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Fiction and Science: A Plausible World in the Early Modern Period Through the Writings of Francis Godwin and Margaret Cavendish

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Introduction

Between 1492 and 1773 the geographic beliefs of the known world were shattered. The world was already understood to be round in the fifteenth century, but much smaller than would soon be discovered. The Americas, Australia and New Zealand, and finally the frozen continent of Antarctica would all be discovered—or rather officially discovered by Europeans—during the ensuing three centuries. The Age of Discovery did not begin with a total lack of knowledge. Ptolemy mapped the world in his *Geography* around 150 B.C. Henry the Navigator commissioned voyages exploring the western coast of Africa in the early fifteenth century. The world was more or less known by the great minds of Europe—or so they thought. Even Christopher Columbus had no aspirations to discover any new land, but rather a new route to already known lands. Men did not stand on the shores of their homelands declaring that they would discovered the Americas. How could they? There were theoretical locations that Europeans knew they did not yet know—like the southern tip of Africa—but there was so much more that Europeans did not know that they did not know.[1] Writers of the early modern period would use this possibility of unknown lands as settings to explore their thoughts on the world, how it works, and how it should be constructed.

This paper will examine two of these writers in particular, Francis Godwin and Margret Cavendish. Both of these authors wrote tales of fiction that involve fantastic voyages to imaginary landscapes. Upon arriving in these new places the authors investigate, in significant detail, how their new worlds work and through their explorations they shine a light on how the

[1] In a somewhat ominous US Department of Defense briefing, then secretary Donald Rumsfeld elaborated on the idea of "known knowns, known unknowns, and unknown unknowns." The last of these—unknown unknowns—being the most intriguing.

actual world works as well. This choice of a fictional place to discuss real-world phenomena leads us to an important question. The Early Modern Period is known for bridging the divide between medieval thinking and the foundations of the modern world. Why, when literature—ranging from Machiavelli, Descartes, Bacon, and Montaigne—is so focused on the real world in addition to actual travel literature—Pigafetta, Vespucci, and Columbus—would writers like Godwin and Cavendish devote pages of thought on a fictional voyage? In a time where geographic discoveries were being made that shook the foundations of what was known about the world, the use of fictional places and their fictional societies presents an interesting choice in literature.

In this paper I will argue that Francis Godwin and Margaret Cavendish, two scientific outsiders, wrote their works of—what we now know as—Science Fiction in the seventeenth century as exercises in discussing their scientific knowledge; reconciling the advances in scientific discovery with the new geographic discoveries being made by explorers. As outsiders in the scientific field, they would have been unable to engage in the discussions held by established thinkers like Kepler, Boyle, Descartes, and Bacon. Instead, Godwin and Cavendish were able to propose new worlds and peoples based on rational scientific ideas of how nature and societies operated. The fact that these worlds were both unexplored and un-explorable gave a blank canvas to propose fantastical ideas that could not be easily disproven, yet in both works the authors delve into a variety of academic topics. I will pursue this argument by examining Godwin's *The Man in the Moone* and Cavendish's *The Blazing World* and comparing the different themes and ideas introduced. The significance of these findings will show that scholars of the Early Modern period were exposed to a vast field of study, and were writing in a time

where assumptions of the world were so frequently being challenged that even a fictional society on a fictional planet could be discussed with scholarly interest. While other writers could write about their scientific theories in a more accepted manner, scientific outsiders like Godwin and Cavendish found acceptance by writing about science in fictional settings. Through their writings, Godwin and Cavendish can be considered some of the first Science Fiction writers. The genre of Science Fiction, while not a term identified until the twentieth century, is often used a lens to examine the concerns of the period in which it is written, despite the futuristic or fanatical elements of the story.

While nineteenth century writers like Mary Shelley, Jules Verne, and H.G. Wells are generally considered the first Science Fiction authors, both scientists and historians have begun to examine earlier works as the foundation of the genre. The Scientific Revolution ushered in a new interest in natural philosophy, and with it an expansion in the public's interest in science. Carl Sagan and Issac Asimov both claim that Kepler's *Somnium* is the first true science fiction, bridging the gap between the fantastical and natural discoveries.[2] William Poole adds Godwin's *Man in the Moone* along side *Somnium* as the earliest Science Fiction, claiming the flight to the moon and the observations of the narrator establish the work firmly in the genre.[3] The significance of *The Man in the Moone* and *The Blazing World*—also easily categorized as such—as Science Fiction is in the key attributes common to most works, across time periods. Science Fiction gives insight to the concerns of the times in which it was written, as the fear of nuclear

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[2] As preeminent experts in the fields of astronomy and science fiction, respectively, Sagan and Asimov are quite qualified to determine the origin of the genre, in my opinion. See Carl Sagan's video "Carl Sagan on Johannes Kepler's Persecution" https://www.dailymotion.com/video/xerz75, and Issac Asimov's *The Beginning and the End*. (New York: Doubleday, 1977)

[3] William Poole, "Kepler's *Somnium* and Fancis Godwin's *The Man in the Moone*: Births of Science Fiction 1593-1638," in *New Worlds Reflected: Travel and Utopia in the Early Modern Period*, ed. Chloë Houston (London: Routledge, 2016) 57.

war in the mid-twentieth century inspired post-apocalyptic tales and the age of technology inspired a rise of conflicts involving robots and artificial intelligence.[4] So too do the themes discussed in Early Modern examples give glimpses to the concerns of the day. The Age of Discovery and Scientific Revolution give rise to tales of exploring new worlds, but not only in an adventurous or romantic way, but through the lens of a natural philosopher.

While there have been many works produced involving journeys into the unknown, both in the early modern period and before, I will be limiting my scope to the writings of Godwin and Cavendish, as these two writers represent outsiders to the scientific field. In addition, both *The Man in the Moone* and *The Blazing World* include significant amounts of theoretical scientific thinking. I have chosen to exclude three important fictional adventure stories from this analysis: Johannes Kelper's *Somnium,* Thomas More's *Utopia*, and John Bunyan's *The Pilgrim's Progress*. Kepler's Somnium is closely tied to Godwin's *The Man in the Moone*, as it involves lunar fiction, but as a preeminent thinker of the seventeenth century, Kepler represents the scientific community too directly. More's *Utopia* likewise falls outside the scope of this paper, as the work is far more concerned with political theory rather than science. Finally John Bunyan's *The Pilgrim's Progress*, like *Utopia*, focuses on other themes, in Bunyan's case religion. While religion and politics are discussed in both *The Man in the Moone* and *The Blazing World*, they are only aspects, rather than the major themes.

[4] The pop-culture phenomenon *Star Wars*—released in 1977, the heart of the Cold War—is allegorical to the USSR as an evil empire expanding across the globe.

Ch. 1: Seventeenth Century Science

One of the hallmarks of the Early Modern period is the shift in thinking about the known world. European philosophical thought had been dominated by two powerful ideas throughout the Middle Ages: Classical Aristotelian philosophy and the Catholic Church. While the Renaissance celebrated rediscoveries of other Classical ideas, this only furthered the dominant view that those in the past had superior knowledge and skill. During the Early Modern period this idea began to change. Most notable were the works of Francis Bacon (1561-1626) and Rene Descartes (1596-1650). Bacon outlined a "New Method"—now known as the Scientific Method—using observation and experimentation. Rather than relying on classical theories, Bacon argued that only observable—and ideally reproducible—phenomena should be the basis for scientific knowledge. Using a different approach, Descartes questioned all previously known ideas in his *Discourses on Method.* Beginning with his own existence, Descartes used reason and pure logical analysis to determine natural truths. These two approaches represented a changing of the guard from classical authors to discovering truths through reason and observation. Along with these new methods, news discoveries—especially about the heavens—cast doubt on many long-held assumptions about the laws of nature.

Perhaps the most significant discovery in astronomy was the heliocentric model of the universe, put forward by the astronomer and mathematician Nicolaus Copernicus (1473-1543). While the idea that the sun was the center of the universe, rather than the earth, was—quite literally—revolutionary, more monumental was the concept that the earth was a planet, like Venus and Mars. If the earth was a planet, and therefore held some similarities with other objects

in the cosmos, then the laws that govern earth would apply to other planets. This shift, along with newly invented telescopes, allowed other astronomers and mathematicians—like Galileo Galilei (1564-1642) and Johannes Kepler (1571-1630)—to propose that the heavens and the earth followed natural laws. This was opposed to the Medieval view that stars and planets existed on a separate plane, governed by their own laws, or ungoverned by any constraints apart from God. New discoveries about nature on earth could therefore be applied to the universe as a whole, as discoveries about the heavens could be applied to earth. As Steven Shapin writes: "The motion of a cannonball could serve as a model for the motion of Venus."[5] Issac Newton (1643-1727) would take full advantage of this view in at the end of the seventeenth century in his work *Mathematical Principles of Natural Philosophy* arguing that the laws of motion applied to both objects on earth and the movement of planets.[6]

Added to the new methods of scientific inquiry and discoveries of the heavens were the geographic discoveries of the navigators of the fifteenth and sixteenth centuries. In 1488 Bartolomeu Dias (1450-1500) was the first European to reach the southern tip of Africa. Christopher Columbus's (1451-1506) discovery of a new continent in 1492, followed by Vasco da Gama (1460s-1524) rounding the southern tip of Africa and traveling on to India in 1598 opened up new trade routes, and introduced perviously unknown lands to the minds of Europeans. Beginning in 1519 Ferdinand Magellan (1480-1521) and his crew sailed around the newly discovered Americas, crossing the then-unknown Pacific Ocean, and completing the first circumnavigation of the globe in 1522, though Magellan himself died in the present-day

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[5] Steven Shapin, *The Scientific Revolution* (Chicago: University of Chicago Press, 2018) 19.

[6] The apocryphal discovery of gravity from a falling apple detracts from the heavenly focus of Newton's work.

Philippines. Throughout the Middle Ages, the known world was far smaller than it was later discovered to be. These somewhat recent discoveries, tied to the revelations discovered by astronomers of the Early Modern period opened a whole new world to thinkers and writers of the seventeenth century. Some, like John Wilkins (1614–1672), went as far to speculate that there may be other inhabitable planets, on the moon or elsewhere.[7]

Another development of the Early Modern period was on the philosophical theory of the substance of bodies—both animate and inanimate. The Aristotelian theory on objects was built on the idea that all objects consisted of matter and form. A statue, for example, was made of two parts. Its matter was the substance of which it is made, like marble, clay or bronze, while the form of the object gives it the observable characteristics, like shape, color, and texture. In a more complex example, a rose may be made of similar matter to other plants, but the form of the rose creates its sweet smell and red color. The seventeenth century chemist Robert Boyle (1627-1691) applied new discoveries to this theory, creating Corpuscularianism. Instead of simply matter and form, all things were created from corpuscles or tiny particles of universal matter. The figure, motion, and size of these corpuscles determined the qualities and characteristics of the object. It is not, therefore, the form or a rose that gives it its red color and sweet smell, but rather the arrangement of the corpuscles. What marks this as distinct from Aristotelian hylomorphism is that qualities of objects were predictable and reproducible, and the matter of an object led to its form. In other words, because a rose is made up of its matter it is red and sweet smelling, as opposed to something that is red and sweet smelling must be a rose. This distinction was

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[7] Another fantastical tale, but Wilkin's position as a founder of the Royal Society excludes his writing from the focus of this paper. John Wilkins, 1684, *A discovery of a new world : or a discourse tending to prove, that 'tis probable there may be another Habitable World in the Moon ; with a discourse concerning the Probability of a Passage thither; unto which is added, a discourse concerning a New Planet, tending to prove, that 'tis probable our earth is one of the Planets.*

important to many Early Modern scientists who were still attempting to create gold out of lead.[8] If all objects were made of corpuscles and differed only in their arrangement, then to turn lead into gold would only require the rearrangement of the lead.

Related to the Corpuscularianism was Mechanical theory of nature, also popularized by Early Modern natural philosophers. This theory argued against the teleological nature of Aristotelian thought. Aristotle—and the Medieval scientists who followed him—described natural phenomena with almost anthropomorphic attributes. Nature has a plan, and natural creations will endeavor to complete that plan. A classic example is with water in a suction pump. According to the Aristotelian view water can be raised using a pump because "nature abhors a vacuum."[9] To explain the behavior of water in a pump the water is given characteristics and purpose. The Mechanical view attempted to remove the personification of nature and create rational explanations for natural phenomena. The rules of mechanics, thinkers like Bacon and Descartes argued, applied equally to human inventions and nature—all that changed was complexity and scale. The favorite example, and frequent metaphor, for mechanists was the clock. Intricately designed with complex parts, the clock carried out a purpose, but not one of its own, but rather the purpose of the designer. In the same way nature operated by a mechanical design that could be discovered with the right tools and observations.

The new theories and approaches to discovery in the Early Modern period marked a dramatic shift in natural philosophy, but by no means was it universally supported. The traditionally supported Scientific Revolution is no longer unanimously agreed upon by

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[8] Robert Boyle, himself an alchemist, was credited as being instrumental in repealing the statute against multiplying gold or silver in England. J. J. MacIntosh and Peter Anstey, 2018, "Robert Boyle" in *The Stanford Encyclopedia of Philosophy*.

