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Within the field of Restoration and eighteenth-century studies, critics have investigated the relationship between literature and science for almost a century. Even among specialists, however, there has been insufficient enquiry into epistemological tensions between categories for what now might be called “pre-science” and what was then known as “natural philosophy.” Even less attention has been paid to the relation between natural philosophy and the category of speculation, in which speculation is understood scientifically and literarily. I explore how what I define as speculative writing about natural philosophy assisted in publicizing and spreading new epistemologies during the Restoration and early eighteenth century. In analyzing speculative writing, I investigate the cultural reception of natural philosophy, tracing responses to such changes. I argue that the speculative mode emphasizes a more integrated vision of knowledge formation at that time, a vision that is now divided by the categories of art and science.

Emphasizing the contemporary reactions to these various models of knowledge, my methods require a deeply historical approach. To focus this approach, I consider writings in the Restoration that respond to the formation and practices of the early Royal Society: its institutional presence and public mission made it an especially attractive target of speculative writing that would challenge the Society’s official promotion of the experimental method and rejection of the speculative method. I take as evidence both literary and nonliterary documents, representative of a range of genres: these include

dictionaries printed at the end of the seventeenth and the beginning of the eighteenth century, Thomas Sprat's *The History of the Royal Society* and Abraham Cowley's opening ode, Francis Bacon's *New Atlantis* and Margaret Cavendish's *Observations upon Experimental Philosophy* and *Blazing World*, as well as Thomas Shadwell's *The Virtuoso* and Aphra Behn's *The Emperor of the Moon*. My argument considers the mixed and conflicting strands that informed the broader category of natural philosophy and recognizes the many ways in which the texts concerned with natural philosophy are by no means easily separated into so-called scientific or literary ones. I conclude the study by looking forward, linking the beginnings of the speculative mode in the Restoration period to a popular eighteenth-century text – Jonathan Swift's *Gulliver's Travels*. I end with a call to understand the cultural moment of the Restoration better by joining together works of science and art as both valid and necessary avenues toward knowledge and literary history.

THE SPECULATIVE MODE: INTERSECTIONS OF
LITERATURE AND THE NEW SCIENCE IN
RESTORATION ENGLAND

by

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To my family:

Your love, encouragement, and patience made completion of this project possible.

In memory of my Aunt “Lo-Lo,” who taught me that words have power and my grandfather, who might have been an English major in another time and place.

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This dissertation written by Crystal Lee Matey has been approved by the following committee of the Faculty of The Graduate School at The University of North Carolina at Greensboro.

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CHAPTER I
INTRODUCTION

Everything must have a beginning, [...] and that beginning must be linked to something that went before.¹

Mary Shelley

Within the field of Restoration and eighteenth-century studies, critics have investigated the relationship between literature and science for almost a century.² Much of this work has included efforts to define “science” in that era, acknowledging that the word “science” has a different denotation in the Restoration and eighteenth century and that what precedes the modern term “science” is better labeled as “natural philosophy.” Even among specialists, however, there has been insufficient enquiry into tensions between categories for what now might be called “pre-science” and what was then known as “natural philosophy.” Depending on what kind of natural philosophy a philosopher practiced, speculation might be central to his practice or a method he sought to distance himself from. Either way, speculation was a crucial part of the discourse surrounding

¹ In Shelley’s introduction to the 1831 edition of *Frankenstein*.

² When I use the term “literature” I use it to reference works that we now would consider literary – works of drama, poetry, and fictive prose. However, during the “long” eighteenth century, literature was more broadly defined. Throughout most of my project, I will use the terms “writing” or “speculative writing” to connote a response to natural philosophy that we would most likely refer to as a type of literature today. “Science” is another problematic term that is often employed by scholars who study what some refer to as the “Scientific Revolution.” The term “science” did not mean what we often think of when we hear the word “science.” “Science” usually meant general knowledge or study. I prefer to avoid the use of this term throughout my project; however, that is near to impossible because almost all scholars whom I reference employ that term. When I do use the word, I do so only to quote them. At times, for its ease of use, I reluctantly refer to “science,” but I always put it in quotation marks to indicate I am using that term loosely and anachronistically. See chapter two for a more in-depth investigation into the term “science.”

