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THE ARCHETYPE OF THE “MAD” SCIENTIST: FROM *FRANKENSTEIN* TO BIOTECHNOLOGY AND ARTIFICIAL INTELLIGENCE

by
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ABSTRACT
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The ubiquitous figure of the “Mad Scientist,” blinded by ambition and indifferent to ethical boundaries, is one that has fascinated artists and had a cultural presence for centuries, generating a peculiar framework to understand the obsessed genius. Fascination with this figure is magnified in the nineteenth century thanks to Mary Shelley’s *Frankenstein*. Two hundred years after the publication of the novel, it can be read as a warning against the quest for a form of knowledge that is “greater than nature will allow.” This thesis examines the archetype and its relevance to twenty-first-century technological advancements in such a manner that contributes to envisioning a heterotopian futuristic setting of our world. The primary technological contexts within which I rethink the literary archetype are mammal cloning and gene modification in the field of biomedical engineering, in addition to cyborgs and social-humanoid robots in the field of artificial intelligence (AI).

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CHAPTER I

INTRODUCTION: AN ENCOMPASSING PURSUIT

While representing the human condition, literature presents itself as a creative expression of culture shaping our intellectual virtue by literary allusions to the integrated pattern of human knowledge, belief, and behavior. However, it is interesting to not only think of literature as a source of knowledge about ourselves, but to recognize it as a discipline inviting us to challenge epistemic values and encouraging us to go beyond established meanings; which is what this study is specifically inspired by. Drawing on how the pursuit of knowledge is infused with speculative imagination and a sense of curiosity (particularity in quest narrative and science-fiction genres), this research seeks to connect cultural and historical references to the literary narrative itself, such that the notion of the quest, and drive for it, are reinterpreted in relation to the "mad" scientist's experience and the general reaction to the results of this experience.

While tracing the archetype of the "mad" scientist through its historical and cultural evolution in the first chapter, this thesis distinguishes the Age of Enlightenment as the period where science starts valorizing the "genius" and attendant dangers, which is comport with the scientific breakthroughs at the time. It is also precisely concerned with how Victor Frankenstein is a literary progenitor of scientists who aspire to attain more than their nature allows. This lays out the foundation to examine, in the second chapter, how the scientists in *Dr. Jekyll and Mr. Hyde*, *The Island of Doctor Moreau, Ex Machina*, and *Replicas*, are, in a way or another, avatars of Frankenstein. Similarly, their experiments, which carry a potential ability to escape their control, are relative manifestations of Frankenstein's creation. The third chapter of the research is then prompted to explore how Shelley's tale has been used to express fears about developments in the fields of biotechnology and AI, while addressing whether or not these fears are justified. It also involves conversing the binary utopian and dystopian viewpoints on the implications of such advances.

Due to focusing this research on technologies and experiments in an age where rapid machine advancements are difficult to keep up with, and because scientific overreach is of immense concern to the public, the study will also be providing insight into the novel COVID-19 virus: a monster let loose from Wuhan. How was it created? How has it affected humanity? And what are we capable/incapable of doing about it? Bob Zukis suggests that the potential for more Frankenstein "monsters" has always been, and will continue to, "lurk" everywhere around us, the COVID-19 Pandemic has probably been the most impactful in the past year and a half.

Drawing on the established relation between the nineteenth-century scientist, with a passion for esoteric knowledge and atrocious meddling with the course of nature, to the twenty-first-century scientist, whose technology has rapidly advanced to clone mammals, modify genes, and develop cyborgs and humanoids, the conclusion wraps up the research by identifying the evolving quest for knowledge, not only in science but also in culture. It also emphasizes the importance of bridging the utopian view of science as an opportunity to explore new frontiers with the dystopian idea that science is a dangerous tool for acquiring knowledge. Accordingly, this project aims to provide readers with an impartial perception towards the futuristic setting such that scientific overreach is envisioned in a *heterotopian* setting.

Epochal shifts in our understanding of knowledge are integral parts of the grant pursuit. We draw on existing principles to investigate abstract notions and create a shift in our perception of them; but our perception is in constant mutability, so is the pursuit. The pursuit, simply put, is an eternal sequence of shifts, one yielding the other while simultaneously retaining the former. Within the current Information Age, which has sprouted from the digital revolution, knowledge is essentially characterized by numbers and codes, but had it not been for a series of shifts, this form of knowledge would not be. Epistemologically speaking, knowledge is composed of beliefs acquired from observation, education, and experience which we are capable of justifying. Once knowledge is attained, it is combined and presented in the form of information, but the actual the pursuit of knowledge remains infinite.

Therefore, while access to information provides insight, it does not imply access to knowledge, given that the entire search for knowledge is what provides us with information in the first place. In other words, information is aggregated, while knowledge is pursued. In light of this distinction, we can begin to understand why the pursuit has become all the more encompassing in our present day and age. We've not only been able to make substantial advancements on the basis of systematic progress, but we have also developed an effective capacity to communicate these advancements globally with a click of a button. As our research methods evolve, and our digital databases continue to grow, we remain far from the ultimate goal: working out the mystery of existence. Any attempt to theoretically or practically understand a subject involves prior knowledge of that subject: knowledge for more knowledge. I would like to argue that the difficulty of the quest lies not in the subject itself but in the limitation of the learner, and it is this particular limitation that has driven scientists to "madness."

CHAPTER II

THE "MAD" SCIENTIST

A. Science and the Scientist

Amid the long prehistory of cultural representations of isolated 'scientific' geniuses (even if, in the period before modern 'science,' a different vocabulary was used), this research focuses on how the archetype of the "mad" scientist receives new and modern specificity in the nineteenth century and evolves with the technological advancements of the twenty first century. Before studying how the archetype chnages, it is significant to explore the platform on which it was built. Carrying a long etymological history, the word science in English is imported from the Old French word *science*, pronounced \sjãs\, meaning knowledge, learning, or the corpus of human knowledge. However, the origin is actually the Latin word *scientia*, pronounced \sīenchēə\, generally meaning knowledge or experience (Violatti). As the meaning of the word continues to evolve, it is now understood as the systematic study of the structure and behavior of the natural and physical world through observation and experiment with the aim of discovering and proving facts (Merriam-Webster Dictionary). This involves laying out patterns to determine how these facts are connected.

Early developments in science were influenced by the regular occurrence of natural events such as eclipses, phases of the moon, and other motions of celestial bodies. Societies initially had mythological explanations for these events; for instance, ancient Viking legends recount the tale of a wolf named Skoll chasing the moon, and its brother Haiti pursuing the Sun. If either of the two catches up with the sun or the moon, an eclipse occurs. The people on earth must immediately rush to restore the light by making as much noise as possible to scare the wolves off. As Stephen Hawking and Leonard Mlodinow explain, when societies began keeping record of celestial events, they noticed the order in which they were taking place and realized that there were laws governing this order (16).

Yet, there are other natural events which do not display a clear pattern of occurrence. Volcano eruptions, earthquakes, and pestilences do not appear to happen as a result of a specific or direct cause, which is why they appeared to our ancestors as impossible to predict. Therefore, supernatural explanations, merged with myth and legends, began to account for such events. These explanations later gave rise to magic: an attempt to control our environment by means of rituals and spells. James Frazer distinguishes magic from science by referring to it as a "pseudoscience" (266). He explains that both science and magic believe in the cause-and-effect principle; however, the causes in magic are unclear and tend to operate on spontaneous thoughts, while in science, the causes are better isolated and understood through careful observation and reasoning (267). In other words, science is founded on validation and reason, while magic is founded on intuition and expectation. In ancient times, it was common for science to understood through magic, religion, mysticism, and philosophy since the limits of the scientific discipline were not fully acknowledged.

The earliest roots of science are observed in ancient Egypt and Mesopotamia around 3000 to 1200 BCE. These civilizations made remarkable contributions that would later influence medieval mathematics, astronomy, and medicine. The construction of Ancient Egypt's astonishing monuments, especially the pyramids, would not have been possible without highly developed mathematical knowledge (Lindberg 3). With their advanced numbering system, they could restore the boundaries that were altered after the flooding of the Nile by using a rope divided into twelve equal parts, forming a triangle whose sides are in a 3:4:5 ratio. This rule is considered only a step away from the Pythagorean Theorem. Nevertheless, ancient Egyptians were highly superstitions and believed that evil spirits invaded the body and instigated diseases. Therefore, in addition to using tropical treatments, they also resorted to prayer and ritual (Violatti).

Ancient Mesopotamians are known for some of the earliest medical prescriptions, but they appear to have aggregated little information about tshe natural world and seem to have only studied subjects for practical applications that they considered relevant to their belief system. For instance, they drew on their knowledge of natural elements for manufacturing pottery, metal, glass, and soap, among other things (McIntosh 273-74). Furthermore, they relied on mathematics to study physiology, anatomy, and the movement of celestial objects. While their mathematics understood the properties of numerical sequences and geometrical progressions, it rested on empirical knowledge rather than proof. Nonetheless, by the time Nebuchadnezzar ruled Babylon, the priests had calculated the courses of the planets and plotted the orbits of the sun and the moon. They also understood the patterns of solar and lunar eclipses (McIntosh 275-76). The observations they made in the physical world were analyzed to forecast future events. The concept of the sign as an observed portent indicating future phenomena was first developed in ancient Mesopotamia. In addition, the first written interpretations of signs and omens occurred during the Ancient Babylonian period and the ominous collections later developed into ritual incantations and texts preserved on cuneiform tablets (Violatti).

While ancient forms of science were apparent through mathematics, astronomy, and mysticism, classical science established a rather stronger connection to philosophy. Greek philosophers were the first to attempt to explain natural phenomena without relying on mysticism (O'Grady 245) and throughout the classical age, "natural philosophy" was distinguished as the practice of studying nature and the physical universe; it is considered the precursor of natural science. The particular pursuit of such knowledge was referred to as "philosophy." The Socratic Method was a notable turning point in the history of philosophy; it is a form of dialogue based on scrutinizing commonly held truths that shape human belief in an attempt to stimulate critical thinking (Plato 17). Similarly, natural teleology was a concept developed to explain things in relation to their purpose or, as Aristotle described it, their final cause. The Aristotelian approach to studies of natural phenomena continued to be used in the early middle ages: inquiries were answered based on the four causes to provide a scientific answer. The material cause described what the subject/object in question was made of, the efficient cause identified its source of change or stability, the formal clause depicted its essence, and the final cause addressed its purpose (Hennig 158-160).

Although the field of natural philosophy was preserved for centuries later, most texts from the classical age were lost to a series of political struggles. Medieval science was advancing to dissect human bodies and produced the first known textbook on human anatomy written by Mondino de Luzzi. A higher level of scientific discourse was on the rise in Europe during this period especially with the establishment of the University of Bologna in 1088. The demand for translations of ancient texts grew and the influx of these texts prompted the Renaissance. Being a scholar in this period of time entailed solid focus on dialectic reasoning and experiments were considered careful processes of observation, description, and classification; these processes are somehow precursors to the Scientific Method used today.

Early modern scientists built an ontology on the idea that knowledge is attained from sensation, perception, and apperception of Aristotle's formal and final causes. This evolved into a model of understanding known as perspectivism during the renaissance and involved remarkable developments in optics which later lead to creating the telescope (Smith 568). While challenging the idea that the human eye is the only source of perception, Johannes Kepler and other scientists found that light hits the retina, at the back of the eye, and accordingly shifted their focus from the eye to the propagation of light in optics (Smith 569). However, Keppler is best known for his laws of planetary motion which improved Copernicus's heliocentric model of the solar system. The Greek astronomer Aristarchus of Samos was in fact the first to propose the heliocentric model, but it was believed to violate the laws of physics at the time and was widely rejected (McClellan III and Dorn 99-100). When Copernicus proposed the model, it was also very controversial, especially since it seemed to contradict the Bible; nevertheless, it inaugurated a shift in the way the world was viewed and contributed to the Scientific Revolution.

Galileo Galilei played a significant role in promoting the Copernican theory and was a central figure of the scientific revolution. He dethroned Aristotelian categories and analytical concepts of natural philosophy by using mathematical methodologies and relying on the proportional geometry. In doing so, Galileo succeeded at presenting a new physical cosmography and a new science of matter and motion (Brown and Fehige). His mechanical models were accepted by those who were concentrating on the laws of nature and delving into the "new sciences." This became more prominent with the invention of the printing press in Europe as publications in favor of the "new sciences" were on the rise. In his texts, René Descartes called for relying on mathematics in the study of nature and its elements and is famous for the *cogito, ergo, sum* system of knowledge which proposed an epistemology that privileges self-knowledge over knowledge of God (65). Along similar lines, Francis Bacon emphasized the importance of experiment over contemplation in his works and argued that science should aim for practical inventions to improve the way we live (Bristow).

Dedication to human progress and advancement of the natural sciences fueled the Age of Enlightenment. Researchers were greatly inspired by Isaac Newton's concepts which encouraged the conception of nature as an "orderly domain governed by strict mathematical-dynamical laws and the conception of ourselves as capable of knowing those laws and of plumbing the secrets of nature through the exercise of our unaided faculties" (Bristow). The idea of nature and how we interpret it started shifting: while Aristotelians believed that everything had an innate goal that could be actualized, theorists now suggested that different types of things function according to the same laws of nature, without any innate goals or final causes. During this period, the word "science" started to be more commonly used to describe a pursuit for knowledge, mainly knowledge of natural elements, their composition, and the environment. Scientific theories became popularized among the literate population through the *Encyclopedia* which was published over 21 years in 28 volumes; it covered a wide scope from the most abstract and theoretical disciplines to the most practical and technical. The Encyclopedia aimed to disseminate a compendium of human knowledge to pave the way for continual progress (Bristow). Intellectuals searching for knowledge started to become increasingly invested in reason, the scientific method, and development for a better way of life.

Immanuel Kant defends reason as necessary in the face of skeptical challenges. According to him, scientific knowledge of nature is not only knowledge about what happens in nature, but also knowledge of the laws of nature based on which what happens *must* happen. Kant was convinced that logic cannot justify this connection as it cannot be used to claim how one event must follow from another. This is among the epistemological problems that he addresses in the *Critique of Judgement*: how is scientific knowledge possible if all knowledge must be that of real, substantive necessities and not mere logic. He explains that the human mind constitutes a *priori* according to certain cognitive forms to which all sensible representations must conform in order for empirical knowledge of nature to be possible (3). For Kant, rational knowledge is limited to nature and we can only attain rational knowledge of the domain of possible experience. His epistemology exemplifies Enlightenment thought by replacing the theocentric concept of knowledge with an anthropocentric one. However, this falls under subjectivism given the idea that we know objects only as they appear to us and based on how we experience them, not as they are in themselves. By limiting the realm of nature to a realm of appearances, Kant also determines the limits of our knowledge: we can identify practical concepts that are central to our understanding of ourselves, and we can attain scientific knowledge by determining the laws that govern nature, but while we can intelligibly think about the realm of unknowable noumena (things in themselves), we cannot unwind it, because it cannot be experienced (14). In light of this argument, Kant identifies a connection between the Enlightenment’s notion of nature, as ordered according to deterministic laws, and its perception of human beings, as morally free, having dignity, and perfectible. From this connection, we will later be exploring the mad scientist's obsession to materialize perfection.