[9] Shapin, *The Scientific Revolution*, 38.

historians, and despite the strides made in the understanding of nature and the cosmos, many of the discoveries were gradually accepted if at all. The mysticism of the Middle Ages was not stamped out, even Johannes Kepler in defending his own mother from accusations of witchcraft did not deny the existence of the occult.[10] Despite attempts by modern writers, there was no great war of science against religion, nor was their consensus on what was discovered, nor how knowledge could be know. As stated above even the two Early Modern pillars of knowledge—Descartes and Bacon—differed on reason versus observation. The new instruments that aided in these discoveries were often considered unreliable or untrustworthy.[11] All of this is to say the seventeenth century saw great strides and great divides in the understanding of scientific discovery and knowledge, with great minds standing astride Medieval and Modern thought. It is in this environment that writers of both fiction and fact existed, and that climate emboldened them to write about plausible fantasy side-by-side reality.

Ch. 2: Godwin's *The Man in the Moone*

In 1599 the adventurer Domingo Gonsales departed the island of St. Helena on his way back to Spain. Before he would reach his homeland Gonsales would embark upon a fantastical journey from the island Tenerife to the surface of the moon, by means of a flying machine powered by twenty-five *Gansas*—large swans. Or so the story is told to us by Francis Godwin in

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[10] For a detailed account of Kepler's defense of his mother and the prevalence of the belief in witchcraft in the seventeenth century see Ulinka Rublack's *The Astronomer & the Witch: Johannes Keplers Fight for His Mother* (Oxford: Oxford University Press, 2017).

[11] While Galileo's use of the telescope for terrestrial observations was not called into question, as it could be verified, there was skepticism when pointed towards the heavens. The same skepticism was applied to the microscope. What one observer sees through the lens could be interpreted differently from another. Furthermore the use of such interments required skill and proper use, while standards for use had not yet been established. Steven Shapin explains this problem in great detail in chapter two of his *The Scientific Revolution* beginning on page 73.

The Strange Voyage and Adventures of Domingo Gonsales, to the World in the Moon: With a Description of the Pike of Teneriff, As Travelled Up by Some English Merchants (from hereon *The Man in the Moone).*[12] Godwin's *Man in the Moone* is just one story in a collection of lunar literature that stretches from antiquity to twentieth-century science fiction. Throughout history the moon had been a source of mythology and speculation, a foreign object in the heavens, a possible location of a new world. In the early modern period, with the discovery of the New World in the West and the Antipodes in the South, there were ample places about which to speculate. The astronomers of Europe would find obvious motivation to focus their telescopes and studies to the heavens, but what led Godwin, an English Bishop to look to the skies instead of his own home on earth?

In this chapter I will argue that Francis Godwin wrote lunar literature as an opportunity to explore fantastical ideas about the natural laws that govern the universe as well as how recent discoveries in natural philosophy could be applied in new ways.[13] A fictional story with an unknown landscape provided an opportunity to present theoretical inventions and new societal frameworks, while being removed from the limitations of the known world. I will pursue this argument by examining the second edition of Godwin's *The Strange Voyage and Adventures of*

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[12] For simplicities sake I will be using *The Man in the Moone* to refer to Godwin's work, based on the original title and the common usage in scholarly work on the text. Francis Godwin, *The Strange Voyage and Adventures of Domingo Gonsales, to the World in the Moon: With a Description of the Pike of Teneriff, As Travelled Up by Some English Merchants* 2d ed. (London, Printed by J. Lever, 1768). Also known as *The Man in the Moone: or A Discovrse of a Voyage Thither by Dr. Francis Godwin and Domingo Gonsales, The Speedy Messenger,* first edition printed John Norton in London, 1638. Quotes and citations from digital copy of the first edition: Domingo Gonsales, *The Man in the Moone: or A discourse Of A Voyage Thither* (London, Printed by John Norton, 1638). http://purple.home.texas.net/etexts/Moone/default.htm

[13] I have chosen to use the term Fantastical over Utopian. Thomas More's *Utopia* descries a earthly society built upon reason. Everything in More's Utopia is plausible, built on a rational system of the common good. Godwin, as we will see, created a world on the moon outside of plausibility, with systems that could exist, but not necessarily built on reason. Fantastical, therefore, fits as Godwin's work is science fiction. Utopian could be used, but I have seen it overused, and stretched its definition unfairly.

Domingo Gonsales, to the World in the Moon printed in 1768, and the original published in 1638, and analyzing the different themes introduced. The significance of these findings will show that scholars of the Early Modern period were exposed to a vast field of study that gave them a broad ranging of knowledge, and were writing in a time where assumptions of the world were so frequently being challenged that a fictional lunar society could be discussed with scholarly intent. This literary exercise was not merely a critique of contemporary society, as other utopian literature was tasked, but attempt to apply recent discoveries in natural philosophy to create alternative theories on how things could be done. Because the moon was unexplored—with little expectation of being explored in the future—it created a blank canvas to propose ideas that could not be easily observed, tested, or disproven. The creation of a fictional society on the moon, as well as a journey to this society, allowed writers to not only explore how the world worked around them, but how it could work differently, while still within the limits of reasonable thought.

Biography of Godwin and Context for Writing *The Man in the Moone*

The first printing of *The Man in the Moone* occurred in 1638 under the pseudonym Domingo Gonsales at the request of Thomas Warren—a rising star in the clergy at the time, but otherwise of no historical significance.[14] Soon after the release it was recognized by John Wilkins—a fellow clergyman and lunar writer—as the posthumously published work of Francis

[14] Stephen Wright, "Warren, Thomas (c.1617–1694)," *Oxford Dictionary of National Biography*, Oxford University Press, 2004.

Godwin.[15] Francis Godwin made his mark on the world not in literature but as a historian of the church in England. He was bishop of Hereford and later Bath. As a student in the later sixteenth century he was well deeply interested in history. Godwin is best remembered for his *A catalogue of the bishops of England, since the first planting of Christian Religion in this Island, together with a briefe history of their lives and memorable actions*.[16] Bishop Godwin also worked on a new national history of England and searched for antiquities in England and Wales. In addition to these pursuits Godwin was much like his contemporaries of the Early Modern period, having scholarly interests in many areas. As we can see in *The Man in the Moone* he was familiar with travel literature, engineering, philology, cryptology, and astronomy. Godwin used *The Man in the Moone* to explore his knowledge on diverse subjects and apply his ideas to a fictional world.

Unlike Wilkins, who was a founder of the Royal Society of London, Godwin was an outsider in the field of science.[17] The rise of Christian Humanism during the Renaissance allowed a bridge between new science and old religion. As Richard Olson notes in *Science and Religion, 1450-1900: From Copernicus to Darwin* the boundaries between science and religion were porous, however, these boundaries were mostly one-way, with scientists claiming strong faith. The members of clergy who were eminent scientists were few, and apart from Wilkins, most were eighteenth century members of more extreme protestant offshoots, such as

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[15] John Wilkins, whose own lunar story *A Discovery of a New World, or, a Discourse: Tending to Prove, That 'tis Probable There May Be Another Habitable World in the Moon. With a Discourse Concerning the Probability of a Passage Thither. Unto Which Is Added, a Discourse Concerning a New Planet* was first published in the same year, described the author of *The Man in the Moone* as "a late revered and learned bishop." David Cressy, "Early Modern Space Travel and the English Man in the Moon." *The American Historical Review* 111, no. 4 (2006): 969.

[16] D. R. Woolf, "Godwin, Francis (1562–1633)." *Oxford Dictionary of National Biography.* Oxford University Press, 2004.

[17] Olson describes Wilkins as one of the "major English natural scientists" as well as a "great British natural theologian." Richard Olson, *Science and Religion, 1450-1900: From Copernicus to Darwin* (Baltimore: John Hopkins University Press, 2004) 42, 96, 167.

Sandemanean and Unitarian congregations.[18] The fact that Godwin never published *The Man in Moone* during his own lifetime supports his outsider status. He was know for his histories of English bishops and searches for antiquities, but it wasn't until several years after his death that *The Man in the Moone* was published, let alone recognized as a work by the late Bishop Godwin.

Francis Godwin wrote *The Man in the Moone* sometime in the late sixteenth or early seventeenth century, as evident by the reference to Queen Elizabeth.[19] Godwin, however, is not alone in writing fictional travel stories in the Early Modern period. Another English clergyman, the previously mentioned John Wilkins, published a book on the moon in the same year as Godwin's was released. Johannes Kepler had begun the framework of a fictional work on the moon in 1609, eventually published posthumously in 1634.[20] Cyrano de Bergerac, inspired by Godwin's *Man in the Moone*, published *Voyage to the Moon* in 1656. These early works of science fiction join Utopian works by Thomas More (1516) and Margaret Cavendish (1666).[21] Like many Englishmen at the time, the early seventeenth century was a tumultuous for Godwin and Wilkins, with the end of Tudor reign and the introduction of the Scottish monarch James I. Perhaps the uncertainty of England in this period encouraged them to look elsewhere for inspiration. Kepler, Godwin, and Wilkins were not the first to speculate on a society on the moon —Dante Alighieri's *The Divine Comedy (*1304) contains a journey through the solar system and Lucian of Samosata's *True History* (174 AD) includes a visit to the moon—but the publishing of

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[18] Olson, *Science and Religion, 1450-1900: From Copernicus to Darwin*, 3.

[19] Gonsales, *The Man in the Moone,* p. 45. Among several veiled praises of the English by a supposed Spanish narrator is a request from the great ruler of the moon—*Irdonozur*—to salute "the great *Queene of England*…the most glorious of all women living*"* upon Gonsales's return to earth.

[20] Johannes, Kepler and Edward Rosen, *Kepler's Conversation with Galileo's Sidereal Messenger.* The Sources of science, no. 5 (New York, JohnReprint Corp, 1965) xxiii.

[21] Cavendish will be the subject of the next chapter.

three works of lunar fiction in the seventeenth century mark a dramatic entrance of the genre into literature. Kepler, Wilkins, and Godwin, as well-educated men, used the moon as the canvas to create fantastical societies to showcase their knowledge about the world and speculate on alternative applications of recent discoveries, however, as a scientific outsider, Godwin's lunar writing was his only avenue for scientific discourse.

A Summary of *The Man in the Moone*

Francis Godwin's *Man in the Moone* starts off with a brief biography of the fictional author Domingo Gonsales. The backstory creates a character that is searching for a way to make his mark on the world and gain his fortune. He finds his opportunity in a voyage of commerce to the East Indies in search of precious jewels.[22] Upon his return trip Gonsales falls ill and is left on the island of Saint Helena to recover. It is here Gonsales—and through him Godwin—displays his inventive mind and creates a flying machine powered by large swans.[23] He later finds passage with a Spanish captain returning home after a separate voyage to the East Indies. As the fleet approaches the Canary Islands they are set upon by three English ships.[24] This attack is the impetus for Gonsales to make use of his flying machine and escape, leading him first to the high peak on the island of Tenerife, then into the atmosphere, where Gonsales described having no weight at all. While there, he is confronted by swarms of locusts and demons that taunt him.[25]

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[22] Gonsales, *The Man in the Moone,* p. 6,

[23] Gonsales, 12.

[24] Gonsales, 16.

[25] Gonsales, 21.

Gonsales then travels upon his flying machine towards the moon. It is on this portion of the voyage that Gonsales observes the earth from a distance, using the opportunity to critique traditional views of the earth: "Philosophers and Mathematicians I would should now confesse the wilfulnesse of the owne blindnesse."[26] Gonsales observes the motion of the earth from east to west, as well as the rotation of the moon in twenty-seven days, and the "Sunne, Venus, and Mercury in a yeare or thereabouts" as well as other planets.[27] After observing twelve rotations of the earth Gonsales arrived on the moon and encounters some of the lunar inhabitants.

The people of the moon are described as strange, being nearly twice the height of humans, with clothes made of an unknown fabric, and skin a "most pleasing and resplendent colour" that Gonsales could not describe—"[f]or as it were a hard matter to describe unto a man borne blind the difference betweene blew and greene."[28] Upon meeting the lunar people Gonsales makes the sign of the cross and utters the words "Jesus, Maria" which the lunar people recognize and bow down. Gonsales then describes his interactions with the people, as they teach him about life on the moon. He travels to the palace of the ruler of the moon—*Pylonas*, the palace of *Irdonozur*—and is given a gift of stones with magical properties. Gonsoles also describes the unique language of the lunar people—more as signing notes than speaking words.[29] Gonsales finally leaves the moon and returns to earth, but lands in China, where he is forced to hide the precious stones he was given on the moon. He is captured by the Chinese and imprisoned until he is released and journeys back to Spain.

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[26] Gonsales, *The Man in the Moone,* p. 23.

[27] Gonsales, 24.

[28] Gonsales, 29.

[29] Gonsales, 39.

An Analysis of Themes in *The Man in the Moone*

Bishop Godwin, through the character Gonsales, uses *The Man in the Moone* to demonstrate his knowledge of the world, as it was known to him in the sixteenth and seventeenth centuries. In the introduction Godwin defends his choice of writing about a world on the moon by citing the travels of Columbus and the existence of the Antipodes. He argues that the world was believed to been charted, and of a known size, yet "and the then unknowne, to be now of as a large extent as all other the knowne world."[30] The recent discoveries of previously unknown parts of the world allow, Godwin argues, the possibility of further undiscovered aspects of the world, or even the moon. Godwin, having never left England, must have read of Columbus' voyage to the new world as well as the Dutch discovery of what is now Australia.

