more ‘godlike’.”¹⁶ With the conception of the new sciences, human ambition became a force to be reckoned with. Humankind was no longer content to succumb to the unpredictable forces of Nature. After the Industrial Revolution, a period commonly referred to following as the Age of Reason, modern culture continued to make rapid progress in scientifically based research. This increase in knowledge also brought about an increase in power. The gods were still acknowledged as the creators of life and human existence, the ones who determined the fate of human beings. Everything else became the property of science and technology, and ultimately human intelligence.

In an essay written in the early 1940s, Edwin Schrödinger raised the awkward question about the real purpose and benefit of scientific research. “Everybody knows that in our days more than ever before a man or a woman who wishes to make a genuine contribution to the advancement on science has to specialise: which means to intensify one’s endeavour to learn all that is known within a certain narrow domain and then to try and increase this knowledge by one’s own work – by studies, experiments and thinking.

Being engaged in such specialised activity one naturally at times stops to think what it is good for. Has the promotion of knowledge within a narrow domain any value in itself? Has the sum total of achievements in all the several branches of *one* science: say of physics, or chemistry, or botany, or zoology – any value in itself – or perhaps the sum total of the achievements of all the sciences together – and *what* value has it?”¹⁷

Many people respond to this type of question by listing all of the great scientific and technological achievements that have been made over the last two centuries; achievements that have transformed almost every aspect of our lives. Yet we must also ask ourselves whether these achievements have actually enhanced the existence of human beings, and more importantly, where they will lead us in the future? One of the greatest fears regarding the acquisition of too much scientific knowledge is that it will irreparably damage humanity and the natural order as we know it, ultimately destroying our bond with Nature, and our traditional religious and cultural beliefs.

As we face the uncertainties of the new millennium, one thing seems certain: biotechnology will become a prominent power in the new era driven by technology. Claims have been made by assorted scientists that we will soon be able to re-create the human race, enabling the entire human race to be as close to ‘perfection’ as possible. We will be able to engineer human beings, and develop new hybrid species unlike anything we have seen before. Natural selection and selective breeding will become a thing of the past in the face of these new technologies. We will finally be able to combine our biological and cultural evolution and seize control of our collective future. These incredible advances in scientific knowledge and methodology will fulfil the prediction of the Age of Enlightenment that progress in scientific discovery will lead to all things becoming possible. It seems that the only thing to limit human progress will be our imaginations.

Despite the fact that the prospect of these developments excites many people, there is still the persistent fear that it will all turn bad. Over time we have become ambivalent about the unrestricted use and long-term impact of biotechnology. Great benefits may be

¹⁶ Schelde, Per. *Androids, Humanoids And Other Science Fiction Monsters*,15.

reaped from such techniques, but these may be greatly outweighed by the number of risks: risks that lurk constantly at the back of our minds. These are the same risks that we have seen unfold before us in countless science fiction films and literary works. As these new scientific techniques evolve from potential to real technologies, our irrepressible fears about the possible outcomes of these unpredictable scientific methods lead us to a classic tale written nearly two hundred years ago.

Mary Shelley's *Frankenstein* is widely acknowledged by critics and historians alike as a potent warning against the fate of humans who reach too far and push the boundaries of science beyond their own grasp in an attempt to satisfy their own desires in the quest for knowledge, fame and notoriety.

Frankenstein has transcended the gothic and horror genres and has been adapted into countless plays, films and countless sequels, yet our fascination with Shelley's timeless classic continues, even more so in an age governed by science and technology.

¹⁷ Schrödinger, Erwin. *Science and Humanism: The Spiritual Bearing Of Science On Life*, 110. Although this essay was first published in the 1940's, Schrödinger still recognised the potential problems the impact of the sciences would have on human life.

CHAPTER 2: THE HIDEOUS PROGENY

STRANGER THAN FICTION: MARY SHELLEY'S FRANKENSTEIN

The story of the ill-fated Dr Frankenstein has become a standard medium for expressing our ambivalence about the limits of human knowledge. Mary Shelley's *Frankenstein* brings forth interpretations about human relationships with Nature, as well as addressing our doubts and anxieties about science and technology. While some critics argue that Mary Shelley was predicting the future of humankind when she wrote *Frankenstein*, many other critics believe that Shelley was actually identifying and addressing concerns about the rapid progress of the new sciences, and the novel has become a governing myth of modern biology.

Whether it is taken as a cautionary tale or a modern story of the creation of life, *Frankenstein* remains without a doubt one of the most important myths of modernity. In an age where the biological destruction of the Earth and/or the creation of a race of super-humans is becoming more and more of a reality, Shelley's vision of the 'end' of human endeavour may be read in an increasingly apocalyptic way.

The nineteenth and twentieth centuries saw countless landmark discoveries being made in all branches of the sciences, especially genetics. The problematic topic of tampering with the human body and mind brought about the ethical question of whether or not humankind as a whole would actually benefit in the long-term from such experimentation. Shelley explores this ethical dilemma in *Frankenstein*. The novel was written during a period when the natural sciences were still considered a branch of philosophy, but were rapidly emerging as a discipline in their own right. New discoveries and advances were occurring at an alarming rate, foreshadowing the massive explosion of knowledge we are witnessing around us today.

Frankenstein is the story of a scientist with great aspirations who wishes to use his new-found knowledge to create a living human being. As a young man Victor Frankenstein attends the University of Ingolstadt to study natural philosophy. However his life

quickly turns to misery as he seemingly uncovers the secrets of creating human life.

“Such were the professors words – rather let me say such the words of fate announced to destroy me. As he went on I felt as if my soul were grappling with a palpable enemy; one by one the various keys were touched which formed the mechanism of my being; chord after chord was sounded, and soon my mind was filled with one thought, one conception, one purpose. So much had been done, exclaimed the soul of Frankenstein – more, far more, will I achieve; treading in the steps already marvelled, I will pioneer a new way, explore unknown powers, and unfold to the world the deepest mysteries of creation.”¹⁸

The creature he builds is monstrous, and Frankenstein flees from the daemon¹⁹ he has created. The monster seeks revenge on his creator for abandoning him, and wreaks havoc on Frankenstein’s life. Many different themes are intermingled in the plot. Perhaps the most prominent and pertinent theme of the Frankenstein myth here is the unrestricted pursuit and use of knowledge, as well as the magnitude of the power of this knowledge when it falls into the hands of an individual determined to break the laws of Nature. Dr. Frankenstein is ambivalent about just how far his scientific experimentation should go. His desire to know as much as he possibly can about the natural world leaves him with an unbalanced view of Nature and society. “The most shocking manifestation of Frankenstein’s arrogant view of Nature is his attempt to circumvent and reverse her immutable laws of life and death.”²⁰

Frankenstein questions the place of God, responsibility of one’s actions, morals, and most importantly here, questions whether or not it is ethical for humans to play God and create artificial human life.

Frankenstein breaks away from the conventions of traditional creation myths, as the Doctor does not enlist the help of the gods; the feat of creating life comes about only through the use of his extraordinary scientific knowledge, which is presented in the novel as souped-up alchemy. *Frankenstein* is basically the reworking of traditional creation myths. This is the tale of Man replacing both God and the human mother as the primary creator of life, instead taking on the divine role of the Gods by creating life in his laboratory. He acts on the assumption that he possesses enough knowledge to make his

¹⁸ Shelley, Mary. *Frankenstein*, 40.

¹⁹ The creature’s only name in the book

²⁰ Newey, Katherine. *Mary Shelley’s Frankenstein*, 40.

dream a reality. By creating the monster, Frankenstein throws all of Nature's laws of rhythm and time out of synch.

Human attempts to attain omniscience fall into two different categories. Firstly, the individual who is in search of the secrets of life wants to uncover the origin of human beings during the Creation, which means that God or the gods must be tricked into performing the task a second time, or disclosing information to a mortal. Secondly, the theme of the myth involves knowledge and the origins of life, and how these factors can help to evade the finality of death. Variations on these themes can be found in the creation myths of many cultures. Myths that concern the possession and use of knowledge almost always end in tragedy, and *Frankenstein* is no exception. The same is true for the Promethean myth, first told by Hesiod, and then retold by Aeschylus. For stealing the divine fire, vengeful Zeus who chained Prometheus to a rock for all time; his liver was pecked out daily for eternity only to grow back overnight.²¹

Unhappiness or discontent with humankind's place in Nature can arise from an overwhelming fear of the power of Nature. It is when this fear occurs that humankind attempts to control Nature in an attempt to tip the scales in their favour. It is this constant fight for power against Nature that has brought about the presumption of human supremacy, a presumption clearly illustrated in Prometheus' sin against Zeus. This pattern that has continued through history to Dr Frankenstein's sin against Nature with the creation of his monster, to our attempts to harness life within the laboratory. Our cultural heritage has apparently been one based on an alienation from and hatred of Nature.

We live in an age where scientific fantasy is fast becoming scientific fact. The wild and often far-fetched speculations of science fiction films that once seemed so improbable are being realised all around us. We are now able to implant artificial organs and organs from other animals into the human body; babies can successfully be conceived in test tubes; and animals have been cloned with some degree of success. With the advent of all these extraordinary feats of science, the Frankenstein myth is more topical than ever. The daemon brought to life by Dr Frankenstein has become a familiar theme in the realm

of science fiction literature and film, feeding an apparently widespread fear, even horror, at the prospect of society being overrun by man-made monsters which has reached epic proportions.

Although the Frankenstein myth has been claimed by popular culture, the real horror of Shelley's cautionary tale is in the novel's underlying message of the dangers of the unrestricted pursuit and application of scientific knowledge and the disastrous consequences of tampering with Nature. By creating artificial human life in the laboratory, Frankenstein not only puts the rhythms of Nature out of synch, but also turns all the traditional creation myths on their heads.

Although it was written nearly two centuries ago, *Frankenstein* is strangely prophetic in that it provides the reader with an image of modernity: the creation of artificial human life, an event today closer to happening than ever before. "The novel vividly dramatises the impact of science on modern life, and our continuing fear that the creations of our intellects might be beyond individual human control. *Frankenstein* expresses our doubts and anxieties about science and technology and the scientific world view, but presents these ideas in terms of the oldest myths of Western culture."²² When Shelley wrote *Frankenstein*, she constructed a modern creation myth, reworking traditional myths of creation and birth. Victor Frankenstein attempts to replace God as the human mother, the primary creator and giver of life. This aspect is one of the most controversial points in the novel, as some of the most important myths of Western culture are creation myths. *Frankenstein* replaced traditional creation myths with a new version that places man in the central role of creator rather than that of the created. *Frankenstein* is the birth of another myth, a "'secular myth' or 'anti-myth' which questions the very power and territory of myth itself."²³

²¹ Although Zeus was originally the one who sought revenge on Prometheus, the myth was also transformed by the Romans into a tale warning of the consequences of mocking the Christian God.

²² Newey, Katherine. *Mary Shelley's Frankenstein*, 25.

²³ Newey, Katherine. *Mary Shelley's Frankenstein*, 11.

MYTH AND MEANING

Some critics still consider myths to be the remnants of tales left over from ancient times. Yet in this day and age these same myths still have a great deal of potency and relevance in relation to the way we live our lives. Through the analysis of cultural myths philosophers of western civilisation are able to interpret our own behaviour and construction of society through these interpretations. Consequently we find that ancient myth still plays an important role in the way we live our day-to-day lives, as well as having had a profound effect on western arts and literature.

Internationally renowned theologian and cross-cultural scholar Raimundo Pannikar defines the significance of myth, explaining that we all have our own unique mythic horizons. “The myth you live is comprised of the ensemble of contexts you take for granted. Myth gives us a reference point that orients us in reality. The myth you live is never lived or seen as one lives or sees somebody else’s myth; it is always the acceptable horizon within which we place our experience of truth. I am immersed in my myth, as others are in their own. I am not critically aware of my own myth, just as others are not aware of their own.”²⁴ Everybody lives within his or her own myth. Myth is not merely an object of the mind, but rather the context that retracts when the light of consciousness is shone upon it.

Classical myth was the product of communal religious sentiments about the origins of life and existence, although it did not attempt to explain the real reason behind the existence of the world. Instead myths tried to tie these important events to specific time and places and peoples. Most importantly, however, these myths acted as a great source of belonging and identity to their respective cultures, as well as providing a sense of continuity and guidelines for how to live. Creation myths play the same role for humans as memories do for the individual, whether they are true or fictitious.

Creation myths also exist as a cosmogony, or a tale that describes the original ordering of Nature and the universe as a whole. The term cosmogony is derived from the Greek

²⁴ Pannikar, Raimundo. *The Destiny of Technological Civilisation*, 20.

word 'kosmos', and 'genesis', meaning birth. Through creation myths, cultures articulated their individual sense of how the cosmos, or existence and order, came to be. All cultures have a strong desire to know where they originated and how their environment came into being, and almost every culture, ancient or modern, has their own set of creation myths to explain their existence and relation to the cosmos.

Myths of creation use cultural symbolism instead of scientific fact to explain the beginnings of life, instead of explaining events in relation to science. Science and scientific knowledge was not always the preferred method to explain the origins of life. "Creation myths describe an understanding that is significant whether advanced science exists or not. A modern Hindu scientist might well subscribe to the 'scientific' big bang theory of creation and in another part of his or her being have faith in the Hindu creation myth as a true metaphor for an ultimate reality that transcends science."²⁵ Science describes sequences of causation, but creation always has a mythic structure.

These myths symbolise a worldview. The way in which any given society perceives itself is directly reflected in that culture's way of life. Although each different creation myth expresses the central aspects of a certain culture, when various creation myths are compared there are similar patterns present in a majority of them. Many creation myths also contain a shadow myth that represents the world culture's collective dream of differentiation (cosmos) in the face of the constant threat of disorder (chaos). Therefore, the creation myth is basically a tale that tells the story of nothing evolving into something, as well as describing the defining moment of chaos becoming cosmos.

These myths also illustrate the difficulties in the quest to exist. A majority of creation myths fall into the following categories:

- 1) From chaos or nothingness (ex nihilo)
- 2) From a cosmic egg or primal maternal mound
- 3) From world parents that are separated
- 4) From a process of earth-diving

²⁵ Leeming, David. *Encyclopaedia of Creation Myths*, vii.

Or 5) from several stages of emergence from other worlds.²⁶

These different scenarios represent an important element of birth, both of the World and humans. In *Icanchu's Drum*, a detailed study of the religious beliefs and life of the South American peoples, Lawrence Sullivan summarises the significance of Nature and spirituality to all cultures. "In the imaginal condition, structures of the sacred appear before human awareness as fundamental to existence and as primordial. The first manifestation of these first-order realities discloses their meaningful nature. The experience of a beginning founds the imagination, for the context of beginning makes apparent those imaginal qualities that remain determinative influences in culture. Creation myths reveal the passage from nothing to something and the transformation of time and matter into newly ordered forms. Creation myths make clear the meaning of the world's appearance and the reasons why that meaning is no longer fully apparent. Myth's reality is not grounded in descriptions of the self-evident world that a people now inhabit, but on a myth's participation in the world of the beginnings."²⁷

As there are common themes and scenarios present in many creation myths, there are also archetypal characters that appear in each of these tales. These characters are:

- 1) The creator or creatrix – the primal, ordered form that wrenches cosmos from chaos, sometimes from clay, sometimes from the matter of its own body, and sometimes in conjunction with an equal and opposite natural power.
- 2) The trickster, who is sometimes a negative force and sometimes a culture hero, who dives to the depths of nothingness to find form.
- 3) A first man and woman, who continue the process of creation in our time and space and who sometimes fall from the creator's grace and are punished.

And 4) the flood hero, who, floating in the placental ark, represents the never-

²⁶ Leeming, David. *Encyclopaedia of Creation Myths*, viii.

ending urge for a new beginning.²⁸

All of these motifs are factors in a symbolic language with which humankind assumes its role as the consciousness behind creation.

Creation myths explain the making of something from nothing and the ordering of matter in the natural world, as well as allowing reflection on the spiritual meaning of these events. One of the most important functions of myths is to make evident the meaning behind the world's initial appearance.

“For reasons provided in myth, that kind of meaning is no longer self-evident or fully apparent. It must be made perceptible through myth in order to clothe fully apparent and mundane affairs in some measure of reality. Here is where myth finds its place, subtly related to an explanation of everyday events: myth explains that whatever is (whether it is oppressive or liberating, a historical or future event) has meaning. Concerning itself with the tiniest details of natural and economic history, myth offers an explanation for the fact that every aspect of the world is epiphanic and that the everyday appearance of things is actually significant of reality. Myth is an integral part of reality not because it describes the world which is self-evident, but because it characterises and even directly participates in the imaginal world of beginnings, a world no longer apparent and, as such, the *real* world where the meaning of all apparent signifiers must now reside.”²⁹

Humankind has always been fascinated with the creation of the Earth and the origin of the human race. In Western culture it is certainly true that the most important myths are those that deal with origin and creation. In ancient times, there was no logical explanation for this phenomenon, so the people created their own tales of how these events came about. The myth of Prometheus is one such tale that has filtered down through the ages, and has been the basis for several famous works of literature, perhaps the most celebrated and timeless of these tales being Mary Shelley's *Frankenstein*, suitably subtitled *The Modern Prometheus*.