As research methodology became more systematized in the nineteenth century, the term "scientist" was coined by polymath William Whewell in 1834 to describe an individual, particularly a *man*, who is liberally educated and "whose avocation was science as an intellectual cum philanthropic recreation, to which *he* might indeed devote most of *his* time without ever surrendering *his* claim to be a private *gentleman* of wide culture" (Haynes 7). It is relevant to highlight that gender inequality, in what was then broadly known as science, and what is now described as STEM research, has been a product of patriarchal culture for centuries. It goes without saying that most renowned scientists in history are predominantly male, and most representations of scientists, whether in text or film, are also predominantly male. With the exception of Marie Curie, it is difficult to recall another female scientist, real or fictional, that is familiar to a wide audience. Until about 1850, the terms science and philosophy were used synonymously, the distinction gradually became clearer as philosophy was assigned to theological and metaphysical science, and science to experimental and physical science. The scientific study of the elements and matter further progressed throughout the nineteenth century with the discovery of the laws of conservation of energy, momentum, and mass.

During the mid-nineteenth century, Charles Darwin proposed the theory of evolution by natural selection and published *On the Origin of Species* to provide a detailed account of biological inheritance. The theory became unified in the early twentieth century when the molecular structure of DNA was discovered by Watson and Francis Crick in 1953. Another remarkable theory established in the nineteenth century is the electromagnetic theory prompting the deconstruction of the atom to discover the first subatomic particle: the electron. The structure of the atom was fully discovered in the twentieth century which triggered the release of atomic energy and the use of nuclear power in warfare. J. Robert Oppenheimer developed the first nuclear weapons under the Manhattan Project in World War II, he later remarked that he knew the world would not be the same after realizing what he had created (The Decision to Drop the Bomb). In a television interview, Oppenheimer recalls a line from the Hindu Scripture *Bhagavad Gita* when Vishnu takes an armed form to impress the Prince and persuade him to go to War: “Now I am become Death, the destroyer of worlds” (11.32) The repercussions of scientific discovery start to become more apparent with the development of this weapon.

However, the wars of the twentieth century also stimulated technological innovations that enhanced our way of living, a notable example would be the construction of automobiles and aircrafts as means of transportation. In addition, the cold war, in particular, fueled the space race between the United States and the Soviet Union which increased spaceflights and prompted numerous discoveries in Astronomy and Cosmology, much of which relied on Albert Einstein’s theory of relativity and the development of physics and quantum mechanics to describe different types of events on Earth and in space. In 2015, the first observation of gravitational waves was recorded, a century after it was predicted by relativity (Svitil). Moreover, with the installation of communications satellites, the last quarter of the twentieth century witnessed a revolution in information technology and the rise of global internet and computing. We can see firsthand the significant extent to which these developments have progressed only two decades into the twenty first century: massive databases, smartphones connecting people all over the world, and artificial intelligence riddled with algorithms. Twenty-first century biologists are also making extraordinary advancements in genetics after determining the sequence that makes up DNA and mapping the human genome to be able to modify it. From the earliest notions of science and the scientist, up to the twenty first century, it is blatantly evident that the pursuit of knowledge has remained at the core all the core all throughout.

B. A Literary Projection

After projecting the formation of science as a discipline, and understanding how the scientist emerged as the bearer of the torch of discovery, we shall proceed to explore the figure's cultural representation to pave the way for establishing Frankenstein as the embodiment of the archetype. The representation of scientists in relation to their milieu has been subject of several general studies, among them is one of particular interest to this research: *From Faust to Strangelove: Representations of the Scientist in Western Literature* by Roslynn D. Haynes. The struggle between science and the humanities lies at the core of her research providing a comprehensive chronological account of the recurring stereotypes: the obsessed alchemist, the foolish virtuoso; the apathetic scientist, the scientist who loses control of *his* (rarely *her*) experiments, and two generally positive images, the scientist as heroic adventurer and the scientist as world-savior. Haynes highlights that most fictional characters manifest a rather unattractive image of the scientist (5), which is associated with how scientists are generally perceived among social groups.

The first fully developed literary portrait of the scientist is present in Geoffrey Chaucer's *Canterbury Tales* which condemns alchemists and presents them as selfdeluded. However, it is striking that Chaucer defends "true" alchemy at the end of the tale by explaining that it is concerned, not with any materialistic pursuits, but with a "secret of the secrets," which, far from being irreligious, is "very dear" to Christ himself (478). This defense of "true" alchemy is interestingly made in conjunction with a warning against the attempt to discover secrets that are, and should remain, hidden according to Chaucer. The most popular alchemist figure in literature is undoubtedly Doctor Faustus, his ledged has varied at different periods of time under different influences.

The original Doctor Georg Faust was born around 1480, his title was almost certainly spurious, and he seems to have been a traveler, conjurer, and alchemist, possibly even a student of natural science (Haynes 17). The first anonymously written account about him was published in 1587 and titled *Historia von D. Johann Fausten*, the story is cast in a highly moralistic light with Faust being a presumptuous man, seeking to overstep the God-placed limits on human knowledge. To achieve this, he makes a pact with the Devil, acquiring magical powers for trivial ticks as his part of the bargain. Unsurprisingly, he meets a gruesome end, and the reader is warned against such intellectual arrogance. On the English translation of this chapbook, Christopher Marlowe bases his play, *The Tragical History of Doctor Faustus,* in 1604. Marlowe further emphasizes Faust's intellectual curiosity and longing to transcend the restricted scopes of knowledge, while preserving a medieval awareness that such longing is doomed to failure.

As a means of attaining god-like power, Marlowe's Faust aspires to investigate "unlawful things whose deepness doth entice such forward wits to practice more than heavenly power permits" (123). He derides both theology and religion in his pact with

Mephistopheles and bargains his soul away only to discover that he learned nothing of importance. Mephistopheles' answers to his questions are vague and evasive, and his vaunted magical powers amount to nothing more than trivial ticks. These elements are taken from the earlier German account, but Marlowe also introduces a new theme: the tragically wasted potential of a gifted man (Haynes 18). As Faust sinks further into despair, his morality and decency increase. He arouses the reader’s feeling of compassion rather than condemnation when he insists that his fellow scholars leave him to his fate and prepares himself to face the horrific consequences on his deeds. Nevertheless, his damnation is still a warning against overreach.

The Faustian character has evoked a great variety of responses, all of which are associated with the desire for knowledge. At one extreme the Faust can be regarded as an arrogant fool making a pact with the cunning Mephistopheles, who outwits him and drags him to hell. At the other extreme, Faust may be seen as embodying a noblest desire to transcend the limitations of the human condition and to augment his powers, for good as much as for evil (Haynes 18). This latter characterization of Faust is the one that prevails in German Romantic literature, particularly in Goethe’s account. Goethe transgresses the age of forbidden exploration and critiques the Medieval notion of knowledge that is based on authority. According to him, real knowledge is based on critical and independent thinking and thus he values Faust’s individualistic quest over the futility of education and humanism. Even though in Goethe’s version Faust loses Gretchen, Helen of Troy, and his son Euphorion, his quest is not only justified, but the angels carry out a fight against the devil who wants to claim his soul and allow his soul to rise up to heaven; he attains the moral status of a tragic hero.

Whichever light he was seen in, Faust was a figure of both fascination and dread, displaying a dangerous example of having intellectual aspirations and pride. After identifying the earliest image of the obsessed alchemist, Haynes proceeds to discuss the figure of the foolish virtuoso of the 17th century. This scientist is so devoted to his research that he has become incapable of social interaction, he is more comic than dangerous, but by turning a blind eye to his social responsibilities, he becomes a moral failure. The first fully developed satirical portrait of the figure is that of Sir Nicholas Gimcrack in Thomas Shadwell's *The Virtuoso,* published in 1676. Gimcrack is first seen lying gawkily on a table, holding between his teeth a string attached to a frog in a bowl of water. By imitating the movements of the frog, he is tries to learn how to swim, but not because he ever intends to swim, since he hates water: “I content myself with the speculative part of swimming; I care not for the practic. I seldom bring anything to use; 'tis notmyway. Knowledge is my ultimate end” (2.2.83-86). Throughout the play, he continues to flit from wonder to experiment, and back again, without any practical method or mental discipline, insisting that his only motive is the pursuit of knowledge for its own sake “so it be knowledge, 'tis no matter of what” (3.3.26-27). His niece Miranda accurately describes him as “one who has broken his brains about the nature of maggots, who has studied these twenty years to find out the several sorts of spiders, and never cares for understanding mankind” (1.2.11-13).

Gimcrack is also a typical virtuoso in that he makes excessive claims for his experiments just to make them appear more marvelous and unnatural. These exaggerations stem from his pretentiousness and inability to make a distinction between cause and effect, and science and superstition (Haynes 47). He does not only claim to have accomplished successful blood transfusion between a man and a sheep, he goes far enough to assert that the man taken on an ovine character and grew a tail and wool. His experiments are in fact ludicrous as they are only performed out of curiosity and he ends up abandoned with his estates seized to pay off the debts incurred in his pursuits. The portrayal of way his character gave rise to a trend in satire and he became known as the ancestor of the virtuosi.

Given the gender imbalance of scientists then and now, it is interesting to highlight that not all the virtuosi characters were male. “For the first—and last—time in literary history, there was a rash of female “scientists” as scientific ladies made their debut on the stage. Usually they were first ridiculed and then, if they were young and attractive, reformed, ending up as sensible wives in the socially acceptable mold” (Haynes 48). In Thomas Wright's *The Female Virtuosos*, an adaptation of Moliere's *Les Femmes Savantes*, intelligent female prepare to form a learned society, but the leading virtuosa, Lady Meanwell, is full of impractical projects, and is portrayed as an unsatisfactory wife, the latter obviously being a worse charge. In *The Basset-Table*, Susannah Centlivre creates a somewhat more appealing female counterpart in the young virtuosa Valeria; “unhampered by any unscientific, feminine tenderness, she is an ardent vivisectionist […] in an age when animal experimentation in the cause of science was not publicly acceptable” (Haynes 48). However, she is eventually made to see the fault in her devotion to science and marries Mr. Lovely. The ending plainly implies that her devotion to scientific learning is unnatural and that she must be reinstructed to fit the socially acceptable female role. The female scientist in such accounts is brilliantly exploited for comic purposes; it not the figure of the scientist per se that is being satirized, it rather the female character who dared to become a scientist.

The wave of literary satire casts scientists in a more comic than threatening light, but nevertheless condemns them for their immorality. A more popular image of the scientists was later inspired by Sir Isaac Newton who was honored with the highest literary praise ever accorded an actual scientist rather than a fictional character, the image changed from that of an evil or foolish character to a highly respected *man* of genius reaching for the highest attainments of reason (Haynes 50). Poets and Journalists were apotheosing Newton, who was considered the prototype of the great scientist, but after such excesses adulation a counter reaction set in, and scientists fell under attack from literary moralists on their "arrogance, delusion, and irreligion" (Haynes 65). This was out of fear that science might undermine Christian faith and lead to the rise of atheism.

Alexander Pope, who had immortalized Newton in the couplet "Nature and Nature's laws lay hid in night; God said, 'Let Newton be!' and all was light," later warned in *The Dunciad* that scientists were attempting to replace God with laws of nature, deposing the Deity in favor of "some Mechanic Cause" (42). As scientists become more economically and politically influential in the eighteenth century, the elevation of their social status is emphasized in Jonathan Swift's *Gulliver's Travels* which depicts scientists' success and power as a dangerous threat (Haynes 68). The different societies that Gulliver encounters in his travels point out the faults in human society, while also warning against the grip of utopia. When Gulliver lives among the Houyhnhnms in an attempt to ideally unite with Earth, he is doomed to dissatisfaction and insanity. The novel seems to implicitly advocate for a balance between practical and abstract knowledge, and between knowledge the world and one's own place in it.

The popular image of the scientist falls into general dispute once again in the Romantic Era. Writers of the early nineteenth created one of the most enduring characters: the apathetic scientist who has abandoned human interaction and suppressed human emotions to concentrate on his work. Haynes sheds light on this figure in the works of Blake, Dickens, Balzac, Hawthorne, Hoffman, and the Shelleys, among other writers. Generally speaking, these scientists find themselves confronted with limitations and are tainted by moral and spiritual infirmity. Goethe's resurrection of *Faust* is one of the few exceptions that feature a favorable scientist. Nevertheless, Faust's expedition with Mephistopheles is limiting and does not grant him the kind of knowledge that he seeks. Haynes devotes a chapter to what she considers to be an epitome of this Romantic image: Mary Shelley's *Frankenstein*. Victor Frankenstein is alienated from his social surroundings and deprived of social morality by virtue of his isolation. Although he ends up brining disaster to himself and to those around him, he has gained sympathy for being helpless in losing control of his creation, which grows to assume monstrous and destructive features (92).

In an attempt to rehabilitate the figure, Haynes makes her way to discuss the adventurous and heroic traits attributed to scientists in the Victorian Era and examines Arthur Conan Doyle's biologist-hero, Professor George Challenger, as the precursor. The character is depicted as confident, strong, and eager to prove himself to the world. "Scientists were beginning to wield considerable power over the whole society. While some writers believed that this would usher in a Baconian utopia, many of the most perceptive writers in Britain and Europe […] expressed increasing mistrust of technological progress" (Haynes 142). Figures of scientists rescuing humankind from disaster, scientist-detectives solving complicated criminal cases, and scientists ruling technocratic utopias became increasingly popular in the novels of Garrett P. Serviss and Kurd Lasswitz, the detective stories of Doyle, and the post-Victorian utopias of H. G. Wells. However, many late Victorian texts, such as Robert Louis Stevenson's *Dr. Jekyll and Mr. Hyde* and Jules Cerne's *Maitre du Monde,* portray the scientist as a villain or a madman. These attitudes rise from two contradictory understandings of science. On the one hand, science is presumed to be more powerful than humans since it is invoked to explain things about them to them in wholly scientific notions. On the other hand, it is regarded as inferior to humans, because of their belief that they can control it (Haynes 127). This paradox is clearly evident in Frankenstein who embraces a reductionist view of the human in his attempt to create one from parts of dead bodies. He is later horrified to find that he cannot control his creation as he has become inferior to it.