Geography

In addition to Godwin's introduction, he displayed further knowledge of geography in beginning of Gonsales's expedition that leads to his lunar voyage. Gonsales, in an attempt to earn riches, journeys to the East Indies in search of "diamonds, emeraulds, and great Pearles."[31] From there he stays on the island of Saint Helena to recover from a sickness. Godwin describes accurately the location and topography of the islands, including the flora and fauna. From Saint Helena Gonsales voyages to the Canary Islands where he once again describes in detail the island of Tenerife. Upon his return to earth Gonsales lands in China. Godwin describes China in mistaken ways—claiming that "China is a country so popular, as I thinke there is hardly a peece

[30] Gonsales, *The Man in the Moone,* p. 5.

[31] Gonsales, 9.

of ground to bee found, through but thrice a mans length, which is not most carefully manured"—but gives a detailed account of the diversity of language and provinces, as well as the laws of the country governing the access of foreigners.[32] The Bishop also accurately identifies the Jesuit missionary he meets in China as Father Pantoja, a missionary stationed in Pekin from 1596 through 1608.[33] Though Godwin's accounts of Saint Helena, Tenerife, and China are only descriptions to complete the narrative of his tale, his accuracy—as to what was known at the time—demonstrate his geographical knowledge.

Engineering and Physics

Bishop Godwin also displays intricate knowledge of engineering. On the island of Saint Helena Godwin describes the process by which Gonsales creates his flying machine. Through experimentation Gonsales begins to communicate with Diego—the *Blackmoore* staying with him on the island. First Gonsales tames a partridge, then a fox as messengers, eventually constructing a lighthouse. Gonsales then discovers g*ansas*—Spanish for swan—that could carry heavier loads to Diego. He theorizes that multiple *gansas* could carry even larger loads and constructs a mechanism to join them but "found by experience, that if many ware put to the bearing of one great burthen, by reason it was not possible all of them should rise together just in one instant."[34] Godwin's solution is an ingenious engineering design of pulleys and counter-weights that allow

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[32] Gonsales, *The Man in the Moone,* p. 46. While we now know that China is so vast that much of it is not cultivated, the knowledge Godwin possessed would have led to his conclusion, based on limited exploration into the country, and the high population that Europeans had encountered.

[33] H. W. Lawton, "Bishop Godwin's Man in the Moone." *The Review of English Studies* 7 no. 25 (1931): 36.

[34] Gonsales, *The Man in the Moone,* p. 10.

the weight of the load to be distributed among the *gansas* as they take off independently.[35] The *gansas* were a creation of fiction, as was the flying machine itself; however, Godwin applied reason and engineering to create a mechanism that would overcome a perceived problem, instead of simply ignoring the issue. Godwin took the time to create a complex logical solution, establishing an understanding of mechanics and engineering. By using mechanical theory and trial-and-error, Godwin applies his knowledge to create a hypothetical solution rather than pure fiction.

Once on the moon, and as the tale becomes more fantastical, Godwin applies his knowledge of physics in the description of nine stones given to Gonsales by the ruler of the moon. These stones—three of each type: *Poleastis, Machrus,* and *Ebelus*—are more fantasy than any of the works of engineering Godwin describes in the rest of his work.[36] The first two are described by Godwin, but never used in the story. *Poleastis* can be heated and will then retain its heat until extinguished, while *Machrus* gives off light "as if 100 lamps were hanged up around it," though Godwin only mentions its usefulness in a church.[37] The third set of stones—*Elebus*—can be used to dramatically increase or decrease the weight of the person that they are affixed to. Gonsales uses these stones twice, once to help his *gansas* return him to earth, and a second time to briefly escape from his Chinese captors. In the latter case Godwin shows Gonsales's ingenuity to create a solution to engineering problems: upon his return to earth, three of his *gansas* were unable to join the journey, and Gonsales feared he may plummet to earth. He used the *Elebus* to

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[35] A depiction of the flying machine is included in the 1638 printing opposite the title page (page 3), that, despite its fantastical nature, looks like it could be replicated, assuming, of course, swans could be trained.

[36] Gonsales, 40.

[37] Gonsales, *The Man in the Moone,* p. 41. Unfortunately, Gonsales was forced to hide all the stones upon his return to earth, giving us no indication of what they could used for on earth, but conveniently making it impossible to use them to corroborate his tale.

lighten the burden for the birds as to land safely in China. Once again Godwin could have ignored the problem, or simply had all of the original *gansas* for the flight, but chose instead to use a logical—within the expanded limits of his fantastical story—solution. This logical solution establishes *The Man in the Moone* as more than pure fiction, but a plausible, well thought out, rational story of what could be possible.

Language

Gonsales's interactions on the moon introduces the reader to more of Godwin's interests —philology and cryptology. Gonsales describes the language of the lunar people as "a marvellous thing to consider" but difficult to understand for Gonsales at first because "it hath no affinitie with any other that ever [he] had heard" and "it consisteth not so much of words and letters, as of tunes and uncouth sounds, that no letters can express."[38] Gonsales is able to learn the language within two months after communicating by signs, but marvels at the mystery and beauty of the language. This created language—that Gonsales gives only two examples, written on a music staff as notes—is an opportunity for Godwin to show his knowledge of philology. Godwin draws a comparison between the musical language of the lunars and the tonal language of the Chinese.[39] Additional, as others have noted—specifically James Knowlson in an article in *Modern Philology*—Gonsales's examples are a form of cryptology popular in the sixteenth and seventeenth century. The phrases are latin characters assigned positions on a music staff.[40] Knowlson also identifies Gonsales's use of communicating with his servant on Saint Helena as

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[38] Gonsales, *The Man in the Moone,* p. 38.

[39] Gonsales, 50.

[40] James R. Knowlson, "A Note on Bishop Godwin's 'Man in the Moone:' The East Indies Trade Route and a 'Language' of Musical Notes." *Modern Philology* 65 no. 4, (1968): 360.

more evidence of Godwin's knowledge of cryptology.[41] The format of Gonsales's transcription matches cryptology common in the period, but Godwin goes further than contemporary cryptology, not simply using a music staff to send coded messages, but imagines an entire language based on tones and singing. Godwin took the concept of a tonal language found in East Asia and augmented it with cryptological theory to create a language that did not exist, but could.

Astronomy

Gonsales's voyage to the moon also demonstrates Godwin's knowledge of astronomy. The bishop made clear his knowledge of astronomical studies, referencing the heliocentric theory while describing Gonsales in the area between the earth and the moon: "I will not go so farre as Copernicus, that maketh the sunne the center of the earth."[42] While Gonsales does not immediately accept Copernicus's theory, he also does not dismiss it as incorrect, stating that he sees clearly that the earth does move. Godwin shows more understanding of astronomy in the same section, describing the stars as fixed, as well as the differing lengths of planet orbits. Additionally, Godwin identifies that between two celestial bodies, there must be an area where the two competing forces of gravity neutralize each other. He describes Gonsales flying weightlessly through an area where the view of the moon is increasing rapidly.[43] Once arriving on the moon, Gonsales describes the earth as appearing much larger than the moon appears on earth—"10, 20, I thinke I may say 30 times more then ours."[44] Godwin uses Gonsales's description of the lunar surface to challenge some misconceptions of the moon, disputing the

[41] Knowlson 361.

[42] Gonsales, *The Man in the Moone,* p. 24.

[43] Gonsales, 21.

[44] Gonsales, 26.

idea that moon creates its own light by stating that the moon merely reflects the light of the sun.[45] While the journey to the moon by Domingo Gonsales is clearly fiction, Godwin uses the most up-to-date astronomical knowledge to make the voyage as plausible as he could.

Once on the moon, and interacting with the lunar people, Godwin's tale becomes more fanciful, but no less reasoned. Gonsales, upon his arrival, travels across the surface of the moon with the lunar people at great speed. Gonsales acknowledges that the moon does have an attractive power like the earth but much weaker, "as if a man doe but spring upwards, with all his force… he shall be able to mount 50 or 60 foote high."[46] The lunar people would then leap and use fans to slow their return to the surface, being able to travel fifty leagues in around two hours. The lunar people are also significantly taller, up to 28 feet tall, with buildings to match their stature. Godwin does not overtly explain why some lunar people grow to such heights, but he does state that the people were originally from earth.[47] While the existence of people on the moon is clearly a fictional idea, Godwin reasonably predicts a weaker pull of gravity on the moon, and applies that weaker force not only to movement and travel, but also the effect it would have on the stature of the lunar people.

Sociology and Politics

The lunar people have no crime, and no need for punishment or prisons, nor do they get sick. The women are described by Gonsales as "all of an absolute beauty" and "that a man

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[45] Godwin is not entirely correct on this point however, as he claims the light of the sun is only reflected off of the oceans of water on the moon's surface. Despite this claim, his reason stands up to logic, as water reflects light more powerfully than solid ground.

[46] Gonsales, *The Man in the Moone,* p.33.

[47] Gonsales, 33. The first ancestor of the monarch came from earth, and they trade out imperfect children with those from earth, from their port—so to speak—somewhere in North America.

having once knowne a woman, never desireth any other."[48] At the end of their lives they die peacefully, holding a great feast before their passing looking forward with anticipation to leaving "the counterfeit pleasures of that world, and bee made partaker of all true joyes and perfect happiness."[49] After death the corpse do not decompose, but stay uncorrupted. These aspects of the lunar people seem entirely fantastical, but Godwin explains that the air of the moon is responsible, as it is more pure and healthy than that of earth. In fact, if a lunar child is deemed wicked or imperfect, they are traded with a child on earth. These formerly lunar children develop the same appearance as a person on earth instead of having the height and color of a lunar being. Gonsales explains this as because "the ayre of the Earth may alter their colour to be like unto ours."[50] Godwin's people of the moon are not an alien race manifested out of his imagination, but the rational consequences of a humans living on the uncorrupted moon. By not creating an entirely new species, Godwin once again works within the realm of plausibility rather than fiction.

Conclusion

Bishop Godwin wrote *The Man in the Moone* as a young man, while still studying at Oxford for his eventual position within the church. He would later go on to write several works of history, though no other fictions tales.[51] Godwin never released *The Man in the Moone* himself, and it was only printed after his death. This fantastical story was not a commentary on

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[48] Gonsales, 42.

[49] Gonsales, *The Man in the Moone,* p.44.

[50] Gonsales, 43.

[51] That we know of.

society, or a wishful dream of a utopian society. The introduction describes the work as "an essay of Fancy, where invention is shewed with Judgement."[52] Unlike Thomas More, who wrote of a fictional land that was governed by reason within the realities of earth, Godwin is not creating a world within the strict framework of the world in which he lived. Neither does he create a fanciful world that could only exist in his own mind, as Margaret Cavendish does in *The Blazing World*. Godwin instead applies his knowledge to a completely novel and unobservable world. In creating a flying machine powered by birds and a society on the moon inhabited by peaceful giants with magical stones, Godwin proposes what could be possible, within the knowledge Engineering. He places Domingo Gonsales's journey within the accurate geography of the world in the seventeenth century, and establishes the world on the moon under scientific principles understood at the time.

As a work of Science Fiction, Godwin's tale demonstrates the concerns of his time. The social and political upheaval of the period is represented by Gonsales's escape from the English ships in the early stages of his adventure. Gonsales finds a peaceful and uncorrupted world on the moon, mirroring attempts of explorers searching for a new paradise. Rather than seeing the new world as a place to invade or colonize, Godwin has his protagonist peacefully return to earth, returning again to danger, this time in China. The use of fantastical elements intertwined with scientific observations creates a work of Science Fiction, even though the term has yet to be coined. The introduction asks the reader to suspend disbelief, to "allow [Gonsales] a liberty of

[52] Gonsales, 5.

conceite; where thou takest to thyself a liberty of judgement."[53] In the fictional world of Domingo Gonsales that Godwin creates, we the readers are not expected to accept that these fantastical experiences *are* real, but Godwin shows us that he knows enough about natural philosophy that they *could* be real.

Ch. 3: Cavendish's *The Blazing World*

A young lady, kidnapped and stolen from her homeland, finds herself in strange new world full of unusual creatures. Through her beauty and grace she rises to the position of Empress. When given full imperial authority she chooses not to revel in her new-found wealth and status, but instead embarks on a scientific inquiry into the workings of the natural and spiritual world. She travels by spirits across worlds and leads a military force of hybrid creatures to save her old home. This tale of fancy and reason is pulled from the mind of Margaret Cavendish, Duchess of Newcastle. Cavendish created this imaginary world to explore her thoughts on society, politics, religion, science and beyond. As a women living in seventeenth century England she had to resort to her imagination because—as she states herself in her *To the Reader*— "although I have neither power, time nor occasion to conquer the world as *Alexander* and *Caesar* did… I have made a world of my own."[54] This world of her own, and the adventures

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[53] Gonsales, *The Man in the Moone,* p.5. One reader has done just that. In Andrew Simoson's "Pursuit Curves for the Man in the Moone" in *The College Mathematics Journal*, we are challenged to ignore the fact that you could not fly to the moon with swans, but instead asked to calculate the angle needed to take off from earth and fly, at the speed given by Godwin, to the moon.