The story of Prometheus' fall is one of the best-known creation myths; it deals with the creation of life forms from clay. This kind of clay-based myth is one of the most ancient,

²⁷ Sullivan, Lawrence. *Icanchu's Drum: An Orientation In Meaning in South American Religions*, 617.

²⁸ Leeming, David. *Encyclopaedia of Creation Myths*, viii.

which has been traced back to pre-patriarchal times when the creative powers of women were dominant. Earth, the origin of clay, is closely linked to the Earth Mother. Later myths that involve males as the individual sculpting the human form and breathing life into it indicate a shift to the patriarchal vision.³⁰

The tale of the over-reacher is a common theme in myth and literature that dates back to ancient times, occurring time and again in literature, two of the most famous examples being Prometheus and his successor Frankenstein. The link between the myth of Prometheus and characters such as Frankenstein is that they are overly ambitious. Frankenstein broke and pushed the laws of Nature to their limit and beyond, mainly for the sake of assuming control, achieving fame and claiming self-gratification. Dr Frankenstein is a modern Prometheus in that he too is a *creator* of life; ultimately both of these characters pay the ultimate price for their crimes against God and Nature.

Humans have been experimenting and fiddling with Nature for hundreds of years. This overwhelming desire to try to penetrate the sphere of Nature has meant that there are virtually no boundaries for human curiosity and experimentation, and these interventions are penetrating further and further into the realm of natural order. The unexpected consequences of these actions can often be disastrous. While humans have seemingly acquired Promethean powers, we have not learnt to appreciate or deal with the moral, ethical or natural ramifications of the responsibilities generated by such God-like powers that such an unimpeded rush towards scientific and technological progress could bring. It is impossible for scientists to foresee where the fruits of their experimentation may fall.

It is in the attempted creation of order that the possibility of evil and/or disorder emerges. Humankind breaks the strings of dependency with the gods, directly resulting in chaos. “The Promethean myth, at least in Hesiod, is not completely emancipated from its theogonic matrix; it continues to share in the defeat of the Titanic and chthonian elements belonging to the origin of things and to the genesis of the divine itself. Prometheus does not invent evil; he continues it; his guile is a sequel to the guile

²⁹ Sullivan, Lawrence. *Icanchu's Drum*, 34.

³⁰ Bulfinch, Thomas. *The Age Of Fable*, 22.

displayed in the theogonic combats.”³¹

There are a number of varying versions of the Prometheus myth, a myth that amalgamates creator and rebel into a single figure. One version of the myth tells of Prometheus the Titan, the son of Iapetus and Clymene, one of the daughters of Oceanus. Prometheus is one of the outstanding figures of Greek mythology, as he is widely perceived as the creator and the saviour of Man. His name translates to mean ‘forethought’; whether this is because his character was based on reflective thinking or because he was an actual person is unknown, although it seems like the former is true as many cultures have mythical heroes based on the character of Prometheus. The traditional myth of Prometheus tells that he shaped the figure of man from clay at Panopea in Boeotia, and Athene then breathed life into the sculpture. Another version of the myth, as told by Ovid, says that Man already existed, and Prometheus helped Man to ensure that he should have the best of any sacrifice made to the gods. He made two separate bundles from an ox carcass: one bundle was wrapped with fat around the bones, and the other had all of the best meat hidden inside the stomach. Zeus was asked to make his choice of sacrifice, and picked the better-looking bundle – leaving Man with the better part. As a punishment for his deception, Zeus hid the secrets of fire making from humankind. Prometheus once again came to the aid of man by stealing fire from heaven and brought it back to Man on earth hidden inside a fennel stalk. Prometheus then taught Man about the power of fire, and how acquiring this element made him different from the beasts of the animal kingdom. He taught mankind how to build and make tools, how to understand the position of the stars and how to heal through the use of plants. Zeus was infuriated that Prometheus had stolen from him, and in an act of vengeance ordered Hephaestus to forge an artificial woman from clay, and commanded Athene to breathe life into her. He then called on all of the other gods to make her beautiful and bestow her with gifts. She was then named Pandora, meaning ‘all-giving’. Zeus planned for her to be the destroyer of the human race, and she was sent to Earth with a sealed jar. Knowing that Prometheus was too wary to accept a gift from the gods, Pandora was sent to Prometheus’ brother Epimetheus, meaning ‘after-thought’, who accepted her despite warnings from his brother. As Prometheus predicted, chaos broke

³¹ Ricoeur, Paul. *The Symbolism Of Evil*, 209.

out when Pandora opened the jar that contained every ill known to Man³². Only one element remained: hope, this being the one thing that allows Man the ambition to survive. Zeus had managed to wreak revenge on humankind, and Prometheus was punished for eternity for defying the Gods.³³

³² 'Man' is used here as in the Greek 'anthropos' or Latin 'homo' to mean 'the human being', not just male.

³³ Stapleton, Michael. *Greek and Roman Mythology*, 210.

TAMING NATURE: HARNESSING OUR ENVIRONMENT

Humans have been attempting to uncover the secrets of Nature for centuries. It was this desire for knowledge, progress and power that brought about the age of the machine. The Mechanical worldview was essentially established by three men: Francis Bacon, Rene Descartes and Isaac Newton. Between them they effectively constructed a new worldview that is very much with us nearly 400 years later.

Francis Bacon argued that the Greeks had not perfected a single experiment to further the overall condition of man. The Greek method of learning aimed to discover *why* things were created and continued to exist. Bacon on the other hand wanted to develop control of Nature, rather than simply contemplating it. “Now the true and lawful goal of the sciences is none other than this: that human life be endowed with new discoveries and powers.”³⁴ He advocated the use of objective knowledge, which if correctly put into practice would allow humans to take control of every aspect of the natural order, in theory making all things possible.

Rene Descartes developed a mechanistic theory to enable the control of Nature through the use of mathematics. He created the concept of ‘universal mathematics’, which he believed contained all of the secrets of human reason. He also believed that mathematics was the key to all of the secrets of the universe, and was much more powerful than human knowledge alone. By the time of his death in 1650, Descartes’ mathematical theory had been accepted by many academics in Europe. This theory explained the forces of Nature in relation to matter in motion. Quality is turned into quantity, as Descartes believed that only space and location were relevant. This theory was based on total order: all elements of chaos were eliminated. Descartes believed that nothing could be more straightforward than mathematics. In order for this theory to work properly, the mechanical paradigm had to be predictable. Humankind would be unable to understand the Natural Order if the Gods were intervening in human life: divinity was therefore

³⁴ Rifkin, Jeremy. *Entropy*, 19. Taken from an essay written by Francis Bacon entitled *Novum Organum*, Book 1, Aphorism 2, which was first published in 1620.

displaced. This theory provided humans with the faith that they needed to uncover the secrets of the world.³⁵

Isaac Newton also developed theories based on mathematics to explain natural phenomena. Newton believed that all of the phenomena of Nature may be caused by forces by which the particles of the particles of bodies are impelled towards each other for unknown reasons, and cohere in regular figures, or alternatively are repelled and recede from each other. This theory could only be applied to objects in motion, as they were the only things that could be measured mathematically. Newton's mechanical worldview received widespread acclaim as it was straight forward, and most importantly, predictable. It mapped out a precise and simple order for all things, which could be understood through mathematical and scientific formulas.³⁶

The chaotic and unpredictable behaviour of humans was not reflected in the theories of Bacon, Descartes and Newton, yet how did humans fit into the natural order? Humans seek perfection, an aim that fit into Newton's mechanical worldview. "Unfortunately, here on Earth, most things in the primal state are in a chaotic and confused condition. Therefore, things need to be rearranged to bring the same order to our world as appears to exist in the rest of the cosmos. The question then arises as to how best to arrange the stuff of Nature so that it reflects the same kind of order that exists in the Universe. The answer, it was assumed, was to use the scientific principles of mechanics to rearrange the stuff of Nature in a way that best advanced the material self-interests of human beings."³⁷

Scientists have already discovered and refined a vast array of scientific methods with which they can play God, manipulating and altering many areas of the natural world once upon a time deemed sacrosanct. Controversial debate about the consequences and net worth of this type of genetic intervention became prominent when the secrets of DNA technology called the world's attention to its potential to alter the heredity of plant, animal and human cells. This process, known as genetic engineering or gene therapy is stronger and more topical today than ever before. We are in fact in the midst of a race to isolate and patent genetic structures for commercial products.

³⁵ Rifkin, Jeremy. *Algeny: A New Word, A New World*, 3.

³⁶ Rifkin, Jeremy. *Entropy*, 25.

³⁷ Rifkin, Jeremy. *Entropy*, 28.

In a letter to the President on June 20, 1980, the general secretaries of the National Council of Churches and the Synagogue Council of America and the United States Catholic Council addressed the potential problems of the rapid growth of the use of genetic engineering, the impact of the technology on human life, especially the unforeseen ramifications of this technology. “At times the cure may be worse than the original problem. History has shown us that there will always be those who believe it appropriate to ‘correct’ our mental and social structures by genetic means, so as to fit their vision of ‘improved’ humanity. This becomes more dangerous when the basic tools to do so are finally at hand. Those who play God will be tempted as never before.”³⁸

To fully understand the concept of ‘playing God’ we need to examine the scope of the role of humans in comparison to the role of God (as it is perceived and assumed by humans) in determining the human experience. Firstly, it is important to recognise that concepts of God and his role vary widely between different religions, different periods in history, and varying cultural and secular societies. The common religious assumption amongst a vast number of secular groups regarding the role of humans is that it is far more limited than that of God; that there is delimitation between God and humans. There is also the widely held belief that to break the boundary between the two is sacrilegious and will likely bring about dire consequences.

Humans continue to be reminded of the issue of Genesis or the Creation, which spells out to Bible-based religions that God is the sole creator of the natural order and the human race. Humans, an integral part of this order, seek to intervene and disturb the process and workings of the natural order, and are transgressing when they attempt to disturb and/or control human beginnings, nature or destiny. These matters are God’s concern, and not to be interfered with by human beings.

In 1949, Erwin Chargraff, a great humanist and chemist, discovered base-pairing, which revealed the key to the structure of the DNA helix. Twenty-five years later, Chargraff commented that by creating

“These freakish forms of life...we shall be throwing a veil of uncertainties over the

³⁸ Esbjornson, Robert. *The Manipulation Of Life*, 77.

life of coming generations. Have we the right to counteract, irreversibly, the evolutionary wisdom of millions of years, in order to satisfy the ambition and the curiosity of a few scientists? This world is given to us on loan. We come and we go, and after a time we leave earth and air and waters to others who come after us. My generation, or perhaps the one preceding mine, has been the first to engage, under the leadership of the exact sciences, in a destructive colonial warfare against nature. The future will curse us for it.”³⁹

The question remains: How much knowledge is too much, and what will we do with all this knowledge once we have it?

Several years later, Chargraff again spoke out about his opposition to interfering with Nature: “I consider to interfere with the homeostasis of Nature as an unthinkable crime. Have they peeped into creation and found it wanting? We do not yet have a pathology of scientific imagination; the urge to change the biosphere irreversibly could make an excellent object for such study... I have not been alone in protesting; I am certain that all these warnings will pass unheeded, the more so since the irrevocable process was started before there was even time for an alert.”⁴⁰

³⁹ Chargraff, Erwin. *On The Dangers Of Genetic Meddling*, *Science*, 192: 938-40

⁴⁰ Chargraff, Erwin. *Heraclitean Fire*, 190.

SCIENCE OR MAGIC?

Although not immediately apparent, the sciences are closely related to myth and magic. Science is simply a more intricate method of explaining the mysteries of Nature. The creation of Frankenstein's monster can be viewed as an act of magic. The primary difference between the magician and the scientist is that the magician desires to draw the world into himself, whereas the scientist does the opposite: he externalises and impersonalises the world with a movement of his will towards an attempt to exert control. Victor Frankenstein is the original and archetypal 'mad scientist', a man who perceives himself as the creator of a new species. In reality he is the deliverer of destruction.

Science took over where magic and alchemy left off. Magic, like science, was a method for predicting and controlling the functions of Nature; science simply provided more advanced and efficient explanations of events. "Science and technology, like magic, are not just theories about the universe; they are prescriptions for how humans can get the greatest benefit from interacting with nature."⁴¹ Like magic, science also has the potential for abuse.

Panikkar observes that almost everything that is recognised as having any value in today's society is seen as either scientific or humanistic. He explains that in the maxim of Protagoras "*Man is the measure of all things*, has not been surpassed when evaluating the two main ideas behind this assumption: that Man is the centre of everything, and measure is at the core of Man."⁴² This concept also suggests that humankind *is* Nature, establishing the assumption that the divine is present within humankind, although more often than not it remains hidden. This idea can be directly applied to the character of Victor Frankenstein and the self-centred ambition that drives him to create the monster. Frankenstein assumes the powers of the divine in creating artificial human life. Humans can be the mastermind behind creation, but only after we uncover the laws of nature and test and manipulate them at our own free will. Only then can we discover the apparently endless possibilities of the mind, and be "awe-struck to see that the physical universe

⁴¹ Schelde, Per. *Androids, Humanoids and other Science Fiction Monsters*, 10.

seems to follow the laws his mind discovers and can formulate.”⁴³

Frankenstein is the perfect example of a mere mortal breaking the bonds he has with nature, along with the reality of putting scientific theory into practice with dire consequences. The Doctor takes on a divine prerogative when he steals the life-giving role of the gods. He acts impulsively on the assumption that he possesses sufficient knowledge to be able to make his dream of creating life become a reality. *Frankenstein* symbolises the potential for the misuse of science and technology that comes with acquiring too much knowledge, or attempting to apply knowledge beyond the boundaries of the knowable.

There is little doubt that the new sciences, and new techniques developed for investigating the physical form of the universe, (based on the assumption that the information was readily available to man through the application of reason), was a contributing factor behind Mary Shelley’s inspiration for the novel. The new sciences “promoted a rational sceptical attitude from which truth could be discovered with more certainty than through the oracular method favoured by some two thousand years of magic and pseudo-science as the road to knowledge.”⁴⁴ The new sciences only encompassed facts that illustrated and supported the most precise information as the foundations of statements about the true nature of the universe. Nothing was taken for granted. Scientists no longer had to rely on previous findings for authority in experiments.

A Majority of literary critics unanimously believe that Shelley had little scientific knowledge. “Frankenstein’s chemistry... is switched on magic, souped-up alchemy, the electrification of Agrippa and Paracelsus... it is a mistake to call *Frankenstein* a pioneer work of science-fiction... the technological plausibility that is essential to science-fiction is absent.”⁴⁵ Despite these claims, scientific elements are still present despite the fact that they often remain invisible to readers of the novel who have little or no knowledge of scientific advances of the age.

⁴² Panikkar, Raimundo. *The Destiny of Technological Civilisation*, 6.

⁴³ Panikkar, Raimundo. *The Destiny Of Technological Civilisation*, 7.

⁴⁴ Vasbinder, Samuel Holmes. *Scientific Attitudes in Mary Shelley’s Frankenstein*, 65.

Critics have debated for decades whether or not Shelley truly believed that creating artificial human life in the laboratory could really be possible. It appears through Shelley's own writings about *Frankenstein* she did not really consider the prospect of creating artificial human life in the laboratory likely. However, she did not completely dismiss the possibility of it eventually happening, especially as a number of her peers and scientists of the age were convinced that it was an achievable feat. Shelley begins the Preface to the 1817 edition of her novel "the event on which this fiction is founded has been supposed, by Dr Darwin and some psychological writers of Germany, as not of impossible occurrence. I shall not be supposed as according the remotest degree of serious faith to such an imagination; yet, in assuming it as the basis of a work of fancy, I have not considered myself as merely weaving a series of supernatural terrors. However impossible as a physical fact, it affords a point of view to the imagination for the delineating of human passions more comprehensive and commanding than any which the ordinary relations of existing events can yield."⁴⁶

Frankenstein is an example of *speculative fiction*⁴⁷, a sub-genre whose the plots are set in futuristic or hypothetical societies, where new technologies are used to their advantage, ultimately causing distress and massive changes within the surrounding environment. "By its very nature speculative fiction, whose life is its powerful, imaginative spirit, assumes a protean shape. As a result the themes used are often so superimposed, or the ideas presented by a variety of speculative fiction novels are so different, that each critic, reader, and writer can set down his own parameters."⁴⁸ *Frankenstein* can not be excluded from this genre due to the subtle scientific tone of the novel that is set down from the very beginning of the story, namely in the letters of the English scientist and one of the novel's three narrators, Robert Walton. Despite this tone being maintained through much of the novel, it has largely been disregarded as 'pseudo-science' with little relevance to the state of scientific knowledge at the time the novel was written.

Frankenstein can be viewed from a variety of different perspectives. It is important to recognise the importance of science as a legitimate and crucial element in the novel,

⁴⁵ Vasbinder, Samuel Holmes: *Scientific Attitudes in Mary Shelley's Frankenstein*, 1.

⁴⁶ Shelley, Mary. *Frankenstein*, 1.