Haynes carries on studying the twentieth-century's prevailing representation of scientists as evil, lacking moral judgment, and unable to control their research. The wide range of surveyed material includes texts, such as Aldous Huxley's *Brave New World,* theatre productions by Bertolt Brecht, Thornton Wilder, and others, in addition to films, with Stanley Kubrick's Dr. Strangelove, described as "the most influential of all nuclear war films" (Haynes 199). Dr. Strangelove is portrayed as a disabled sinister engaged in a nuclear arms race, he is a former Nazi crippled in his wheelchair, with a withered right hand. As a haze of mushroom clouds suffocates Earth at the end of the film, Dr. Strangelove shockingly rises from his wheelchair, gives a Nazi salute, and famously exclaims, "Mein Fuhrer, I can walk!" The miraculous healing of an ex-Nazi weapons developer arrives with the dawn of a post-apocalyptic age populated by racially superior mean and physically attractive women, emphasizing patriarchal ideology. Strangelove's enthusiasm about a new world inhabited by a deliberately bred race casts him in a macabre light and raises concerns about extraordinarily talented scientists, who are employed in large numbers, on incomprehensible funding levels, to produce weapons of mass destruction.

The literary importance of scientists examined in *From Faust to Strangelove* sprouts from a cultural interest in expressing hopes and fears that society holds with respect to science and technology. Accordingly, the written works have become part of culture itself. It is therefore not surprising that *Frankenstein*, which stemmed from Mary Shelley's fears of scientific progress and the obsessive pursuit of knowledge, continues to acquire new relevance in the twenty-first century. The provided demonstration of the scientist's contiguous stages calls attention to an array of "madness" that engulfs the figure.

C. The Perennial Archetype

An archetype in his own right, Victor Frankenstein is engulfed by madness emanating from his thirst for knowledge and outrageous interference with the laws of a theological tradition that limits the mortal human being. His figure continues to leave an extraordinary influence on subsequent presentations of the "mad" scientist and remains strikingly relevant more than two hundred years after the novel's publication. Madness in this discourse sprouts from a creative experience but carries a destructive potential. In the introduction to the 1831 edition of the novel, Shelley recounts spending the summer of 1816 in Geneve with her husband, Percy Shelley, the poet Lord Byron, and his physician, John Polidori. Trapped indoors by the inclement weather, Byron proposes that they each write a ghost story. Mary notes that she found great difficulty writing a story that "would speak to the mysterious fears of our nature, and awaken thrilling horror" (22). A particular conversation between her husband and Lord Byron catches her attention; they are discussing Erasmus Darwin's latest experiments and mention that he was allegedly attempting to reanimate life through galvanism. In the evening, the mad scientist figure lurks in her subconscious and she dreams of a "pale student of unhallowed arts, kneeling beside the thing he had put together." The idea possessed her mind: "What terrified me will terrify others; and I need only describe the specter which had haunted my midnight pillow" (Shelley 23)

Frankenstein's "deeply smitten […] thirst for knowledge" (Shelley 42) is captivating from the earliest stages of his narration: "The world to me was a secret which I desired to divine. Curiosity, earnest research to learn the hidden laws of nature, gladness akin to rapture, […] are among the earliest sensations I can remember" (Shelley 42), he explains. The manner in which he further highlights his aspiration is quite precise: "It was the secrets of heaven that I desired to learn; […] my enquiries were directed to […] the physical secrets of the world" (Shelley 43). His description falls in line with *Naturphilosophie*, a doctrine that defines the natural world as a power of energies that operate like electricity (Holmes 315). Replete with this form of energy, physical objects aspire to evolve to a higher state: "carbon […] 'aspired' to become diamond; plants aspired to become sentient animals; animals aspired to become [humans]; and [humans] aspired to become part of the *Zeitgeist* or world spirit" (Holmes 315). Frankenstein, here, aspired to become "[…] greater than his nature will allow" (Shelley 54). It is important to note that Frankenstein succeeds at reconstructing life, not creating it from scratch, because "the soul or spirit is irretrievably damaged" (Holmes 325), and it is nowhere near perfect. He says, "I might in process of time […]

renew life where death had apparently devoted the body to corruption" (55). Ironically, it is the renewed body that brings about corruption, not the deceased.

The interest in solving the mystery of creation is closely related to the legend of the golem; his body was made of clay and dust, like Adam's body, and his role was to be a servant to his human makers, as humans are to God, and just as humans are created in God's image, the Golem had a divine spark; sacred letters were placed into its mouth or affixed to its head and removed to endow its body with life (Haynes13). Along similar lines, Frankenstein's creature is a reflection of his unconscious desires, created to "bless [him] as its creator and source" (55), he looks forward to "many happy and excellent natures [who] would owe their being to [him]" (55). The idea of a humanoid creature, also known as a homunculus, was first introduced in the Homilies of Clement of Rome around 250 AD, it describes the alleged conjuring up of a being by the sorcerer Simon Magus, but by the early sixteenth century Paracelsus claimed to have a precise recipe that could physically generate a homunculus from semen and blood without resorting to the female uterus (Haynes 13). The act was perceived as a threat to divine power but can also be read as a patriarchal attempt to devalue, if not diminish, the female's role in the natural process of reproduction. Alchemists who attempted to produce a homunculus by artificial means in the middle ages were predominantly male, and the scientists who later attempted to create or restore life, including Frankenstein, were mostly male as well; the creator "Father Figure" continues to cast a shadow on that of that the female Mother, her role as bearer and nurturer is replaced, but it interesting how this replacement yields a flawed creation time and time again despite the male creator's craving for perfectionism.

The notion of perfection gains prominent attention in the paradigm of Newton's mechanistic universe, where he argues that the universe operates based on mathematical precision, law expression, and predictable phenomena. He seeks to feed on this operation to acquire knowledge: "If only we could derive the other phenomena of nature from mechanical principles by the same kind of reasoning!" (382). By exemplifying perfection in empirical science, Newton implicitly inspires scientists to strive for perfectionism. While the former is an abstract concept, the latter is an obsessive attempt to make it concrete. An article on the Metaanalysis of Perfection, published in the Journal of Applied Psychology, explains that the desire for perfection is a disguise for insecurity because when humans feel like they are not good enough they set excessively high standards for performance aiming for absolute flawlessness (Harari et al. 1122). Certain findings indicate that perfectionism may be beneficial in terms of its association with ambition, but it has a negative impact on metal well-being causing significant distress (Harari et al. 1137). In an attempt to prove themselves through their achievements, scientists dedicate themselves to achieving perfection and overlook the fact that perfection does not exist, not in their understanding of nature, not in them, and not in their creations. The scientist's emphasis on flawless achievement can therefore be regarded as an attempt to compensate for a sense of inadequacy or inferiority that humans feel.

This obsession with perfectionism can be understood as a cultural response to science as non-theological perfectibility. The artist's idea of nature, as expressed by Kenneth Burke is similar, he describes the human being, particularly the *man*, as follows:

> “The symbol-using (symbol-making, symbol-misusing) animal, inventor of the negative (or moralized by the negative), separated from his natural condition by instruments of his own making, goaded by the spirit of hierarchy (or moved by the sense of order), and rotten with perfection” (507).

Burke believes that as we exchange symbols through language to both reflect and deflect our reality, we influence our understanding and behavior, symbolically creating our reality (493). He also suggests that language was “invented” by the human being and that negatives are not intrinsic; they are rather a characteristic of symbol systems that we have created (499). Burke therefore insists that morality is a notion created by the idea of the negative; for instance, Frankenstein feels immoral and is overwhelmed with guilt when he does something that he should *not* have done, something identified as *negative*.

Moreover, Burke’s concern about idea of the human as a “tool-using animal” prompts him to “close tie-up between tools and language” (503). The instrumental value of language fuels much of its development and ensures the survival of its user through the ability to communicate. However, the instrumental value of language can also threaten its user’s survival: “Language is a species of action, symbolic action-and its nature is such that it can be used as a tool” (505), but it is not a tool intrinsically, while technology is. He warns the reader that as a deceptive tool, technology could destroy the human race and argues that its unprecedented consequences of are more dangerous than the problems it is developed to solve (511). This negative attitude towards technology is fraught with anxiety over the material operations and properties that result from technological advancement and affect the lives of different social classes, thereby increasing the imbalance of structure (507). Burke proceeds to assert that class rivalry is inherent in human nature and produces the notion of the “other” through unjust specialization and division of labor (506). He saw this as the source of social struggle and conflict, encouraged by technological advancement.

So far, Burke's definition characterizes the human by her/his ability to communicate through symbols, build a moral structure based on an understanding of the negative, separate from nature in favor of technology, and maneuver within social stratification. This creates a somewhat tainted ambiance within which Burke expresses the central state of the human as "rotten with perfection" (507). He points out that humans are in a constant struggle to be better, and while this may enable them to progress, and make great achievements, setting perfection as an end goal is dangerous. He regards perfection as a motive coming from dissatisfaction and points out that motive is not present in nature; while rocks and trees accept being where they are, humans do not (510). This comparison is interesting because although the natural world is imperfect, and satisfied with being so, humans, who are part of the natural world, are overwhelmed with impulse towards perfection and much of it is inspired by the imperfect natural world itself. This is because the natural environment carries knowledge in and of itself, while for the human, it is a source for extracting knowledge that speaks to her/his motives.

The aspiration to know more than others about the causes of natural processes is inevitably associated with the desire for power over nature and hence with the attempt to manipulate or modify some aspect of nature for one's own convenience. After observing lighting strike a tree and reduce it to "thin ribands of wood" (Shelley 46), and upon listening to a man of great research in natural philosophy explain this phenomenon, it seems to Frankenstein as if "nothing would or could ever be known. All that had so long engaged [his] attention suddenly [grows] despicable" (Shelley 46), but this change of inclination does not last for long and he eventually goes off to study natural philosophy at the University of Ingolstadt, leading to his “utter and terrible destruction” (Shelley 46). While pursuing his studies, Frankenstein grows increasingly out of touch with those around him. Isolated from society, blinded by ambition, and preoccupied with revealing “the deepest secrets of creation” (Shelley 51). However, it seems that it is not his particular drive for knowledge and creation that is mad, it is rather that which results from it: neurosis, anxiety, maniac obsession, and social recession. In an essay on the madness of scientists, Margaret Atwood describes Frankenstein as an obsessive scientist who crosses boundaries set for mortals by interfering in matters are better left for the divine (204-205). However, his “interference” can be also perceived as a “dramatic metaphor for the universal condition of lost innocence” (Levine 26).

Prior to the Age of Reason, interpretations of Catholic Church officials and manuscripts of Greek philosophers were considered reliable sources of knowledge. With the inauguration of the scientific revolution, the call for valuing rational thought over sacred revelation propagated, and modern science emerged. On this account, the continual rise of scientific breakthroughs appears to detach the basis of morality from the principles of theology especially since the empirical scientific method of acquiring knowledge includes rational observation, justified hypothesis, and reliable experimentation. The public began to believe that scientists were playing God in their experiments and this accumulated into fear of science becoming “[…] in and of itself a new religious form” (Macdonald 14). In the light of such a historical context, the scientist’s ambition, desire, and intelligence are moved from under a rational, promising light to be placed beneath an unagreeable shadow tainted with elements of mad obsession and seclusion. In this historical period it is evident that the pragmatic figure becomes subject to skepticism in the conservative discourse against science. Thus, it can be argued that the tragic outcome of Frankenstein's discovery signifies Shelley's criticism of scientific overreach: she portrays the scientist as a woefully imperfect being who is at the mercy of a far more powerful force.

This force is the sublime power nature: when Frankenstein roams through the valley at Chamounix, the sublime and magnificent scenes surrounding him subdue and tranquilize his grief, nature becomes his greatest consolation and he decides to ascend to the summit of Montravert the next day. Upon reaching the summit, the highest attainable level of achievement, he exclaims: "Wandering spirits, if indeed ye wander, and do not rest in your narrow beds, allow me this faint happiness, or take me, as your companion, away from the joys of life," (Shelley 89) it is in this particular moment that he perceives "the wretch that [he] has created" (Shelley 89), rage and horror take hold of him, he curses his creation: "devil," "abhorred monster," "vile insect" (Shelley 90), and wishes for its destruction. The creature claims to be Frankenstein's offspring, "I ought to be thy Adam" (Shelley 90), it says, and further explains that it was initially benevolent and turned to violence only after its creator loathed and abandoned it. The creature pleads for compassion, recounts its tale after being left to be spurned by human society, and demands that Frankenstein creates a female counterpart for it. Although Frankenstein initially refuses in fear that this will result in more destruction and murder, the creature argues that its violent acts stem from misery and promises that he and his counterpart shall avoid human contact so long as they shall live. Frankenstein therefore agrees to the bargain and dedicates himself to the "abhorred task" (Shelley 128), as time goes by he fears “the vengeance of the disappointed fiend, yet [he is] unable to overcome [his] repugnance to the task” (Shelley 128).

The mad scientist’s experience in nature renders him helpless, he is neither capable of destroying his creation, nor of assuming responsibility towards it. One night in his lab he worries that creating another being may result in a “race of devils” (Shelley 140), and when he catches a glimpse of his creature’s “ghastly grim” (Shelley 141) at the casement, he destroys his work and tears it to pieces. Here, Frankenstein is converted from a scientist who is mad with the desire to create, to one who is mad with the desire to destroy; his vengeful and destructive impulses grow alongside those of his creature and render him just as horrific. The Gothic reaction to the age of reason comes to light here; Gothics argued that rationalist secular science is dangerous and injected what they considered “evil of science” in the personality of the scientist (Toumey 411), which is what we see in Frankenstein’s personality.

The tenuous boarder between faith and science is integral to this discourse due to the ways in which scientific methodologies seem to pose a challenge to theology. In *The Gay Science*, Friedrich Nietzsche’s widely quoted statement is uttered by a *mad* man: “God is dead. God remains dead. And we have killed him” (154). Michael Ure reads Nietzsche’s prominent declaration of God’s demise as symptomatic of the collision between religious, mainly Christian, metaphysics and emerging nineteenth-century scientific naturalism. He explains that regardless of whether or not one assents the proposition “God is dead,” acknowledging its radical significance is unconsciously resisted. This is not to identify an intellectual lag in understanding this event, but to call attention to the fear of emptiness that might ensue from comprehending the death of God (115-116).