[54] Margaret Cavendish, *The Blazing World and Other Writings,* ed. Kate Lilley (London: Penguin Books, 2004), 124.

that surround it, are described in Margaret Cavendish's *The Description of a New World Called the Blazing World.*

Much like Francis Godwin, Cavendish was not part of the community of scientists of seventeenth century Europe, they were both scientific outsiders. Despite their exclusion—though for different reasons—they both endeavored to write about their theories and beliefs of the natural world. As a women it was difficult enough for Cavendish to publish any of her writings, let alone be considered at all on equal footing with the scientific writers of her time.[55] Instead she created her own fictional world that could serve as a vehicle for Cavendish to delve into the mysteries of nature.

In this chapter I will argue that Margaret Cavendish, as a scientific outsider, wrote *The Description of a New World Called the Blazing World* as a canvas to showcase her knowledge of natural philosophy, and that she had to rely on the fantastical aspects of her story to allow any introduction of science. Much like Godwin's *The Man in the Moone*, Cavendish used a fantastical location and fictional story to examine established and newly created scientific ideas. Unlike Godwin, Cavendish could not merely use the moon as her setting, but had to create an entirely fictional place in order to protect her work from criticism. I will pursue this argument by examining the second edition of Cavendish's *The Description of a New World Called the Blazing World* printed in 1668, revised by Cavendish from the original published in 1666, published by Penguin Books as *The Blazing World and Other Writings*, edited by Kate Lilley, and analyzing the different themes introduced. The significance of these finding will show that rich discussion

[55] While she was forced to self-publish many of her works initially, the eventual scope of her published works speaks to her success and ability.

on natural philosophy could be found outside of the writings of scientific insiders, however to avoid disdain and bias had to have been written through a fictional and fantastical lens.

Biography of Cavendish and Context for Writing *The Blazing World*

The Description of a New World Called the Blazing World may be Margaret Cavendish's most well-know work, but it is far from her only piece of literature. During her fifty years she published a dozen works, all under her own name, a rarity at the time. That alone makes her an impressive figure in seventeenth century Europe. Her unique personal experiences helped shape her writing and her public life. Born in England in 1623, she sided with the Royalists during the English Civil War. As Maid of Honor to Queen Henrietta Maria she traveled in exile to France. Surely this experience, along with growing up as the youngest daughter to a widowed mother, aided her development in becoming an independent-minded strong-willed individual. In exile she met and married the Marquis of Newcastle, also a royalist. Her allegiance to the crown can be seen as a through-line in her writings. As allies to the executed King Charles I, the estates of the Newcastle's were confiscated, not to be returned until after the Restoration, although ransacked and damaged.

Not content with the life of a duchess, Cavendish became well known for her role as an author and provocateur, with "her idiosyncratic dress combined masculine and feminine elements in a parodic masquerade of gender, while her rare and highly theatrical public appearances never failed to draw an audience."[56] While many of her writings were fanciful and poetic, she also engaged in philosophy and scientific writing. She never became a member of the

[56] Cavendish, *The Blazing World and Other Writings, xii.*

Royal Society—nor would any women until 1923—and did not belong to the scientific community. Despite her exclusion she published *Philosophical and Physical Opinions* in 1655, *Philosophical Letters* in 1664, and *Observations on Experimental Philosophy* in 1666. All these works reflected Cavendish's interest in the *New Science* of the time. She was "minimally educated" and accused of "unsound scholarship" in her writings, with some even questioning whether she was the true author of her works.[57] Despite these difficulties, Cavendish was able to display a depth and breadth of knowledge across natural philosophy.

Cavendish made her most lasting mark with the publishing of *The Description of a New World Called the Blazing World* in 1666, at the same time as *Observations on Experimental Philosophy*. This work was written after the Newcastles returned to England after the Restoration. It was during this time the influence of the Marquis declined in the royal court, as had Duchess, far from the Maid of Honor she had been to Queen Henrietta Maria before and during her exile. The influence of this position can be seen in *The Blazing World* through discussions between the main character—the Empress—and her "platonic friend" the Duchess of Newcastle. Together they make a plea to spiritual personification of Fortune on behalf of the Duke of Newcastle. Cavendish describes *Fortune* saying "this Duke who complains or exclaims so much against me, hath always been my enemy; for he has preferred Honesty and Prudence before me."[58] It is in the view of Cavendish that her husband has suffered at the hands of Fortune

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[57] The limited controversy of the authorship of Cavendish's works stemmed from the disbelief of the abilities of women as writers and scientific thinkers at the time, but also because of the disconnect between her writing style and her personal and public life. While these doubts have put to bed, the idea that an unknown author wrote *The Blazing World* and other works lends further credence to the view that the seventeenth century literary world had marginalized outsiders. If an author with such interesting ideas on society and natural philosophy had to resort to their works being published under the name of a character such as Cavendish, how much more of a literary and scientific outsider must they have been? See introduction to *The Description of a New World Called the Blazing World* page *xiv.*

[58] Cavendish, *The Blazing World and Other Writings,* 197.

because he chose to side with King Charles, the honest and prudent path in her mind. The exclusion felt by the Newcastles may have also led Cavendish to create an imaginary world, the Blazing World, to explore rather than the one she has become disappointed in. A year after publishing *The Blazing World* Cavendish visited the Royal Society, becoming the first woman to do so. This however was not a formal scientific invitation, but rather was at the request of Cavendish herself, and served more as social occasion. Cavendish was impressed with the Society, but the feeling was not mutual.[59] Whether she was aware of the society members' views or not, her creation of scientific societies in *The Blazing World* can be seen as satire of the Royal Society. Regardless of her view of the scientific community, it is clear that she was an outsider.

A Summary of *The Blazing World*

The Description of a New World Called the Blazing World was published at the same time as *Observations Upon Experimental Philosophy*, but Cavendish admits it odd that she "join a work of fancy"[60] to her more serious work on science. This supports the idea that scientific outsiders would have to rely on fantastical stories to discuss their scientific thoughts, or at the very least use fiction to find an audience open to such discussion. Cavendish explains what she means by "fancy" as not opposing reason, but as a creation of her own to "recreate the mind, and withdraw it from its more serious contemplations."[61] Despite this withdrawal, Cavendish uses her fiction as an arena to describe her more rational and scientific investigations, but also freeing

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[59] As quoted in Rhetorica Samuel Pepys noted "I do not like her at all, nor did I hear her say any thing that was worth hearing, but she was full of admiration." Richard Nate, ""Plain and Vulgarly Express'd": Margaret Cavendish and the Discourse of the New Science," *Rhetorica* 19, no. 4 (2001): 404.

[60] Cavendish, *The Blazing World and Other Writings,* 123.

[61] Cavendish, *The Blazing World and Other Writings,* 124.

her to write in a way she prefers. Much like the Blazing World's connection to our own, science and fiction are united: "Like the worlds joined at the poles, so too are reason and fancy."[62]

To set up Cavendish's *Blazing World* she begins wit the kidnapping of a young lady. This young lady remains nameless in this tale, but is the main character and through who's eyes we see throughout the work. Finding favor with the gods—while her kidnappers facing their anger—she is blown to the North Pole where the extreme cold kills her captors. She is kept alive by "the light of her beauty, the heat of her youth, and the protection of the gods."[63] Connected to the North Pole is the pole of another world. Cavendish, perhaps through a misunderstanding of global geography but more likely as a literary device to further the plot, explains that it is impossible to "round this world from pole to pole so as we do from East to West."[64]

Once in this new world the young lady encountered the of its first inhabitants. These creatures are described as bears that walk as humans, talk with one another and help her. They brought her to their city, full of caves instead of houses. The bear-men took care of the young lady, bringing her to another island, this time inhabited by fox-men—who walked and communicat like the bear-men. The fox-men were impressed by the young lady's beauty and agreed to take her to the Emperor of this new world.

The young lady's voyage continues through lands of goose-men and satyrs before having to sail across open seas to travel to the island that serves as home to the Emperor of the Blazing

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[62] Cavendish, *The Blazing World and Other Writings,* 124. Cavendish references Bergerac's work in her *To the Reader* citing that she choose to create her own world rather than use the moon as the canvas for her tale. This is interesting as Bergerac may have been inspired by Goodwin's *The Man in the Moone* for his tale, as well as Kepler's *Somnium.*

[63] Cavendish, *The Blazing World and Other Writings,* 126.

[64] Cavendish, *The Blazing World and Other Writings,* 126. Cavendish had some reason to make this claim as it would not be until the early 20th century before explorers reached the North or South Poles, and failed attempts at finding the fabled Northwest Passage had been made since the voyages of John Cabot in 1497.

World, the name of this world as Cavendish now reveals to the reader. On this journey the young lady learns to communicate in the language of these new creatures. Eventually she arrives at the island called "Paradise, which was the seat of the Emperor."[65] Cavendish describes the beauty and magnificence of the island: "pleasant, heathful, rich, and fruitful."[66] The lady was brought before the Emperor, who initially thought to worship her, but upon discovering her to be a mortal "rejoicing, made her his wife and gave her absolute power to rule and govern all that world as she pleased."[67] Cavendish then describes the items given to the young lady, now Empress, to mark her authority. She is also introduced to the top levels of the ruling and religious structure. The people of the *Blazing World* are made up of many different creatures who each had professions "as was most proper for the nature of their species".[68] It is these species that Cavendish will use as devices to explore different scientific theories and observations. However, before the Empress investigated the works of her societies she first inquired about the religion and government of the *Blazing World*.

The priest and statesmen—being lumped together as with the aristocracy and higher clergy in England—explained the reason for their system of government. They had few laws by

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[65] Cavendish, *The Blazing World and Other Writings,* 130.

[66] Cavendish, *The Blazing World and Other Writings,* 131. While Cavendish mentions several times in introducing the Blazing World that it had no enemies or wars ((“because they had no other enemies but the winds” 129 and they “live in continued peace and happiness, not acquainted with other foreign wars, or homebred insurrections” (130),)) she describes several defensive or militaristic traits, including the Emperor's guards and defensive city walls, as well as a spear given to the young lady upon becoming Empress to "assault those that proved her enemies" (133). The military prowess of the Blazing World becomes useful later, as we see in the *Second Part*, and may betray Cavendish's view that conflict, even within a utopia, was inevitable.

[67] Cavendish, *The Blazing World and Other Writings,* 132.

[68] Cavendish, *The Blazing World and Other Writings,* 134. "The bear-men were to be her experimental philosophers, the bird-men her astronomers, the fly-, worm- and fish-men her natural philosophers, the fox-men her politicians, the spider- and lice-men her mathematicians, the jackdaw-, magpie- and parrot-men her orators and logicians, the giants her architects, etc." Of these we do not hear from the fox-men or giants in the Empress's scientific investigations. Additionally the Empress also questions the "imperial race" on the area of government and religion (133).

design, as laws led to division, in the opinion of the members of the Blazing World.[69] As for the monarchical form of government, with an emperor at its head, the statesmen provided two defensives: "A monarchy is a divine form of government, and agrees most with our religion; for as there is but one God, whom we all unanimously worship and adore with one faith, so we are resolved to have but one emperor, to whom we all submit with one obedience."[70] In addition to the spiritual support of a monarchy, the statesmen added support from nature: "it was natural for one body to have but one head, so it was also natural for a body politic to have but one governor."[71] This position of course aligns with Cavendish's political beliefs, as she first hand witnessed the destruction caused by a civil war, and was a staunch royalist. Interestingly, as the Empress finds out more about the system of government in the *Blazing World*, there is no mention of a parliament or any other form of ruling council, and the Emperor rules with absolute power.

Based on her limited observations the Empress guessed that they must be either Jews or Turks, as women were absent from religion services. She inquired about their religion, asking whether "they were Jews, Turks, or Christians?"[72] The priests of the *Blazing World* explained that did not know of these groups but described their monotheistic faith: we do all unanimously acknowledge, worship, and adore the only, omnipotent and eternal God."[73] Additionally, they only have one form of worship that excluded women, as they would be a distraction. This

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[69] The idea of unity versus division is a common theme in Cavendish's work. Our heroine the Empress often finds frustration with disagreements and disputes, but as we find she is also responsible for some herself. Cavendish's occupation with unity may likely stem from her experiences of the English Civil War and the efforts she and her husband take to reestablish themselves after restoration.

[70] Cavendish, *The Blazing World and Other Writings,* 134.

[71] Cavendish, *The Blazing World and Other Writings,* 134.

[72] Cavendish, *The Blazing World and Other Writings,* 135.

[73] Cavendish, *The Blazing World and Other Writings,* 135.

exclusion was carried into politics as well. Not only were women excluded from religion and government, but the priests and statesmen were all eunuchs to avoid the influence of women at home. They believed that women and children "cause as much, nay more mischief secretly, than if they had management of public affairs."[74] The Empress seems to be excluded from this characterization, as she is given dominion over all the *Blazing World*, though as we will see, she recognizes that some of her actions lead to disunity, perhaps proving this concept correct.[75]

The Empress continued her inquiry, asking about the buildings on the island, why they were only two stories, with thick walls, arched roofs, and pillars. The noblemen answer her question, explaining the purposes behind the techniques.[76] These three areas of inquiry—government, religion, and architecture—mark the beginning of the curiosity of the Empress that makes up the bulk of *The Blazing World*. Cavendish, through her avatar of the young lady turned Empress, displays her curiosity and observation, answering her own questions with reasoned responses often supported by the scientific views of the day.