⁴⁷ Literary works which have scientific, or pseudo-scientific foundations

which after all prophesies the possible future of humankind with unnerving accuracy. The darker side of the prospect of creating artificial human life lies in humankind's overwhelming desire to achieve this goal. It may not be part of a universal harmony but rather a flaw of human ambition that may eventually bring about human extinction. "Those steering artificial life towards the creation of autonomous, evolving organisms truly will become the successors to the fictional Victor Frankenstein, who was destroyed not so much by his own creation as by his willingness to tamper with the justifiably forbidden."⁴⁹ Mary Shelley was the first to outline not only the science of her day, but its' shadow. H.G Wells entered the same territory nearly a century later with *The Island of Doctor Moreau*. The contours of science may have changed since then, but its shadow grows ever longer and deeper.

⁴⁸ Vasbinder, Samuel Holmes. *Scientific Attitudes in Mary Shelley's Frankenstein*, 2.

⁴⁹ Levy, Charles K. *Evolutionary Wars*, 346

THE IMPERFECT SPECIMEN

Victor Frankenstein questionably had the best of intentions when he planned the creation of his prototype, yet his efforts were far from successful. He took the greatest care when selecting the body parts with which he built his creation, parts taken from the charnel house, the slaughterhouse and the dissection room. The ill-fated Doctor took months assembling the parts in order to create a new kind of human being, a process that proved to be extremely difficult. “Despite the unusual knowledge of anatomy Victor is pictured as possessing, his labour to bring together these disparate parts into a coherent whole undermines his physical well-being and destroys his analytical judgement.”⁵⁰

Victor manages to complete the massive task that he sets himself; however, it falls woefully short of his expectations. Victor’s study of natural philosophy is initially so successful that “after days and nights of incredible labour and fatigue, I succeeded in discovering the cause and generation of life.”⁵¹ He does not manage to create a handsome creature as he intended. Instead, he gives life to a monstrous being, so repellent that he immediately flees from it.

The moment of the monster’s birth is without doubt the most horrific event in the novel. However, not all of the horror stems from the physical appearance of the monster. Much of the tragic element of the novel originates from Frankenstein’s immediate rejection of the creature he gave life, and his complete denial of any responsibility for the life he created. Much of the book is seen through the sorrowing, pathetic eyes of the daemon abandoned by its creator.

Frankenstein has often been referred to as a drastic reworking of the natural birth process experienced by women, and the emotions that go along with it. The central focus of *Frankenstein* is undoubtedly the artificial creation of human life; the monster being the result of Victor Frankenstein’s experiments with the manipulation of life. Another of the most horrific yet relevant events that Shelley illustrates are the effects of childbirth without the involvement of a woman, and the disastrous results of not assuming

⁵⁰ Vasbinder, Samuel Holmes. *Scientific Attitudes in Mary Shelley’s Frankenstein*, 38.

responsibility for the creation of human life. We are shown the creation of artificial life; a process that has effectively excluded the role of the mother in every respect. Victor tells his story of creating life, clearly illustrating the horror of creating life outside of the womb, and the horrific consequences of his ultimately selfish actions. His actions are the result of pursuing knowledge for the sake of knowledge, with little regard for the possible outcomes. Frankenstein fantasises about creating his own race of super humans exclaiming, “a new species would bless me as its source; many happy and excellent natures would owe their being to me. No father could claim the gratitude of his child so completely as I should deserve theirs.”⁵²

“After Frankenstein makes the decision to use his triumph over nature to create life, he becomes an horrific double of a pregnant woman. He is not in control of the process of creation, but is driven by its demands, executing his task with unremitting ardour. He is physically changed and decreases in size, in a nightmarish reversal of the effects of pregnancy in a woman’s body. He comments “My cheek had grown pale with study and my person had become emaciated with confinement.” Frankenstein’s creature is actually nothing short of a parody of nature and the process of childbirth, believing that he can renew life where death had apparently devoted the body to corruption.”⁵³ It is also interesting to note that Frankenstein spends a period of nine months on his creation, a period consisting of “winter, spring and summer”⁵⁴, the same length as a normal human pregnancy. Ironically the creature is not brought to fruition during spring, the season of rebirth, or at the end of winter as a symbol of hope. Instead, the creature is brought to life in autumn, the season traditionally associated with death.

Frankenstein is also often considered to be a woman’s perspective on the process of childbearing and birth, due to Frankenstein’s reactions to the horrific aftermath of the birth of his creature, especially the overwhelming emotions of guilt, fear, depression and anxiety Frankenstein endures after the birth of the monster. “These secret fears about the child growing within the woman’s body and her resentment of its control over her hitherto independent physical existence, are acted out in the unbalanced and neurotic

⁵¹ Shelley, Mary. *Frankenstein*, 37.

⁵² Shelley, Mary. *Frankenstein*, 22.

⁵³ Shelley, Mary. *Frankenstein*, 54.

⁵⁴ Shelley, Mary. *Frankenstein*, 56.

behaviour of Frankenstein in the creation and abandonment of his ‘child.’”⁵⁵

The moment of the monster’s creation is the turning point in the novel; this single event being the catalyst for all of the horrendous events that follow. Victor’s description of the ‘birth’ of the creature immediately indicates that he does not share the same feelings for his creation as a mother would have for her own child. This crude intervention with the workings of nature is seen in the inherent contradiction of his seeking the tools needed to create life in places of death.

Mary Shelley’s own turbulent experiences of pregnancy and childbirth are reflected in *Frankenstein’s* narrative. Mary and Percy Shelley’s first daughter, Clara, was born prematurely and died eleven days after her birth. Their second child, William, was born in 1816 and died at age 3. Their third child, also named Clara, died in 1818. After four pregnancies, the only child that survived was their fourth, Percy Florence, born in 1819. The untimely deaths of three of her children brought about an immense feeling of failure for Shelley. It is believed that this is one of the main reasons why Mary Shelley’s most famous novel raises daunting questions about the creation of life. “Implicit also in Mary Shelley’s novel is the feminist’s vision of a ‘male pregnancy’ and the horror which comes from this distortion and perversion of female pregnancy when reproduction is removed from the female sphere. While Frankenstein does enact female fears about childbirth, it is also a profound criticism of masculine ambition and belief in the possibility of complete control over Nature.”⁵⁶

Frankenstein is a horror story of two parts that are almost interwoven with each other. Firstly, the creature is abandoned by its creator, and faces an incredibly lonely existence – alone as no living creature has ever been alone before. Secondly, the creator finds to his horror that his own creature rebels against him and destroys all that he loves. The monster eventually hunts his creator down and destroys him too. The creator defies the Gods and loses control.

“Until very recently, systematic thought about knowledge, beliefs, attitudes, desires, preferences and obligations has been concerned with only two kinds of agents: humans

⁵⁵ Newey, Katherine. *Mary Shelley’s Frankenstein*, 20.

⁵⁶ Newey, Katherine. *Mary Shelley’s Frankenstein*, 22.

and gods. Until this century, the best mechanical analogue for thought was clockwork (recognisably inferior to biology), and the fantasy of creating something with knowledge could be achieved only by giving the mysterious quality of life to some dead or inert mass, risking the gods' wrath or vengeance. Frankenstein's monster was the most vivid imaginable thinking creation of human science".⁵⁷ Unlike many other Gothic horror stories, *Frankenstein* does not draw from the supernatural: instead it is horrifically rational. There is also a distinct element of failure in that daemon failed to meet the Doctor's ambitions. Frankenstein attempted to cheat Nature and defy the Gods by trying to find the principles of human life, and he pays the ultimate price. The monster is also left to self-destruct. Frankenstein's death at the conclusion of the novel is the final death in a chain of fatalities and destruction that drives the pursuit of the monster.

An intriguing feature of the novel is the ambivalence of the plot that is left unresolved, an approach in literature that was rare when Shelley wrote the story. Victor Frankenstein's narration of the events that lead up to the creation of the daemon illustrates the reality and blurred logic of his ambition. This narration offers the reader an intimate insight into Frankenstein's intellectual development and his scientific experimentation. It is also a device to convince the reader of the rationality of the story.

Frankenstein's character, like Goethe's Faust, desires to know much more than his mortal body and society can explain. On several levels *Frankenstein* is a reworking of *Faust*, and in fact comes closer to Goethe's tragic tale with every advance in biotechnology. Unlike Faust, however, whom Mephistopheles tempted with the knowledge of the supernatural, Frankenstein's temptation comes from his attraction to natural philosophy and biology. *Frankenstein* is a story based entirely on the actions of humans, without interference from the fantastical.

Perhaps part of Frankenstein's timeless essence is the representation of the dramatic impact of science on modern life and our constant fear that that the things that we create may be beyond our control. The monster symbolises the power of untamed nature, and one of the greatest literary examples of science gone wrong: a specimen developed by a human attempting to capture, corrupt and control the natural environment. This monster

⁵⁷ Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 11.

exists as both a product and a warning of the repercussions of trying to dominate nature, and possibly bringing about a human-created apocalypse.

Many peoples first encounter with *Frankenstein* is in the cinema rather than from reading the novel. Despite the fact that the original tale has been through countless adaptations and has found its way into popular culture, Shelley established a set of archetypes that remain extremely relevant today. It is these archetypes which form the foundations of the various re-workings of the Frankenstein theme.

CHAPTER 3: BRAVE NEW WORLDS

TOMORROW HIT TODAY: THE SCIENCE FICTION FILM

Finding a comprehensive yet not overly complicated definition for science fiction film is difficult. Definitions vary greatly between critics. Per Schelde, however, provides a broad description of the genre, commenting that a true science fiction film is one that has a plot that is purely fictional, with the main focus highlighting a form of fictional or speculative science.⁵⁸ In many of these sci-fi films these fictional plots are literally becoming a reality. The thought of building a functioning human being from scratch in the laboratory would have seemed incredibly far-fetched in Mary Shelley's day, yet it is quickly becoming a reality in this age of seemingly unrestricted scientific pursuit.

Contrary to popular belief a majority of sci-fi⁵⁹ films do not focus on aliens and the far reaches of outer space. Instead, a majority of the films deal with disasters of an earthly nature, often brought about by the most ambivalent tool in the possession of the human race - technology. One of the genre's most common themes since the 1950s has been that modern science will either save us, or ultimately destroy us.

Sci-fi is often more focused on the present than the future. The genre embraces and reflects the aspirations and attitudes of the time in which it was created. An excellent example of this is the overwhelming and apparently unconditional belief in technology and patriotic American supremacy in the original series of Star Trek that first hit TV screens in the 1960s. In comparison to later series of the cult classic that were made in the 1990s, where the crew of the Star Trek Voyager were drifting aimlessly through space trying to find a way home. If the sci-fi genre does in fact tell us more about the present than the future, it would seem that through humankind's unrelentless desire to take science and technology to their limits, we expect to create our own dystopia. Ironically, the only release from this dystopia will come from the technology that has caused it; through the use of genetic engineering, artificial intelligence and virtual

⁵⁸ Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 15.

⁵⁹ Science Fiction will hereby be referred to as 'sci-fi'

reality. Instead of following the rhythms of Nature, we will instead become dependant on the machines we have created. Reminiscent of Dr. Frankenstein, this is another example of the controller out of control. The common thread in all of these works - both literary and cinematic - is the ultimately destructive human desire for more, no matter what the consequences.

With a distinct shift in social and cultural climates since the sci-fi genre's pinnacle in the 1950s, the standard sci-fi themes have been approached in a different fashion. As a result the audiences going to see these films has also changed dramatically. "Nuclear, computer, robotic, communication and gene-splicing technologies have advanced far enough into the daily lives of large segments of the US population that social and psychological issues have emerged - both for individuals and the broader society - that require narrative symbolisation. The new science fiction films seek at various levels to meet these needs."⁶⁰

Sci-fi films exist as a modern folklore: largely fictional accounts of the continuing battle between human beings and the environment in which they exist, or more specifically, the battle between nature and culture. "Typically, nature is anthropomorphised and is given some kind of human-like - but awful and dangerous - form. Nature in folklore is represented as trolls, monsters, ogres, leprechauns, elves, nixes, and other such creatures that humans need to befriend or do battle against in order to keep their own distinct domain, that is, culture, intact. The battle is between the raw power of the ogres and trolls and the ingenuity and inventiveness of humans: Science and technology."⁶¹

A possibility for the disappearance of these symbols of folklore from modern culture is that as we began to understand more and more about nature, these traditional figures faded from memory as they were surpassed by science and technology. These monster-like creatures of traditional folklore embodied humankind's fears of the unknown powers of Nature, representing the struggle between Nature and the various stages of human civilization. The new monsters present in sci-fi films reflect the struggle between humanity and the dangers of the unrestricted use of science and technology. Schelde maintains "SF science is real science seen through a troll mirror. 'Real' science has a

⁶⁰ Glass, Fred. *Science As Culture*, 7.

reputation for being emotionally restrained, dignified, serious, and respectable. SF science shows the 'true' face of science, that it is potentially dangerous, that it is about egos and fame and fortune, and that it is a threat to the ordinary Joes/ Janes of this world. Real science tries to solve scientific quandaries and make humans increasingly masters of their environment."⁶²

Sci-fi is the most popular cinematic genre of all time, producing messages and images that oppose the dominant ideology. Sci-fi films strayed away from the common beliefs and values held by the masses, and instead dared to explore issues such as alien life forms, androids, and the creation of artificial human life. However, this subversion never goes very far. In fact all that these films manage to do is indicate that something is wrong. As a form of modern folklore, science fiction exposes the fears and anxieties of the masses that have no say about the path that science and technology and our collective future takes.

Through the medium of sci-fi cinema we have come face to face with the fate of the human race through the arrival of alien life forms, nuclear radiation, adventures-gone-wrong in outer space, and modern science either saving us or ultimately destroying human life and, quite possibly, the entire planet. "By the end of the 1960s, we knew that the world was in crisis, perhaps the most profound crisis in human history. Although our species now possessed the science and technology potentially allowing us to shape the future of the planet according to human needs and desires, we faced these forces as alien powers - which we ourselves had created - slipping out of our control and threatening to wipe us off the planet."⁶³

Information technology and gene-splicing technologies have moved far enough into the day-to-day lives of a majority of the population that a number of social and psychological issues have come to the surface that require narrative symbolisation. Today's generation of sci-fi films seek at various levels to meet those needs. This new generation of films differ significantly from their predecessors in that they no longer share the same liberal ideology of progress. "The worldview was already in crisis at that

⁶¹ Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 3.

⁶² Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 4.

⁶³ Franklin, H. Bruce. *Future Perfect: American Science Fiction Of The Nineteenth Century*, 73

time, when some films displayed advance signs of crumbling belief in the forward march of an inexorably positive scientism. But crisis is not the same thing as collapse. By contrast, many of today's films reject this former linchpin of American capitalist ideology, and propose another model entirely of where we are and where we're going."⁶⁴

Sci-fi offers predictions of the future, forcing us to question if this is really the direction we want to be heading in. We foolishly assume that life will be better in the future. We rush headfirst into projects for improvement of self or environment, putting into motion our hopes and ideals which somehow manage to cancel out our mistakes of yesterday and today. Most importantly, these films illustrate that we are ill prepared to face the future.

We are no longer being dished up visions of the perfect utopia, but rather a vast array of dystopia caused by our flippant approach to technology. These films often offer a rather pessimistic vision of the future where technology evolves more rapidly than humans do. Alternatively, these films also show that science can also be a good thing used for beneficial purposes, as long as its limitations - and ultimately its downfalls - are known, along with its place in relation to God and Nature.

The intention of the protagonists that appear in many sci-fi films is not always to make the world a better place to live in. When their intention is simply to discover and experiment, problems are bound to arise. As the Frankenstein character comments in Frank Whales' 1936 film adaptation of Shelley's novel "Where would we be if no-one tried to find out what lies beyond? Have you ever wanted to look beyond the clouds or the stars to know what causes the trees to bud and what changes darkness into light?" The Frankenstein in Whale's film chooses to live within his human limits, and decides to know only what a human should know. However, the Victor Frankenstein of Mary Shelley's novel becomes the victim of his own scientific arrogance and madness. Shelley's tale is in fact a Gothic novel, whereas Whale's film is a Hollywood production, where the audience expects a happy ending; at the conclusion of the film Frankenstein survives and the creature is destroyed.

⁶⁴ Glass, Fred. *Science As Culture*, 47.

Whale's film adaptation of *Frankenstein* is still regarded as the definitive screen adaptation of Shelley's novel. However, much of the film's greatness comes from the moody atmosphere created by Whale, rather than from the film's script. This cinematic adaptation created a lasting image of Frankenstein's creature. Whale's monster was a hideous fiend who was unable to speak.

The changes in the film's content are the result of the translation from one medium to another, as well as a change in audience. The adaptation of the novel to film resulted in the elimination of the narrative frames of Shelley's novel; the only narration that remains is that of Dr Frankenstein (whose name is changed from Victor to Henry in the film version).

The creature also undergoes significant changes in the transformation to film. The novel attempts to humanise the monster, whereas the film dehumanises him. By doing this the chance of the viewer identifying with the monster is gone. Another significant change occurs in the reason behind the creature's evilness. In the novel he is the result of his social circumstances. At the beginning of the plot he means no harm, but he is rejected by everybody because of his appearance. His actions are a direct result of the way he has been treated by those around him. In the film version the creature's evilness comes when Frankenstein's assistant Fritz is supposed to steal a perfect brain for the creature, but instead steals the brain of a criminal. By making the monster's aggression the result of an abnormal brain, the novel's idea of the monster's behaviour being directly caused by a reaction to the neglect by his creator and his personal experiences are removed.