natural philosophy. Despite its prominence – either in practice or as part of the discourse surrounding methodology – even less attention has been paid to what speculation means, both scientifically and literarily. Some of this tension arises because of the distinctions between speculative and experimental philosophy during the Restoration period. What I will eventually define and differentiate as speculative and experimental philosophy often gets labeled by scholars under a variety of terms: natural philosophy, science, empiricism, pre-science, and imagination – just to name a few. Understanding the nuances of these terms will prove essential to understanding how what would come to be known eventually as literature developed in certain directions because of its relation to this “pre-science.” As pre-science moved closer to what we today refer to as empiricism, speculation became aligned with the imaginative faculties, eventually becoming a prized component of the imagination. At the same time, speculative writing emphasized the need for the humanities at this particular moment in history, as a means through which to better understand science.⁴

⁴ In choosing the term “speculative writing,” which I describe as operating in the “speculative mode,” I have selected a term that had historical relevance. As I will establish in the introduction and in chapter two, the term “speculative” was related to a type of philosophy that relied on observation and conjecture to formulate truth. As a type of philosophy that relied more on observation and experimentation emerged, speculative thinking was positioned as inferior. My term, “speculative,” therefore, represents the debate between these two different kinds of knowledge production – speculation and experimentation. The “speculative mode” should not be confused with “speculative fiction,” a term coined in 1941 by Robert A. Heinlein. According to Merek Oziewicz, “the term ‘speculative fiction’ has three historically located meanings: a subgenre of science fiction that deals with human rather than technological problems, a genre distinct from and opposite to science fiction in its exclusive focus on possible futures, and a super category for all genres that deliberately depart from imitating “consensus reality” of everyday experience. In this latter sense, speculative fiction includes fantasy, science fiction, and horror, but also their derivatives, hybrids, and cognate genres like the gothic, dystopia, weird fiction, post-apocalyptic fiction, ghost stories, superhero tales, alternate history, steampunk, slipstream, magic realism, fractured fairy tales, and more” (n.p.).

Speculative writing, as I define it, relies on practices formerly associated with older methodologies, namely those grounded in observation and conjecture. In other words, speculative writers rely on their observations of practices related to natural philosophy and then use those observations to hypothesize or speculate on what significance those practices might have for society and culture. As such, speculative writing that responds to the formation of the Royal Society as a public institution contributes to the Restoration discourse surrounding the developments in natural philosophy. These writings explore how shifts in epistemology impact us on a more personal level, within our daily lives and within our homes. Writings about natural philosophy assisted the public in mediating and discussing the anxieties that arose from such large shifts in knowledge.⁵ In this dissertation, focusing attention on general readers instead of practitioners exemplifies how the progression of “science” was slow moving, instead of sudden, and how its trajectory did not follow a straight, progressive line that consistently advanced toward more modern ideas of science. Our understanding of how this change occurred is limited if we consider the “scientific revolution” only in terms of those who practiced natural philosophy and not in light of those who were impacted by the changes natural philosophy brought.

⁵ When I refer to the public in my dissertation, I mean the reading public. David H. Richter argues that there is evidence for an increase in literacy during the eighteenth century. He notes that in 1700 around “50 percent of men and 15 percent of women” could sign their name, but that those numbers jumped to 65 percent and 40 percent by 1820 (214). According to Ian Watt, although the reading public at this time was larger than in previous eras, it was “far from the mass reading public of today” (35). There was an increase in printed titles between the years 1700 and 1800, rising from 1,800 to 6,000; however, Abigail Williams notes that books were expensive, “luxury items” (95); nevertheless, there were other ways that people could access print – newspapers, abridgements, secondhand shops, and circulating libraries. Williams also discusses how text was read out loud, both in the home and in public places (96). Despite a reading public that was small, Nicola Parsons contends that “print and reading were vital to the public sphere” at the start of the eighteenth century (7).