It is at this point in Cavendish's story of fancy that the scientific investigations begin, as the Empress assembles representatives from different species that make up her "societies of virtuosos"[77] to inquire about their areas of expertise. Cavendish will use these discussions to demonstrate both her curiosity and her wide ranging knowledge. The Empress's investigation finds mixed results. In some areas she is greatly impressed; as with fish- and fly-men's study of

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[74] Cavendish, *The Blazing World and Other Writings,* 135.

[75] This is one of the more unusual positions in the text, as this view does not conform with Cavendish's personal views. While it may have been intended as critical of an archaic patriarchal system, she does not use the Empress as her mouthpiece to critique the view, as she will do so in scientific areas. An interesting study, though outside the scope of this papers analysis, would be on Cavendish and feminism with investigation on the ambivalence of this passage. Such studies do exist, though I was unable to find one addressing this particular idea.

[76] The answers to this inquiry will be discussed in a later section of this paper.

[77] Cavendish, *The Blazing World and Other Writings,* 136.

the sea and air, the anti-aging discoveries of the ape-men, and the worm-men's analysis of the substance of matter. At other times the Empress becomes disappointed in the disagreements within societies, becoming so annoyed with lice-men that she dissolves their society entirely.[78]

After finishing her "discourses and conferences" she turns again to religion, and "finding it very defective, was troubled…and to that end she resolved to build churches, and make also up a congregation of women."[79] Cavendish then describes the Empress's restructuring of the religion of the *Blazing World* and her clever use of the some of the more spectacular elements found in that world to create show-pieces that encourage the support of her new religious practices. These creations provide an interesting view into Cavendish's ideas of how religion should operate, as well as expanding the picture of the *Blazing World*, but fall outside of my scope of analysis.

Another section that falls outside my scope follows. Once satisfied with her changes to religion, the Empress turns her attention to her native world. In order to establish contact she asks to meet with spirits that can travel between the two worlds. This portion of the text is perhaps the most fanciful of *The Blazing World* as it leads to an investigation of the immaterial and unobservable, as well as inter-world travel and the inhabitation of souls within other bodies. Cavendish also uses this portion to delve into mysticism and cabalism. It is here that Cavendish inserts herself into the story. The soul of the Empress becomes friends with the soul of the Duchess of Newcastle—Cavendish herself. As though she is breaking the fourth wall—to borrow a term from theater and film—by using this friendship to discuss how a person can create their

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[78] These areas will be explored in more detail ahead.

[79] Cavendish, *The Blazing World and Other Writings,* 162.

own imaginary world in their own mind to inhabit and investigate, as Cavendish did by writing this work. Before returning to the *Blazing World* the Empress is given advice from the Duchess to restore her new land to the government and religion to how it was before her arrival. This advice is given in order to preserve the "pleasant, heathful, rich, and fruitful" nature of the *Blazing World* and to avoid it becoming "as unhappy, nay, as miserable a world as that is from which I came"—in other words to avoid it becoming like the world in which Cavendish lives herself.[80]

Finally Cavendish writes *The Second Part of the Description of the New Blazing World* in which she describes an invasion of the Duchess's country and the forces of the *Blazing World's* intervention and eventual victory. The Duchess's world is united under the King of ESFI (England, Scotland, France and Ireland), recreating the *Blazing World's* harmony in her own.[81] The bond of friendship between the two stays strong as they visit one another in their respective homes. Cavendish finished her work with an *Epilogue to the Reader*, reiterating her purpose in creating an imaginary world in her own mind and encouraging readers to do the same, instead of imposing their views on her own.

An Analysis of Themes in *The Blazing World*

Cavendish's *Blazing World* is an imaginative work of fancy, as the author readily admits, but it is also a showcase for the breadth of her knowledge, much like Godwin's *Man in the*

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[80] Cavendish, *The Blazing World and Other Writings,* 131 and 201. In this section Cavendish also describes the Empress befriending the Duke of Newcastle, the authors actual husband, and having a discussion with the personifications of *Fortune, Folly, Rashness, Prudence, Honesty,* and *Truth*. This interaction, along with the immaterial spirits and the investigation into cabalism mark a break from the scientific investigation that precede this section. There has been much scholarship in this area, but it does not fit within the purpose of this paper.

[81] Cavendish, *The Blazing World and Other Writings,* 216.

Moone. The fact Cavendish was never accepted by the scientific community contributes to her writing in several ways, as this section will demonstrate. First, I argue that her outsider status led her to write creatively on scientific ideas. Second, Cavendish's mouthpiece in this tale—the Empress—is often critical of established specialists, especially when they are unable to come to consensus within their societies. Finally, third, her outsider status is reflected in the mistakes or incorrect statements she makes, both in scientific theories and in her self-professed poor grammar.

Most easily seen is the imaginative way Cavendish creates an opportunity to discuss natural philosophy in her story. We, the reader, know almost nothing about the young lady-turned empress in the story, but as the tale continues we discover that she is portrayed as being knowledgable in a wide variety of areas of science. A prime example of this is the lecture by the Empress to the chemists, or ape-men. Cavendish writes: "given them [the ape-men] better instruction than perhaps they expected, not knowing that her majesty had such great and able judgment in natural philosophy, had several conferences with them concerning chemical preparations."[82] This is an opportunity for Cavendish to remind the reader that it was unexpected for a woman to have the sort of knowledge to converse with trained scientists, and yet we see the heroine of the story able to discuss on an equal footing.

As we will see in more detail, Cavendish uses the Empress to be critical of certain practices held by traditional scientific insiders. Richard Nate in *Rhetorica* points out how

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[82] Interestingly the quote continues "which for brevity's sake, I'll forbear to rehearse." It could be that Cavendish is ascribing more knowledge on the subject to the Empress that she herself contains, or that she simply does not want to go into too much detail. I would suggest it is some combination of the two, as Cavendish does display some knowledge on chemistry that she displays in this passage, but perhaps not enough to make any hypothetical conference interesting to the reader. Cavendish, *The Blazing World and Other Writings,* 155.

Cavendish "had scrutinized the works of other authors."[83] One of the the major criticism that Nate identifies is how Cavendish "argued against a linguistic elitism."[84] We see examples of this in *Blazing World*, specifically in her interactions with the parrot-men orators. Cavendish is also critical of the disagreements of her virtuosos. This parallels with her dissatisfaction of divisiveness in both science and society, which may stem from her experiences being exiled as a royalist in the English Civil War and Commonwealth period. As an amateur scientist, without the opportunity to conduct elaborate experiments or detailed observations, she would have been frustrated that the so-called experts could not find consensus.[85] Cavendish also displays her bias against certain observations that provide no practical application, as seen in her discussion with the bear-men and their microscopes. This criticism of linguistic elitism, disaffection with disagreement, and frustration with the lack of practicality in some areas of science point to Cavendish's negativity toward the scientific community that has pushed her to the margins.

Due to her inability to be a member of the community, Cavendish demonstrates several areas where her knowledge and understanding is lacking. This is not meant to be a criticism of Cavendish, nor the scientific understanding of the time, but rather further proof of her position as an outsider. With her restricted formal schooling, which she admits leads to her limited grammar, she acknowledges some areas are far too difficult for her to fully understand. This is most notably seen in her discussion with the spider-men over mathematics.

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[83] Nate, ""Plain and Vulgarly Express'd": Margaret Cavendish and the Discourse of the New Science," 409.

[84] Nate, ""Plain and Vulgarly Express'd": Margaret Cavendish and the Discourse of the New Science," 410.

[85] As noted in Nate's article, Cavendish was greatly impressed with the tour of the Royal Society in 1667, but the program on display for her was "the usual visitors programme for members of the nobility" and included experiments that were chosen for their "visually attractive" characteristics. I would argue that Cavendish's admiration with the visit shows that she was unfamiliar with experiments, even ones with little benefit to science apart from their aesthetic nature. Nate, ""Plain and Vulgarly Express'd": Margaret Cavendish and the Discourse of the New Science," 404.

Despite all the factors that cause Cavendish to be a scientific outsider, she does not shy away from introducing scientific themes and explanations into her tale. Before any of the actual inquiries take place, Cavendish uses reasoned and scientific based explanations to add sense to how her story can take place. In an attempt to explain the connected poles of our world and the Blazing World, she explains that each world has its own sun, moving so preciously, never extending beyond the tropics, so that the other world's sun is not visible in our world. She defends this position citing "skillful astronomers" using "very good telescopes [who] often observed two or three suns at once."[86] Even though she has already defended the creation of an imagined world in her introduction to the reader, she still endeavors to create a reasonable explanation to how this Blazing World can connect to our own at the poles. This attention to detail is evident throughout the story, and is an early reminder that Cavendish wants to have her tale of fancy grow from a place of science and reason.

In the rest of this section I will be analyzing several different scientific themes introduced by Cavendish in *The Blazing World*. These examples will show both the depth and breadth of Cavendish's scientific thinking, as well as demonstrate some insight into her role as a scientific outsider. I have chosen to group the passages by theme, rather than follow the chronological order from the text, in an effort to create a more straightforward framework to see the areas of scientific inquiry she investigates.

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[86] Cavendish, *The Blazing World and Other Writings*, 126.

Initial Observations of the Empress in the Blazing World

Before the Empress begins her discussions with her virtuosos she makes several observations that demonstrate a greater than expected knowledge. Once the young lady has traveled to the new world, she is brought by sea to the Emperor. The young lady—not yet Empress—observes that the inhabitants did not use tools for navigation that were common in her old world. Rather, the inhabitants were "skillful and experienced sea-men" relying on "subtle observations and great practice."[87] We are also introduced to the first of the inventions from the Blazing World not seen in our world. The ships were propelled by "a certain engine, which would draw in a great quantity of air, and shoot forth wind with a great force."[88] Cavendish describes how this primitive jet-engine would be used to move a ship forward and to clear waves in front of the vessel, with each ship having an engine in the front and rear. In the fantastical world created by Cavendish's imagination she has invented a new device for seaboard travel. While we are not given specifics of how the engine works, it is an early opportunity for Cavendish to show her interest in navigation and engineering. She continues, describing the construction of the boats. The ships of the Blazing World were different, based on their purpose and class. The merchant ships were constructed of leather while the Emperor's ships were made of gold. Cavendish does not ignore the reader's likely first thought on how a ship of gold would likely sink due to its weight, but instead explains how the ships were "not much heavier than ours of wood" because of the skill in manufacture and lack of items such as "pitch, tar, pumps, guns and the like."[89] Cavendish wanted to create a world where ships are made of gold, but

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[87] Cavendish, *The Blazing World and Other Writings*, 128.

[88] Cavendish, *The Blazing World and Other Writings*, 128-9.

[89] Cavendish, *The Blazing World and Other Writings*, 129.

rather than rely on the fictional nature of her tale, creates a rational basis for the existence and function of vessels.[90]

After arriving in *Paradise*—the island of the Emperor—the young lady makes observations about the political nature of the Blazing World. This world was utopian in that:

> There was but one language in all the world, nor no more but one Emperor, to whom all submitted with the greatest duty and obedience, which made them live in a continued peace and happiness, not acquainted with other foreign wars, or home bread insurrections. [91]

Cavendish has the statesmen of the Blazing World defend their system, including the monarchy, using both natural and spiritual arguments: "It was natural for one body to have but one head, so it was natural for a body politic to have but one governor" and "for as there is but one God…so we are resolute to have but one Emperor."[92] These observations provide insight to Cavendish's views on politics and society, but significantly for the purposes of this paper demonstrate again her desire to provide rational reasonable explanations. Additionally this short discussion on politics is an additional area of interest for Cavendish, adding political science to the themes she analyzes in her work.[93]

In describing the inhabitants of the Blazing World Cavendish also relies on reason. The people of the Blazing World were "men of different sorts, shapes, figures, dispositions and

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[90] This parallels with Godwin's description of the *Gansa*-powered flying machine. In both cases a logical explanation is used in place of fantasy or magical elements.

[91] Cavendish, *The Blazing World and Other Writings*, 130.

[92] Cavendish, *The Blazing World and Other Writings*, 134.

[93] While political science is only a minor part of Cavendish's investigations of the Blazing World, it may be one of the aspects closest to her heart. Cavendish was greatly affected by the "home bread insurrections" that the Blazing World managed to avoid. As stated before her life was shaped by her alliance to the royalist cause that forced her into exile with Queen Henrietta Maria. Her personal views on royalty come out in her defense and esteem of the Emperor.

humors…some were bear-men, some worm-men, some fish- or mear-men, etc."[94] Cavendish does not elaborate on how these beings came to be, other than they behave and speak as humans, but she does give more explanation on the ordinary men of the island of *Paradise*. These men were humans of "several completions; not white, black tawny, olive or ash-coloured; but some appeared of an azure, some of deep purple, some of a grass-green, some of a scarlet, some of an orange-colour, etc."[95] This diversity of color is interesting enough to Cavendish that she theorizes on the cause:

> Whether they were made by the bare reflection of light, without the assistance of small particles, or by the help of well-ranged and ordered atoms; or by a continual agitation of little globules; or by some pressing and reacting motion, I am not able to determine.[96]

Cavendish's curiosity on the cause of the complexions is also an interesting examination on the nature of light and color—not the only example, as we will see later. This speculation ties in with the still persistent struggle with understanding the nature of light today. As Cavendish theorized, it is both a particle ("well-ranged and ordered atoms") and a wave ("some pressing and reacting motion").[97] Perhaps most significant of all her investigations into science, this investigation on the source of color displays the intricate level of Cavendish's scientific knowledge. She is aware of the complex nature of light even to the extent of its unknown composition.