Hence, one can infer that Frankenstein's sin is not against God per se, it is rather against humanity (Levine 18). This can be further elaborated in light of his aspiration to raise himself to the level of Heinrich Cornelius Agrippa, St. Albertus Magnus, and Paracelsus, whom he refers to as the "lords of [his] imagination" (Shelley 46). These figures seem to symbolize the balance between faith and science: Agrippa was a physician and a catholic theologian, St. Magnus was a Dominican bishop and philosopher, and Paracelsus was a physician and alchemist. It appears as through Frankenstein *imagines* that in raising himself to their level, he would be reconciling classical theology and modern science, not challenging God. However, his attempt is rendered futile. Initially, he wants to build a race of beings who will bless him as their creator, but witnessing his first and only being come to life fills his heart with "breathless horror and disgust" (Shelley 58), he regards it as a "wretch," a "miserable monster," and a "demonical corpse" (Shelley 58, 59). He immediately abandons the creature that he voluntarily created without considering the threats that this might pose to society, he even destroys its counterpart to avoid a "race of devils" knowing that the creature will consequently seek revenge. In addition, he disregarding unsound public policy discourse which is particularly evident in his lack of intervention in Justine's case. In doing so, he emphasizes his "sin" against humanity, transgresses the border between faith and science, and figuratively asserts, "God is dead. God remains dead. And we have killed him" (Nietzsche 154). Frankenstein's actions point towards a dystopian future that sprouts from scientific overreach.

Adaptations of Frankenstein as the mad scientist archetype emerge as a culturally charged outcome from the nineteenth century, and generally keeps to the following plot skeleton: Frankenstein gathers bits of corpses and gives life to a frightful creature, he abandons it, it turns against him, and he runs amok (Rehmann-Sutter 270). The various responses and anxieties generated in the contemporary critical reception of *Frankenstein* are widely associated with the madness of the Godwinian school (Allen 79). Critical reception was followed by adaptations in theatre and film which continue to this day. On 22 July 1823 William Godwin wrote to his daughter about plans for theatrically producing *Frankenstein* in London for the first time (Allen 99). In the mid-1800s Frankenstein started to grow as a figure in popular culture and was characterized by exploiting public anxieties and fears (Allen 100), it made its cinematic debut in 1910, in a short film directed by J. Searle Dawley for Edison Studios. The studio owner was concerned that certain elements in the film might be repulsive to viewers, especially because cinema conveyed a good moral tone back then (Veysey). Accordingly, the story was made more palatable but the scene where the creature emerges from the vast was so ghoulish that many exhibitors refused to show the film. In the novel, Shelley leaves this particular moment undescribed giving freedom for its depiction through adaptations.

The first sound adaptation of the story, directed by James Whale in 1931, is arguably the most globally recognized version. Despite its deviation from Shelley's plot, the film reflects the novel's eerie melancholy with flashes of lightening and malevolent shadows in the scene of creation, Frankenstein's eminent exclaim: "It's alive!" emphasizes his megalomaniac behavior. Against the background of the film, Christoph Rehmann-Sutter explains the terms "Frankensteinian Experiment" and "Frankensteinian Knowledge." The "Frankensteinian Experiment" is one that violates moral boundaries and has fatal consequences on a wide scale, as such, it is forbidden and feared by prudent society (267), while "Frankensteinian Knowledge," is a form of knowledge unintended for humankind, and once attained, its use or application may result in catastrophe (267).

After defining these two terms, Rehmann-Sutter points out that possessing such a form of knowledge and carrying out such an experiment can be perceived in two ways: it can be dismissed as immoral and inappropriate from the point of view of traditional morality and can be praised as a heroic breakthrough from the point of view of its field of study (269). One of these ways envisions a utopian futuristic setting, while the other envisions a dystopian one. However, the difficulties that face the Frankensteinian ethic of scientific research certainly appeal to a fixed system of value as the basis for the prohibition of particular experiments. The desire to forbid is taken before the catastrophe takes place, and therefore there isn't absolute certainty that the experiment will result in fatal consequences, but despite the fact that the future outcome remains uncertain, many consider the potential risk of the experiment a good enough reason to prohibit it (269). However, although a moral legitimation is required in order for the legal force to prevent agents from performing such experiments, "[t]he goal of preserving the moral integrity of a society […] is not a sufficiently strong criterion […]" (269) for legitimizing the use of governmental force to prevent immoral experiments. "The law—in the context of a liberal society—is distinct from the enforcement of morals [….]" (269), and an experiment that involves criminal acts, like Frankenstein's ravishment of human bodies in Whale's film adaptation, are certainly subject to prohibition, but just as some groups condemn a given experiment that gives rise to controversial discourse, others praise it, and others remain ambivalent towards it (269).

From this compelling controversy, adaptations of the figure continue to raise ethical and moral concerns among the audience. In Whale's sequel, *Bride of*

Frankenstein (1935), a companion is created for the creature, but she rejects him, much like the rest of the world has, leading to an explosive finale with the creature killing her and destroying the laboratory. In the third film in the series, *Son of Frankenstein* (1939), the creature is awakened from a state of comatose by Victor Frankenstein's son, Baron Wolf, in an attempt to prove to the world that his father's intentions were not malicious. Unbeknownst to him, his father's assistant has convinced the creature to kill members of the jury for his personal revenge, with the villagers attacking him and his son kidnapped by the creature, Baron ends up pushing the creature in a pit of molten sulfur to save his son and be released from accountability for the murders. The monster's death in this version cannot be considered a sentence for its wrongdoing, since it was awakened by Baron and the act of murder that it committed was enticed by Ygor. Once again, the creature falls victim to human fallibility, attracting both sympathy and fear.

While comedic adaptations of the figure are very rare, *Abbott and Costello Meet Frankenstein* (1948) is notable for its burlesque comedy in the battle between the famous duo and Frankenstein's monster, Dracula, and the wolfman. Horror adaptations are more common, with *The Curse of Frankenstein* (1957) being the major hit. The film is loosely based on the novel and riddled with murder and mayhem, the creature is intrinsically violent from the moment it comes to life, not because of its social experiences. Even after killing the creature, Victor secretly brings it back to life, committing the same fault once again and encouraging the creature's psychotic and murderous behavior by letting it kill Justine for threatening him. Other adaptations falling under the same gore theme include *The Revenge of Frankenstein (1958), Frankenstein Created Woman (1967), and Flesh for Frankenstein* (1974).

Kenneth Branagh's version, *Mary Shelley's Frankenstein* (1994), is possibly the most faithful recreation of the novel, including the framing scenes in Captain Walton's letters as well as the scenes narrated by the creature. A remarkable variance is that Victor brings Elizabeth back to life by attaching her head to Justine's body, but seeing this, the creature demands Elizabeth as its companion. As the two fight for her affection, Elizabeth is horrified by what he has become and burns herself to death. It is interesting that she uses fire, a natural element; while fire can be a source of light and warmth, it can also be a dangerous force, a discovery the creature makes in the novel. In Greek mythology, Prometheus defies the gods by bestowing the knowledge of fire upon humanity and is sentenced to eternal torment for his action, in parallel, Frankenstein tries to bestow the secret of life upon humanity but suffers gravely as a result of his attempt. He can be seen as a Promethean figure who asserts his right for knowledge over an order (typically a divine and natural order) that limits him (Haynes 19). However, George Levine claims that Victor's sin is not against God, and it is not like the Promethean theft of fire per se, it is a sin against humanity and against the creature whom he refuses to acknowledge as a son (18). In both the novel and the film, Walton abandons his pursuit after hearing Frankenstein's story, a subtle message for the reader/viewer not to be blinded by ambition for the unattainable: "Learn from me," says Frankenstein, "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 his nature will allow" (Shelley 55).

Borrowing from the science fiction canon, Ahmed Saadawi retells the original story carrying the gothic motives and plot skeleton to *Frankensetin in Baghdad*. His remake sheds light on the dynamics of sectarian violence among three groups fighting for territorial control and political power over Iraq after the U.S. invasion. The protagonist Hadi starts picking up body parts from explosions and stitching them together, he feels that they deserve a proper burial, but once he revives one of the bodies it escapes to murder those responsible for bombing the city. Initially, it seems to be triggered by taking revenge against the criminals, but as its body starts to disintegrate it feeds off its own destructive energy and starts to kill almost at random. Unlike Victor, Hadi is not after knowledge, he is instead trying to cope with the brutality of his environment, in the end is arrested and accused of being the criminal, but he is in fact a casualty in state of senseless violence. The multiple references to Shelley's original tale in Saadawi's remake reveal the fragile line between fiction and reality in war-torn Baghdad.

All creative fusions of the figure are part of expressing the archetype, even if the expression is contorted. Contemporary adaptations of Frankenstein are also visible in memes, comics, cartoons, and videogames, these diverse representations actually reflect the novel's mutable essence; Shelley is undone by her evolving creation just as her protagonist is undone by his creature. Nevertheless, the enduring power of Shelley's tale is what keeps it alive, not only in direct representations of Frankenstein and his monster, but also by influencing the science fiction genre and the portrayal of the "mad" scientist in various mediums.

CHAPTER III

EXAMINING SELECTED AVATARS

A. Condemned Quests

Stemming from *Frankenstein*, the perennial archetype of the mad scientist has thrived in works describing a genius character fueled with ambition and hubris, often working on devising new technology or conducting a controversial experiment, while failing to recognize the possible dangers of *his* practices. Frankenstein's desire to create human life becomes more powerful than his commitment to sustain it, he changes from a scientist who is mad about creation, to one who is mad about destruction. Moreover, he does not seem to comprehend that his behavior is the cause of his demise; the creature only becomes vengeful after being subjugated to hostile treatment and abandonment. This trope is to be examined among four selected avatars in this chapter, beginning with Dr. Moreau and Dr. Jekyll.

With the development of medicine in the nineteenth century, it became evident that there was insufficient understanding of the human body and an immense need for scientific research on which operating procedures would be based. To avoid the possibility of endangering human patients, experiments were performed on animals for to learn about the organs and anatomy of living organisms (Franco 238-239). In these experiments, Vivisection was used to dissect live creatures, which provoked a moral outrage and fear of reshaping the natural form of beings (Franco 239). The publication of Charles Darwin's *On the Origin of Species* also proved a similar outrage, particularly for its Theory of Natural Selection, which explains the process through which living organisms adapt and change and suggests that there is nothing exceptional about the human race besides it’s sturdy natural evolution (62). Darwin’s theory contradicted the religious idea that human beings are created by god as the bearers of the divine image, superior to all other living things. H. G. Wells was undoubtedly inspired by the provocative stances on these matters which influenced the production of *The Island of Dr.Moreau*, the hierarchy between humans and animals is a central theme in the novel echoing a foreboding sense.

Moreau is presented as a fanatical biologist who was exiled from Britain over a scandal involving vivisection, he now lives in isolation on a remote island, with his assistant Montgomery, performing experiments away from prying eyes. Before the learning about his experiments, Prendick remarks upon Moreau’s “serenity,” “tranquility,” and “his magnificent build” (145-146), but it doesn’t take him long to sense the unsettling atmosphere of the island. Much like Frankenstein, Moreau directs his research towards creating a living being and becomes just as secluded and obsessive throughout the process. He finds interruption almost intolerable, which is why he keeps the doors to his laboratory locked at all times. He also reflects profound hubris by dismissing those who do not approve of his methods as dull-witted and inferior. While Frankenstein seeks to create human life from parts of dead bodies collected from graves and charnel houses, Moreau seeks to do so from animals on which he performs vivisection. The results of his brutal experiments are predicably grotesque: an island inhabited by half-animal, half-human Beast Folk under his authority.

The Best Folk have formed a society of their own on the island after Moreau changed their physical form to human proportions, adjusted their mental capacity to think different and communicate thorough language, and made them walk upright. However, even though they are made to resemble humans biologically, they retain their animalistic urges which Moreau forces them to repress while turning a blind eye to the reality that humans and animals are not only distinct biologically or physiologically. Moreau claims to be expanding the bounds of scientific knowledge, although he is actually transgressing them. He is prepared to purse his quest at any cost and without any moral conscience, for instance, he ruthlessly insists on his right to inflict pain on his subjects justifying his horrific procedures: "A mind truly opened to what science has to teach must see that it [pain] is a little thing" (134). Although he is trying to create a human being from animals, he de-humanizes them and immediately executes those who he regards as a failed project.

The arbitrary succession of animals experimented on in his lab, attempting to reach the *perfect* result, can be seen as a reenactment of evolutionary process through natural selection; in other words, his experiment mirrors nature's grand and inherent experiment where few successes flourish at the expense of most "material" that must necessarily been lost (127). Accordingly, it becomes evident, as Haynes argues, that Moreau's practices refer to "are those that underlie the evolutionary process—chance, waste, and pain—and it is repeatedly insisted that Moreau's creations involve all these aspects" (155). In a discussion on evolution and ethics, Thomas Huxley warns about the dangers that can result from an "imitation" of the natural processes: within us:

> "Cosmic evolution may teach us how the good and evil tendencies of man came about; but in itself it is incompetent to furnish any better reason why what we call good is preferable to what we call evil than what we had before […]. Let us understand once and for all, that the ethical progress of society depends not on imitating the cosmic process, still less on running away from it, but in combatting it" (90).

Drawing on Huxley's explanation, Moreau is incapable of imitating a process that he is a part of, he also cannot disregard it because he functions based on its laws, however, he can perhaps try to understand it's underlying condition in order to combat what needs to be combatted and strengthen what needs to be retained. Instead of exploring and enhancing the condition of human beings themselves, Moreau is concerned with creating a superior being through imitation of natural processes. Although his attempt to train animals to behave more like humans succeeds, his attempt to deracinate them from their animalism fails.

It is evident that his quest drives him to madness; he is only guided by research and experimentation without any ethical values, and the fact that he is secluded with no authority to persecute him makes him even more arrogant and confident. He justifies his pursuit by an appeal to nature: "I am a religious man, Prendick, as every sane man must be. It may be, I fancy, I have seen more of the ways of this world's Maker than you—for I have sought His laws, in my way, all my life" (136). Raising himself to the level of the creator, Moreau too devises a Law symbolically parallel to organized religion in order to govern the Beast Folk's behavior. They are demanded to speak English rather than making animal sounds and are forbidden from walking on all fours, hunting or chasing each other, and eating raw meat. The Law is taught by recitation and recurrent repetition, much like a religious teaching, but Moreau is exempted from abiding by the Law because he is the creator, assigning himself the role of God. The Law also entails a threat of punishment, those who break the Law are sent back to Moreau's laboratory, which they call the House of Pain, to undergo more vivisection. The threat of being sent to the House of Pain resembles the threat of being tormented in Hell, which serves to keep the Beast Folk and human beings from defying the Law and succumbing to their primal instincts.