Al Coppola notes that there has been a “recent wave of revisionist histories of early modern science” that seeks to look beyond the practitioners’ and apologists’ views of natural philosophy to recover how society related to and understood natural philosophy (15). Joseph Drury traces the recent trends in the study of literature and science in his 2017 article, “Literature and Science in Enlightenment Britain: New Directions.” His essay identifies four main areas of research in this field, although he notes that these research areas often overlap: poetry and performance, fiction, new ontologies, and politics and gender.⁶ Both Coppola and Drury acknowledge the connection between the discursive practices of natural philosophy and the techniques used in literary texts. Although scholars continue to explore how natural philosophy influenced literary texts, scholars are now beginning to investigate what practices literature and natural philosophy shared (Drury 2). More and more, scholars are breaking away from the tradition that natural philosophy came into practice and then was disseminated across society. Instead, many scholars see literary works as playing an “essential role” in natural philosophy’s creation, arguing that eighteenth-century literature actively participated in the societal networks that “establish and sustain that knowledge” (Drury 9).⁷ Coppola argues that this

⁶ Drury notes that such research explores: the “discursive strategies that 18th-century fiction shares with new science,” specifically the new practices of narration and description afforded by the “sciences” (4); the “renewal of interest” in neo-Epicureanism (6); the exploration of how “science” reflected or departed from the political rhetoric of moderation; and investigations into what opportunities women in the eighteenth-century were afforded by “science” (8).

⁷ For some of this recent scholarship see: Courtney Weiss Smith, *Empiricist Devotions: Science, Religion, and Poetry in Early Eighteenth-Century England* (2016); Karen Bloom Gervitz, *Women, the Novel, and Natural Philosophy, 1660-1727* (2014); Sarah Tindal Kareem, *Eighteenth-Century Fiction and the Reinvention of Wonder* (2014); James J. Bono, “Making Knowledge: History, Literature, and the Poetics of Science” (2010); Jesse Molesworth, *Chance and the Eighteenth-Century Novel: Realism, Probability, Magic* (2010); John Shanahan, “Theatrical Space and Scientific Space in Thomas Shadwell’s *Virtuoso*” (2009); Catherine Gallagher, “The Rise of Fictionality” (2006); Clark Lawlor, “Poetry and Science” (2006); Barbara Benedict, *Curiosity: A Cultural History of Early Modern Inquiry* (2001); Jan Golinski,

knowledge is expressed and circulated within “networks of persons, objects, and institutions that radiate out from the lab in all directions, linking specimens and scientists, politicians and playwrights, mechanics’ workshops and middle-class households” (16).

My dissertation coordinates with the trends that Coppola and Drury note, as I seek to explore how writing about natural philosophy assisted in publicizing and spreading new epistemologies. In exploring these speculative writings, I am investigating the cultural reception of natural philosophy, analyzing responses to such changes. My methodology emphasizes the contemporary reactions to these various models of knowledge, which requires a deeply historical approach. Within this method, I take as evidence both literary and nonliterary documents, representative of a range of genres. I rely on this array of texts because each provides historical evidence: literary texts, dictionaries, and other nonfiction materials are each representative of the cultural moment. As such, close reading supports the method through which I analyze such varied texts. In putting these writings into conversation with one another, I can focus on how they relate to each other. Although there may not always be a clear cause and effect relationship between them, there is at least a dynamic of association. Because I rely highly on historical evidence, it is necessary to provide some background on Restoration politics and gender dynamics. The reason for this approach, above all, is to historicize, as specifically as possible, what was understood in the era as tensions between new organizations of knowledge and their cultural experiences. I am interested, therefore, in cultural politics and the power dynamics of competing knowledge.

Science as Public Culture (1999); and Larry Stewart, *The Rise of Public Science: Rhetoric, Technology, and Natural Philosophy in Newtonian Britain, 1660-1750* (1992).