This aristocratic race that lives on the Emperors island is set apart, as "none was allowed to use or wear gold but those of the imperial race, which were the only nobles of this state."[98] In

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[94] Cavendish, *The Blazing World and Other Writings*, 134.

[95] Cavendish, *The Blazing World and Other Writings*, 133-4.

[96] It is of note that Cavendish attributes the difference of completion to light and color rather than a biological or anatomical difference. I am, however, cautious to apply any egalitarian application to Cavendish on the issue of race. As we see she is supportive of a class system that differentiates between a privileged aristocracy. Cavendish, *The Blazing World and Other Writings*, 133.

[97] Cavendish, *The Blazing World and Other Writings*, 133.

[98] Cavendish, *The Blazing World and Other Writings*, 133.

the utopian society that she has constructed, Cavendish still creates a tiered society with its own privileges. It was only these members of the imperial race that held positions of priests and governors. Interestingly, Cavendish separates the scientific virtuosos from the imperial race. This could be in reference to her status as a duchess not being sufficient to overcome her outsider status in the community.[99]

In her final observation before the Empress's scientific investigations, she asks the members of the imperial race why the buildings were built with only two stories, thick walls, and arched roofs and pillars. The statesmen respond:

> The lower their buildings were the less they were subject to the heat of the sun, to wind, tempest, decay, etc. … the thicker the walls were, the warmer were they in winter, and cooler in summer… [and] that arches and pillars, did not only grace a building very much, and cause them to appear magnificent, but made it also firm and lasting.[100]

This passage is another example of the detail evident in Cavendish's world building. These description are not vital to the story, however much like Godwin, Cavendish uses these opportunities to add rational explanations for why the world she describes was constructed.

The observations the young lady-turned Empress make in her introduction to the Blazing World are pieces of evidence to show the depth and breadth of scientific knowledge that Cavendish possesses. Before the inquiries made to the scientific societies begin, Cavendish provides reasoned descriptions of ship building and navigation, hypothetical inventions, defenses of monarchy and aristocrats, theories on the nature of color and light, and rationale for building techniques. Far from simply creating an imagined world that behaves with an entirely different set of natural laws, Cavendish's Blazing World is a fantastical location that is governed by the

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[99] Even in Cavendish's utopian Blazing World, there is no mention of any female scientists, though we see how obedient the virtuosos are to the Empress, and how impressed the are with knowledge.

[100] Cavendish, *The Blazing World and Other Writings*, 136.

same forces that govern her own, and she uses this fiction as an opportunity to display her understanding of political and natural philosophy.

Inquiry into Astronomy and Earth Science

The first society that the Empress consults is the astronomers, made up of bird-men. When Cavendish has the Empress ask about the nature of the celestial bodies the bird-men describe the sun as "a firm or solid stone, of vast bigness, of colour yellow, and of extraordinary splendor." While not correct, as the sun is not a solid stone, this does reflect the updated belief that the celestial bodies were not just objects of light, as Galileo discovered by observing mountains on the moon earlier in the seventeenth century. The bird-men, however, disagree on the source of the sun's heat. Some argued that "the sun [was] hot itself" and "that it should at some time break asunder and burn the heavens." Others argued that this could not be true, as "fire cannot subsist without fuel; and the sun stone having nothing to feed on, would in a short time consume itself." Instead, they continued, the heat "was an effect of its light." All the astronomers agree that the sun was "fixed and firm like a center."[101] These views, while unable to discern the source of the sun's heat, match what was known about the sun, demonstrating Cavendish's contemporary knowledge on the subject. Additionally this gives us one of our first examples of disagreement within the societies. The Empress is not yet critical of this disagreement, perhaps due to the difficulties in determining the true nature of the sun.

As observation of the heavens was so important, the Empress commanded her experimental philosophers—the bear-men—to use their telescopes to settle debates on the

[101] Cavendish, *The Blazing World and Other Writings*, 136.

subject. To the frustration of the Empress, the bear-men "caused more differences and divisions amongst them, than ever they had before."[102] Some of the bear-men argued that the sun was fixed and the earth moved, others that the earth was fixed, others still that they both moved. Similar disagreements arose from the structure and substance of the moon. The disagreement led to the frustration of the Empress, deciding that since the telescopes "are false informers, and instead of discovering the truth, delude your senses"[103] should be destroyed and observations should only be made by the naked eye. The bear-men successfully petition the Empress to reconsider "for, said they, we take more delight in artificial delusions, than in natural truths."[104] Cavendish uses the disagreements stemming for the use of telescopes to point out that there are many disagreements in the scientific community, but additionally this passage provides a look into her skepticism toward scientific insiders. After being confronted about the inadequacies of their observations and devices, the bear-men argue to keep their telescopes not for academic pursuits, but to "delight in artificial delusions." In this way, Cavendish draws a parallel between her creation of an imaginary world to delight in fancy and the pursuits of scientists.

When inquiring on the nature of the air, Cavendish again stresses the importance of observation. The bird-men explained to the Empress that they had no perception of the air, except "by their own respiration."[105] The Empress pushes the bird-men, asking about the more observable wind. All the bird-men could agree upon was that it was denser than air, but they were divided on the source or cause of wind. The theories on the source of wind reflect several

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[102] Cavendish, *The Blazing World and Other Writings*, 140.

[103] Cavendish, *The Blazing World and Other Writings*, 141.

[104] Cavendish, *The Blazing World and Other Writings*, 142.

[105] Cavendish, *The Blazing World and Other Writings*, 138.

well reasoned possibilities. The Empress did not push for a unified answer, perhaps reflecting Cavendish's own uncertainty on the subject. Cavendish's inquiry on air and wind shows both a hole in her understanding, but also her curiosity. She suggests several possible theories on the creation of wind and brings up the problem of knowing the unobservable. While these only lead to more questions, they are reasonable points of inquiry for a scientific discourse, not typical for a fictional description of a new world.

In the description of weather, the Empress's experts are more fanciful. According to the bird-men snow "was made by a commixture of water, and some certain extract of the element of first that is under the moon." Ice was created by "some strong saline vapor arising out of the seas." When the Empress asked the worm-men about frost she received a similar answer: like the "congealment of water into ice and snow, by a commixture of saline and acid particles."[106] The Empress is skeptical of these answers, as snow, ice, and frost being so plentiful, it would "require an infinite multitude of saline particles to produce." She also reasons that there should be an immense amount of salt left over once they revert back to water. The experts have no answer. These passages are examples of Cavendish's curiosity and her use of reason when confronted with an unsatisfactory answer. Instead of being critical of Cavendish's lack of a scientific description on the creation of ice, snow, and frost, this is an opportunity to see her logical process. She does not accept a suspect answer, but investigates more deeply.[107]

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[106] The Empress asks the bird- and fish-men about creation of ice and snow on page 139 and the worm-men about frost on 148. While these passages are separated by several other investigations, I found them to be similar in nature to combine. Cavendish, *The Blazing World and Other Writings*, 139 & 148.

[107] The bird-men's description of thunder—in the same passage as ice and snow—is much closer to modern understanding, where thunderstorms are created "by an encounter of cold and heat." This matches with what we know to be true about thunderstorms, but falls within to the understanding of them in the seventeenth century with a lack of knowledge on electricity. Cavendish, *The Blazing World and Other Writings*, 139.

The Empress converses with the fish- and worm-men on earth science, specifically on the composition of the seas, fresh springs, and the earth itself. The first question was on the saltiness of the seas. The fish-men observed that there was "a volatile salt in those parts of the earth, which as a bosom contain the waters of the seas."[108] They explained it was the volatility of this salt that not only led to the salinity of the sea, but also caused the currents and tides. They claimed it was this salt, not the movement of the earth nor "the secret influence of the moon"[109] that created the tides. The Empress accepts this explanation but more significantly, Cavendish connects different areas of natural phenomena. Instead of the cause of the sea's saltiness, the currents of the oceans, and the tides being unique, she manages to link them to a singular origin. Additionally the use of the phrase "secret influence of the moon" shines a light on the moon being seen as a mystical and spiritual source of many unexplained phenomenon. Cavendish seems to prefer a more observable and rational—in her mind—explanation.

The lack of saltiness in spring water leads the Empress to inquire among the worm-men the explanation of springs. The worm-men disagree on the cause, some arguing that the ebb and flow was "caused by hollow caverns within the earth"[110] while others suggest it is the same volatile salts that cause the movement of the seas, but in a diminished amount as to not change the taste. All the worm-men agree, however, that the "swift circular motion upon [the earth's] own axe"[111] led to the distillation of water that pours out of the cracks in the earth. Again,

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[108] Cavendish, *The Blazing World and Other Writings*, 145.

[109] Cavendish, *The Blazing World and Other Writings*, 145.

[110] Cavendish, *The Blazing World and Other Writings*, 148.

[111] Cavendish, *The Blazing World and Other Writings*, 149.

Cavendish ties natural phenomenon together, linking her interests of many areas together though the lens of the inquires of the Empress.

Delving deeper into the structure of the earth, the Empress asked the worm-men about the heat of the earth, and whether they were aware of any art to create gold. The worm-men concluded that gold was created in the earth through temperate, rather than violent, heat. They were unable, however, to answer the Empress's questions on alchemy, deferring to the chemists —the ape-men. The Empress's disappointment with their response is an example of the theme Cavendish weaves throughout her investigations of the importance of the practical application of knowledge. What benefit is there to knowing the nature of the earth if it cannot be put to good use? This critique will be seen much more forcefully in other of the Empress's inquiries.[112]

Through the Empress's discussion with the bird-, fish-, and worm-men Cavendish is able to demonstrate her knowledge and her curiosity on astronomy, weather, and earth science. Rather than simply glossing over areas that she herself does not know the answers, Cavendish creates opportunities to use her reasoning. She also uses these themes to unite differing areas of science, as with salt being a significant aspect to the current and tides of the seas as well as the creation of ice, snow, and frost. She also united the moment of the earth with observable phenomena like springs and wind. While these theories may not stand the test of time, they are attempts by an amateur scientist to find unifying theories for the natural world. It is also in these inquiries that we observe one of Cavendish's strongest critiques of the scientific communities—one that we will resist several times. The Empress finds frustration in the observations made by her experts—

[112] Cavendish's criticism of theoretical knowledge has already been introduced before this investigation, as I will discuss in the next section, but I believe the questions about the nature of the earth fit better with the investigations of weather, oceans and springs of this section. Cavendish, *The Blazing World and Other Writings*, 149.

in this case the bear-men—that have no practical applications. As noted by Richard Olson: "with rare exceptions medieval science was not intended to be applied."[113] While the Scientific Revolution ushered in a new wave of observation and experimentation, there was much of the "new science" that was still too theoretical, especially in the eyes of the Empress—and therefore Cavendish.

Inquiry into Biology and Chemistry

In order to make amends for the disappointment and division caused by their telescopes the bear-men showed the Empress their microscopes. Cavendish describes how the Empress examined a grey drone-fly, charcoal, leaves of a nettle, a flea, and a louse. The Empress observed the eyes of the drone-fly, with the bear-men explain "they perceived that each [small pearl] was covered with a transparent cornea, containing a liquid within them, which resembles the water or glassy humor of the eye."[114] Cavendish goes in to detail about the eyes of the drone-fly, as if to demonstrate that she understands the anatomy of the eye. She could have simply mentioned the Empress observing the eyes on the fly, but inserts scientific language rather than simple observation. A similar pattern emerges as the Empress examines the charcoal. When looking at the piece under magnification she "discovered in it an infinite multitude of pores, some bigger, some less."[115] The bear-men concluded that the pores were the reason for the black color of charcoal. This leads to a debate on the nature of black as "a privation of light, or a want of reflection" or more simple as a "colour as any other colour."[116] As with the fly, Cavendish is not

[113] Olson, *Science and Religion, 1450-1900: From Copernicus to Darwin*, 25.

[114] Cavendish, *The Blazing World and Other Writings*, 143.

[115] Cavendish, *The Blazing World and Other Writings*, 143.

[116] Cavendish, *The Blazing World and Other Writings*, 143.

satisfied with just making observations, but using the observations and reason to delve deeper into science. Further still, when examining the leaf of a nettle, the Empress questioned the bear-men how the poison observed in bladders affects the skin, but not through digestion. The bear-men have no answer, reasoning that "it belonged to physicians more than to experimental philosophers, to give reasons hereof."[117] As well as demonstrating Cavendish's curiosity, this reiterates a critique she has of the scientific community. Observation without practical application is wasteful in her eyes. Additionally the specialists inability to bridge multiple areas of expertise disappoints the empress. Cavendish herself demonstrates wide ranging knowledge across many fields in *The Blazing World*, which is easily contrasted with the scientists the Empress inquires upon. When observing the flea and louse, the Empress is disgusted in their terrible appearance under the microscope. She asked the bear-men if they were able to use their microscopes to "hinder [the fleas] biting, or at least show some means to avoid them?"[118] Once again the experimental philosophers replied that they only make observations, with almost contempt stating that "such arts were mechanical and below [their] noble study."[119] This section on microscopes serves several purposes. First it demonstrates that Cavendish herself had used such devices, or at least was familiar in their uses. Second the variety of objects allows Cavendish to theorize on several topics. Finally it creates the opportunity for Cavendish to critique observational science as being unable to answer questions or provide practical benefit. Despite this criticism, the the Empress is impressed with the devices, even if she acknowledges the limitations.