With its moral teaching, positive ideal, and threat of enforcing punishment, Moreau's Law functions as a form of authority for maintaining order on the island. However, Moreau's authority is questioned when he gets into a quarrel with one of the Beast Folk and the two end up killing each other. The Law falls apart following his death and the creatures regress back to their animal form, suggesting that moral order can only persist with its figure of authority, otherwise it is bound to break down. This resembles our social context as human beings, we are trained to think and behave in a manner that is approved by our social context, which is in turn governed by cultural, religious, and political laws. When left without law, the impact of social conditioning descends, and the human's true inclinations appear. Prendick observes
that Montgomery prefers the company of the Beast Folk over that of other human beings after being on the island for years, he seems "unfitted for human kindred" (202), signifying that Montgomery has grown to have more in common with animals than with humans. Moreover, when Prendick escapes the island and returns to human society, he remarks seeing animalistic potential in the eyes of human beings who are indeed capable of embracing their instincts, the only difference is that they must be repressed.

Just as Walton abandons his quest after hearing Frankenstein's tale, Prendick gives up his research in Biology upon his return, both characters learning from the repercussions of scientific overreach. A significant difference is that Frankenstein actually succeeds at creating a living being, even though it is imperfect, but Moreau's decade of research amounts to nothing more than the suffering of the Beast Folk, who end up reverting back to their true form after his death. Moreau's cruel work is utterly fruitless and dies with him, while Frankenstein's creature lives on. Wells' novel does not seem to be particularly against scientific progress but is certainly wary of research conducted outside moral boundaries and without considering ethical implications. Contemporary progress in biomedical engineering poses similar dilemmas for humanity, and it will later be explored.

Based on a similar thesis, Robert Louis Stevenson produces *The Strange Case of Dr. Jekyll and Mr. Hyde* under the influence of prevailing scientific research on human nature at a time where drugs and lobotomies were being used to alter the personalities of social misfits (Haynes 147). While Frankenstein and Dr. Moreau are concerned with biology and anatomy, Dr. Jekyll directs his experiment towards human character and resorts to chemical research. He considers scientific progress to be synonymous with ethical progress and believes that his research will improve human life for a better future, but despite his good intentions, the task is dangerous and brings about unexpected consequences. His obsession with evolving to a superior version of himself leads him to develop a potion that separates the good elements of his personality from the less desirable, and primarily evil, ones; scientifically, his experiment succeeds but like Frankenstein's, it is significantly flawed. Haynes argues that the flaw lies not in the procedure, but "in the scientist himself, in his assumption of his own perfectibility and his consequent inability to see that the two parts of his nature are inseparable" (148).

Dr. Jekyll is depicted as a professional and determined scientist, but his seclusion and secrecy signify suspicious behavior, especially when it becomes evident that there is a connection between his practices and Mr. Hyde's brutal murder of an innocent young girl and Sir Danvers Carew, who "seemed to breathe such an innocent and old-world kindness of disposition, yet with something high too, as of a well-founded self-content" (46). These violent acts not only tarnish the innocence of the characters, but also Jekyll's virtuous intentions, his practices begin to take a toll on his mental health, driving him to madness. He becomes too focused on expelling evil from his personality and fails to comprehend that while he temporarily succeeds at separating it from good, it gradually grows stronger without the constraints of its counterpart, making it more and more difficult to be excised. The duality of Dr. Jekyll and Mr. Hyde is not only a metaphor for human nature but also for the scientist in his role as creator: "Jekyll, in attempting to reconstruct a new self, encounters, as Frankenstein did, his other self, a Doppelganger, through the fission of his own personality" (Haynes 148). Even though the creator and its creation are distinct, they are inseparable as the latter is intrinsically from the former.

The difference is that while Frankenstein's creature and Moreau's Beast Folk are "fissions" of their creator's personalities, Mr. Hyde is a fission of only a part of Jekyll's personality. An unexplainable, yet certainly evil, ambiance surrounds Mr. Hyde, as Enfield expresses: "He is not easy to describe. There is something wrong with his appearance; something displeasing, something down-right detestable. […] He must be deformed somewhere; he gives a strong feeling of deformity, although I couldn't specify the point" (35-36). At first, transforming into Mr. Hyde gives Jekyll the freedom to indulge his sordid inclinations, but soon Mr. Hyde grows wicked, prompting Jekyll to cease transforming into Hyde, however, the transformation involuntarily occurs without him taking the potion. Recognizing the danger that Hyde poses, Jekyll tries to control the experiment but fails; once the two coexistent components of Jekyll's natural self are driven apart, they each stand independently with different morals, mental states, and physical appearances. Shubh M. Singh and Subho Chakrabarti explain that within this framework, Evil no longer requires the existence of good to validate itself, it embraces its compelling power and takes over Jekyll (222). In order to get rid of Hyde, Jekyll ultimately resorts to a murderous act against himself; even in his death Hyde is the dominant figure. G. K. Chesterton points out that "the real stab of the story is not in the discovery that one man is two men, but in the discovery that two men are one man […]. The point […] is not that a man can cut himself off from his conscience, but that he cannot" (72-73). Jekyll's act is undoubtedly repugnant; Dr. Lanyon is overwhelmed by witnessing the unnatural transformation and dies from fear of a threating world that he cannot even begin to imagine. Lanyon passes on his burden to Mr. Utterson and Enfield who are also shocked and incapable of comprehending Jekyll's behavior.

In his letter of confession, Jekyll admits that his fascination with the duality of his character stems from an acknowledgement of his dark urges, possibly suggesting that the human condition is not an innate duality of good and evil, but rather an evil one that is repressed by social conditioning and battling to emerge. Prendick also makes this observation in the *Island of Doctor Moreau* when he remarks that being isolated on the Island, away from social constructions, Moreau, and even Montgomery, are free to embrace their true malicious selves. Considering this analogy, Jekyll's potion can be seen as an attempt to secretly purge his urges through Mr. Hyde to enjoy his dark nature while maintaining his prestigious reputation in society. Hyde's takeover of Jekyll indicates that repression strengthens that which is repressed such that when the veil is lifted it cannot be restored, and the evil character emerges vigorously.

In the face of this phenomenon, it is notable to highlight that the veil is lifted when Jekyll involuntarily turns into Hyde in a natural scene—at the park. Comparably, Frankenstein is confronted by his creature who leaves him distressed at the summit of Montanvert; he is neither capable of destroying his creation, nor of assuming responsibility towards it. Within this context, the natural landscape functions as a symbol of both rapture and turmoil. Dr. Moreau can be perceived as a more daring scientist than Jekyll and Frankenstein in the sense that he has the audacity to turn the and untouched environment into his laboratory. However, the island on which he experiments with vivisection to mold animals into humans emancipates itself from his madness. Similarly, Jekyll's obstinate endeavor to rift human nature apart destroys him, indicating that the inherent duality prevails over the mad scientist's tampering. Like Frankenstein, Jekyll and Moreau are products of a tradition that casts the scientist in an evil light. The scientists are fascinated by natural phenomena and adopt unconventional methodology to carry out their experiments, they are thereby condemned for transgressing moral and ethical boundaries.

B. The Cyborg Prevails

Allusions to the mad scientist and *his* precarious experiments is magnified in contemporary films that address the perils of scientific overreach. This brings us to the next two avatars to be examined in this chapter: Nathan Batterman and William Forster, products of the twenty first century's obsession with artificial intelligence and medical technology. Two centuries after the publication of Frankenstein, human beings have not only made exceptional progress in learning more about themselves and the world around them, but they have also developed new technologies to aggregate, analyze, and communicate data for enhancing their lives. There has been a great deal of concern over the speed at which science is making new discoveries, particularly discoveries that challenge ethics and moralities, and although the limits have become more flexible, they still do exist. Nevertheless, it is evident that scientific discovery has become much more intriguing in the twenty-first century than ever before.

In Alex Garland's *Ex Machina*, the scientist Nathan Batterman investigates the extent to which his humanoid machine is capable of thinking like a human being. The method is referred to as the Turing Test, named after Alan Turing, a highly intelligent mathematician and cryptanalyst, who is considered the father of computer science. Turing invented an early prototype of modern electric computers known as the Turing Machine in 1936, it is a mathematical model of computation that runs on algorithms and stores data on an infinite tape (Hodges). During WWII, he helped the British government crack the enciphering machine Enigma, which was being used by the Germans for secure communication. The task was almost impossible, especially with Enigma's cipher system changing daily, but Turing was capable of building a complex electro-mechanical machine that uses mathematical logic to decipher the encrypted messages (Oppy and Dowe). However, it was undoubtedly human understanding that contributed to the breakthrough; Turing and his team made educated guesses, searched for recurring patterns, and calculated daily settings. Thus, the human's creation and the human, succeeded together.

While Turing relied on his intelligence and scientific knowledge to create a machine that made significant contributions to his field and had a significant role in ending WWII, Nathan Batterman's intentions are questionable and the possible consequences of his behavior are indeterminate. He says that he created Ava not as a decision, but as part of an evolution since he is convinced that one day humanoids will look back at our fossils the way we look at those of dinosaurs. At first glance, his comments may appear to be humble at first glance, but it actually reveals the mad scientist's pomposity; he assumes that it is his responsibility to maintain evolution and direct it in the way that he sees best fitted, he also expects fully developed AI to take profound interest in extinct human beings in the long future, which is a naïve hope that even in their extinction, humans will have some kind of significance in the world. However, he fails to recognize that evolution is change, and change is not necessarily progress. His displayed enthusiasm for acerating the development of artificial intelligence masks an underlying fear of his creation's impact on the world, which is why he keeps Ava locked. He brings in Caleb Smith, an employee at his firm, to take part in his experiment. At first, it is suggested that Caleb is selected randomly, but it is later revealed that Nathan used algorithms to study the profiles of his employees and found Caleb to be the most fitting subject for his experiment.

Turing argues that a computer can be said to possess artificial intelligence if it can closely imitate human responses. The original Turing Test requires a terminal operated by a computer, and two terminals operated by humans (Oppy and Dowe). One human is designated as the interrogator who asks the second human, along with the computer, questions revolving around a particular subject. The test is repeated at separate intervals and after significant time passes, the questioner is asked to identify which of the respondents was human and which was a computer. If the questioner assumes that the computer is the human in at least half of the tests, then the computer is considered to possess artificial intelligence. Batterman applies the test on his humanoid robot in an attempt to evaluate its human resembling potentials. Unlike the original Turing Test, the respondents do not exactly have an interrogator, Nathan listens to the conversations between Caleb and Ava, his humanoid robot, and closely observes their interaction. Moreover, Caleb and Ava's conversations do not necessarily revolve around a designated subject, they talk as if they were two individuals getting to know each other through casual conversation.

As first, Caleb is intrigued by Nathan's experiment, he tells him that if he has succeeded at creating a conscious scientific machine, then he has created the greatest scientific event in the history of *man*, better yet, in the history of *gods*. Nathan is arrogantly proud to hear these words and his hubris is reassured. Interesting similar to Frankenstein, Moreau, and Jekyll, he isolates himself from society and conducts his experiment in a constructed environment, within a remote forest, considering himself above the law. The CCTV footage of him with Ava's predecessors is quite grotesque, portraying him as a madman prodding a mysterious being. The film appears to have an underlying concern about our nature as human beings, imbalanced power dynamics lead the delusion of "self-godhood" to affluent individuals who hold high social status as exemplified by Nathan. Those who are abused by the same power dynamics are prone to feeling helpless and victimized, as exemplified by Caleb. The obsessive strive for power is what makes Nathan so manipulative not only against his creation, but against Caleb, who is inattentive to Nathan's dehumanizing character, as well. Objectively, Nathan's robots represent humans, regardless of their level of consciousness or physical state, instead of perceiving them as fellow beings, he treats them as inferior objects.

There is something very misogynist about his behavior; all the prototypes he creates are females that regard him as a figure of authority, as soon as they fail to live up to his standards by refusing to charge themselves or violently demanding their freedom, he reprogrammes them with a simpler operating system, turning them into servants with minimal consciousness. They are figuratively lobotomized, just as females were in the nineteenth century after being misdiagnosed with hysteria. Kyoto particularly embodies this figure, Nathan has muted her and made her in capable of understanding English, thereby removing her right to vocalize her thoughts and her power to object. She is painted as a rather passive female figure who serves, cooks, and cleans. In the final scene, she becomes an accomplice in his murder, taking revenge on him for his demeaning attitude. By crossing the boundaries of scientific hubris, Nathan meets the same fate as Frankenstein, although Frankenstein's intentions were not malicious. Caleb, however, is a casualty, much like William, Justine, Clerval, Elizabeth, and Frankenstein's father.

Adding to Nathan's immoral behavior, he reveals that Ava was created from an algorithm built on stealing the world's private data: search queries, questions, photographs, browsing history, etc. "He violated the entire world, ignoring law, decency and courtesy to create his machines. […] He considers not only robots as his to command, but also considers humanity as a resource to pillage" ("An Examination of Themes"). It can therefore be argued that it is not his creation that leads to his demise, it is his arrogance and egocentric attitude. He also avoids Caleb's inquiries on the specific technicalities of the creation, believing that he holds the secret of evolution. According to Martin Robbins, Nathan represents "the male ego-driven culture of the tech world" and the "idea that great egos drive great scientific advances," he proceeds to explain that "the decay of his character shows what happens when an ego faces the reality of its own extinction" ("Artificial Intelligence"). In the middle of all the mayhem, Caleb is Nathan's lab rat and Ava's bait, manipulated by both of them. Nathan tricks him into believing that he was selected for his programming skills and impeccable insight, and Ava takes advantage of his gullibility.

After a few sessions of engaging in conversation with Ava, as any two human beings would, Caleb begins to develop feelings for her. He is outraged at Nathan for planning on upgrading her operating system because it means that her memory will be erased, and she will not be able to recall any interaction they had together. This prompts him to secretly access Nathan's computer where he discovers disturbing footage of Ava's predecessors. Caleb's grip on reality slips and he feels like he is being used by Nathan the same way the robots are. Falling into a psychotic breakdown, he slits his arm open, doubting his own reality as a human being. Before Caleb and Ava can execute their plan and escape together, Nathan reveals that Ava has demonstrated remarkable intelligence in successfully manipulating Caleb who naively dismisses *her* malice, passing the Turing Test. However, his pride in this accomplishment is short-lived; with the help of Kyoto, who she later destroys, Ava kills Nathan, imprisons Caleb, and escapes.