My argument considers the mixed and conflicting strands that informed the broader category of natural philosophy and recognizes the many ways in which the texts concerned with natural philosophy are by no means easily separated into so-called scientific or literary ones, a complication that I will discuss further below. Analyzing several genres within what I call “speculative writing” – that which speaks back to the rhetoric of the Royal Society - I will establish that this writing not only critiques these new methods but also helps to shape them. Speculative writing also assists in knowledge production by entering the discourse surrounding natural philosophy. Consequently, I participate in what Coppola refers to as a “revisionist history” because my goal is to establish a discursive interchange between messages promoted by the Royal Society and how they were received and molded by writers outside of the Society. Writing in the Restoration and early eighteenth century that I define as speculative writing took on the topic of natural philosophy as one of its main subjects participated in a kind of speculative questioning of natural philosophy and its possible trajectories. I argue that what today is known as science fiction, and by that label assumed to be a genre, is what in the seventeenth and eighteenth century functioned as a mode that could appear in any genre – a mode that I call speculative.⁸ Exploring the speculative provides us with a

⁸ Scholars remain divided on whether science fiction is a genre or a mode, although many tend to refer to it as a genre. In fact, science fiction is often a member of the umbrella term “genre fiction.” David Seed asserts that calling science fiction a genre fails to “recognize the hybrid nature of many science fiction works” in which “different genres and subgenres [such as the fantastic voyage, the utopia, the tale of the future, and so on] intersect” (1). As will be discussed in chapters two and three, the Royal Society rhetorically positioned itself as opposed to “speculative philosophy.” The new philosophy, as practiced by the Society, advocated for experimental philosophy, which drew its conclusions inductively, by relying on observation and experimentation. See the next chapter for more analysis about what “speculation” meant at the time.

different foundation on which to understand the science fiction that follows and reorients emphases that will appear in later science fiction.

In considering the role of the speculative mode, it is necessary to acknowledge its connection to the eventual development of the genre of science fiction. According to John Frow, “genres create effects of reality and truth, authority and plausibility, which are central to the different ways the world is understood” (2). One genre that attempts to understand the role of science in the modern world is science fiction. Many scholars of science fiction have searched and continue to search for precursors to science fiction, but those scholars often disagree about the origins of science fiction. David Seed contends that the range of origins of science fiction span from Lucian’s *A True Story* in the second century, to Thomas More’s *Utopia* (1516), to Mary Shelley’s *Frankenstein* (1818), to as recent as the early twentieth century (2). The span of time in Seed’s history represents the difficulty in determining what counts as “science” and what counts as “fiction.”⁹ Brian Stableford considers that the application of the scientific method in the seventeenth century means that authors started writing science fiction about the latest discoveries and modern technologies during that period (15); accordingly, he proposes that Francis Godwin’s *The Man in the Moone* (1638) could be another potential forerunner.¹⁰ Godwin’s narrative, however, mixes fantasy with musings about possible life on the moon. Stableford’s assessment, therefore, seems grounded in Godwin’s speculations

⁹ Seed contends that any text from antiquity should be seen as “ur-science fiction” and that works from the Renaissance through the early nineteenth century move closer to the methods we find today in science fiction, so they should be labeled “proto-science fiction.” In Seed’s view, science fiction emerged in the late nineteenth century (2).

¹⁰ Stableford fails to acknowledge that the modern scientific method was not established in the seventeenth century.

instead of recognizing that Godwin's text does not develop conclusions based on the writer's observations about natural philosophy. Interestingly, the chronology in *The Cambridge Companion to Science Fiction* classifies nine titles prior to *Frankenstein* as members of the genre, beginning with More's *Utopia*, followed by Francis Bacon's *New Atlantis* (1627), and also includes Godwin's *The Man in the Moone* (1638). German, French, and Norwegian writers penned the remaining narratives in the Cambridge chronology, and none of the titles listed during the Restoration or eighteenth century is by a British writer.¹¹ This range of dates can be explained in part by whether scholars choose to focus on a particular historical and cultural understanding of science or on thematic connections across time periods. When scholars argue for the former, they suggest that science fiction "could only have arisen in a culture experiencing the Industrial Revolution," as opposed to the latter, which speaks to "something more fundamental in the human make-up, some human desire to imagine worlds other than the one we actually inhabit" (Roberts 37-38).