PREDICTING THE UNPREDICTABLE FUTURE

It is unlikely that a fully functioning human being will ever be created from assorted body parts collected from cemeteries and slaughterhouses, however, it is highly probable that humans will soon be created (or manufactured) within the laboratory through genetic engineering⁶⁵ and biotechnology research. G.E can be applied to everything of living origin: humans, animals, plants and pharmaceuticals.

Claims have already been made from several groups, including Canadian-based cult the Raelians, that the first cloned human has already been born, although evidence to support these claims is yet to come to light.⁶⁶ Bringing new meaning to the term 'test-tube baby', this process draws further attention to the debate over the morality of creating artificial human life. G.E takes the gift of life out of the hands of the deities, therefore Nature is in danger of becoming obsolete as scientists attempt to control and manipulate every aspect of the human genetic genome. The question remains of how far scientists will go to create the perfect human being or human-animal hybrid. More importantly, what will the consequences be?

When Prometheus stole fire from Zeus he made civilisation possible. As Prometheus harnessed fire to carve the future of humankind, we have begun the process of harnessing the human gene to shape our future. We now hold the power to shape life itself. We are witnessing a fundamental shift in worldview that will ultimately determine the future of human evolution, and the evolution of all species on the planet.

Nature is rapidly evolving into a technology. The boundaries between the natural world and technology are becoming increasingly blurred. Jeremy Rifkin, biotechnology critic and President of the Foundation of Economic Trends in the United States, is currently attempting to officially address these concerns by applying for a patent to stop any

⁶⁵ Genetic engineering will hereby be referred to as G.E

⁶⁶ The Raelians claim that a clone of a dead child will be the first baby produced by Cloneaid, a for-profit subsidiary of the Raelian cult. The group even went so far as to advertise their cloning service on the internet. It has also been revealed that the Raelians rely on techniques developed for animal cloning.

possible future attempts to create human-animal hybrids.⁶⁷ Rifkin has spent the last three decades as a strident voice in the campaign against the unrestricted use of genetic technology. It has been his aim to increase public awareness of the problems and challenges that science, technology and economics (all of which are closely linked) present. Despite accusations of being an alarmist, Rifkin does not advocate a complete ban on G.E. Instead, he has popularised the debate about moral and ethical dilemmas surrounding these technologies, and urges that extreme care be taken when we applying these new technologies, as we are still largely unaware of the possible consequences of putting these new technologies into practice.⁶⁸ He advocates that the temptation to design human beings will persist. The ability of genetics to re-engineer each generation could undermine our sense of self, and the idea that one's identity is partially shaped by the natural world.

Through this proposed patent, labelled the *Frankenstein Patent*, Rifkin and associate Stuart Newman aim to prevent groups or individuals from moving large amounts of genetic material from humans into animals and vice-versa. Animals that carry human genes already exist, as do crossbred animals. A part sheep-goat, or 'shoat', was created several years ago. Although the application is yet to be made fully public, its main purpose is to patent genetic techniques that are currently only theoretical at this stage. Their main fear is that scientific studies will soon use animals that clearly have been developed to bear human traits and genetic material. Biotech researchers have labelled the application as a publicity stunt rather than a legitimate means of blocking research of this kind. The U.S Patent and Trademark Office (PTO) have brought into play a morality clause that is rarely used to disregard Rifkin's patent on the grounds that no such experiments are currently being undertaken (that we are aware of)⁶⁹. This proposed patent has again sparked off the debate of just how far is too far?

Transgenic animals, already covered by myriad patents, are already a large part of the biotechnology industry. It is estimated that animals such as these will generate billions of dollars over the next two decades. Mice, rats, sheep, goats and cows have already

⁶⁷ Rifkin has spent the last three decades as a strident voice in the campaign against the unrestricted use of genetic technologies. It has been his aim to increase public awareness of the potential problems and challenges that science, technology and economics present.

⁶⁸ Rifkin has also been labelled a biological fundamentalist, and was named by *Time* magazine 'The Most hated man in science.'

undergone genetic alterations that have given them human genes, as well as being extensively used for disease and drug research. Transgenic pigs are already being used to produce organs that will eventually be able to be transplanted into humans. Cows, sheep and goats have been genetically modified to produce human proteins in their milk. The PTO considers living organisms to be compositions of matter that has been available for patent since 1980. Patent applications must explain how an experiment is to be carried out to meet Enablement requirements, which means other scientists must be able to duplicate the techniques. Applications must also show the purpose of the proposed invention by describing its potential applications. As Rifkin and Stuart have not actually performed the techniques that they wish to patent, it is unlikely that they will have enough valid data to prove Enablement. Another factor that counts against their case is that they have included other scientists' prior work, such as the shoat, as examples of how their theories could work. Two previous applications made to the US Senate to prevent human cloning, after the cloning of sheep such as Dolly, have failed.⁷⁰

The tough questions still remain: should scientists be able to hold the kind of power cloning represents without restraint? Should we progress with this technology regardless of the possible risks? The closer we get to understanding the molecular nature of what makes us a human, the more we think about manipulating humans, but at what point do we cease to tamper with Nature? History has taught us that the line is drawn when it comes to a point that seems unimaginable from where we are today.

Biotechnology brings with it countless problems that will impact on us all. What happens when we begin to regard life as intellectual property when all of the genes in the human body are being patented? How do we go about protecting our own individual and unique genetic privacy and rights? Rifkin urges the scientific community to use more prudent technology: the more conservative and less radical options. He believes that the question is not whether or not we favour science and technology, but instead what science and technology we want to take for ourselves.⁷¹ How do we choose how to use this new knowledge and technology? The intellectual and instinctual habit of humans is to dominate and take control of Nature with force from a distance. Perhaps a better

⁶⁹ Retrieved 13 October 2003, from www.biotechcentury.org/rifkin.html

⁷⁰ Stix, Gary. Jeremy Rifkin: Dark Prophet Of Biogenetics. Retrieved 25 January 2003, from www.sciam.com/0897issue.html

approach would be to encourage scientists who are seeking to understand life and Nature to properly grasp how things relate to each other. Both options are available, but only one will prevail.

If we once again turn back to our literary sources, we will see that the idea of combining human and animal genes is by no means new. H.G Wells, the godfather of sci-fi literature predicted the onset of human-animal chimeras in his classic novel *The Island of Dr Moreau*.

⁷¹ Retrieved 13 October 2003, from www.biotechcentury.org/index.html

THE STRANGEST TRIBE: EVOLUTION OR DEVOLUTION?

Following in *Frankenstein's* footsteps, Wells' classic tale of human-animal hybrids is another literary example of scientific experimentation gone wrong. First published in 1896, the novel shocked readers with its controversial and grotesque subject matter. The shipwrecked narrator finds himself on an island where Moreau plays god and engineers his own animal-like humans. Wells constructs one of the most fundamental concepts of the science of modern man. He draws particular attention to the argument of nature versus nurture, a potent debate that is a great deal more relevant today than in Wells' time; a debate also prevalent in Shelley's *Frankenstein*. The true horror of the novel is that the island is a microcosm for an amoral world, lacking a god or Nature to control the fate of man.

The Island of Dr Moreau is arguably the most famous literary tale to incorporate the use of vivisection⁷²; highlighting the scientific rationale of the novel. The story revolves around Dr Moreau attempting to create human-like beings, or chimeras, through vivisection. Wells' earlier works such as *The Time Machine* and *The Invisible Man* were, according to Wells, little more than a vague suggestion of future events. However, *The Island of Dr Moreau* is different. The first editions of the book published contained a foreword by Wells stating "there can be no denying that whatever amount of scientific credulity attaches to the detail of this story, the manufacture of monsters, and perhaps even of quasi-human monsters, is within the possibilities of vivisection."⁷³

Wells penned the novel in the late nineteenth century, about a British psychologist who is driven from England due to his mutilating experiments involving animals. He takes refuge on an island in the South Pacific where he works in seclusion, and sets about transforming helpless animals into crude human-like beasts through vivisection. Moreau's unbridled thirst for knowledge is undoubtedly reminiscent of Dr Frankenstein.

Moreau attempts to justify his research by saying that he is simply refining techniques of vivisection that have already been established, and while living on the island, is able to

⁷² Dissection or other painful treatment of live animals for scientific research

continue his unrestricted experimentation to his heart's content. Moreau justifies the nature of his research by explaining "You see, I went on with this research just the way it led me. You can not imagine what this means to be an investigator, what an intellectual passion grows upon him. You can not imagine the strange odourless delight of these intellectual desires...to this day I have never troubled about the ethics of the matter. The study of Nature makes a man at last as remorseless of Nature."⁷⁴ Moreau effectively turns Heaven into Hell, and the results of these experiments are grotesque chimeras. Although Moreau's attempts to create the perfect specimen were unsuccessful, Wells himself was actually a technological optimist. *Frankenstein* was Shelley's comment about our collective ambivalence and fear towards the progress of science and the unrestricted pursuit of knowledge. Wells, on the other hand, focuses on one side of the debate about scientific progress and the possibilities of experimentation. Wells himself was not opposed to vivisection, having trained in biology.⁷⁵ The inclusion of vivisection within the novel was Wells' attempt to blur the boundaries between humans and animals. Moreau is eventually killed by one of his creatures, and they follow their evolutionary path and revert back to their animal instincts, illustrating firstly that evolution is far more powerful than human intellect and tampering with the laws of Nature, and secondly, that humans can never really be sure of the outcome of scientific experimentation. Like *Frankenstein*, *The Island of Doctor Moreau* is also a cautionary tale about upsetting the balance of Nature, and the boundaries of the human quest for knowledge.

The novel was successfully adapted for the cinema as *The Island of Lost Souls* and under its original title in 1977. The film was once again adapted for the big screen in 1996 by John Frankenheimer and Richard Stanley; however, this version fell woefully short of expectations. The film is set in the year 2010, starring Marlon Brando as Dr Moreau. Critics agree that this particular adaptation failed to have the same impact as the novel. Unfortunately the human-animal monsters do not come across as examples of science gone awry, but rather they look like childish creations, and because of this the film fails to be convincing.⁷⁶

There are a rapidly increasing number of creatures that have had their DNA altered or

⁷³ Turney, Jon. *Frankenstein's Footsteps: Science, Genetics and Popular Culture*, 55.

⁷⁴ Wells, H.G. *The Island Of Doctor Moreau*, 152.

⁷⁵ Wells, H.G. *The Island Of Doctor Moreau*, ix.

tampered with. Along with Dolly the sheep there is also Andi,⁷⁷ a rhesus monkey that has been genetically altered. Andi was created by scientists in Portland, Oregon, who inserted glow-in-the-dark jellyfish DNA into Andi's embryo.⁷⁸ The question has to be asked as to what use there could possibly be for a monkey that glows in the dark. What other reason could there be behind such an experiment other than pure curiosity? This same 'novelty-value' technique has also been applied to glow-in-the-dark fish for aquariums as well as several cats. This type of experiment is a good indicator of what this kind of technology will mean for us in the future.

Our primary concern should be the multitude of changes that will come about once G.E becomes commonplace, and the way that these technologies will alter our perception of ourselves. There are many benefits to be reaped from these new gene-based technologies, such as possible cures for terminal genetic diseases. What could prove to be disastrous is the sheer speed of these developments and the staggering amount of capital presently being poured into genetic research. This rapid build-up of pressure in the race innovate and beat the competition to patent new life forms will inevitably lead to disaster, probably sooner rather than later. This could also mean that there is less time for biotech companies and researchers to properly consider the political and social effects of their actions.

Rifkin addressed these concerns in his 1983 book *Algeny*.⁷⁹ The alchemists were firm believers that no borders exist between different chemical elements as each different element could be merged with others. Biologists also believe that the barriers that separate the different species are moveable, therefore different species and any transgenic alterations made to them are part of a continuum. According to these two groups, all genetic material is moveable. "Algeny merely means to change the essence of a living thing. The algenic arts are dedicated to the 'improvement' of existing organisms and the design of wholly new ones with the intent of perfecting their performance. But algeny is much more. It is humanity's attempt to give metaphysical meaning to its emerging technological relationship with Nature. Algeny is a way of thinking about Nature, and it is this new way of thinking that sets the course for the next

⁷⁶ Due to the poor reception this film received, there is little worthwhile analysis available to critique here.

⁷⁷ 'Inverted DNA' spelt backwards

⁷⁸ Retrieved on 14 September 2004, from www.thehumanfuture.org/topics/background.html

great epoch in history.”⁸⁰

Many works of literature have successfully managed to foreshadow our collective futures. It is this prophetic element that makes many of these works so enduring. *Brave New World* presents a startling vision of the future, and is considered to be Aldous Huxley’s most enduring work: it is a classic work of sci-fi that, like *Frankenstein*, continues to be a significant warning to society and culture today. Within the novel Huxley successfully foreshadowed many of the practices and technologies that we now take for granted.

Written in the 1930s, the *Brave New World* delivers a dark and prophetic message. Huxley’s premise was that in the not too distant future there would be one world government, taking away our freedom as individuals. Although this idea was by no means new, Huxley’s interpretation is different in that his fictional society embraces the totalitarian government. Soma is the weapon of choice – a drug that is handed out by the government to dull the masses. It is a world without pain, but also a world without soul. Huxley maintained that the theme of *Brave New World* is the advancement of science as it affects human individuals.⁸¹

The conflict within the novel lies between utopianism and primitivism, more specifically a world run efficiently by science, or a human environment where culture and spirituality thrive. ‘Community, Identity, Stability’ is the motto of Huxley’s world state, yet there is a distinct clinical detachment to the society. He has portrayed a genetically engineered, drugged utopia which seems more and more prophetic by the day.

Perhaps the society Huxley illustrates in *Brave New World* will become a reality in the near future, a society which has built its foundations on genetic technology, in an attempt to perfect the human race, where every human is ‘programmed’ to be satisfied with their pre-determined existence. Each class in this society is custom-bred to meet specific criteria; the Alpha-Plus are at the head of the hierarchy while the Epsilon-Minus Semi-Morons are bred for menial labour. The ‘exiles’ who choose to live a more traditional

⁷⁹ A term defined by the combination of analogy and alchemy.

⁸⁰ Rifkin, Jeremy. *Algeny*, 3.

⁸¹ Huxley, Aldous. *Brave New World*, ix.

existence are confined to 'savage reservations'. Segregated from the genetically superior citizens of a Fordist society.

THERE IS NO GENE FOR THE HUMAN SPIRIT

"Consider the work of God - who can make straight what he has made crooked."

Ecclesiastes 7v13

Being human is synonymous with being imperfect. If human imperfections were permanently erased by science we would quickly forget what it means to be human.

Scientists and ethicists alike are comparing our current position with the beginning of atomic research in the 1950s and 60s when humans were discovering new powers but had little practical or moral understanding of where these powers could take us. Over the last several years, genetic research has given us a much clearer understanding of a vast array of genetic illnesses, not to mention behavioural traits such as depression, sexual promiscuity, musical and artistic ability.

Rifkin predicted over twenty years ago that genetic screening would firmly be in place by the end of the century.⁸² Although this has not yet happened, this is the scenario presented to us in *Gattaca*. This is a sci-fi film, and like Huxley's *Brave New World*, is set in the not too distant future, a future that we are all anxious to see. This film falls into a sub-genre referred to as 'social science-fiction', where alternate futures are presented in a completely believable manner.⁸³

Gattaca, reminiscent of Huxley's *Brave New World*, explores the controversial implications that genetic engineering will have on society as a whole, and how we may come to deal with a culture based on science and technology. The landscape of *Gattaca* is aesthetically beautiful and embraces extraordinary achievements, but it is also a world governed by the laws of genetics at every level. Those who are of inferior genetic breeding are labelled 'degenerates', 'in-valids' or 'faith births'. Our protagonist Vincent's parents decide to have a second son through the ironically named 'natural birth' process, a procedure involving the careful genetic selection and manipulation of specific human genes. This carefully engineered child inherits only the best features of

⁸² Rifkin, Jeremy. *Who Should Play God*, 2.

⁸³ Retrieved on 21 November 2004, from www.whatshotin.com/movies/gattaca/html

both the mother and father. The product is a child worthy of his father's name – Anton.

*Gattaca*⁸⁴ sets the tone for the genetic debate early in the film. This is a society where it is no longer preferable to conceive children naturally. Instead, a geneticist-cum-paediatrician designs children to order. It is a world where sex and reproduction have become interdependent. In the opening scenes of the film doctors take blood samples from the baby at birth to immediately determine the child's genetic defects; namely heart disorders, neurological and psychological conditions and life expectancy. Their genetic and future is therefore prescribed to them at birth. "Although the long columns of statistics are initially baffling, the doctor points out that most of the risks are normal, or below normal, and that the only worrying figures are somewhat elevated probabilities of diabetes or hypertension. Like many others who have experienced the new medicine, the parents are grateful that they can take rational steps to promote their child's health."⁸⁵ Although at this stage this is only a fictional procedure in a film, this is the kind of technology that may become commonplace in the not too distant future.