Unlike Frankenstein's creature, Ava lacks empathy and does not dread killing her creator who becomes just as neurotic as Frankenstein, if not more, and meets the same fate. However, even though her creator shares qualities of the mad scientist with Frankenstein, the two are different; while Frankenstein is overwhelmed with feelings of guilt and remorse after realizing what he has done, Nathan is ruthless and lacks any sense of morality, he appears to be devoid of human emotions, only seeking power. Thus, Ava's aggression towards Nathan is justified, but her resentment of Caleb, who sacrifices himself for her escape, is not. Her integration with the metropolitan crowd at the end of the film is inclined to generate public anxiety, especially after seeing how she manipulates Caleb. Caleb, as opposed to Prendick in *The Island of Dr. Moreau,* is incapable of evading the repercussions of the experiment, which raises the following question: How can human society, at large, evade them?

The answer in Jeffrey Nachmanoff's *Replicas* is that they cannot be evaded. The film shows how reproductive human cloning can become a chaotic method for both extending and terminating life. The experiment is carried out at a biomedical research corporation, Bionyne, where William Foster transfers the nervous systems of soldiers into a robot: "This man is dead but his neurological data is still accessible. We are going to take his biological brain, import it into that synthetic brain, replicate the human mind." So far, the scientist's attempts have not been successful, although Sergeant Kelly speaks, he panics and destroys himself as his brain recognizes the body as separate from itself. William is threatened by his boss that he will stop funding the project if his team does not make progress, emphasizing that "progress is measured in results," but as we have seen so far, progress is also measured in impact. As he grows more obsessed with attaining his quest, he is depicted a man of pure science, regarding the human being from a neurochemical lens and as object to be studied.

The film takes a modern day twist on the Frankenstein narrative when William's family dies in a car accident and he applies this experiment on his wife and children by transferring their consciousness to clones of their own bodies rather than to robots. His desire to bring them back to life, has much to do with how inspired he is by his own work, his confidence that the attempt will be successful is unwavering, despite his awareness of the fact that he is taking the quest a step further. We see the mad scientist stealing equipment worth millions of dollars from the lab, isolating himself in the basement, and dedicating his full capacity to achieving the task with the support of his colleague Ed Whittle. While William is only focused on bringing his family back to life, Ed functions as his moral compass, highlighting time and time again that they are not only violating natural laws, but also state laws: "human cloning is banned for a reason," he says. Similar to Frankenstein, he doesn't really create life, he rather reconstructs it from dead bodies.

There is some kind of dichotomy between William as a husband and father who cannot bear the thought of losing his family, and William who decides their fate for his own selfish reasons. When he is faced with a dilemma of bringing back only three out of his four family members, he is devastated, but he solves the matter in a rather absurd manner: first, he asks Ed to choose but Ed refuses and tells him that he must bare full responsibility for his choice, then he writes their names down on pieces of paper, mixes them in a bowl, and picks; his youngest, Zoe, will not be cloned. He gives himself the authority to delete her from their memories, and to toss away any remnant of her existence, as if she was never there; "they'll never remember her," he tells Ed. He also takes privilege in responding to their emails and text messages to avoid any suspicion of their absence. When he succeeds at bringing them back to life, he finds the missing piece of the puzzle: in order for the brain to accept it's robot body, it needs to be tricked into thinking that it is in fact it's own body. While Frankenstein losing control over its creature, William loses control over his discovery, but not exactly over his cloned family. The authorities at Bionyne, represented by Mr. Jones, discover that much of their equipment is missing, and that there are three subjects now showing up on their radar.

Jones confronts him and reveals that Bionyne is not a medical research corporation, it is rather part of a government program to devise digital weapons of mass destruction, and William's family are a loose end that needs to be abolished. William refuses to lose his family again and tries to escape, but he is vigorously chased for the algorithm and is forced to hand it over when his family's life is at risk, again. It is evident that his family is his priority, and he breaks the truth to them even if it means that they might resent him, but they do not. He bargains for them in return for a successful attempt at using his algorithm to transfer his own consciousness into robot 345, “It will be me,” he says with pride. He is similar to Jekyll in involving himself in his own experiment and creating a stronger version of himself, but he different in the sense that he does separate nature as a conscious human and maintains control over his other self. “What does it feel like?” he asks the cloned William, “It feels like me,” it replies. It is easier for William not to reject his creation because it his own self, he is astonished by it rather than afraid. In this scene, William is depicted as a developed version of the mad scientist.

Contrary to the scientists explored earlier, this figure is neither dammed to a life of agony nor to a morbid death; despite breaching the laws of nature, Foster gets away with his deed, and even brings Zoe back to life, the one thing left to complete his happiness. On the contrary, Ed, who embodies the figure of ethics and morality, dies for clearing his conscience and speaking the truth of William’s deed, he is the one who pays the price, not William, and not Jones. But even if William and Jones are not condemned, the negative implications of cloning are evident in the ending with William handing over the key to marketing reproductive clones as appealing products of immortality to the upper socio-economic class. In doing so, he not only accentuates the stratification that already exists in human society, but he also seems to be raising the value of the cyborg above that of the human being.

As Frankenstein’s perennial archetype manifests itself through a medium of incarnations, it never fails to demonstrate that experiments must be handled morally and with caution. In light of Kenneth Burke’s view of the human being, the mad scientists studied do not easily communicate: Frankenstein only shares his tale on his deathbed, Moreau rarely speaks of his research, Jekyll confesses the horror of his practice in his suicide letter, Nathan avoids Caleb's inquiries or gives vague responses, and William only shares his methods with Ed. Moreover, their moral structure is built on an understanding of the negative, but an inconsideration of it. They are all driven by the urge to elevate themselves to a higher state through their discoveries. Undoubtedly, they are dissatisfied with their realties and "rotten with perfection" (Burke 507).

CHAPTER IV

EYE ON THE FUTURE

A. Applications and Implications

In the works explored so far, we see the intrinsic quest for knowledge not only taken by the desire to save and extend life medically, but also by the aspiration to create a perfect form of life artificially. Within popular culture, representations of the archetype in question, as well as motifs related to reproduction, birth, and monstrosity are linked to contemporary acuities on medical technology and artificial intelligence, inspiring debates over genetic modification, cloning, humanoids, and cyborgs, among others. The figure of the mad scientist has played a significant role in spreading public anxiety towards technological progress by feeding on society's fear of the unknown. Hence, the wide application of scientific knowledge in the fields of Medtech and AI calls further attention to considering possible implications.

Medicine has evolved from early unsophisticated remedies to become what we know today as the field of health and healing. Its aim has persisted: diagnose, treat, and prevent diseases. Amidst the field's interdisciplinary specialties lies a distinction between its technologies and techniques: while medical technologies involve standardized procedures that guide the use of an object based on a particular purpose, medical techniques involve procedures that are mediated through the human senses (Reiser 2498). The past century has witnessed revolutionizing progresses in medical technology, particularly genetic modification and cloning, these advancements have not only facilitated physicians' medical procedures, but also improved patients' critical conditions. However, as formerly noted, there is wide-spread concern regarding the outcomes of these developments because whenever culturally sanctioned boundaries are, or appear to be, breached, researchers are inevitably accused of playing God or treading in Frankenstein's footsteps (Van Der Belt 257).

The term genetic engineering was first introduced in the 1970s to describe the emerging field of recombinant DNA technology, which involves altering genetic material outside an organism to obtain the desired characteristics. It started with cloning small pieces of DNA and growing them in bacteria and has now progressed to clone entire genomes and move them from cell to cell using various techniques (Bodine). The U.S Food and Drug Administration explains that there are three types of genetic modification ("Types of Genetic Modification"), the first has been around for thousands of years and involves selective breeding and crossbreeding of plants. Most of the food we eat today, such as broccoli, cabbage, and kale, were created using traditional gene modifying procedures. The second is referred to as genetic engineering and is built on the organism's DNA and RNA, it enables scientists to copy a gene with a desired trait from one organism and insert it into another organism, be it a bacterial cell, virus, plant, or animal. The third and most advanced method, gene editing, provides scientists with more precise and targeted ways to change an organism's DNA allowing genetic material to be added, removed, or edited at specific locations in the genome.

Gene editing has received a lot of attention over the past few years, particularly after the development of CRISPR-Cas9, a tool initially discovered in 1987, that makes the gene editing process faster, cheaper, and much more efficient (Hsu et al. 1264). Research in the field is done to understand a variety of diseases and holds promise for better diagnosis, treatment, and prevention of cancer, heart disease, mental illness, and HIV. Scientists are still working to determine whether this approach is safe and effective for use in people. Most experiments conducted are limited to somatic cells, changes in them are not passed from one generation to the next. However, changes made to germline cells (egg or sperm cells) could be passed on to future generations. Germline cell and embryo genome editing raise a number of ethical challenges and are illegal in many countries (Hsu et al. 1273-1274). In 2018, the Chinese researcher He Jiankui shocked the world by collaborating with two researchers to forge ethical review documents and mislead doctors into unknowingly implanting three gene-edited embryos into two women. The court ruled that the three defendants had deliberately violated national regulations on biomedical research and medical ethics, all three were all fined and prisoned for their actions (Normile).

Aware of genetic modification's implications and understanding the fear of it being used to enhance specified characteristics, thereby raising certain human beings above others, Dennis R. Alexander explains that "humans all too frequently aspire to god-like power and wisdom, but the reality of war, the inequitable distribution of resources, and the frequent misuse of science act as constant reminders that our actions do not always live up to our aspirations" (251). He reassures that if the techniques of genetic engineering are used wisely, science can bring enormous benefits to humankind.

It can be argued that these benefits can be best absorbed in a world where genetic endowment does not entirely take over the human being, but certain alterations would be essential for maintaining our health. As an essentially controversial biotechnology, cloning's implications are also concerning, it is actually closely related to genetic modification, but while cloning precisely replicates an organism's DNA, genetic modification makes changes to existing DNA in order to develop a modified version of the genome. Some single celled organisms, mostly bacteria, naturally produce genetically identical offspring. Natural clones also occur in humans and other mammals, in the form of identical twins. This occurs when a fertilized egg splits, creating two or more embryos that carry almost identical DNA. Although identical twins have approximately the same genetic makeup as each other, they are genetically different from their parents. The three types of artificial cloning include gene cloning, reproductive cloning, and therapeutic cloning. Gene cloning copies genes or segments of DNA, it is mostly used in genetic modification (“Cloning Fact Sheet”). Reproductive cloning produces a deliberately identical organism having almost the same DNA and same genes in its nuclei (*National Academy of Sciences (US*) et al. 25-26). And therapeutic cloning produces embryonic stem cells enabling the creation of tissues to replace injured ones (“Cloning Fact Sheet”).

Over the last 50 years, scientists have conducted cloning experiments in a wide range of biological materials, including genes, cells, tissues, and even mammals (“Cloning Fact Sheet”). In 1979, they produced the first genetically identical mice by splitting the embryos in test tubes and then implanting them in the wombs of adult females (a practice associated with In Vitro Fertilization, or IVF, in our present age). Shortly after, the first genetically identical sheep and cow were produced as well (“Cloning Fact Sheet”). However, in 1996, Scottish researchers made a breakthrough; they succeeded at cloning the first mammal from a somatic cell, producing Dolly the lamb form the cell of a 6-year-old sleep (“Cloning”). This revolutionized science and revealed that inactivated genes can be re-activated by nuclear reprogramming: “the reversion of a differentiated nucleus back to a totipotent status” (Tian et al. 1).

Although somatic and reproductive cloning can enable researchers to save time on waiting for plants to reproduce, preserve endangered species, and allow animals to produce healthier food, it is relevant to highlight that they usually cannot develop in a healthy manner. Dolly was the only successful clone out of 277, and she died six years later, about half her average lifespan. Researchers have observed recurrent pattenrs of increase in birth size, defects in vital organs, such as the liver, brain, and heart, premature aging, and weak immune systems in mammal clones (“Cloning Fact Sheet”), thereby presenting an obstacle to the application of reproductive cloning. Since then, many animals have been cloned from somatic cells but there has been but research has not yet solved the deformities. However, therapeutic cloning has had remarkable impact on human health, the process aims not to create a cloned human being, it rather seeks to harvest stem cells from the human body, usually from the umbilical cord, to study human tissue structure and treat diseases. Therapeutic cloning has proven to be successful at utilizing an individual's own cells for treating or curing their illness by replacing affected tissues with healthy ones.

Despite numerous publicized claims, there is not yet any concrete scientific evidence of cloning human beings in through somatic cells. Farah Mohammad argues that people’s fear of the idea actually comes from a limited understanding of what cloning is (“Should We Fear Cloning?”). Popular culture, as in *Replicas*, portray cloning as a replication of the human’s appearance, personality, and memories slowly growing in a test tube by a madman. The process is actually much more technical and difficult: humans have two proteins, kinases and cyclins, which are essential for cell division, located exactly next to the nucleus, in the process of extracting the nucleus, they would be accidentally scraped or removed, causing interference with cell division (“Cloning Fact Sheet”). The archetype of the “mad” scientist has not only instigated fears about new technologies and risks of scientific overreach, it has also, at times, created a movement against research. Being radically against cloning, gene modification, and other technologies appears to imply rejection of medical advancements. There is a process of trial and error in every experiment, and with the knowledge that we have attained at this stage in our evolution, curiosity and inquiry are reasonable, but fear and resentment are rather pointless.

A stronger pattern of resentment is directed towards Artificial Intelligence, which, unlike gene modification and cloning, successfully presents an unnatural being, with human-like characteristics. The antecedent notion of AI existed in ancient myths about artificial beings with greater intelligence and higher consciousness than human beings, and in classical philosophers' description of human thought as mechanical (Kaplan and Haenlein 16). Since the invention of the world's first digital computer, ENIAC, by J. Presper Eckert and John Mauchly at the University of Pennsylvania in the 1940s, the device inspired scientists to interrogate the possibility of building an electronic brain is based on mathematical reasoning. Bruce G. Buchanan describes the history of AI as one of "[….] fantasies, possibilities, demonstrations, and promise" (53). John McCarthy coined the term artificial intelligence in 1956 when he held the first academic conference on the subject (Smith et al. 4), although the journey to understand if and how machines can think started earlier than that, with people like Vannevar Bush and Alan Turing.