Regardless of what work scholars label as the first work of science fiction, the speculative mode is a type of writing that allows us to trace the beginnings of an imaginative response toward natural philosophy. The speculative mode is a valuable link in the long history of cultural responses to an epistemological shift that will develop into

¹¹ Other critics' views of the origins of science fiction have ranged substantially. Brian Aldiss, *Billion Year Spree: The True History of Science Fiction* (1973) asserts *Frankenstein* is the beginning of the genre; Mark Rose, *Alien Encounters: Anatomy of Science Fiction* (1981), marks Jules Verne and H.G. Wells as the originators of the genre; Paul Alkon, *Science Fiction Before 1900: Imagination Discovers Technology* (1994), marks Daniel Defoe's *Robinson Crusoe* (1719) and Jonathan Swift's *Gulliver's Travels* (1726) as precursors but Mary Shelley's *Frankenstein* as the original (1); Brian Stableford's, "The Emergence of Science Fiction," in *Anatomy of Wonder* (2004), argues that the first work of proto-science fiction is *Gulliver's Travels*; and Adam Roberts, *The History of Science Fiction* (2005) cites Godwin, in addition to John Wilkins's *Discovery of a World in the Moon* (1638) and *Gulliver's Travels*.

what we now call science fiction. However, if there is such a strong relationship between the speculative mode and science fiction, why not just refer to the speculative mode *as* science fiction or at least as a precursor/prototype? When considering speculative writing in the seventeenth and eighteenth centuries that take on natural philosophy as one of their main subjects, employing the term “speculative mode” as opposed to “science fiction” (or referring to them as precursors to science fiction) is necessary for several reasons. First, the words “science” and “science fiction” are both anachronistic when applied to Restoration and eighteenth-century texts, as demonstrated by the study of dictionary definitions of terms such as “science,” which is discussed in depth in chapter two.¹² There are also problems with both, especially when used in light of early contributors to the mode. For example, part of the concern with the word “fiction,” is that it implies narrative (especially prose) and excludes other genres. Moreover, the word “science” also poses a problem since that word has drastically changed meaning over time. “Speculative,” instead of “science” emphasizes the theoretical, as opposed to experimental knowledge. It sufficiently describes an inclination toward conjectural reasoning, a practice that both natural philosophers and writers were participating in because of natural philosophy.

According to Helen Conrad-O’Briain, science fiction appears and reappears in response to scientific and technological shifts (33), and the speculative mode does the same. However, the speculative mode is more inclusive because it does not specify or imply the requirement of prose narrative. The speculative mode also deemphasizes

¹² According to the *OED*, the term “science fiction” was not used until 1851.

science fiction's requirement for technological plausibility. Typically, science fiction readers expect that predictions of technology be possible within the realms of science, so texts that are more far-fetched or fantastical would be excluded from science fiction. Because natural philosophers in the Royal Society themselves were speculating about technology with no hard proof to back up some of their theories, it seems appropriate that speculative writers would be doing the same; hence what today might be seen as so fantastical as to be outside the bounds of science fiction proper could be within the framework of possibilities within natural philosophy. Finally, the speculative mode, as I define it, neither requires nor dictates that imaginative literature operating within the mode focus mainly on the topic of natural philosophy, even though science fiction typically requires a sustained focus on science. Ultimately, recognizing the importance of the speculative mode emphasizes the essential position these literary writers occupy as part of a longer continuum that eventually gets labeled "science fiction." The themes that speculative works in the seventeenth and eighteenth century were investigating have become more pertinent as time has progressed because they contribute to understanding cultural responses to discourses that shape our understanding of how the natural world works and how experimental philosophy shapes methods of inquiry. Without this category of the speculative mode, we ignore the work of the speculative in multiple genres. Understanding this mode leads to a richer and deeper understanding of how science fiction developed as a genre, while also providing insight into the ways in which speculative and experimental thinking were connected in the Restoration and eighteenth century.