Writer/director Andrew Niccol illustrates a landscape where genoism⁸⁶ runs rampant. The film addresses several of the most important arguments in the G.E debate: as we strive for perfection, how will we co-exist with the scientific powers that are coming to fruition today? The fact that *Gattaca*'s society is so believable is one of the most alarming aspects of the film. This is an environment where power over genetic material is both political and economic; only the wealthy can afford to utilise the new genetic technology: the wealthier you are the better off you are. Only the wealthy have the power to can control their offspring's genetic destiny. This also illustrates that as the technology increases, so does isolation. Vincent's isolation due to his genetic 'inferiority' is extreme. It is in fact so severe that he will give anything – including his life – to escape from it.

In this film discrimination has quite literally become a science. This society has been segregated into two distinct groups – the Valides, those with superior genes, and Invalids, those who are genetically inferior. Despite the skills an Invalid may possess, they are

⁸⁴ It is likely the name '*Gattaca*' is also a acronym for ACGT – four letters of the genetic code

⁸⁵ Kitcher, Phillip. *Abusing Science: The Case Against Creationism*, 67.

⁸⁶ Discrimination based on an individual's genetic make-up.

only worthy of the most menial of tasks. Physicality is more important than personality. One's dreams and ambitions are not achieved by hard work, ambition and persistence, but are instead only obtained through superior genes. Niccol portrays a world where women take swabs off their lips to catch and test the saliva of a potential mate in order to have their DNA analysed; only then can suitability be decided. Pianists are bred with an extra finger so they can play pieces that could only be played by a musician with 12 fingers. It is a world where security checks can be carried out by instant DNA blood tests. Genoism may be illegal, but there are ways of getting around the law – from the skin particles exchanged in a handshake, or by the saliva used to seal an envelope – all of this 'evidence' can be used to uncover an individual's identity and genetic make-up.

A number of layers of humanity are touched on in this film. The real Jerome (played by Jude Law) shows how elitist the 'Valid' are and how they look down on those below as being inferior. He also illustrates how they are only human and still have the same emotions, fears, etc as the Invalids. Vincent (Ethan Hawke), an invalid and the film's protagonist, is placed on the outskirts of society because of his weak genetic make-up, he is the vision of persistence that we desire to be. It is as much a look at our own present social interaction amongst different races and classes as it is futuristic sci-fi.

Each morning Vincent must scrub off all of his loose skin and hairs to prevent any of his DNA becoming scattered, thus revealing his true identity. He then sticks small patches containing Jerome's blood to his fingertips, and straps a bag of Jerome's urine to his leg. When he is randomly tested at his work, the DNA tests show that he is in fact Jerome Morrow – not Vincent, who is genetically inferior and therefore not eligible to work at Gattaca.⁸⁷

Niccol comments "I would hate for anyone to look at my film and think it is advocating that you never tamper with genes, because there have been and there will be many positive things to come out of this kind of science in terms of curing diseases. But the problem is that blurred line between health and enhancement. How far do you go? Do you consider short-sightedness a disease? Premature balding? Crooked teeth? Where

⁸⁷ When Vincent (Hawke) first applies to train at Gattaca he finds that the interview is nothing more than a urine test. Eligibility is based on DNA; intelligence or qualifications are irrelevant.

do you draw the line?”⁸⁸

The problems surrounding genetics, genetic engineering, determinism, freedom, identity and discrimination are creeping into our daily lives. Hardly a week passes without a proclamation that another gene has been isolated for a particular genetic trait or disease. The experts tell us that our emotional and mental characteristics, such as religious susceptibility, can be attributed to our DNA. Insurance companies are looking into implementing genetic screening in the future to identify high-risk applicants for health insurance. Indeed, it is only a matter of time before genetics becomes firmly ingrained in the business sector. Our genetic make-up is becoming a defining feature of our individuality as humans. *Gattaca* illustrates the genetically inferior as the underdogs, whereas those with superior genes whose life blueprints were drawn up before conception instantly become the elite of society. The so-called Invalids or ‘God children’ are confined to the role of cleaners, whereas those with superior genes are allowed to travel to space.

Gattaca is an important film in the G.E debate as it addresses important questions about the uses of gene technology in everyday life. The primary forces running this world are prejudice, judgement and a very subtle form of dictatorship. It plays on the simple paranoia that we all have - that we are not as good or successful as the next person or that our child is not the most perfect child of all time. Niccol creates a manicured world where the quest to make a better society has destroyed individuality.

A tagline of the film is ‘there is no gene for the human spirit’. In short, even an individual’s inferior genes can not kill the overwhelming human desire to succeed. If we begin to use genetics to re-engineer and alter each new generation, we are at great risk of losing our sense of self as well as our individual and group identities, factors that remain closely connected to the natural world. By altering our genetic make-up, we are in effect creating multiple personas, yet we still see ourselves as being incomplete. This film illustrates that despite the use of biotechnology to interfere with human genetics, we will still continue to evolve and strive for perfection in human development.

⁸⁸ Retrieved on 19 March 2003, from www.spe.sony.com/sonymovies/gattaca

Pannikar asserts that the *perfect* system would eliminate all freedom and would inevitably destroy itself; therefore the concept of a technologically perfect society is a contradiction in terms. "Power means order, order means organisation, and organisation curtails your freedom."⁸⁹ The perfect system would be far from perfect as it would quickly destroy freedom, and ultimately its own foundations.

As I have already illustrated, G.E has the terrifying potential for misuse that could produce a new race of human beings as far removed from us as we are from the apes. The implications of the use of G.E are two-fold. Genetic diseases that occur in animals and humans could be cured or avoided completely through gene therapy and genetically engineered vaccines and drugs. Genetic defects could be detected and rectified before birth, and ageing could be delayed with a few minor alterations to the human genome. "All this would be 'unnatural', yet so are shoes, and tractors, hearing aids and operations for appendicitis, houses and parachutes and defences against avalanches. In a world of cancer, plague, earthquakes and people born blind and deformed, there is nothing evidently superior in all that's 'natural'.⁹⁰ Although these techniques could theoretically do a great deal of good, they could also be used in a variety of harmful ways. When trying to sell their ideas to the public, genetic engineers claim that their methods are far more powerful than those of traditional agricultural cross-breeding. They must also try to convince their audience that none of their acts involve significant dangers. There will be countless cases where artificially engineered organisms will not survive in the wild. Yet there will almost certainly be other cases in which such organisms will fare better than their natural counterparts.

Once we genetically alter humans to be superior, we face the problem of these specimens falling victim to a new generation of diseases or complications. This could be one of the disastrous consequences of genetic manipulation, especially as there would be less chance of the former inferior humans falling victim to the same illnesses. Despite all of the possible hypothetical positive outcomes of G.E, we cannot look past the fact that the complex nature of this technology makes possible risks extremely difficult to evaluate and anticipate. We are dealing with the unknown.

⁸⁹ Panikkar, Raimundo. *The Destiny Of Technological Civilisation*, 243.

There are two forms of reactions to the biotechnology debate: scientific and non-scientific. While the scientific responses tend to focus on the risks and benefits of the new technology, the non-scientific response points towards a "clash of cosmologies".⁹¹ This is when differing worldviews collide and these non-scientific concerns are often too easily disregarded due to the fact that they are not unanimous, yet science can also be deemed to a system of belief. As Eastham concludes, "people do not support or condemn genetic engineering because they have more or less information. They support or condemn it because they believe in it, or they don't."⁹²

Unfortunately, as individuals we are not given the opportunity to vote on whether or not to develop a particular idea, and we do not get to decide whether this idea is put into practice. More often than not, a vote, should we be given the opportunity to cast our opinion, usually comes after the fact, when the idea has already become a commodity for sale.

In 1999, the global association of Physicians and Scientists for Responsible Application of Science and Technology (PSRAST) issued the following facts about genetic engineering:

- Genetic Engineering is fundamentally different from breeding
- Genetic Engineering of today is technically primitive (it is impossible to guide the insertion of a new gene, therefore impossible to see the effects of the new gene)
- Hazardous substances may be generated unpredictably
- No safety assessment methods are fully reliable
- The present rules for safety assessment are seriously inadequate
- The GE foods so far developed are of no significant value for mankind
- The knowledge of ecological effects is very incomplete
- New and potentially dangerous viruses may emerge
- The knowledge of the hereditary substance, DNA, is very limited

⁹⁰ Leslie, John. *The End of The World: A Natural History and Ethics of Human Evolution*, 91.

⁹¹ Eastham, Scott. *Biotech Time-Bomb*, 11.

⁹² Eastham, Scott. *Biotech Time-Bomb*, 12.

- Genetic Engineering will not help solve the world hunger problem⁹³

Biotechnology is very clear about its place in the scientific realm. What it is not concerned with, however, are the social and environmental ramifications of the use of this technology. We are being promised a utopia, a world where we would never go hungry and illness would be a thing of the past. We could just as easily be heading towards a complete dystopia.

⁹³ *Soil and Health*. The GE Issue, July 1999.11.

CHAPTER 4: THE REVOLUTION OF EVOLUTION

THAT WAS THEN, THIS IS NOW: NEW TIME MEASUREMENTS

In order to properly understand the way in which we perceive and measure time we must examine the way that humankind has measured natural rhythms and time throughout history, and the devices that we have used to do this. More specifically, it is important to investigate how we have become increasingly dependent upon modern technology, and the significance of time keeping devices in human progress.

The Modern Age has been an age dominated by the machine. Our world is now full of buttons and switches, and machines have become central to our existence; they are our way of life and our new worldview. Machines regulate our daily rhythms and practices: clocks, watches, telephones, televisions, computers and the Internet. Our lives have been arranged around these machines and their functions. Echoing Mumford's critique half a century ago, Rifkin summarises our current situation: "We view the universe as a grand machine set in motion aeons ago by the supreme technician, God... The Earth is like a giant hardware store, made up of all sorts of parts that need to be assembled together into a functioning system. Our job is never done. There are always new designs to consider and new jobs to be performed, all requiring the constant management of parts and the enlargement of processes. Progress is geared toward the perfection of the machine."⁹⁴ Precision and speed are of primary importance, and we long for the day when machines will be able to run themselves and take care of our most mundane and trivial tasks. In his *Life Is A Miracle*, Wendell Berry writes "The most radical influence of reductive science has been the virtually universal adoption of the idea that the world, its creatures, and all the parts of its creatures are machines".⁹⁵

Our new time spectrum runs from ecological rhythms on the one side to artificial rhythms on the other. Those who choose to use the ecological time dynamic are calling for the "resacralisation" of life. Those aligning themselves with the artificial time

⁹⁴ Rifkin, Jeremy. *Entropy*, 17.

⁹⁵ Berry, Wendell. *Life Is A Miracle*, 6.

dynamic are calling for an efficient simulated environment. “The rhythm of the first constituency is slow-paced, rhapsodic, spontaneous, vulnerable, and participatory. Emphasis is on re-establishing a temporal communion with the natural biological and physical rhythms and of co-existing in harmony with the cycles, seasons and periodicities of the larger earth organism. The rhythms of the other side are accelerated, predictable and expedient. Emphasis is on subsuming the natural biological and physical rhythms and creating an artificially controlled environment that can assure an ever increasing economic growth curve for present and future generations.”⁹⁶ These perceptions of time could not stand further apart.

We live in a society obsessed with time. Time management has become an essential skill needed to survive in the modern world. “Modern life is accelerated life, and the pace tightens up every day. We are in the midst of a time famine. Back in the old days, though we hardly noticed it, there was a time glut. Time for everything, everything in its own good time. The good old days, when we had all the time in the world...But who are we kidding? Nowadays we can’t even make time for nostalgia. Even our ‘leisure’ activities are now planned and programmed down to the minute. Time was, leisure could be considered the basis for culture.”⁹⁷ The acts of thinking and contemplation used to be at the centre of human activity. However, with our accelerated pace of life and advances in modern technology, we now have a vast array of time-saving devices that we allow to perform menial tasks and do our thinking for us, all in the name of saving time.

Time is an integral factor in examining the similarities and differences between different cultures and societies. It is at the centre of the construction of the rhythms of biological and social life and interaction. It also serves as an essential factor in social experience. *Homo sapiens* have been reliant on four different time-allocating devices throughout history: biotic rituals, astronomical calendars, clocks and schedules, and most recently computer programmes. With the inception of each of these new devices for time measurement, the human race has systematically detached itself further from the biological rhythms of planet Earth, the very rhythms that used to be at the centre of human existence.

⁹⁶ Rifkin, Jeremy. *Time Wars*, 229.

Throughout much of humankind's pre-history, our distant ancestors referred to natural phenomena as the primary means of measuring time. The rhythms of migration of different species of animals and the growth and maturing of plants were the main temporal markers for the Palaeolithic tribes. Extremely close temporal bonds were created between the hunter-gatherers and ecological events with the enactment of sacred cultural rituals. Seasonal changes were marked by a great number of different celebrations and festivities. As the hunter-gatherer lifestyle gave way to an agricultural society, there was a distinct shift in the methods of time measurement used. Biological time clocks were disregarded in favour of cosmic time measurement. Changes in the constellations and planets were observed closely to develop a more complex and sophisticated method for measuring time. The practice sacred rituals became more rare with the advent of *the calendar*; a time ordering device that was better suited to an agriculturally based society. Through the widespread use of the new calendar, advanced civilisations were able to establish certain dates reserved for communal activities. With the advent of days, weeks, months and years, we have come to mark and celebrate events such as births, deaths, religious holidays and the coming of the New Year.⁹⁸

Calendars were originally constructed from a mixture of biological, astronomical, religious and economic celebrations. Modern calendars, however, also incorporate dates that reflect the fast-paced societies in which we live. Religious festivities and lunar cycles still present on the calendar have been joined with other dates of importance such as fiscal years, tax payment deadlines and political holidays such as Labour Day. In both its secular and sacred nature and functions, the calendar is one of the most complete and comprehensive representations of different cultures and group cohesion that we have.⁹⁹

The calendar has always existed as an instrument for social organisation, regulating the rhythms of life and organising the group activities of nearly every culture on the planet. It is a device oriented to the past, with its foundations established on the commemoration of certain events such as archetypal myths and legends, important historical events, gods, historical figures, as well as important environmental and astrological events and changes. Undoubtedly, the calendar plays an essential role in a majority of cultures and

⁹⁷ Eastham, Scott. *EyeOpeners*, 37.

⁹⁸ Rifkin, Jeremy. *Time Wars*, 36.

⁹⁹ Rifkin, Jeremy. *Time Wars*, 39.

societies, but as Rifkin indicates, the political significance of the calendar has lessened considerably with the introduction of the Schedule. The Schedule is a concept which regulates 'micro-time' - events spread out over the seconds, minutes and hours of the day, whereas the calendar controls events in 'macro time', i.e. events spread out over the year. "The schedule looks to the future, not the past, for its legitimacy. In scheduling cultures the future is severed from the past and made a separate and independent temporal domain. Scheduling cultures do not commemorate; they plan. They are not interested in resurrecting the past but in manipulating the future. In the new time frame, the past is merely prologue to the future. What counts is not what was done yesterday, but what can be accomplished tomorrow."¹⁰⁰ Calendars of modern times have become increasingly secularised: rather than concentrating on sacred events the schedule is more concerned with productivity. Spirituality plays little to no role in the production of the schedule. Time has been transformed into pure utility. It is an inevitable occurrence in human history that cultures will construct a device that will eventually bring about its destruction. The schedule is one such device: it has systematically undermined the whole notion of sacred time.

The Benedictines developed the first mechanical clock as a means of complying with their rigid prescribed schedule, enabling them to measure time more accurately by standardising the length of hours. By the end of the fifteenth century, the clock had found its way into everyday life. Clocks became a regular feature in the centre of towns and cities, co-ordinating the rhythms of urban life. The clock brought about the dissociation of time and nature from human events. "The clock, more-over, is a piece of power machinery whose 'product' is seconds and minutes: by its essential nature it dissociated time from human events (the variably-sensed duration of human experiences) and helped create the belief in an independent world of mathematically measurable sequences: the special world of science."¹⁰¹ Time had always been measured in association with biological and physical phenomenon, such as the changing of the seasons. From the point of the development of the clock, events such as this became a function of mechanism. A mechanical device now regimented the rhythms of the natural world. The cycles of organic time were permanently altered as linear time took over. Western civilisation has developed a new time orientation. Science and technology now

¹⁰⁰ Rifkin, Jeremy. *Time Wars*, 44.

govern us.¹⁰²

As we enter further into the post-industrial era, the computer has begun to take on many of the same time-keeping functions of the clock, in many respects replacing the clock as a time-allocating device. Although both computer programmes and the schedule are tools for planning future events, only computer programmes are capable of determining the precise way in which future events are to occur. Schedules are effective tools for planning events in the short-term future, but they do not determine exactly how that future will develop.