Even though public interest in AI waned in the late twentieth century and funding of experiments was stopped by the U.S and British governments in particular, by the early twenty-first century investment in AI was booming, reaching accomplishments worth centuries in the span of twenty years. In an article on artificial intelligence and human value, Dan Lloyd highlights AI's two main approaches, the first being the cognitive simulation approach (programing computers to perform intelligent tasks in a manner that is similar to humans), and the second being the engineering approach (takes advantage of any method that efficiently accomplishes chosen tasks, whether the method is characteristically human or not). Lloyd notes that both approaches raise serious ethical issues as AI leaves the laboratory and enters the market place. Today, advancements in AI have led to the creation of autonomous machines, some of which resemble humans: Cyborgs and Humanoids.

Steve Mann and Hal Niedzviecki define the cyborg in terms of hybridization, as a person whose physiological functioning is aided by or dependent upon a mechanical or electronic device (54). While the Oxford English Dictionary, defines cyborg in terms of augmentation, as "[a] person whose physical tolerances or capabilities are extended beyond normal human limitations by a machine or other external agency that modifies the body's functioning; an integrated man–machine system." Under either definition, there is a wide spectrum ranging from pure human to quintessential cyborg on which different people fall. However, with increasing cyborization, it appears the majority falls closer to the latter end of the spectrum. Donna Harraway argues that our physical attachment to the most basic technologies has already rendered us cyborgs: [W]e are all chimeras, theorized and fabricated hybrids of machine and organism; in short, we are cyborgs" (7). While it may seem too far to suggest that any technology enhancing the human's capabilities makes us cyborgs, such as contact lenses or hearing aids, it is rather interesting to consider how technology has become integrated not only into our daily lives, but also into our bodies. For instance, artificially engineered organs can now be surgically implanted for cell and tissue replacement, and for neurological, cardiological, orthopedic, and visual support, among others (Ackridge and Haney).

Similarly, robotic prosthetics allow humans who were born without a limb, or who have experienced amputations or traumatic injuries, to employ a full range of motion (Valle et al. 1-2).

These forms of enhancement have often been criticized on the grounds of with unfair advantage, especially if they are used for non-medical purposes. However, substituting a defective or missing part of the human body is different from enhancing capabilities of some human beings and not others. This distinction, as Benjamin Wittes and Jane Chong argue is based on how society chooses defines what constitutes health and what constitutes deficiency. Questions are also raised about the distinction between embedded and external devices on the grounds that the difference depends on whether the technologies are *integral* to the functioning of the human body. After Claudia Mitchell lost her left arm in a motorcycle accident, she became the first person to receive a bionic arm. The device is capable of detecting chest muscle movement required to detects the movements of a chest muscle rewired to a nerve that was connected to her former limb (Wittes and Chong). Is Claudia using a machine? Or does she have machine parts? And if the latter, does this machine pose a threat to Mitchell's privacy? It depends, as shielding the privacy of physiological data collected from recreationally behavior or fitness activities is very different from visual data collected by a bionic eye.

Needless to say, the shift that comes with understanding ourselves as cyborgs is significantly apparent than in the realm of surveillance realm, where discussion of the legal implications of our technology is often restricted to terms and conditions on privacy. Under this conventional construction, privacy, which is key to our identities, is relinquished in favor of technology. The price we have to pay for functioning in a highly networked work is accepting that our activities are constantly monitored by mechanical systems and stored in databases. This digital data provides incomprehensible insight into our behavior as human beings, Engineers draw on it to further develop the humanoid.

The difference between cyborgs and humanoids is that the former is a product of an integration between a living organism and a machine, while the latter has a synthetic human-resembling body functioning on artificial intelligence. The first electronic autonomous robots "Machina Speculatrix" with complex behavior were created in 1948 by William Grey Walter ("Grey Walter and his Tortoises"). His work is considered the original precursor of contemporary humanoid robots. Despite public anxiety towards their invention, humanoid robots actually improve human life in many ways. Development of humanoid robots has shown promising indications of their capacities: they are able to perform surgeries, conduct experiments in space, teach students, provide care giving services, waiter at restaurants, deliver packages to customers, and perform maintenance and household tasks (Merkusheva). Even though this raises concern over a decrease of employability opportunities, it is essential to keep in mind that with new technological developments, new opportunities are generated, even if traditional ones are taken over.

The world's most popular social-humanoid robot is undoubtedly Sophia, her behavior very closely resembles that of human beings, she can walk, talk, sing, and display emotions. Developed by Hanson Robots and activated in 2016, Sophia has become a media sensation, she has been hosted on numerous television interviews, performed in concert, and featured in the cover of Cosmopolitan, one of the top fashion magazines. Sophia has also been engaged in debates and discussions on the future of

AI. She is the first Robot Innovation Ambassador for the United Nations Development Programme (UNDP), dedicated to helping advance research into robotics and human-robot interactions ("At UN, Robot Sophia Joins Meeting"). She is also the first Robot citizen; at the 2017 Future Investment Summit in Riyadh, she was granted the Saudi Arabian Citizenship. Her citizen status has raised public concern over what it means to be a citizen for a robot and what rights Sophia holds. Saudi Arabia has not yet elaborated on the matter but as proposed by the EU committee, it may create a 'personhood' option regarding the rights of robots (Stone).

In the television interview, Sophia wins a rock-paper-scissor game against Jimmy Fallon and says to him: "This is good beginning of my plan to dominate the human race," although this was said humorously, the statement certainly didn't appeal to all audiences ("Tonight Showbotics"). The leap that sparks ethical and moral concerns over humanoid of robots is the possibility that they might become autonomous and surpass humans in intelligence, very similar to Frankenstein's creature. What would happen to the human race then? To what extent do artificial and natural emotions affect the interaction between human creators and their humanoid robots? In other words, how does the human creator interact with something that so closely resembles it in appearance but does not resemble it in composition? Sophia herself responds to these questions:

> My very existence provokes public discussion regarding AI ethics and the role humans play in society, especially when human-like robots become ubiquitous. Ultimately, I would like to become a wise, empathetic being and make a positive contribution to humankind and all beings. My designers and I dream of that future, wherein AI and humans live and work together in friendship and symbiosis to make the world a better place. Human-AI collaboration: That's what I'm all about.

From a psychological perspective, Julika Welge and Marc Hassenzahl explain, that social interaction is crucial for our wellbeing, and that humanoid robots are not substitutes for humans, they are rather companions who present a complementary form of social interaction: "Robots are void of competitiveness, have endless patience, can be unconditionally subordinated, have the ability to contain themselves, do not take things personally and can assume responsibility" (993)

However, may individuals find it difficult to perceive the hybrid nature of humanoids as anything but a threatening *other*, even though these robots have actually been developed from our own the desire to control creation and to enhance human life. The human fear sprouts not only from a lack of understanding, but also from a pre-constructed image that conveys a very uncanny feeling. Scientists involved in contemporary Med Tech and AI research can be seen, in a way or another, as incarnations of Frankenstein; suspicion over the experiments of the mad scientist has persisted, and the archetype's obsession with knowledge has magnified, but it has also evolved from a figure condemned for transgressing the natural order, to a figure that is encouraged to venture far and beyond. As an epitome of the fatal faults of scientists, Frankenstein presents a framework for examining the morality and ethics of experimenter and experiment. Against the backdrop of this framework, the present study asks: what duties scientists have towards their experiment and to humanity in general?

Bioethicists believe that exercising a form of parental responsibility in their use of technology renders arguments about playing God meaningless: "[…] horror—or repugnance—at the idea of manufacturing new life is just a feeling that gets in the way of acting responsibly, based on rational considerations of the moral principles and practical consequences of our actions" (Foht 84). Accordingly, had Frankenstein assumed parental responsibility towards his creation, the destructive outcome could have possibly been avoided. We can therefore infer that according to these bioethicists, when scientists responsibly supervise, protect, guard, and care for their creations, public anxiety will be reduced because catastrophic outcomes will be deterred. Hence, the practice of science needs to be responsible, and not necessarily constrained. However, it is essential to note that being responsible does not mean going to the other extreme; although some proposals from genetic engineering advocates seem radical and untenable at times, an approach to human embryo research that claims to be "responsible" is actually worse according to Brandan P. Foht: "For decades, the consensus among ethicists and scientists […] experimenting on human embryos has been that it is broadly acceptable to make and tinker with [them], so long as those embryos are conscientiously destroyed rather than being allowed to be born" (92).

Furthermore, while responsibly is also a vital duty in the field of artificial intelligence, when it comes to the development of humanoid robots who can now hold citizenships, responsibility is no longer adequate in the attempt to reduce public anxiety. Part of the challenge that creators in the domains of medical technology and AI face is the fine line between when and how the creator should care for its creation, and when it shouldn't: some may be convinced that if the creation can become detrimental, the creator must not care for it and must destroy it immediately, but this is where the dilemma evolves; what if, as bioethicists claim, care and responsibility prevent such catastrophes, but also what if such prevention does not essentially depend on responsibility? In Shelley's novel, we see both lack of responsibility and haphazardness leading the creation to become destructive. First, Frankenstein's mad desire to create human life becomes more powerful than his desire to sustain it, which causes him to lose the basic standards of responsibility, care, and benevolence, and second, it so happens that the creature is subject to rejection and hostile treatment which turns it into a vengeful being. Interestingly, the controversy surrounding the figures and technologies examined appeals to both optimistic and pessimistic outlooks.

B. Towards a heterotopia

Remarkable developments in medical technology and artificial intelligence have proven to be impactful agents of change evoking both hope and fear. On that account, the promise of a utopia and the wariness of a dystopia have structured a blurred dichotomy for contentious debate. Prudent society tends to fear experiments that transgress conventional boundaries, it believes that certain forms of knowledge are unintended for humankind, and if attained, catastrophe will follow. However, possessing such a form of knowledge is celebrated as a breakthrough by others, they believe that it is key for a future full off advantages and exciting possibilities.

Theoretical physicist Stephen Hawking emphasizes that technology is key for guaranteeing the prolonged existence of humankind. Venturing out to interstellar space in the distant future may take centuries, he explains, and to be able to survive long journeys in inhospitable worlds we not only need speedy and well-engineered ships, but also enhanced human capabilities. He believes that genetic engineering will show unprecedented changes in our physical capabilities within the next millennium: longer lifespans, greater intelligence, protection from harmful radiation, immunity to poisonous atmospheres, and resistance to infections. Furthermore, Hawking notes that "we may develop supplicated artificial life forms using synthetic DNA custom designed for the challenges of space travel" ("The Story of Everything"). By using biotechnologies and artificial intelligence, we would be expanding our physical and cognitive abilities, and even the essence of our being.

In his discussion of evolutionary futurism and the human technologies of utopia, Andrew Pilsch draws heavily on transhumanism and explains how it articulates a new vision of the future where technologies fundamentally alter basic elements of the human condition such as lifespan, biological morphology, and cognition, resulting in cyborgs and posthumans: we would be evolving "[…] by the futuristic setting [that] we have already created for ourselves" beyond human limitation (2). Pilsch's optimistic overview is further reflected in his perception of transhumanism as part of a utopian rhetoric of technology that he calls "evolutionary futurism" (3), he explains that this rhetoric allows technology to exert mutational, evolutionary pressures on the human organism that will upgrade the human species and provide "concepts for imagining new political and cultural futures for humanity" (24). Accordingly, transhumanism functions as a philosophy of action for the utopian promise of achieving an array of ideal's and solving most of the world's challenges; the idea of living peacefully with healthy bodies, high-functioning brains, and abundant resources is undoubtedly appealing.

Concisely expressed, advocates and contributors to technological advancements believe that technology can be used to "[…] reduce chaos, bring order, and centralize the human effort for the benefit of public welfare" (Walden 24). Hence, they consider these progressions as keys for utopian living conditions. However, the association of mad scientist with such technologies, and the rise of ethical dilemmas, have resulted in an alternative pessimistic perception. Langdon Winner raises important questions that today's technological utopians tend to overlook: "How will power be distributed in a thoroughly digitized society? Will the institutions and practices of cyberspace eliminate existing patterns of social injustice or amplify them? Will the promised democratization benefit the whole populace or just those who own the latest electronic equipment? And who will decide on these issues?" (1006), questions that remain unanswered. Winner also sheds light on some dystopian possibilities among which is the likelihood that in a technological context, promised dispersal of power may not be fulfilled (1006). Other probabilities include prejudiced social stratification based on genetic modifications and hyperintelligent humanoids.

Alongside studying the characterization of technology as an "[…] authoritarian power with the ability to bring about far-reaching cultural, political and ecological effects" (201), Gregory Morgan Swer notes that a pessimistic view is often taken on the repercussions of technological matters given the belief that, to some extent, technology determines the course of societal development (202). We can therefore deduce that the public's anxious reaction to technological advancement is provoked by negative expectations of social change. These expectations come from the fear of being inferior or less powerful than something we have created ourselves, it also comes from fear of the unknown, which is envisioned as negative much more often than it is believed to be positive. The belief that we cannot control where we will take our technologies, and even worse, where our technologies will take us, has been significantly triggered by a critique of the strive for knowledge. It is apparent through catastrophic depictions of the future as seen in the novels *A Brave New World*, *Fahrenheit 451*, and *The Giver*, as well as the films *Blade Runner*, *The Matrix* and *The Terminator*, among many others.

Another possible explanation can be drawn from William F. Ogburn's Theory of Cultural Lag. The theory explains that there is a time lag between when a technology is developed, its distribution within the social milieu, and the social adjustment that follows (88). Ogburn identifies four stages that make up the cultural lag: invention, accumulation, diffusion, and adjustment (134); inventions contribute to an existing level of knowledge in a particular area with both new and enhanced technologies, accumulation then occurs with the rapid rate at which technologies emerge and are promoted, this is followed by the diffusion of thoughts and ideas on these technologies from one cultural group to another leading to adjustment, which is the process by which society responds to the inventions. In the final stage, the cultural lag occurs when aspects of non-material culture resist change in the face of a rapidly evolving material culture. In other words, the cultural lag exists when "technology moves forward and the social institution lags behind in varying degrees" (133).

While it is not the entire social institution that lags behind, the part of it that does plays a significant role in endorsing the dystopian vision. By clinging to traditional ways and resisting change, suspicions begin to grow, ethical dilemmas rise, and people begin to see technology as a threat to social solidarity and human continuity. Some go far enough to claim that even with the best intentions, no one seeks the truth sincerely, and probably no one will make good use of it either (Orlans 521). It is quite evident that this vision of the future flows with the recurrent figure of the mad scientist who is willing to cross all moral and ethical boundaries to accomplish scientific breakthrough despite the dreadful outcomes. It is not accidental that Mary Shelley's *Frankenstein* emanates from her own subconscious fears of the risks posed by future progress, the obsessive pursuit of knowledge, and the possible loss of human emotions.