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[117] Cavendish, *The Blazing World and Other Writings*, 144.

[118] Cavendish, *The Blazing World and Other Writings*, 144.

[119] Cavendish, *The Blazing World and Other Writings*, 144.

Cavendish has the Empress inquire about life in the seas. She asks the fish-men whether sea creatures have blood, if so where it resides, and if no how creatures can live without it. The fish-men answer "that blood was not a necessary propriety to the life of an animal" explaining that animal spirit "was nothing else but corporeal motion proper to the nature and figure of an animal." The fish-men are unable to explain if creatures with blood had circulation, as "the circulation of blood was an interior motion, which their senses…could not perceive."[120] Cavendish uses this discussion to point out the limits of scientific discovery while still displaying some of her scientific knowledge and curiosity. She also shows the logical thinking of the Empress when she concludes "if all animal creatures have not blood, it is certain, they neither all muscles, tendons, nerves, etc."[121] The discussion on the life of sea creatures lead the Empress to inquire about creatures that live on both land and sea. Here, I believe, is the opportunity for Cavendish to point out how much more complex nature is than expected, as the fish-men state: "the motion of nature being infinitely various, it was impossible that all creatures have the like motions." Oddly enough, this explanation as to how such creatures can exist satisfied the Empress, despite lacking a concrete explanation of whether amphibians breathe air or water. In this passage Cavendish uses both the Empress and the fish-men as her mouth piece, asking and answering her own questions, being both curious and knowledgable.

Cavendish explores some more controversial scientific ideas on the propagation of species. She has the Empress ask the fish-men if "in every species the off-spring did always resemble their generator or producer?"[122] This is a question is regarding to the still-held view that

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[120] Cavendish, *The Blazing World and Other Writings*, 146.

[121] Cavendish, *The Blazing World and Other Writings*, 146.

[122] Cavendish, *The Blazing World and Other Writings*, 147.

there were two ranks of creatures: those of the first rank that breed and create offspring similar to themselves, and those of the second rank that are created out of some other substance. The fish-men discuss the difference, stating the offspring of the first rank is like that of the producer, but give the example of maggots produced out of cheese as an example of the second rank. The Empress identifies similarities between them—"cheese has no blood, and so neither have maggots; besides, they have almost the same taste which cheese has"[123]—but the fish-men argue that because cheese has no "visible, local, progressive motion"[124] they are not the same. This discussion of Spontaneous Generation is of particular interest. This theory—that some creatures are created out of a substance rather than born to parents of the same species—was still widely held at the time of the publishing of *The Blazing World*. There were attempts, however, at proving it to be false. Whether Cavendish had her doubts on the theory we do not know, but the Empress is depicted as supporting the view, as are her fish- and worm-men. Whatever Cavendish's views were at the time, it is of interest that so much discuss on the topic takes place as one of the first experiments attempting to disprove the theory took place the year *The Blazing World* was republished in 1668.[125]

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[123] The example given by the Empress seem to be straw-men arguments, as I do not think Cavendish would hold these are reasonable enough characteristics to argue that cheese and maggots are alike. As a modern reader I would jest that perhaps they are presented to shock the audience, as I don't find the thought of describing the taste of maggots like cheese as a particularly appealing concept. Cavendish, *The Blazing World and Other Writings*, 147.

[124] Cavendish, *The Blazing World and Other Writings*, 147.

[125] As Russell Levine and Chris Evers write: "The first serious attack on the idea of spontaneous generation was made in 1668 by Francesco Redi, an Italian physician and poet. At that time, it was widely held that maggots arose spontaneously in rotting meat. Redi believed that maggots developed from eggs laid by flies. To test his hypothesis, he set out meat in a variety of flasks, some open to the air, some sealed completely, and others covered with gauze. As he had expected, maggots appeared only in the open flasks in which the flies could reach the meat and lay their eggs." While there was much criticism of this experiment, and the theory would persist until 1859 with definitive proof by Louis Pasteur, 1668 was the beginning of the end for the theory. Russell Levine and Chris Evers, "The Slow Death of Spontaneous Generation (1668-1859)" *Access Excellence: National Health Museum*, 1999. http://webprojects.oit.ncsu.edu/project/bio183de/Black/cellintro/cellintro_reading/Spontaneous_Generation.html

On the topic of life, Cavendish has the Empress ask her chemists—the ape-men—on the building blocks of natural life. The ape-men disagree on the question, with some arguing that all natural bodies were composed of the "four natural elements, fire, air, water and earth,"[126] but others argued against the theory as fire had never been extracted from any body. They suggested the principle ingredients were salt, sulphur, and mercury—the same ingredients for making frost.[127] A third group suggested that "all natural bodies were produced from one principle, which was water."[128] Of the three theories, only the first—the ancient view of the four humors of the body—was suggested without evidence. The other two views were given with rational arguments and evidence, demonstrating Cavendish's interest in contrary theories. The Empress rejects all three theories, however, and explains the folly of her chemists. The Empress explains to the ape-men that their efforts to find the basic principles of natural bodies was a waste, because from "[her] own contemplations, and other observations…nature is but one infinite self-moving body."[129] Therefore, explains the Empress "it is vain to look for primitive ingredients, or constitutive principles of natural bodies."[130] As a scientific outsider Cavendish declares some searches vanity, much like the condemnation of the bear-men that contribute no benefit to society. The Empress furthers this idea by ordering the ape-men to "busy yourselves with such experiments as may be beneficial to the public."[131] Much like with the bear-men's observations on fleas and louse, theoretical knowledge does not impress Cavendish without application.

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[126] Cavendish, *The Blazing World and Other Writings*, 153.

[127] See the previous section, and page 148 in *The Blazing World and Other Writings*.

[128] Cavendish, *The Blazing World and Other Writings*, 153.

[129] Cavendish, *The Blazing World and Other Writings*, 154.

[130] Cavendish, *The Blazing World and Other Writings*, 154.

[131] Cavendish, *The Blazing World and Other Writings*, 155.

Asking the chemists on more practical matters, the Empress asked the ape-men how the imperial race appeared so young despite living for hundreds of years. This leads the ape-men to explain to the empress about a substance distilled from gum found in a hollow rock that when tased caused the body to cast out many humors from the body, eventually covering the body in a thick scab. Once free from the scab the body is prepared, eventually leading to a fresh and healthy body appearing to be twenty years old. The ape-men describe all the steps of the process, taking nine months—"which is the time of a child's formation of the womb"[132]—and allows the imperial race to be free of sickness and decay. The Empress compares this substance to the myth of the Philosopher's Stone that she believed "was but a chimera."[133] While the myth of a Philosopher's Stone typically relies on some form of magic—like the fountain of youth—Cavendish creates a reasoned process by which a substance could ride the body of deal, using both medicinal—in the form of expunging negative humors—and nature based—the cocooning effect of a scab like in caterpillars or molting insects—examples. The bridging of myth and reason is a hallmark of science fiction that Cavendish's *Blazing World* and other similar works create.

Moving to more traditional medicine, the Empress inquires about the use of herbs and drugs to her satyrs—her Galenic physicians. She wondered how the herbs and drugs worked, but the satyrs could not explain why or how, but only the effects. This insight into the curiosity of the Empress—and Cavendish—shows that she is not merely satisfied with remedies, but how the remedies actually work. We see further curiosity when the Empress asks "whether they could not

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[132] Cavendish, *The Blazing World and Other Writings*, 156.

[133] Cavendish, *The Blazing World and Other Writings*, 156.

by a composition and commixture of other drugs, make them work other effects than they did, used by themselves?"[134] As in many examples in the text, the Empress's curiosity is not sated, as the satyrs answer is unsatisfactory.

In the last discussion with the Galenic physicians, the Empress asks about diseases like the spotted plague. Her physicians describe it as an inward gangrene that "did break forth outwardly," and once "spots appear, death follows."[135] The physicians are in disagreement on the cause of the spread of the disease. One group observed the plague to be "a body of fleas like atoms" that were spread by "expiration and inspiration,"[136] that is through the lungs. Despite this view, the "most experienced and wisest of the society"[137] discredit this idea and state it is through imitation. This disagreement is interesting as the more wise and experienced group supports a traditional position without observed evidence. Cavendish does not give us the Empress's opinion on the dispute, perhaps revealing that she has not yet decided her view on the debate.

To end this section on biology and chemistry, the Empress departs from her typical critiques and views. Cavendish writes that the Empress asks her anatomists to dissect "such kind if creatures as are called monsters."[138] This is the first mention of such monsters, and Cavendish does not return to the subject again. The anatomists, reflecting the Empress's usual position, state

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[134] Cavendish, *The Blazing World and Other Writings*, 157.

[135] Cavendish, *The Blazing World and Other Writings*, 158.

[136] Cavendish, *The Blazing World and Other Writings*, 158.

[137] Imitation meaning: "the motions of some parts which are sound, do imitate the motions of those infected, and that by this means, the plague becomes contagious and spreading." Cavendish, *The Blazing World and Other Writings*, 159.

[138] Cavendish, *The Blazing World and Other Writings*, 157.

that "it would be but an unprofitable and useless work."[139] They argue that there would be no benefit to others by dissecting monsters, as the purpose of their dissections is to help help cure disease and there is no gain in preserving monsters for sickness, nor would dissections "prevent the errors of nature's irregular actions"[140] that created the monsters in the first place. This is unique among the Empress's inquiries as typically she is against observations and practices without application, going as far as calling it vanity.[141] In this example it is the anatomists that describe the action as vain. In this case perhaps Cavendish is using the anatomists as her mouthpiece, rather than the Empress, while still allowing her curiosity to be on display.

In these passages we see Cavendish repeat a theme on the usefulness of scientific knowledge. Through the Empress she displays a level of criticism towards her virtuosos that cannot use their knowledge and observations to benefit the world. While there are times the Empress is impressed, overall a trend of disappointment in the experts. Cavendish also highlights the disputes among the scientists. These disagreements enable Cavendish to both explore her curiosity on a wide range of subjects, from microscopic observation to questions on life itself, but also identify that expertise, especially when limited to a single field, does not eliminate disagreements. As a scientific outsider Cavendish is able to make these claims in a hypothetical world. It is not until later sections of the story that she references any contemporary scientist or thinker, but Cavendish can still point out that within fields there is still debate and even the most wise and experienced scientist does not have all the answers.

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[139] Cavendish, *The Blazing World and Other Writings*, 157.

[140] Cavendish, *The Blazing World and Other Writings*, 158.

[141] The Empress suggests that such dissections would be "very beneficial to experimental philosophers"—the bear-men that she has been critical of so often. The anatomists answer if the bear-men "do spend their time in such useless inspections, they waste it in vain, and have nothing but their labour for their pains. *Cavendish, The Blazing World and Other Writings,* 158.

Inquiry into Mathematics, Rhetoric, and Logic

In this last section, we will explore what Cavendish describes as her "serious discourses,"[142] that is mathematics, oration, and logic. Cavendish's own limitations are on display as the Empress converses with the spider-men, her mathematicians. They present her with tables full of "mathematical points, lines and figures of all sorts of squares, circles, triangles and the like."[143] This is the first instance where the Empress—and through her, Cavendish—appear beyond her depth: "notwithstanding that she had a very ready wit, and quick apprehension, [the Empress] could not understand; but the more she endeavoured to learn, the more she was confounded."[144] Cavendish as the narrator also confides that she is also at a loss.[145] This lack of mathematical knowledge supports the claim by the editor in the biographical introduction of *The Blazing World and Other Writings* that Cavendish was "minimally educated"[146] as mathematics requires more than observation to understand fully. Despite this lack of understanding, there is no negativity towards the spider-men. What we see in this discussion is Cavendish accepting her limitations, but those limitations do not lead to criticism.

The Empress does, however, direct significant criticism towards her so-called geometricians—the lice-men. These experts "endeavoured to measure all things" but "would seldom agree."[147] Of all the disputes and disagreements witnessed by the Empress, this displeases her the most. The Empress dissolves their society entirely, finding "neither truth nor

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[142] Cavendish, *The Blazing World and Other Writings*, 159.

[143] Cavendish, *The Blazing World and Other Writings*, 159.

[144] Cavendish, *The Blazing World and Other Writings*, 159.

[145] When trying to determine if the mathematicians were able to square a circle she writes "I cannot exactly tell." Cavendish, *The Blazing World and Other Writings*, 159

[146] Introduction and Biography of Cavendish by Kate Lilley. Cavendish, *The Blazing World and Other Writings*, *xv*.

[147] Cavendish, *The Blazing World and Other Writings*, 159.

justice in their profession."[148] This passage is surprising as it is the only time time the Empress had disbanded a society, but not much detail is given as to why. I believe it stems from Cavendish's own confusion over what she describes as geometry. Cavendish states that the spider-men provided the Empress with lines and shapes, while—as we will see later—the jack-daw men use logical arguments. These two disciplines are more suited to be described as geometry than the weighing of the air and atoms attempted by the lice-men. This misunderstanding of the term supports the view that Cavendish was limited in her education in mathematics, but also a reminder of the common theme of the uselessness of observation that leads to division.