As a timepiece, the computer is radically different from the conventional clock. It is able to alter our perceptions of time-consciousness. The clock operates with gears, whereas the computer operates with an electrical current, substantially shortening duration to near simultaneity. Clocks were also set to operate with identical and exact rhythms. Computers on the other hand measure time differently depending on which programme is in operation. With the advent of the computer programme, time no longer exists externally from events. Time has instead become a form of information, with each programme having its own unique set of rhythms and time measurements. A traditional clock measured time in seconds, minutes and hours; a computer effectively changes and manipulates these standard measurements of time into microseconds and nanoseconds of information.¹⁰³

The clock has always operated around circadian rhythm, an analogue of the solar day, itself a mirror of the revolving of the Earth and the solar system as a whole. On a circular clock it is possible to see time progress, with the hands of the clock acting as a reference point for both the past and the future. The computer is absolutely independent of nature and perceptions of duration. Digital clocks were the first to break the connection with circadian measurements of time, disregarding the concept that time operated in a cycle. Reference points for the past and future were also destroyed with the advent of digital time, as these devices only show the current time. The digital clock is an appropriate metaphor for society at large “in which the time orientation is becoming

¹⁰¹ Mumford, Lewis. Quoted in *Time Wars*, 15.

¹⁰² Rifkin, Jeremy. *Time Wars*, 12.

¹⁰³ Rifkin, Jeremy. *Time Wars*, 120.

increasingly separated from the ecological rhythms of the planet and in which the expediency of the moment takes precedence over a sense of historical reflection and future projection.”¹⁰⁴

Early ideas behind the construction of the first computers in the 1950s originated from the notion that sets of binary oppositions (i.e. on/off, in/out) could be programmed into the computer as a set of instructions. From this basic process came the idea of creating computers that possessed simulations of very simple ‘laws of thought’, machines that were able to switch on or off based on the binary oppositions of true or false. The motivation behind the concept of computers was driven by the desire to create machines that were able to mimic human problem-solving processes, and understand and make decisions based on these thought processes. Despite early optimism it became obvious by the 1970s that this feat would not be able to be achieved in the near future, however, at the beginning of the new millennium this became a reality. In fact the outcome has exceeded expectations that scientists had for the future of computers three decades ago.¹⁰⁵

¹⁰⁴ Rifkin, Jeremy. *Time Wars*, 121.

¹⁰⁵ Slouka, Mark. *War Of The Worlds*, 19.

MORE HUMAN THAN HUMAN: ARTIFICIAL INTELLIGENCE

Humankind has lived under the assumption that we are the King of Creation, and therefore we should not abdicate in favour of robots. We are witnessing the dawn of a new era - an era dominated by information technology. We are seeing a distinct shift from an industrial to an information society.

When the concept of artificial intelligence was first introduced to the world, computer programmes that were able to play chess against a human counterpart were considered to be the greatest achievements in the field of artificial intelligence. Due to the ever-changing manifestations of the technology, this is no longer the case. This has led to the 'leading frontier' definition of AI, where the technology is defined as being an investigation into computer-based problems yet to be solved. This is unlike other definitions for separate fields of scientific investigation. A gene-splicing technique does not stop being part of bio-engineering the moment it is perfected. Yet, if we examine the shifting judgements as to what has qualified as true artificial intelligence over the years, we find this definition has more validity than one might expect. It is likely that the post-industrial society will be primarily driven by artificial intelligence, which will itself be considered a commodity of great value.

Current trends indicate that there is significantly less opposition to the onset of artificial intelligence than there is to genetic engineering. The threat of computer-based intelligence evolving through the infection of intricate computer viruses is a lesser threat than humans deliberately planning to give computers advanced intelligence and power. Many nation states would see great advantages to letting computers run their factories and performing functions of government. One possible danger of delegating this kind of responsibility to computers is that they could eventually overcome the limitations of their powers through means incomprehensible to the very people who handed them the power in the first place. Once again we come back to the idea of the Controller out of control. Artificial Intelligence systems would not necessarily control people, but would instead discard people; both workers and leaders, and yet many people are infatuated with the idea of computers replacing people, with the finer details of our mental processes being transferred into machines.

It is difficult to imagine the existence of a computer that could rival the human brain. To assume that computers have the ability to think for themselves is to assume that they possess something that resembles a consciousness; that they actually know and understand what is good for them and what is not. Leslie argues that this is like saying that computers are unable to play chess, despite the fact that they have been able to beat the world's finest chess masters at their own game.¹⁰⁶ The general assumption amongst many critics and researchers is that computers will never be able to truly possess any kind of consciousness that would be deemed worthwhile.

From the development of artificial intelligence has come a new branch of the science – android epistemology. This discipline includes the study of robotics, neural networking, artificial life as well as linguistics and cognitive psychology. Android epistemology focuses on the process of the machine, not about what the machine is made of. It is concerned with the business of exploring the space of possible machines and their capacity for knowledge, attitudes and desires in accordance with their mental states. The mere development of this discipline indicates that scientists truly believe that thinking machines are a real possibility.¹⁰⁷

Artificial intelligence is both a thriving technology as well as a rich source of material for literary theorists, futurists and visionaries. A specialised branch of Artificial Intelligence is the idea of making fully functioning robots or androids, which rival their human counterparts. This theme has been touched on many times in sci-fi film, creating some of the most acclaimed sci-fi movies of all time.

Phillip K Dick was one of the most prolific writers of modern sci-fi, churning out a number of highly acclaimed novels renowned for their surreal yet brilliant concepts. In 1982 director Ridley Scott adapted one of Dick's most famous stories for the big screen. Loosely based on the novel *Do Androids Dream of Electric Sheep*, *Blade Runner* has become one of the most popular and influential pieces of sci-fi cinema ever made.

Dick came from a group of 1950s sci-fi writers who took it upon themselves to critique

¹⁰⁶ Leslie, John. *The End Of The World: The Science and Ethics Of Human Evolution*, 23.

American mass society. Dick dealt with themes such as the threat of nuclear war, the negative effects of rampant capitalism and marketing, and the influence of mass entertainment – particularly television. Much of Dick’s work contained a distinctly personal flavour: the blurring of reality, the difficulty in drawing the line between dreams and waking or between self and alien; mechanical replicas that are indistinguishable from their originals, and drug-induced hallucinations that seem more real than reality itself.

Blade Runner is one of the most famous sci-fi films to have dealt with the topic of artificial human life. The tagline for the film is ‘Man has made his match, now it’s his problem.’ Loosely based on the Frankenstein theme where the creator shuns his creation, *Blade Runner* also paints a bleak picture of our future with the technology we have created. *Blade Runner* differs from *The Terminator* in that the humans still have the upper hand, but not the uppermost hand. This belongs to the Tyrell Corporation who manufacture the cyborg Replicants.

A race of androids indistinguishable from humans, known as Replicants, have been developed by humans, and then banished to colonies away from Earth. The Replicants have become problematic as a direct result of Tyrell’s creation ethics. The Replicants were created for slave labour and other hazardous and undesirable tasks such as colonising other planets, and they prove to be better humans than humans. We are told at the beginning of the film that the NEXUS 6 Replicants are “superior in strength and agility, and at least equal in intelligence, to the genetic engineers who created them.” Deckard (Harrison Ford) is hired to track down a group of renegade Replicants from the ‘Off World’ that have hijacked a space ship in order to return to Earth to track down their maker. They are declared illegal on Earth and it is Deckard’s task to ‘retire’ them. The task of a blade runner is to enforce national security, and the dilemma Deckard faces is one based on a tension between his job and his consciousness in the face of the Replicants’ humanity. The Replicants are condemned to a life composed only of the present tense. They have neither past nor memory. There is no conceivable future for them as they have a lifespan of only four years. They are denied their own unique, personal identity. These androids are merely stand-ins for humans. “Power, meaning

¹⁰⁷ Ford, Kenneth M. *Android Epistemology*, 6.

the New World Order, grounded in a capitalist ideology that makes profit and consumption the ultimate freedom, has forced all of us to follow suit, to become extensions of machines, docile bodies turned to technology. We have allowed the tool to become our master instead of our servant.”¹⁰⁸ The Replicants desire to live the same kind of existence as real humans. They want normal mortality. Their creators at Tyrell were aware of making the Replicants more human than human, so built in a device which would kill them after four years. The problem here, just as in *The Terminator*, is what we have allowed to happen. The film shows the fear of technology in the harrowing future that new tech will bring.

The Terminator is another film that investigates the role of the cyborg. *The Terminator* was the first of three sci-fi action thriller films, and is considered by critics to be better crafted than the sequels. The film is a dark depiction of a futuristic battle between man and machine. Set in a post-apocalyptic Los Angeles in the year 2029, the leaders of the world want to reshape the future by changing the past. In order for this plan to work effectively they needed something to carry out their plan that had no emotion, no fear, no pity and was unstoppable.

An intelligent computer system called Skynet is fighting a losing battle against the humans that designed and built, and who it nearly killed. Immediately before the Skynet system is destroyed, it sends a cyborg programmed to be a terminator back in time to kill Sarah Connor, the mother of John Connor who will become the leader of the human resistance against the machine in the future. The Terminator (Arnold Schwarzenegger) is indistinguishable from a human and is infallible. In retaliation the resistance send another cyborg back to 1984 to prevent Sarah Connor from being killed.

Apart from being a fascinating variation on the theme of time-travel, *The Terminator* is about the battle for the future of the human race, this time against the evils of the thinking machine. It is a scenario based on the premise of ‘Us’ and ‘Them’. It is a world where humans fight their cyborg master for control. *The Terminator* is an anti-technology fable. Warning of the potential terror of blind acceptance of new technologies, it is another instance of the familiar progress-run-amok theme.

¹⁰⁸ Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 241.

Here lies the irony. The machines and technological systems that we have put in place to order our existence and give our lives meaning may one day control us. The controller is steadily losing control. Humankind is losing its sense of self, and we are speeding up this process by further emerging ourselves in this fast-paced techno-culture in the hopes that it will improve our growth, wealth and overall standard of life. Who needs an identity when we have machines to regulate our lives and penetrate our minds, bodies and consciousness?

Film is an incredibly influential medium as these movies offer us possible visions of the future, as well as effectively get us accustomed to the possibility of existing within a dystopia, should humankind push technology too far. These films are potent predictions and warn us about our possible collective futures. As sci-fi exists as a modern folklore, it “gives decisions about where science goes and what it does. SF shows worlds where the artificial neon lights are about to outshine the sun, where we will be forced to live in perpetual ‘spiritual’ darkness, while our soulless body-machines are bathed in the searchlights of the corporate police and move about like decapitated chickens, devoid of inner life.”¹⁰⁹

Another film that deals with human/ cyborg relationships, which includes elements of themes found in both *Frankenstein* and *Blade Runner* is *AI: Artificial Intelligence*. Acclaimed science-fiction author Brian Aldiss wrote the short story *Super Toys Last All Summer Long*, a short story which evolved into the basis for Steven Spielberg’s *AI: Artificial Intelligence*. *AI* is one film that investigates the problems of human/machine integration and explores the possibilities of thinking technology, namely robots.

The film is based in a closely monitored society reminiscent of that seen in *Gattaca*. The polar ice caps have melted, natural resources are scarce and technology is progressing at an alarming rate. Food is genetically engineered, and fellow humans are not humans at all: they are robots made to look and behave like humans. These pseudo-humans are designed to serve all the needs of their human masters. *AI* focuses on the final and most controversial frontier of artificial intelligence: the evolution of robots and their ability to

¹⁰⁹ Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 243.

feel and experience emotions. In the early stages of the film the robots are perceived as appliances showing affection. The creation of David, the film's protagonist, is a milestone in the creation of robots, or mechas (short for 'mechanicals') as he is the first one of his kind programmed to love. He is adopted by a couple whose biological child has been cryogenically frozen while he awaits a cure for the terminal disease he is suffering from. It quickly becomes apparent that he does not fit into their lifestyle. Failing to find complete and unconditional acceptance and love from neither machines nor humans, David is abandoned by his adopted human parents (in much the same style as Dr Frankenstein abandons his creation), and he embarks on a journey of self-discovery in his quest to be a 'real boy'. Jon Harlan, executive producer of *AI*, says that the film "shows a new romanticism that hasn't been seen on the big screen so far: the idea of an artificial being feeling genuine love and a human truly loving an artificial being is quite new territory."¹¹⁰ The film is set in a future where the government rigidly controls the size and types of families. Most types of physical labour are performed by mechas especially designed to performed designated tasks; there are even mechas, such as the character of Gigolo Joe (played by Jude Law), designed especially for physical and sexual pleasure. In the world of *AI*, humankind has started to rely a lot more on mechanical devices to take over simple jobs, whether it be menial household chores or more pleasurable activities.

David soon discovers that his attempt to assimilate himself into humanity is resisted by humanity itself. As David becomes more 'human', the more uncomfortable the humans become with the idea of a feeling robot, illuminating the fact that humans are extremely hostile to extremes. One of the poignant messages of the film is that we must be careful about what we make, as our creations may prove to be more resilient than we are, and may outlive us.

Androids are autonomous. They have been created by humans, but that is where the creator's role ceases. In both *Blade Runner* and *AI* these cyborgs somehow evolve to be superior to their creators, and as the tagline of *Blade Runner* states, these beings really are more human than human. They show more signs of humanity and compassion than their human creators and counterparts. They were built in an attempt to achieve

¹¹⁰ Retrieved on 19 July 2003, from www.speilbergdreamworks.com.ai, 5.

(mechanical) perfection. These machines can not be overpowered or subdued by human force and intellect. The controller quite literally loses control once his creation is set free.

"A robot is as much a man converted into a machine as a machine can be converted into a man. The gap between the two certainly diminishes. Indeed, the great problem lies in what direction the equilibrium is displaced: to the mechanisation of man or to the humanisation of the machine? For man it may be the degradation, but for the machine it is an upgrading. Yet, is the hybrid able to live?"¹¹¹

AI is a reworking of the fairy tale of Pinocchio: the quest of an artificial boy/human to become real. The film retains some infantile motifs. Although David is a robot, the audience has forgotten this by the conclusion of the film. The line between humans and robots has become blurred, almost indistinguishable. This is artificial intelligence in its most pure state, and this may be the path that our future will take. In the same way that Pinocchio wanted to become a real boy with real emotions, David embarks on a journey to discover who and what he is, attempting to make a connection with his human mother. This in turn develops into a journey that reveals the dark and unforgiving side of human nature.

¹¹¹ Pannikar, Raimundo. *The Destiny of Technological Civilisation*, 254.

NOTHING AS IT SEEMS: TRADING REALITY FOR FANTASY

“What is “real”? How do you define “real”? If you are talking about what you feel, what you can smell, what you can taste and see, then “real” is simply electrical signals interpreted by your brain.”

Morpheus, *The Matrix*

One of the most important and impressive functions of the computer is that it has the capacity to make our fantasies become ‘reality’. Computers have become so complex that they are now able to transcend the restrictions of time, space and even the human body. Virtual reality ‘replaces’ the original, breaking down all of our ingrained notions of time, space and all things of a physical nature. True addicts of cyberspace and virtual reality proclaim that ‘Reality is death’, with one fanatical user of virtual reality remarking that “nature was a patriarchal conceit designed to enslave us to the past and demonise machines.”¹¹² The virtual world that we can now enter through the medium of the computer is timeless, bringing an abrupt halt, within its domain, to the world as we know it. Yet are these virtual worlds actually superior to the real world most of us currently inhabit, or is the use of virtual reality simply the most intense form of escapism humans are able to take? Have we taken self-indulgence to a purely scientific level or is this the only chance we will have to ‘inhabit’ an apparently utopian environment?

Strange Days deals with the alternate worlds of virtual reality. Set on New Years Eve 1999¹¹³, the film immediately paints a bleak picture: a dystopia full of social unrest, rioting, killing and general degradation. A new cyber-drug/technology makes it possible to experience other people’s pure and untouched personal experiences, complete with lust, arousal, paranoia and fear. The new technology offers an obtainable alternative to the real world. The plot follows a former police officer Lenny (Ralph Fiennes) who peddles these virtual experiences, and spends most of his time watching clips of a happier time in a previous relationship. Through viewing one particular clip, he sees the slaying of a politically radical rap singer, and as a ‘witness’ everybody wants him dead. Is this really what we thought the new millennium would bring us? Were we worried

¹¹² Slouka, Mark. *War Of The Worlds*, 28.

¹¹³ The film was initially released in 1995, so 1999 was still four years away at the time.

that this is the kind of environment we would be living in? A society so disillusioning that the only moments of pleasure were obtained through artificial means through virtual reality. *Strange Days* presents a disturbing dystopia, full of the addictive and destructive thrills of virtual reality, and the social implications of this new virtual 'drug'.

The concept of virtual reality has had an interesting evolution. Cyberspace research, which initially took off in the 1980s, was originally conducted for military purposes, in the hopes of constructing a virtual battlefield in which soldiers could train and develop their military exercises. The programme that was the product of this research, the SIMNET system, linked together 200 MII tanks that were able to travel within a constructed virtual space. The system even came complete with realistic sound effects that simulated gunfire.

The widespread attention that virtual reality has received and is still receiving indicates that this is not simply a passing phenomenon. Virtual reality is here to stay, and if its creators have anything to do with it, we will all soon be abandoning real life (otherwise known as 'RL' in the virtual world) in favour of downloading a much more desirable virtual environment of our choice. Video helmets are already available, a device which allows the user to enter a three-dimensional virtual world controlled by a computer which responds to the head movements of the user. Next on the agenda for virtual reality aficionados are wired bodysuits with transmitters which respond to and represent the movements of the user. It is also predicted that in the near future bodysuits such as these will be able to telegraph the presence of solid objects back to the user. With the help of devices such as these, we will be able to completely immerse ourselves in an artificially constructed virtual environment. Reality will become redundant in favour of living in fantasy worlds. Largely due to the fact that computers have become so highly developed and are able to perform intricate tasks such as constructing virtual worlds, they are now being given omniscient qualities. Michael Benedikt, a professor of architecture at the University of Texas, firmly believes that the creation of cyberspace makes up for the fall from Eden, the creation of this new world apparently redeeming the human race in the eyes of God.¹¹⁴ Computers represent the future, so much so that it now seems impossible to imagine a future without them.