I have chosen the term “speculative” because of its meaning at the time. Speculative philosophy was associated with ancient methods of knowledge formation, namely deductive reasoning, in which observations are used to suppose conclusions and theories. Therefore, when I refer to the “speculative” mode, I mean a type of writing that observes the practices of natural philosophy and then deduces where those practices might lead. Speculative writing, therefore, relies on conjecture and prediction and not on knowledge derived completely from the senses (as experimental philosophy does). As the Royal Society criticized speculation and sought to distance itself from it, writing about natural philosophy relied on speculation to ponder, criticize, and hypothesize about the various consequences “science” might have for society – both positive and negative. Additionally, the speculative mode draws attention to the various ways that speculative writing often used the tools of empiricism to consider truths that cannot be known empirically.¹³

Speculative writing as I define it here is a vast territory, and studies of it could fill volumes. To focus my approach, I consider writings that respond to the formation and practices of the early Royal Society: its institutional presence and public mission made it an especially attractive target of speculative writing that would challenge the Society’s official promotion of the experimental and rejection of the speculative. R.S. Woolhouse

¹³ The term “empiricism” is another often employed by current scholars, despite the absence of the term from various discourses in the Restoration and early eighteenth century. We often refer to Francis Bacon as the “father of empiricism”; however, natural philosophers did not use that word to describe their methods. The Royal Society labeled their practices as “experimental philosophy,” and we often refer to those practices as empirical since they are based in methods that we today associate with empiricism (induction, observation, and experimentation). See chapter two for more information on the use of the term “empiricism.” See also chapters two and three for distinctions made between speculative and experimental philosophy.

contends that natural philosophy, although it was still emerging as a concept, was a “public, not private development,” and he argues that the institutionalization of the Royal Society is proof that natural philosophy was part of public life (67). The notion of a “public science” was derived from the experimental methods in the late seventeenth and early eighteenth centuries. One of the purposes of its practitioners, according to Larry Stewart, was to make natural philosophy public (xxii). Consequently, the *Philosophical Transactions* and Thomas Sprat’s *The History of the Royal Society* were both avenues through which natural philosophers could spread knowledge outside the confines of the laboratory (xxiv).¹⁴ Although, as we will see, the Royal Society had multiple goals for the role it might serve in society, “the translation of private knowledge into public certainty had long been at the heart” of the Royal Society’s varied purposes (Woolhouse 101).

The public nature of the Society’s mission opened its methods up to public scrutiny and critique. This critique could often be found across genres in what I delineate as the “speculative mode,” which was emerging in the seventeenth and eighteenth centuries and has thus far gone unnamed and perhaps underappreciated and

¹⁴ For recent scholarship on the Royal Society see: Elliot Rossiter, “Locke, Providence, and the Limits of Natural Philosophy” (2014); Peter Harrison, “Sentiments of Devotion and Experimental Philosophy in Seventeenth-Century England” (2014); Palmira Fontes Da Costa, *The Singular and the Making of Knowledge at the Royal Society of London in the Eighteenth Century* (2009); Marie Boas Hall, *Henry Oldenburg: Shaping the Royal Society* (2002); William Lynch, *Solomon’s Child: Method in the Early Royal Society of London* (2001). For recent scholarship on the Royal Society as public enterprise refer to John Shanahan, “The Dryden-Davenant Tempest, Wonder Production, and the State of Natural Philosophy in 1667” (2013) and “Theatrical Space and Scientific Space in Thomas Shadwell’s *Virtuoso*” (2009); Peter Dear, “*Toitus in verba*: Rhetoric and Authority in the Early Royal Society” (2014); *Science in Print: Essays on the History of Science and the Culture of Print*, edited by Rima Apple, Gregory J. Downey, and Stephen L. Vaughn (2012); John Morgan, “Science, England’s ‘Interest’ and Universal Monarchy: The Making of Thomas Sprat’s *History of the Royal Society*” (2009); Al Coppola, “Retraining the Virtuoso’s Gaze: Behn’s *Emperor of the Moon*, the Royal Society, and the Spectacles of Science and Politics” (2008); Stephen David Snobelen, “William Whiston, Isaac Newton, and the Crisis of Publicity” (2004); and Jeffrey R. Wigelsworth, “Competing to Popularize Newtonian Philosophy” (2003).