Cavendish's uses the Empress's next investigation to express more of her critiques. The Empress's orators—the parrot-men—address her "with great formality"[149] but disgrace themselves by becoming so confused that they could not continue. The criticism that Cavendish faces for being an author of "unsound scholarship"[150] are addressed with the Empress's response to the parrot-men. She tells them that "they follow too much the rules of art, and confounded themselves with too nice formalities and distraction."[151] Instead, she encourages them, they should "consider more the subject you speak of, than your artificial periods, connexions and parts of speech."[152] Cavendish acknowledges her limitations in the area of grammar, but argues in the preface to another one of her works—*The World's Olio*—that strict grammar is a hindrance

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[148] Cavendish, *The Blazing World and Other Writings*, 160.

[149] Cavendish, *The Blazing World and Other Writings*, 160.

[150] See the section titled *Biography of Cavendish and Context for Writing the Blazing World* in this paper for more detail on these critiques. Cavendish, *The Blazing World and Other Writings*, *xvi.*

[151] Cavendish, *The Blazing World and Other Writings*, 160.

[152] Cavendish, *The Blazing World and Other Writings*, 160.

to the writer: “yet those rules may be stricter than need to be, and to be too strict makes them too unpleasant and uneasy.”[153] In the same way, the Empress criticizes the parrot-men for letting the strict rules of rhetoric interfere with message. This is a critique of the traditional scientific and literary communities by Cavendish, as well as a defense of her writing style, and as such supports her position as a scientific outsider forced to write about her scientific knowledge through a fictional setting. As she attempted to write about her scientific beliefs she wrote in a manner that would be more easily accepted by both literary and scientific communities in late seventeenth century England, still with her outsider status.[154]

Finally the Empress inquired about the progress her logicians—magpie- and jackdaw-men—had reached in settling disputes. As noted several times, the disputes within her societies left the Empress frustrated, and the timing of conversing with the logicians last show a hope that the differing views can be remedied. The logicians used conflicting Aristotelian syllogisms to argue about wisdom and philosophers:

> *Every politician is wise:*
> *Every knave is a politician,*
> *Therefore every knave is wise.*

And:

> No politician is wise:

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[153] Margaret Cavendish, *The World’s Olio* (London, 1655), 94.

[154] Nate writes in *Rhetorica* that Cavendish herself changed her style of prose. In her earlier works, written in the exiled court of Charles II she was more critical of the simple style of writing that she later adopted upon her return. At the same time the scientific community in England that later became the Royal Society was also encouraging the use of a “scientific plain style.” Cavendish, clearly not a part of the scientific community, was following the guidelines that the Royal Society was implementing in the writing of science. Nate, ““Plain and Vulgarly Express’d”: Margaret Cavendish and the Discourse of the New Science,” 409.

Every knave is a politician,
Therefore no knave is wise.[155]

The Empress interrupted, scolding them for creating more confusion, stating that they "disorder men's understanding more than it rectifies them, and leads them into a labyrinth whence they'll never get out."[156] The Empress's concern was that once trapped in the labyrinth of logic, men will become "unfit for useful employment."[157] Again Cavendish shows her disdain for intellectual enterprises that provide no practical benefit. This angers the Empress to the point she almost disbands the society, as she did with the lice-men, but is convinced by the logicians to allow them to continue, as long as they "confine your disputations to your schools"[158] and not disturb other studies. In her explanation the Empress argues the pursuit of logic is vanity "for no particular knowledge can be perfect, by reason knowledge is dividable… nature herself cannot boast of any perfection, but God himself."[159] This is a critique of any scientist or natural philosopher that would claim to have perfect knowledge on any subject. It is not a stretch to extend this position to be critical of any member of a scientific community that marginalizes others who study in their field, in which Cavendish herself falls victim.

Cavendish ends the Empress's investigations into her scientific societies by acknowledging her limitations—as with the spider-men and their mathematics—before revealing her most scathing criticisms. The lice-men have their society disbanded for providing nothing of

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[155] The logicians used several more syllogisms—most of them including a fallacy in the major premise, minor premise, or both—that contradict each other. Generally the fault is in the generality of the statement, as in "Every philosopher is wise." Cavendish, *The Blazing World and Other Writings*, 160-161.

[156] Cavendish, *The Blazing World and Other Writings*, 161.

[157] Cavendish, *The Blazing World and Other Writings*, 161.

[158] Cavendish, *The Blazing World and Other Writings*, 162.

[159] Cavendish, *The Blazing World and Other Writings*, 162.

value. The parrot-men are scolded for their formality in rhetoric detracting from the messages of their orations. Most poignantly the magpie- and jackdaw-men's use of logic to confound and confuse, rather than settle disputes, highlights again Cavendish's frustration with disagreements in science and sharply criticizes the hubris of so-called experts who believe they have perfect knowledge on their subject of study.

Conclusion to Cavendish's Scientific Investigations

Much like Godwin, Cavendish is influenced heavily by the concerns of her time period. As a product of the English Civil War her concern for the affects of division on society—whether in the areas of politics or science—are demonstrated in the actions of the Empress. Likewise, the recent discoveries of her time—in both geography and science—are inspirations for her story. Rather than creating her new world as an undiscovered continent, as Thomas More does in *Utopia,* Cavendish creates a pathway through the poles to an entirely new, and conventionally undiscoverable, world. It is this "act of fancy" that helps categorize *The Blazing World* as Science Fiction. Through the Empress's inquiries and discourses, it is clear that Cavendish has both interest in and respect for scientific study, but her position of being exiled from the scientific community raises her many concerns with the state of science in the seventeenth century. Cavendish ability to write on a wide range of topics—politics, engineering, astronomy, earth science, weather, biology, chemistry, mathematics, rhetoric, and logic—demonstrates her breadth of knowledge. While she reveals her deficiencies in some areas, she also provides ample evidence that she is well studied, especially so for a woman of her time. Beyond exhibiting her knowledge, she uses the discourses of the Empress to provide criticism of the scientific

community. Cavendish shows her frustration with disagreements within fields, her disapproval of observations that provide no meaningful benefit, and the hubris of experts. These observations indicate that Cavendish is qualified to be included in the scientific community, while at the same time positioning her as an outsider.

Ch. 4: Conclusion

Comparing Cavendish and Godwin

Cavendish—as we have seen—is not unique using a fictional tale to discuss scientific ideas. Francis Godwin's *The Man in the Moone* holds many similarities with *The Blazing World.* Cavendish outlines in her *To the Reader* that she chose to create an entirely fiction world as opposed to a world on the moon.[160] This enabled her the freedom to create a world more of her choosing, but the purpose of both the moon and the Blazing World are the same. Both worlds hold fictional societies that allow the authors to apply their theoretical knowledge within plausible frameworks. Today we would categorize both as Science Fiction rather than fantasy, as both societies operate within the laws of nature as understood by the authors.

There are several significant elements shared by these two tales. First, both stories begin in our world with nautical adventures—the voyage of Domingo Gonsales and the kidnapping of the young lady. These features anchor each story in our world, introducing each protagonist as characters that share a similar perspective to the reader. Whatever is new and unique in the

[160] As stated, Cavendish references two lunar stories as comparison's to her blazing world, Lucian's *True History* (174 AD) and "the French-man's"—that is Cyrano de Bergerac's*Voyage to the Moon* (1656). Bergerac was inspired by Godwin, while Lucian may have, in turn, inspired Godwin. Cavendish, *The Blazing World and Other Writings*, 124.

fictional worlds also appear new and unique to the protagonist. Sea journeys also provide a reference point in both tales to exploration and adventure, with the writing and publishing of both works coming in the midst of the Age of Discovery. In the transition from our world to the imagined, both tales attempt reasonable explanations. In *The Man in the Moone* the journey is made through clever engineering in an escape from danger, while the young lady in *The Blazing World* is blown into unexplored reaches of the Arctic.[161] Good fortune is necessary for both travels as well. These plausible journeys do not overly stretch the imagination, while still creating unique—though practically unrepeatable—transitions to new worlds. This allows both authors uninhibited freedom to create a new world. Despite this freedom, both authors anchor the natural laws of the new world to their own.

While both characters describe their discoveries using theories accepted at the time, with logical explanations, the two authors do add fantasy-like elements of magic. In *The Man in the Moone* Gonsales describes the magic stones he is given as presents. These stones—*Poleastis, Machrus,* and *Ebelus*—are similar to the fire-stone and star-stone that Cavendish describes in *The Blazing World*.[162] Cavendish also introduces the Philosopher's Stone-like gum that enabled the imperial race to remain perpetually young. In both stories these objects are more fantastical than most other aspects, but the application of the items is reasoned and practical. Much like the idea of traveling to a new world, the use of these "magic" stones are fantastical elements supported by reasoning.

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[161] While I believe Godwin's explanation of a swan-powered flying machine is more plausible, Cavendish does go out of her way to explain how joined worlds can exist without observers being aware. See Cavendish, *The Blazing World and Other Writings*, 126 and Gonsales, *The Man in the Moone,* 21.

[162] I did not elaborate on the Empress's use of these stones, as they related more to the religious aspects of Cavendish's story, and the war against invades in *The Second Part of the Description of the New Blazing World*. See pages 163-165 and 211 in Cavendish, *The Blazing World and Other Writings*.

In several ways the worlds of both Godwin and Cavendish differ from Thomas More's *Utopia*. Godwin and Cavendish use their created worlds to support both monotheistic religions and an aristocratic monarchy. Godwin, as a Bishop, makes several references to the lunar people being Christians—when Gonsales says the word *Jesus, Maria* the people fell to their knees and held their hands high, and later discussing with the king the different saints.[163] Cavendish is less specific, having the Empress wonder if the people of the blazing world "were Jews, Turks, or Christians?"[164] Later the Empress built temples to convert the inhabitants to her own religion, though it is not abundantly clear that she is referring to Christianity. Less significant is the specifics of the religion in each world, but that in the imaginations of Godwin and Cavendish they must be monotheists. Similarly both worlds are ruled by a monarch. Both Godwin and Cavendish praise the rulers, defending monarchy as the ideal form of government. Godwin goes as far as having *Irdonozur*—the king of the lunar people—ask Gonsales to salute Queen Elizabeth if he ever has the opportunity, describing her as "the most glorious of all women living."[165] In *The Blazing World* Cavendish uses both spiritual and natural arguments to support a monarchy. Just as with monotheism, a monarchy is seen as the best form of government for these fictional societies. With these two examples we see that both authors are not attempting to create a utopian society that overthrows the traditional systems of their own world, but rather create a fictional place to demonstrate their knowledge of how their own world operates. This distinction that separates Godwin and Cavendish from other utopian writers like More is key to the purposes

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[163] Gonsales, *The Man in the Moone,* 29 and 36.

[164] Cavendish, *The Blazing World and Other Writings*, 135.

[165] Gonsales, *The Man in the Moone,* 47.

of their works.[166] Neither author is attempting to create an ideal society in their stories, nor aspiring to enact change upon their own world. Instead these stories are opportunities for the authors to showcase their broad knowledge on scientific topics.

There are, of course, differences between the two works. Godwin never published *The Man in the Moone* himself, indicating he was less inclined to share his tale. This is reflected in tone of the piece. Godwin writes an interesting story that is peppered with his curiosity and musing on natural philosophy. Cavendish self-published *The Blazing World*, then rereleasing it two years. The philosophical portion of the story appears more as an attempt to show off her knowledge than Godwin, with the Empress's more overt discussion of scientific matter as opposed to Gonsales's observations in *The Man in the Moone*. These differences reflect the different positions of the two authors in society. Both were scientific outsiders, not holding membership in any scientific societies, but Bishop Godwin was respected in his field. Cavendish was required to be more direct in her writing in regards to science and natural philosophy.

What we see in the works by Godwin and Cavendish are fictional worlds that provide the framework for their authors to write about the scientific knowledge. In *The Man in the Moone* Francis Godwin tells a story of a sailor who builds a cleverly engineered flying machine, travels through the atmosphere to the moon, and interest with a lunar people. Through his story Godwin demonstrates his knowledge of engineering, astronomy, geography, physics, and philology. Godwin uses a fantastical location as a blank slate to explore the natural laws that govern his own world. His fictional story is anchored in the scientific knowledge he gained, but as a

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[166] Cavendish does strike a more utopian tone in the later parts of her story, especially with *The Second Part of the Description of the New Blazing World*, which she distinguishes from the early parts of her story as *fantastical* in her *To the Reader*. Cavendish, *The Blazing World and Other Writings*, 124.

member of the clergy—known only for his histories of English bishops—he was a scientific outsider. Rather than write a scientific treatise he created his lunar world to discuss the topics that interested him.

Margaret Cavendish, like Godwin, was no member of the accepted scientific community. As such she wrote her own imaginary tale, this time to the Blazing World linked to her own at the poles. Her protagonist—the young lady turned Empress—seeks out all the experts in this fantastical world filled with hybrid animal-men. Through the discussions between the Empress and her virtuosos Cavendish delves into her own knowledge and offers several critiques of the state of natural philosophy and the societies of the time.

Both Godwin and Cavendish find themselves outside of the scientific community, yet they manage to write compelling narratives full of complex scientific thinking.

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