¹¹⁴ Slouka, Mark. *War Of The Worlds*, 47.

We are becoming immersed in synthetic environments through television, video, the Internet and cyberspace. Consequently we are further and further removed from reality. Technology has been waging a constant war against the Old World. The primary driving forces behind this shift have been a massive increase in consumerism, urbanisation, and a steady alienation from Nature. "We'll be able to immerse ourselves in an entirely synthetic world, a world that only exists as a trick of the senses, a computer-induced hallucination. And when we emerge from cyberspace - that strange non-place beyond the computer screen - all indicators suggest that we will find it increasingly difficult to separate real life (already demoted by the acronym RL on computer Nets around the world) from virtual existence. Or worse, that we will know the difference but opt for the digitised world over the real one."¹¹⁵ For example, sound effects have come have taken the place of real sound, as special effects replace reality in films. Authentic life and reality as we know it (or knew it) is becoming less appealing than the representations of reality that are fed to us in motion pictures, television and advertisements. The originals are becoming inferior.

This assault on reality and personal experience is becoming more and more intense. We are now placing our trust in the 'reality' that is presented to us through the media. Yet these representations are often unreliable, but we believe that what the media shows us is the truth. The possibilities of virtual reality are limited only by the imagination. We are already being told that technology has begun to 'liberate' us from the limitations of the human body. The possibilities are endless. We are told that within our children's lifetimes it will be possible to link the human nervous system directly to a computer to download the human consciousness into RAM (Random Access Memory), preserving it in an artificial state. The dividing line between technology and nature - a false dichotomy since the development of agriculture - would be permanently erased; G.E and the Human Genome project have blurred the line forever.

For centuries there has been a dominant and constant worldview that humans are the dominant species, and have for many ages been at the centre of the Universe. However, as science and technology advances, this position is uncertain. This worldview no longer

¹¹⁵ Slouka, Mark. *War Of The Worlds*, 5.

fits, leading to a demythologisation, followed by a re-mythologisation. A technological mythos is becoming predominant. We are now seeking more contemporary references. Have we moved beyond myth now that we have science and technology? “A myth has moral content. It carries its own meaning. It secretes its own values... science is an attempt to free investigation and knowledge from human emotional attitudes.... This so-called “objective world” thus becomes devoid of mind and soul, of joy and sadness, of desire and hope.”¹¹⁶ Virtual realities are becoming more and more prevalent in sci-fi cinema, bringing into question the meaning of reality and our place within it.

At the beginning of the new millennium the face of sci-fi film changed dramatically. One film created a massive phenomenon that spawned a film trilogy that made the world sit up and take notice of an apocalyptic future dominated by machines. A new cyber-idol was born, who along with his group of fugitives set out to save the future of humankind from the grasp of a hostile breed of machines.

Apart from being visually groundbreaking, *The Matrix*¹¹⁷ forced us to question our perceptions of our reality. How do we know that what we are experiencing at this very moment is reality? How do we know that we aren't merely players in an artificial construct developed and controlled by intelligent machines? The film is the ultimate cinematic example of the controller out of control. The world of *The Matrix* is an environment where machines have assumed total control – to the point where the humans are not even aware that they are being controlled or that their ‘reality’ is nothing more than a computer simulation. In this world humans are nothing more than a commodity.

The film is set in a post-apocalyptic environment sometime in the near future. Artificial intelligence has created a complex computer construct that simulates the present-day world. Machines have taken over the world, capturing all humans and putting them in incubators and harvesting them as an energy source for the computers through a hardwire into the brain. As reality in the Matrix is computer generated, ‘reality’ only exists in the individual's mind. This Matrix hides the truth from the humans, letting them believe they are living a real life in 1999. A small group managed to escape the machines and

¹¹⁶ Suzuki, David. *Earth Time*, 342.

¹¹⁷ The definition of ‘matrix’ is a mould in which a thing is cast or shaped; place in which thing is developed, or an array of mathematical qualities treated as a single quantity.

have chosen to live in the real world. They have made it their mission to destroy the Matrix and end the reign of the machines. The leader of this group of freedom fighters, Morpheus, finds a computer hacker within the Matrix, Neo, who is trained to defeat the malevolent machines. Morpheus believes that Neo is 'The One', the human being destined to lead humanity to freedom and overthrow the machines.

The Matrix presents a world where humans are subordinate; they are at the mercy of a complex computer system. The film is intended as a thought experiment, which prompts its audience to consider 'What if this scenario was in fact real?', consequently leading to a shift in self-perception.

The Matrix addresses several philosophical and problematic questions regarding technology, reality and the human condition. It is the ultimate example of the commodification of human life, consequently becoming dependent upon the machines that they have created. The controller has become the controlled.

At the beginning of the film Morpheus presents Neo with the choice between knowing the truth about his 'reality', or remaining within the Matrix, remaining oblivious that he is living with a computer simulated environment. Neo chooses to learn the truth. One of his fellow freedom fighters, Cypher, chooses to go back to live in the Matrix. Is this a valid choice? If real life lacks any kind of enjoyment, then the Matrix may in fact be a better alternative. Which is the best sort of existence for us? Philosophy and religion both have attempted to answer this question, and *The Matrix* gives us a new and interesting way to explore this.

The Matrix implies that there is inherently something bad about living inside this artificial construct; that people inside the Matrix are considerably worse off than people outside it. "*The Matrix* dramatises René Descartes' worry that, since all we ever experience are our own inner mental states, we might, for all we could tell, be living in an illusion created by a malicious demon. In that case most of our beliefs about reality would be false... *The Matrix* also suggests that we could *never* be in direct touch with

the real world (if there is one) because we are, in fact, all brains in vats.”¹¹⁸ Is the Matrix actually a bad place, or is the virtual reality of the matrix a safe world within a hostile and volatile environment. Is the construct simply a ‘utopia’ as opposed to a post-apocalyptic dystopia? We must ask ourselves, what is so bad about life within the matrix?

Some critics of G.E believe that it is only a matter of time before computers change and evolve to the point where they will become indistinguishable from biological organisms; becoming independent of man and operating on a biological level. The idea of this kind of machine independence may at first seem unfathomable; however, computers already have the ability to pair themselves in rudimentary ways. “Our ordinary confidence in our ability to reason and our natural tendency to trust the deliverances of our senses can both come to seem rather naïve once we confront this possibility of deception.”¹¹⁹

¹¹⁸ Dreyfus, Hubert & Steven. *The Brave New World Of The Matrix*. Retrieved 22 April 2003 from www.whatisthematrix.warnerbros.com/rl_cmp/new_phil.html

¹¹⁹ Gran, Christopher. *Brains In Vats and the Evil Demon*, 1.

BIOLOGY MEETS MACHINE

David Cronenberg is renowned as a director and auteur who tackles the dark side of human life and impending institutional disasters head-on. He has defined his own style by incorporating the motifs of urban alienation and body mutation to reach his somewhat niche audience. *existenZ* saw the director exploring the underground world of bio-engineered video games in a new form of virtual reality, and accentuating the polemical relationships between human and machines. He blurs the boundaries between organic and inorganic matter, reality and a fantasy-future. Particular attention is paid to technology, psychology and sexuality.

Cronenberg comments “It seemed to me that what people were really doing in computer and video games is trying to get closer and closer to fusing themselves with the game. The idea that a game would plug right into your nervous system made perfect sense to me, because putting on glasses and gloves is a crude attempt to fuse your nervous system with the game. So I went that little bit further – if I want to be the game, the game will also want to be me.”¹²⁰

The film was released at approximately the same time as *The Matrix*, and consequently the two are often compared. Yet there are significant differences in the landscapes of the two films. *The Matrix* we are shown a future where artificial intelligence has literally taken over the world, and the machines feed off the power generated by humans, who are plugged into a computer-generated dream state. In *The Matrix* the underground guerrillas are fighting a war against the machines.

eXistenZ is just one film that deals with this type of scenario. Director Cronenberg has managed to create a hybrid genre of horror films in his own right, *eXistenZ* is essentially a virtual reality thriller. Mutating body parts, a favourite theme of Cronenberg’s, and a biologically enhanced virtual reality game are at the centre of this film. *eXistenZ* is a technological system so advanced that it is an extension of biology. It is a game that takes virtual reality a step further - a game that goes beyond the player’s wildest dreams.

¹²⁰ Retrieved on 14 February 2004, from www.existenz.com/movie/background.htm

The game differs from the average gaming machine in that the console is not made from plastic and metal. One of the most startling features of the film is that the controls of the game bear a striking resemblance to a human organ, and in fact plugs directly into a 'bio-port' inserted into the player's nervous system through their lower spine, using a cable that resembles an umbilical cord. By plugging into this gaming pod, the player is able to cross the barrier between fantasy and reality. The gaming pod is able to directly tap into the fears, anxieties and memories of each individual player, and directs the game around the specific players' personalities, which guarantees the player an unpredictable experience. The energy to drive the game is derived from the player, with the game changing every time it is played and adapts to the individual player, with more than one player being able to enter into the game at one time.

At the beginning of the film, a group of die-hard game players gather for the launch of Antenna Research's latest game, *eXistenZ*. As the game's creator, Allegra Gellar (Jennifer Jason Leigh), prepares to lead a select group of players through the new game, an anti-gaming protestor opens fire on the group in an attempt to assassinate Gellar and her gaming pod. Gellar is rescued by Ted Pikul (Jude Law), an Antenna Research security guard, and as the pursuit of the 'high priestess' of gaming escalates, Gellar and Pikul are forced to seek refuge in the world of *eXistenZ*. Although Gellar is accustomed to the world of fantasy she has created, the new unpredictable and dangerous virtual environment plagues the meek Pikul as he attempts to rescue the heroine from her pursuers. Although initially reluctant to enter into the game, Pikul quickly becomes captivated by the realism of this strange new world, which only becomes stranger as the accomplices explore the depths of the game. The players are quickly transported from one setting to another, making it increasingly difficult to discern just what is reality and what is an illusion.

Although *eXistenZ* covers much of the same territory addressed in *The Matrix*, overall it is a more believable and thought-provoking film, taking the viewer on a psychological journey. Cronenberg addresses two of his favourite themes within the text of the film; firstly, the lengths that we are able to go to create our own levels of reality, and secondly, the concept of a creation being dangerous to the creator, although in this case the creation is not of human origin. Cronenberg was inspired to write the screenplay for

eXistenZ after an interview conducted with writer Salmon Rushdie in 1995. The interview sparked the idea of the artist or creator finding themselves forced to flee into hiding after their creation and its effects take on a life of their own. As Cronenberg says “It’s the game made flesh.”¹²¹

While machines like the ones featured in *Metropolis* force humans to conform to unnatural rhythms and people are replaced by machines in certain areas of work, they are not a threat to human identity. The arrival of the computer put an end to the safety of both human identity and the natural rhythms of humans. The computer is an extremely complex and technologically advanced machine that challenges and attempts to surpass human cognitive processes. Many of the computer-based machines that feature in sci-fi exist as more than extensions of the human mind in the workplace. These super-computers possess a consciousness of sorts and attempt to replace their creators and/or operators, pushing humans into the role of slave. “If we are able to create machines that - in the areas of logic and analysis - are superior to humans, wouldn’t the smart thing be to pass the baton of power to thinking machines? Humans are not exactly doing an exemplary job of running the world because they are illogical, subject to silly pride, given to macho posturing and power play. In short, humans are all too *human*. So why not let machines - cool, logical, smart as they are - take over?”¹²² Although we are willing to acknowledge the profound affect that machines and technology have on our external way of life, we often vehemently deny that they exist at the very centre of our being. Machines, whether they are computers or cellular phones or ATM machines, have rapidly become a permanent and enormous fixture in our daily lives, so much so that it has become virtually impossible to tell where the machines stop and we start.

The possibility of computers eventually replacing humans could occur through several different avenues. Firstly, as the unintended result of rivalry between different groups whose production is largely dependent on computers. Secondly, after the design of computers becomes the task of computers, and finally, as a direct result of scientists who viewed the life and intelligence of advanced computers as vastly superior to the intelligence of mere human beings, possibly because death could be inevitably delayed.

¹²¹ www.existenz.com/movie/background.htm, 7.

A computer scientist by the name of Joseph Weizenbaum developed a computer programme in the 1980s that would act as a psychiatrist. The exercise was initially intended to illustrate to his students just how limited computers actually are. The programme was supposed to closely resemble the responses of a human psychiatrist, directly reflecting human behaviour, and revealing the massive gap between man and machine. However, Weizenbaum's programme failed: his students loved it and bonded to it more closely than they would an actual human doctor, revealing more information to the computer programme than to its human counterpart. Weizenbaum was horrified; his subjects almost granted the machine human status, when in fact all that the machine was programmed to do was respond to certain key words entered by the subjects.

Weizenbaum concluded that many people become inhibited when talking to other humans; this is not the case with computers. We are often concerned with what other people think of us, however, the computer effectively removes this threat and breaks down barriers to communication. Although computers such as these have no human characteristics whatsoever and are often difficult to operate, their subjects often form strong bonds with the machines.

One of the central themes of *Frankenstein* is the desire for and need of human companionship. Computers may have the power to abolish some of these emotional needs. There is a growing tendency to communicate with other people through the internet and e-mail rather than having face-to-face contact. "There is a clear indication that these humble machines are the early manifestations of a new life form, one which is about to make an evolutionary leap. When this occurs it will offer the human race (itself a species undergoing transformation) vast benefits."¹²³ Stephen Hawking, one of the world's most highly regarded theoretical scientists, addresses the growing threat of the 'thinking' computer, commenting "In contrast with our intellect, computers double their performance every 18 months. So the danger is real that they could develop intelligence and take over the world. We must develop as quickly as possible technologies that make possible a direct connection between brain and computer, so that artificial brains contribute to human intelligence rather than opposing it. The important message to take from this is that the danger - that we will see machines with an intellect that outperforms

¹²² Schelde, Per. *Androids, Humanoids and Other Science Fiction Monsters*, 135.

that of humans - is real.”¹²⁴ We will quickly have to learn to co-habitate with these new types of intelligence: the thinking computer, and possibly new artificially engineered species.

¹²³ Hammond, Ray. *The Modern Frankenstein: Fiction Becomes Fact*, 176.

¹²⁴ www.whatisthematrix.warnerbros.com, 6.

CONCLUSION: A CHANGING DISCOURSE

The future is difficult, almost even impossible, to predict. But what exactly are we attempting to define the future of?

Humans have always had a love/hate relationship with the tools we have created. We are currently enchanted with the prospect of the benefits of genetic engineering, thinking machines and entering virtual worlds. Yet we are frequently warned that these new technologies may bring about our own obsolescence.

The biotech revolution will affect every aspect of our lives. The way we eat, the way we reproduce, the way we work, and the way we perceive our world and our place in it. Each of us will be forced to evaluate the ultimate question of our purpose and meaning.

Chargaff explains “I consider the attempt to interfere with the homeostasis of Nature as an unthinkable crime. Have they peeped into Creation and found it wanting? We do not yet have a pathology of scientific imagination; but the urge to change the biosphere irreversibly could make an excellent subject for such a study... I have not been alone in protesting; I am certain that these warnings will pass unheeded, the more so since the irrevocable process was started before there was even time for an alert. Since humanity has never listened to a warning, why should it - and how could it - have listened to mine?”¹²⁵

The beginning of the relationship between humans and Nature marked the dawn of civilisation. For thousands of years man had no choice but to adhere to the laws of Nature. Approximately six thousand years ago, humankind partially succeeded in the quest to tame the forces of Nature with the rise of agriculture. From this the first civilisations were established, marking the beginning of the demise of our relationship with Nature. Today we live in an era dominated by information technology. We have unparalleled knowledge, and with that knowledge has come power. Now we are faced with countless ethical and moral dilemmas for which we are ill prepared.

¹²⁵ Chargraff, Erwin. *Heraclitean Fire*, 190.

Humans are using technology to overcome the restraints of Nature, and at the same time flaunting Man-made inventions. “Man apart from Nature. Indifference to Nature, and of the consequences to Nature of our developmental activities, appears to remain a major part of our attitudes.”¹²⁶ We still have a co-dependent relationship with Nature, but we have alienated ourselves so far from Nature that we believe that we no longer need Nature as the sole human environment; instead we could choose to exist within a completely artificial milieu, not unlike the construct of *The Matrix*.

Daniel Quinn addresses the age-old dilemma humankind has had with progress.