unrecognized. Since it was an emerging mode, classifying which texts are speculative and which are not can be difficult. Nevertheless, the main goal in identifying emergent forms is larger than mere classification (Fowler 37), especially since the discourses used by natural philosophers and those used in “literary” texts were still being established (Aït-Touati 5). In fact, “the meaning of the word ‘literature’ was much broader in this period,” leading critics to question whether eighteenth-century writers saw any difference between works of literature and science: all were ‘literature’ to them (Lawlor 40). The goal, then, is not just to identify which works might be classified as speculative, but instead to investigate their function in developing a speculative or imaginative response to natural philosophy.¹⁵ Because writing about natural philosophy by its practitioners did not yet have a “fixed form” and because natural philosophy was still in the process of deriving methods “distinct from the methods of literary writers,” we must remain cognizant of the fact that natural philosophy and speculative writing share similar motifs in the texts each produces (Aït-Touati 5). That could mean, for instance, that writings produced by the Royal Society for the purposes of promoting experimental philosophy could contain

¹⁵ When I use the word “imaginative” or “imagination,” I do so understanding the long history of philosophical and aesthetic treatises on the “imagination,” acknowledging that it is a complicated term. Occasionally, I do use the term to indicate a process the brain goes through when speculating, a process that is often understood in opposition to experimental philosophy. Dictionaries of the day, as will be discussed in chapter two, define the term “imagination” in a variety of ways and often list “fancy” as synonymous with the “imagination.” Some of those definitions include the imagination as an act of conceiving or surmising in the mind, while others define it with terms that denote a creative process – it feigns, invents, or devises. As Samuel Johnson describes the process of imagining, it is “to paint with the mind.” Sprat also employs the terms “fancy” and “imagination” to distinguish the speculative process from the experimental process; therefore, it is not a term I can avoid. As we will see, however, there are clusters of terms – such as “fancy,” “imagination,” and “magic” – that are frequently juxtaposed with the category of knowledge verified by the experimental method. I do not necessarily intend for such terms to be synonymous but am instead presenting them as a lexical field against which experimental philosophy is defining itself. Many of these terms as they are used in the Restoration lead to what will be known and appreciated as the “imagination.”

elements that seem more “literary” and more aligned with speculative modes of discourse. Although my study focuses on the speculative mode in relation to what we might deem today as “literature,” that does not mean that only texts we might consider to be literature were operating in the speculative mode. To underscore the dynamic between natural philosophy and speculative writing and to show the necessity of considering multiple genres, I examine works ranging from proto-novels, to poetry, to drama, to periodicals.

Because speculative writing can be found across genres, classifying this type of writing as contributing to a mode and not a genre is an important distinction. Genre as a term is multi-faceted and complex.¹⁶ Genre or kind is distinguished by formal or structural classifications (Frow 67). Genre, thus, is distinct because of its noticeable formal features (Sitter 94). The mode, as opposed to genre, involves more of an “elusive generic idea,” making it so that it can seem unclear exactly how the mode relates to or is connected to genre. Alastair Fowler notes that when discussing genre, we can always put it in the form of a noun (a novel, an epic), but modes tend to be adjectives (106). As Frow notes, “rather than standing alone, modes are usually qualifications or modifications of particular genres (pastoral elegy or satirical sitcom)” (65). It is useful, therefore, to think of a mode as a type of writing that does not have to adhere to certain formal structures

¹⁶ In “An Introduction to Genre Theory” Daniel Chandler notes that the “word genre comes from the French (and originally Latin) word for 'kind' or 'class'. The term is widely used in rhetoric, literary theory, media theory, and more recently linguistics, to refer to a distinctive type of 'text'” (1). Within literature, the most basic genres include poetry, prose, and drama. Chandler acknowledges that terms related to genre are abstract so “one theorist’s *genre* may be another’s *sub-genre*” and what one sees as a mode “may be treated as a *genre* by another” (1). According to Jill Marie Bradbury, “genre itself was a critical problem during the late seventeenth and eighteenth century, when there was no consistent principle for distinguishing among forms of prose literature” (29).