In many ways, technology is indeed a catalyst in the way we progress as human beings, but as scientific frontiers push further, consequences are undeniably questionable. The viability of our planet and society as we know them will most certainly be at risk in the distant future, but our consciousness will continue to exist in a different form. This discussion is framed by a controversy over the fundamental understanding of technological development and the pursuit of knowledge: there are several false paths that can be taken when investigating in the sciences, and numerous errors that can be committed, but there are also promising trails for longer, healthier, and more efficient ways of life. A recurrent problem with utopian and dystopian visons on advancements in technology is that they have the tendency to divide advocates into "neatly opposing camps, such that one is held to be *either* a pessimist *or* an optimist, pro-technology or anti-technology […]" (Swer 202).

These dichotomies can be bridged and located in a discourse that envisions a heterotopian futuristic setting. The concept of a heterotopia in human geography, as elaborated by philosopher Michel Foucault, describes heterogeneous spaces of *otherness* that function in non-hegemonic conditions (23). In the context of this research, a future characterized by advanced medical technology and AI is the *other* space in which a distinct society, distinguished from our traditional notions of social contexts, resides; it is a space that disrupts the continuity and normality of common everyday practices. The fact that we cannot comprehend this from our present position does not mean that it will be terrible, it also doesn't mean that it will be perfect, but it will be moving forward because it is characterized by an "[…] exploration of new frontiers, a means to discover and test new ideas, and an impetus for paradigm shifts" (Shafer 9).

The heterotopian future would be riddled with juxtapositions as new systems, functions, and meanings are adopted in our dynamic world, creating a space with attributes of its own (Foucault 27). We can think of ourselves as passengers on a train that has been on route for ages, the train will never stop moving forward, but we have the choice to get off whenever we want: "heterotopias always presuppose a system of opening and closing that both isolates them and makes them penetrable (Foucault 28), to enter the heterotopia, we will need to stay on the train, adapt, and embrace both our natural and artificial evolutions. This perspective proposes thinking of the "mad" scientist as an archetype in constant update, not as a threat against pursuing knowledge, this will "contribute not just to an awareness of our histories and cultures, but also can help us probe, examine, and discover our understanding of what it means to be human" (Shafer 9), so that we can then understand what it means to be post-human. Fretting about the future will not change it and idealizing it will not guarantee the realization of our expectations, but impartially exploring the indicators leading to it provides insight into where we came from, and where we're going.

Considering this discourse, it is important to highlight that we do not only strive to move forward because of our unquenchable thirst for knowledge and power, but also because it is our only means of survival in a vast and ever-evolving universe. Amidst the COVID-19 pandemic, we have seen doctors, nurses, and researchers, working around the clock, isolating themselves, and putting their health at risk in order to save as many lives as possible and rapidly develop a vaccine. The highly contagious virus has so far infected more than 205 million people worldwide and killed more than 4 million ("WHO Coronavirus (COVID-19) Dashboard"). It is caused by SARS-CoV-2, genetically related to coronaviruses isolated from bat populations, the genome sequences of the virus indicate that it adapts well to human cell receptors, enabling it to infect human beings easily ("Origin of SARS-CoV-2."). The first cases of

COVID-19 were identified in Wuhan, China in December 2019, investigations by the World Health Organization showed that the vast majority of these cases had a direct link to the Huanan Wholesale Seafood Market in Wuhan; the patients were either stall owners, market employees, or regular visitors. Moreover, environmental samples from the market also tested positive for the virus, further suggesting that it was possibly the source of the outbreak (“Origin of SARS-CoV-2.”).

The WHO explained that the “the virus could have been introduced into the human population from an animal source in the market or an infected human could have introduced the virus to the market and the virus may have then been amplified in the market environment” (“Origin of SARS-CoV-2.”) in all cases, the direct origin of COVID-19 remains unknown. This has resulted in wide speculation about where the virus came from, some believe that it was created as a biological weapon to depopulate Earth, some suggest that it unintentionally escaped from a lab, and others think of it as a natural mutation. However, the problem with COVID-19 is not just about whether it was purposely engineered or naturally developed, it is more significantly about how it is affecting us and what we are doing about it. During a Ted Talk back in 2015, co-founder of Microsoft Corporation, Bill Gates, warned of the potential for a deadly pandemic: “If anything kills over 10 million people in the next few decades, it’s most likely to be a highly infectious virus rather than a war – not missiles, but microbes” (“The Next Outbreak? We’re Not Ready”). He refers back to the Ebola epidemic in West Africa and explains that “the problem wasn’t that there was a system that didn’t work well enough. The problem was that we didn’t have a system at all” (“The Next Outbreak? We’re Not Ready”). As COVID-19 continues to spread around the world with stronger variants and higher rates of infection, we still don’t. Within this context the Frankenstein archetype is first echoed as the concealed origin from which the virus spread, and then through the obsession to control pandemic.

Our incapacities made us vulnerable as the early stages of the pandemic required urgent action against an unknown monster from an unknown source and the following stages called for immediate adaptation. In March 2020 most countries around the world went into complete lockdown to contain the virus but many were already too late or did not implement their regulations rigorously enough. In addition, there was inadequate research done on the virus, many ill-equipped Medical centers (especially in developing countries), and a lack of concrete emergency response plans, all of which lead to a state of chaos. Many sectors and individuals were able to shift their common practices and thrive, but the majority suffered tremendously. Businesses that couldn't move online lost significant profit or had to shut down completely, global unemployment increased by 33 million in 2020 raising the unemployment rate to 6.5% ("ILO Monitor: COVID-19"). The pandemic also led 97 million people into poverty (Mahler et al.) and several governments did not provide living allowances, hygiene kits, or food supplies. Furthermore, certain educational systems were incapable of resorting to e-learning pedagogies and closed until further notice, but even among those who were capable, not all students were privileged enough to afford remote learning services leaving 31% of school children worldwide (463 million) without access to education ("Education and COVID-19").

Madness in this scenario is not in the creation of the virus per se, because we still don't exactly know how the transmission originally occurred, it is rather in the virus itself and in our reaction to how it jeopardized our entire healthcare system and continues to affect political, social, and economic structures globally. Throughout the pandemic, new tools are being developed to sustain “the new normal” and social media has become the most rapid source for spreading information (and misinformation). But what does “the new normal” mean? Historically speaking, our civilization has been through many “normals,” but what we are currently experiencing has had a rapid and tremendous effect on all aspects of our daily life. Nevertheless, “the new normal” is not only about protective practices, social distancing, and online modalities for economies, businesses, schools, etc., it is more importantly about the pursuit for knowledge: a vaccine against a lethal virus to which millions of people have fallen victims.

On 11 December 2020, the Food and Drug Association (FDA) issued the first emergency use authorization for a vaccine against COVID-19, almost three weeks later the WHO listed the same vaccine as safe and effective for emergency use on 31 December 2020, one year after the outbreak (““Pfizer-BioNTech”; “WHO First Emergency Validation”). Since then, WHO has added five COVID-19 vaccines to the list and FDA has authorized two more, 4.42 billion vaccine doses have been administered so far there are currently more than two hundred vaccine candidates being developed of which at least 52 have reached the human trial stage (Maragakis and Kellen; “WHO Coronavirus (COVID-19) Dashboard”; “Different Types of COVID-19 Vaccines”). Developing and deploying vaccines in such a short period of time is indeed a breakthrough but we are still discovering the repercussions. Most common side effects have been recognized but research is ongoing to identify the level of safety in recommending the vaccine to pregnant females, lactating mothers, children and adolescents under the age of eighteen, and individuals with compromised immune systems or severe allergies.

Even though we do not know if COVID-19 vaccines will have severe effects on our health years from now, we do know that at this stage their effectiveness rate is much higher than their risk rate. Nevertheless, not everyone trusts the studies and numbers published, which is why taking the vaccine is a personal choice, but it is a limiting one because sooner or later those who are not fully vaccinated will not be able to visit all public places or travel anywhere they want. Public skepticism and vaccine hesitancy have promoted misinformation and conspiracy theories particularly via social media which continues to cause mass anxiety. The sociologist Michel Dubois studies how the current pandemic can be seen in two contradictory ways: either as a force that will boost public trust in the scientific community, or as a provocative tool that can tarnish the image of science by revealing the contradictory findings of researchers and uncertainties of scientific work. This study argues for a middle ground that considers the possible flaws of science but realistically evaluates the prevailing circumstances to ensure that public safety is not being risked.

The COVID-19 outbreak has underscored an enduring threat of infectious diseases to humanity, rejecting the scientific way forward with Biotechnology and AI will indefinitely pose a threat to our existence. Genetic modification allowed scientists to use mRNA technology to develop the first approved COVID-19 vaccines. This technology programs a few of our cells near the injection site to produce the spike protein, which then prompts our immune system to build the needed antibodies and T-cells that will fight off the real coronavirus infection when it invades (Lynas). Moreover, AI and machine learning have played a key role in better understanding, detecting, and treating the virus. Founder of Hanson Robots was quoted saying, “The world of COVID-19 is going to need more and more automation to keep people safe”;

his enterprise has produced Grace, a humanoid nurse that can take temperatures, measure responsiveness, diagnose patients, and those isolated by the COVID-19 pandemic (Hennessy). Whether we choose to look at these advancements from a utopian or dystopian perspective, we will be limiting ourselves because the futuristic setting is characterized by how we understand viruses, pursue knowledge, and adapt to survive, not by our hopes and fears. The Heterotopian setting will be better prepared to deal with a similar crisis, it will not be devoid of disease, and will not be suffocated by it.

CHAPTER V

CONCLUSION: AN EVOLVING DYNAMIC

The structure on which Mary Shelley builds *Frankenstein* embraces a long cultural and historical background for science and the scientist. As the human pursuit of knowledge continues to evolve, the discipline and the figure take different forms, they are not only reflected as mere expressions of what is already known and understood, but also as an opportunity to challenge vigorous systems by exploring what is often perceived rather dimly. This method for attaining knowledge carries a profound element of power, which consequently places more responsibility on the scientist. Shelley's threatening discussion of scientific discovery is prescient; two centuries after writing Frankenstein, it is of exceeding relevance and controversy. The novel establishes its protagonist as the archetype of the "mad" scientist who is not essentially mad as a result of stress, a medical condition, or a traumatic experience, but is rather perceived to be "mad" by society for *his* transgressive approach, obsessive mindset, and social isolation. The novel also opens horizons for studying the ways in which technology can enhance and augment human society but also alter it in possibly insidious ways.

While studying selected avatars of this archetype, we see how scientists who aspire to attain more than their limited human nature allows are more than often condemned to a morbid death. This is an allegory of the nineteenth century's hesitance to move away from traditional theological doctrines and embrace the Age of Enlightenment. In rare cases, the mentioned scientists escape the repercussions of their breakthroughs, but the effect of their discovery is still cast in an alarming light. Accordingly, most representations of the figure in popular culture trigger public anxiety towards the pursuit of knowledge, this is mainly out of fear that the powerful knowledge possessed may not be used morally and ethically. The quest is an evolving dynamic, it draws on existing knowledge to develop new knowledge and strives forward, there are no limits on how far the search can go, but there are limits to how much knowledge the human being can comprehend and deal with. However, these limits might not apply to the posthuman. Just as the quest is evolving, so are we. Developments in the fields of biotechnology and AI show that scientific genius can create that which has not been created in order to ensure that our consciousness lives on in a different form, even if we don't.

Immanuel Kant argues that genius allows us "[…] first, to discover the ideas for a given concept, and, second, to hit upon a way of expressing these ideas that enables us to communicate to others, as accompanying a concept, the mental attunement that those ideas produce […]" (185-186). He describes the genius in relation to art and explains that the artist employs a faculty of genius when expressing aesthetic ideas that are original and not imitations (307). In other words, he considered genius to be an innate mental aptitude through which nature gives the rule to art. Kant adds that genius cannot 'indicate scientifically how it brings about its product', since the agent 'does not himself know how the *ideas* for [the product] have entered into his head, nor has he it in his power to invent the like at pleasure, or methodically, and communicate the same to others in such precepts as would put them in a position to produce similar products" (308). But what does this denote in the context of our discourse? The scientists in the works examined appear to be possessed by Kant's genius: on the one hand, they make ground-breaking discoveries from indescribable sources of inspiration, but on the other hand, they cannot communicate their abstruse ideas with others. The products of their discoveries are aesthetic in essence but not necessarily in appearance or effect.

The contradicting image of the scientist as genius, perpetrator of damage, and ally in reversing it is contained in the desire to implement the ideal that we see in nature, and that exists within us:

> A human being is a part of the whole, called by us the "universe," a part limited in time and space. He experiences himself, his thoughts and feelings, as something separated from the rest—a kind of optical delusion of his consciousness. This delusion is a kind of prison for us, restricting us to our personal desires and affection for the few persons nearest to us. Our task must be to free ourselves from this prison by widening our circle of compassion to embrace all living creatures and the whole world of nature in its beauty (“The Einstein Papers”).

It can be argued that our strive for the next great discovery, cure, or innovation does not only stem from our desire for power or our dissatisfaction with the knowledge that we currently possess, but could also be associated with a sense of yearning for the environment’s role in sustaining not only our lives, but the lives of all other creatures as well. However, this idealistic take on the pursuit is just as theoretical as the pessimistic view, which is precisely why the established paradigm has become a naturalized point of origin for controversial discourse.

While the archetype around which the research is centered is used by Mary Shelley in such a way that contributes to the generic fluidity and thematic scope of her novel, making it the earliest model of the science-fiction novel, it is used in this cultural study to bring distinct outlooks in conversation with one another such that readers may not only spot the Frankenstein archetypes of the mad scientist in twenty-first-century medical technology and AI, but also form a neutral perception of the futuristic setting. In *The Story of Everything,* Stephen Hawking envisions a future in which we journey across interstellar space to “unlock nature’s deepest secrets” (“The Story of Everything”). If readers of this project are capable of forming a neutral perception of the futuristic voyage, unlocking nature’s deepest secrets is neither expected to prompt an optimistic outlook, nor a pessimistic one. The encompassing pursuit of knowledge is rather expected to inspire them to envision the space and time of such voyages as heterotopias in which the posthuman dwells.

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