“Before becoming full-time farmers, the Maya, the Olmec, and all the rest practised hunting and gathering or some combination of farming and foraging. *Doesn't the fact that they eventually became full-time farmers indicate that they were less than perfectly satisfied with these lifestyles?* That's exactly what it indicates. At some point the idea of making their living from agriculture seemed more attractive than the traditional way. This doesn't necessarily mean they hated their previous life, but it certainly means they judged the agricultural life to be more promising. Very probably they didn't regard their venture into the agricultural life as an experiment at all but as permanent, irrevocable choice. If so, this doesn't negate the role of a natural selection in this process but rather underscores it. Each these peoples began by abandoning a traditional lifestyle for an innovation that seemed to promise more of what they wanted. When the innovation ended up giving them less of what they wanted, they abandoned it to resume their previous way of living. The innovation in each case had failed the test. *But doesn't this indicate that their traditional lifestyles were less than perfect?* Certainly it does. Natural selection is a process that separates the workable from the unworkable, not the perfect from the imperfect. Nothing evolution brings forth is perfect; it's just damnably hard to improve upon.”¹²⁷

Since Mary Shelley penned her novel, humanity has been privy to profound changes occurring at an alarming speed. The Gothic and semi-Romantic world of Shelley is very different from recent cinematic works such as *The Matrix*. However, we can not say that there are no similarities between the two. Although they belong to different media, both tackle the complexity of our problematic relationship with technology. Shelly's novel foreshadowed the growing apprehension towards these new technologies, and films such as *The Matrix* continue to realise some of the possible outcomes of technological

¹²⁶ Morton & Schneider. *The Primordial Bond: Explaining The Connections Between Man and Nature*, 11.

¹²⁷ Quinn, Daniel. *Beyond Civilisation*, 60.

development and scientific experimentation, as well as illustrating our growing fears about the development of these new technologies. Yet in both the very essence of human nature has barely altered.

Frankenstein is a compelling tale of scientific experimentation on a massive scale, human obsession and the apparently limitless possibilities of the human imagination and creativity. In relation to my dissertation, it is most importantly a cautionary tale about the demise of the over-reacher who tries to defy the gods and break the rules of Nature. The defining difference between *Frankenstein* and other horror stories that have a strong supernatural influence is that Shelley's tale is unnervingly rational. It is the very real nightmare of the creation of artificial human life.

Frankenstein was written during a time of dramatic social change - The Industrial Revolution. During this period there was a strong conviction that rapid changes would take place, and as now, there were differences in view about to what extent these changes would be beneficial to humankind. Over time these fears largely subsided, and the new sciences were seen as contributing to a future where an increase in knowledge would increase both power over Nature, as well as bringing economic wealth. What makes the novel even more potent is Shelley's remarkable gift of foresight, and her ability to predict the severe consequences of immoral technological utilisation. Unlike a majority of her peers, Mary Shelley recognised the dangers of a new technology-driven society, which based its foundations on scientific research and attempted to overthrow Nature.

Shelley had to entice the reader into a suspension of disbelief about an event that is literally incredible. The horror of the story rests on the reader's belief in its most fictional creation, the monster. The moral and ideological arguments of the novel also depend on the reader's acceptance of the Monster's reality, not only in Frankenstein's tale, but also in the monster's own narrative. Shelley provided the monster with the most persuasive and credible voice of the three narrators, and by doing this Shelley had to navigate between the conflicting elements of monstrosity and humanity in the monster's characterisation.

It is unlikely that we will ever know for sure whether or not Shelley was attempting to make a prediction about the future of science when she wrote *Frankenstein*, or whether

she was instead addressing the root concerns and responses we have to science. Whatever the motivation, *Frankenstein* has a timeless quality, because the questions Shelley raises about scientific progress are still very relevant today. “It is an exciting tale of scientific experimentation, obsession, the creation of an artificial man (or android or homunculus) and the sublime possibilities of human creativity and intellect. It is also a cautionary tale about the fate of the over-reacher, and the sublime possibilities of the egotistical adventurer in knowledge. What is so intriguing and compelling about the novel is that these oppositions and ambivalence are held within the novel and not fully resolved.”¹²⁸ Although countless scientific discoveries have been made since Shelley wrote her novel in 1816, we are not really any closer to fully comprehending the possible repercussions of this unrestricted pursuit and application of knowledge. Like Faust, Victor Frankenstein was driven by an ultimately fatal ambition, and desired to know much more than their minds and bodies could endure. The novel’s subtitle, *The Modern Prometheus*, indicates precisely what is being updated. Shelley’s reworking of the Promethean myth is a resolutely modern one, and becomes more so with every advance in biotechnology. Frankenstein’s temptation comes entirely from natural philosophy; from the body of knowledge amassed by mortal human beings. There is no doubt that Mary Shelley was not a scientist, yet she is still widely regarded as a prophet.

The most profound and potent insights into how technology will affect culture often originate from science fiction. Critics of the science fiction genre note that that often our attitudes towards ‘the machine’ indicates “both an invitation and a warning ; it is simultaneously fascinating and threatening, both superior to and somehow inferior to the punier humans who build, operate and are sometimes subjugated by it.”¹²⁹

When a new technology such as G.E or virtual reality has been recognised and accepted by a majority of science-fiction fanatics, as well as being recognised by the cultural elite, it is fair to assume that the concept has filtered down to the masses. If we are to believe the opinion of economists, we are now experiencing the beginning of an economic revolution as a result of these groundbreaking new information and genetic technologies. Some believe that this shift is of the same magnitude as the Industrial Revolution.

¹²⁸ Newey, Katherine. *Mary Shelley’s Frankenstein*, I.

Humans no longer have to succumb to the powers of our pre-determined biological and genetic inheritance. We now have the tools with which to determine and design our own futures. Scientific advances in medicine, agriculture, technology, industry and other various fields have forced humankind to re-examine what it means to be human and the place that the human race takes in the natural world.

We have embraced science and technology so closely that the foundation myths, moral beliefs, and sources of wisdom with which we identify our culture and ourselves have virtually been destroyed. "Ironically the muting of traditional voices of moral authority by modern science has taken place at precisely the same time modern science is forcing us to face a growing number of difficult ethical issues - many of them unprecedented in human history."¹³⁰ The sheer pace of this scientific and technological progress has thrown us out of synch with Nature, and our unconditional faith is seriously misplaced if we do not realise that science only offers us a very limited worldview.

When the world was created so was the possibility to alter and/or fix it. It was this prospect of power and freedom from the constraints of Nature that were the driving forces behind Frankenstein's decision to create his monster. It is in the creation of order that the possibility of disorder and evil is founded. The monster can be interpreted as being a medium of evil and the personification of the unleashed forces of Nature.

Science and technology are neither good nor evil. They are the products of human curiosity - the mind's relentless urge to explore, to know, and to change. That is a quality we must always nourish. However, we must recognise the need for a moral framework within which scientific inquisitiveness can be expressed without exposing human populations and their surroundings to unacceptable risks or irreparable harm.

The decision to use and manipulate these new technologies will determine the future of all living species on the planet. "Human cultures one and all are today impelled to come to grips not only with our new found powers to manipulate life, but with our long and sorry history of failing to do so wisely."¹³¹ Once we know the secrets of a new

¹²⁹ Rushing, Janice & Frenzt, Thomas. *The Frankenstein Myth In Contemporary Cinema*, 61.

¹³⁰ Suzuki, David. *Earth Time*, 342.

¹³¹ Eastham, Scott. *Biotech Time-Bomb*, 4.

technology, whether it is genetic engineering, artificial intelligence or virtual reality, it can then be cultivated everywhere.

The million-dollar question is whether or not we are able to come to an ethical conclusion to the problematic nature of genetic engineering, artificial intelligence and all of the pros and cons associated with these technologies. Ethics deals with the whole and draws conclusions. More specifically it addresses problematic factors that are often ignored by the scientific focus. Ethics, however, is neither a precise science, nor merely a collection of specific rules and regulations. The word *ethics* originates from the term *ethos*, meaning 'way of life'. A world developed from the unrestricted use of biotechnology would be an artificial world, reminiscent of Huxley's *Brave New World* or Niccol's *Gattaca*, where nothing is left to chance; a world based on a rigid system of programming and control, where we ultimately become masters of our own destiny. Eastham appropriately comments "maybe we have seen too many science-fiction films to trust unquestioningly in the good faith and *disinterested* research of scientists any more."¹³²

Profound change in many aspects of human life is imminent. The place of science and technology in society today indicates significant changes in the structure of our world. This very danger to the future of humankind is hidden within our extreme reliance on technology in our day-to-day lives. Shelley's message is absolutely clear: a morally and ethically irresponsible act could unleash a monster than could destroy the very foundations of human civilisation.

We must ask the logical question: Are science and technology really going to improve the world and our standard of living? Will these new technologies really improve human communication? Will our lives really be better? Our future already seems to be full of uncertainty and ambiguity, but what we need to remember is that it is crucial for us to continue to keep asking the right questions, supply the best answers and share them with the rest of our society.

This is the very essence of why sci-fi and speculative fictions are so important in

¹³² Eastham, Scott. *Biotech Time-Bomb*, 48.

investigating such questions: it is our responsibility as humans to address and tackle the issues before we overstep the limit and unleash powers beyond our control. We humans are the root enigma of these films, and we ourselves the only conceivable resolution.

BIBLIOGRAPHY

Abanes, Richard. *End-Time Visions: The Road to Armageddon?* New York: Four Walls Eight Windows, 1998.

Berry, Wendell. *Life Is A Miracle*, Washington D.C: Counterpoint, 2000.

Brosnan, John. *Future Tense: The Cinema of Science Fiction*, New York: St Martin's Press, 1978.

Bulfinch, Thomas. *The Age Of Fable*, New York: Macmillan, 1997.

Chargraff, Erwin. *Heraclitean Fire*, New York: Rockefeller University Press, 1978.

Chinon, Allan B. *Beyond The Hero: Classic Stories of Men In Search of Soul*, Toronto: Putnam Books, 1993.

Cochrane, Peter. *Tips For Time Travellers*, London: Orion Business Books, 1997.

Eastham, Scott. *Biotech Time-Bomb: How Genetic Engineering Could Irreversibly Change Our World*, Auckland: RSVP Publishing, 2003.

Eastham, Scott. *EyeOpeners: A Little Something To Think About*, Wellington: Horizon Press, 1999.

Eastham, Scott. *The Media Matrix: Deepening The Context of Communication Studies*, Lanham, Maryland: University Press of America Inc., 1990.

Esbjornson, Robert (ed). *The Manipulation Of Life*, Toronto: Fritzhery & Whiteside, 1994.

Fairley, Barker. *Goethe's 'Faust'*, Toronto: University of Toronto Press, 1970.

Franklin, H. Bruce. *Future Perfect: American Science Fiction Of The Nineteenth Century*, New Jersey: Rutgers University Press, 1995.

Grant, Michael. *Myths of the Greeks and Romans*, New York: Penguin Books, 1995.

Grant, Michael & Hazel, John. *Who's Who In Classical Mythology?*, London: Routledge, 1999.

Hammond, Ray. *The Modern Frankenstein: Fiction Becomes Fact*, Poole, England: Blandford Press, 1986.

Hardison, O.B Jnr. *Disappearing Through the Skylight: Culture and Technology in the Twentieth Century*, London: Penguin Books, London. 1989.

- Hughes, J. Donald. *Ecology In Ancient Civilisations*, Albuquerque: University of New Mexico Press, 1975.
- Huxley, Aldous. *Brave New World*, Glasgow: Caledonian International Publishing, 1994.
- Huxley, Aldous. *Brave New World Revisited*, London: Chatte and Windus, 1992.
- Jensen, Paul M. *Fritz Lang's 'Metropolis'*, Letchworth, Hertfordshire: The Garden Press Ltd, 1973.
- Leeming, David. *Encyclopedia of Creation Myths*, California: ABC-CLIO Inc, 1994.
- Leiss, William. *Under Technology's Thumb*, Montreal: Queen's University Press, 1990.
- Kitcher, Phillip. *Abusing Science: The Case Against Creationism*, Cambridge, Massachusetts: MIT Press, 1982.
- Kirk, G.G. *The Nature of Greek Myths*, London: Penguin Books, 1974.
- Leslie, John. *The End Of The World: The Science and Ethics of Human Evolution*, London: Routledge, 1998.
- Levison, Paul. *The Soft Edge: A Natural History and Future of the Information Revolution*, New York: Routledge, 1997.
- Levy, Charles K. *Evolutionary Wars: A Three-Billion-Year Arms Race: The Battle Of Species On Land, At Sea and In The Air*, New York: W.H Freeman & Co., 1999.
- McKibben, Bill. *The End Of Nature*, London: Penguin, 1990.
- Mason, Jim. *An Unnatural Order*, New York: Simon and Schuster, 1982.
- Newey, Katherine. *Mary Shelley's Frankenstein*, Sydney: Sydney University Press, 1990.
- Panikkar, Raimundo. *The Cosmotheandric Experience: Emerging Religious Experience*, New York: Orbis Books, 1993.
- Prebble, Ray (Ed). *Designer Genes: The New Zealand Guide To The Issues, Facts and Theories About Genetic Engineering*, Wellington: Dark Horse Publishing Ltd, 2000.
- Quinn, Daniel. *Beyond Civilisation: Humanity's Next Great Adventure*, New York: Harmony Books, 1999.
- Ricoeur, Paul. *The Symbolism of Evil*, New York: Harper and Row Publishers Inc, 1967.
- Rifkin, Jeremy. *Algeny*, New York: Viking, 1983.
- Rifkin, Jeremy. *Entropy*, New York: Putnam, 1990.

- Rifkin, Jeremy. *The Biotech Century: Harnessing the Gene and Remaking the World*, New York: Penguin Putnam Inc, 1998.
- Rifkin, Jeremy & Howard, Ted. *Who Should Play God?* New York: Dell Publishing Co, 1978.
- Rochlin, Gene I. *Trapped In The Net: The Unanticipated Consequences of Computerisation*, Princeton: Princeton University Press, 1997.
- Rolands, Mark. *The Philosopher At The End Of The Universe: Philosophy Explained Through Science Fiction Films*, London: Ebury Press, 1993.
- Roszak, Theodore. *The Cult Of Information: A Neo-Luddite Treatise on High-Tech, Artificial Intelligence and the True Art of Thinking*, Los Angeles: University of California Press, 1994.
- Rushing, Janice & Frenz, Thomas. *The Frankenstein Myth in Contemporary Cinema*, Critical Studies In Mass Communication; V.6, No. 1, March 1989.
- Russell, Dora. *The Religion of the Machine Age*, London: Routledge, 1983.
- Shelde, Per. *Androids, Humanoids and Other Science Fiction Monsters: Science and Soul in Science Fiction*, New York: New York University Press, 1994.
- Schneider, Stephen H. & Morton, Lynne. *The Primordial Bond : Exploring the Connections Between Man and Nature Through the Humanities and Sciences*, New York: Plenum Press, 1981.
- Schrödinger, Edwin. *What Is Life? And other Scientific Essays*, New York: Doubleday Anchor Books, 1956.
- Shenk, David. *The End of Patience*, Indiana: Bloomington Books, 1999.
- Slusser, George & Rabkin, Eric S (Eds). *Shadows of the Magic Lamp*, Carbondale: Southern Illinois University Press, 1985.
- Stapleton, Michael. *A Dictionary of Greek and Roman Mythology*, London: Hamlin Publishing, 1978.
- Stewart, R.J. *Elements of the Creation Myth*, Dorset: Element Books Ltd, 1989.
- Stocker, Jack H (Ed). *Chemistry and Science Fiction*, Washington D.C: American Chemical Society, 1998.
- Sullivan, Lawrence E. *Icanchu's Drum : An Orientation to Meaning in South American Religions*, New York: Macmillan Publishing Company, 1998.
- Suzuki, David. *Earth Time*, Toronto: Stoddart Publishing, 1998.
- Suzuki, David & Knudtson, Peter. *Genethics: The Ethics of Engineering Life*, (1998),

Allen and Unwin Publishing, Sydney.

Turney, Jon. *Frankenstein's Footsteps: Science, Genetics and Popular Culture*, London: Yale University Press, 1998.

Vasbinder, Samuel Holmes. *Scientific Attitudes in Mary Shelley's Frankenstein*, Michigan: UMI Research Press, 1984.

Wells, H.G. *Anticipations: The Reaction Of Mechanical and Scientific Progress Upon Human Life and Thought*, London: Chapman and Hall, 1914.

Wells, H.G. *The Island Of Doctor Moreau*, Boulder, Colorado: University Of Virginia Library, 1993.

FILMOGRAPHY

- A.I: Artificial Intelligence*, (2001, dir. Steven Spielberg)
- Blade Runner*, (1982, dir. Ridley Scott)
- Creator*, (1985, dir. Ivan Passen)
- eXistenZ*, (1999, dir. David Cronenberg)
- Frankenstein*, (1931, dir. Frank Whale)
- Gattaca*, (1997, dir. Andrew Niccol)
- Johnny Mneumonic*, (1995, dir. Robert Largo)
- Mary Shelley's Frankenstein*, (1994, dir. Kenneth Brannagh)
- Metropolis*, (1927, dir. Fritz Lang)
- Mr Stitch*, (1996, dir. Roger Avery)
- The Island Of Dr. Moreau*, (1996, dir. John Frankenheimer)
- The Matrix*, (1999, dir. Andy and Larry Wachowski)
- The Matrix Reloaded*, (2003, dir. Andy and Larry Wachowski)
- The Matrix Revolutions*, (2003, dir. Andy and Larry Wachowski)
- Strange Days*, (1995, dir. Kathryn Bigelow)