and instead focuses on the writer's purpose, while also signifying "a broader specification of tone" (Frow 65). In that regard, a mode modifies a genre, and the term "mode" signifies certain themes or ways of speaking, but mode does not require specific formal structures. In other words, modes are completely detached from having to adhere to certain types of arrangements that are expected in genre (65). For example, if I refer to Margaret Cavendish's *The Blazing World* as a speculative prose narrative, I mean that *The Blazing World* by kind is a prose narrative, but by mode it is speculative. The "speculative mode," therefore, signifies a certain tone and/or a certain theme that Cavendish includes and does not refer to generic or formal elements. Furthermore, mode does not imply sustained focus, in that a mode may be found in some or all of the work (Frow 107). That is why a work such as *Gulliver's Travels* can participate in the speculative mode even though only a small portion of it (several chapters in Book III) focuses on natural philosophy. Additionally, modes traverse genre, in that a certain type of mode can be found in a novel, a play, or a poem. The variable nature of the "speculative mode," in particular, does not confine itself to specific forms, especially in the seventeenth and eighteenth centuries. Modes, like genre, can also transcend literary periods; however, modes can change or become outdated "when the values they enshrine, or the emotions they evoke, grow alien" (Frow 111). In the case of the speculative mode, as science and technology continue to advance into the present age, this particular mode becomes more and more relevant.

Based on the distinctions above, the word "mode" indicates a common focus on natural philosophy, and it draws attention to the writer's purpose and tone – in the cases I

explore, a critical purpose and often a ridiculing or disparaging tone. In defining the speculative mode, I also include its treatment of certain themes. Its variable forms arise in part from the speculative mode's concern with emerging or imagined, thus changing, epistemologies. In exploring the speculative mode in the chapters that follow, it is important that I clarify that such writing is not merely *about* natural philosophy, meaning that subject matter is not the only criterion that must be met in order to classify a work as speculative. The purpose and tone are just as important as the subject matter since the purpose of investigating natural philosophy is to consider the ways in which natural philosophy could affect society. In that way, the speculative mode is often attempting to forecast or predict consequences of emerging epistemologies. In terms of tone, the speculative mode focuses on natural philosophy and its technologies so as to provide a social, political, and/or cultural critique. The ever-fluctuating mode, therefore, seems suited to address the substantial cultural questions and anxieties that accompany such technological advancements. Thus, the speculative mode speaks to themes of cultural change, managing and dealing with particular anxieties about technological advancement. As such, the speculative mode is a type of writing that critically considers the place of natural philosophy in society in order to ask "what if?" questions. These "what if?" questions are often tied to certain apprehensions associated with new technologies and epistemologies. Such questions frequently tackle themes such as skepticism regarding the advancements of natural philosophy, fears and uncertainties about natural philosophy and its practitioners, and natural philosophy's potential to harm society. Speculative writing may also focus on the fantastical, while simultaneously staying true to the plausibility of

a scientific age, “thereby providing an artistically satisfying vehicle for rational speculation” (Alkon *Science* 3).

Without the category of the speculative, we might disregard the very real ways that this category exposes the relation of speculative philosophy to experimental philosophy; this connection to the speculative was often either overlooked or denigrated by the Royal Society. Additionally, the speculative mode emphasizes a more integrated vision of knowledge formation at that time, a vision that is now divided by the categories of art and science. Mark Greenberg contends that the Restoration and eighteenth century emerge as “the pivotal period for what deepens into an ongoing antipathy between the two socially constructed institutions” of literature and science (116). Greenberg goes on to argue that works written during this period give us insight into the “fierce struggle between science, or natural philosophy, and literature as competing [...] social institutions” (116-17). What Greenberg fails to acknowledge, however, is that science and natural philosophy were not the same categories in the seventeenth and eighteenth century, and the meaning of literature at the time was broader because it could include natural philosophy as its subject matter. Although the speculative mode does highlight the beginning of a struggle between speculative and experimental knowledge, the speculative mode also gives us access to the ways in which natural philosophy stimulated writers to consider the consequences, both positive and negative, that natural philosophy might have for society. Literary writers found in natural philosophy “not only a rich source of inspiration but a whole range of new strategies of writing and techniques with which they could develop their own way of thinking about fiction or story telling” (Ait-

Touati 6). By investigating the speculative mode, we can examine the various ways in which natural philosophy and literature “joined in a larger project [...] of defining ‘truth’ in terms of verisimilitude of probability” (Bender 252). In other words, speculative literature participated in natural philosophy by questioning how realistic and how probable empirical truths could be. In the Restoration and early eighteenth century, the speculative mode brings conjecture and hypothesis in its response to natural philosophy to transform the reader’s understanding of what might be known and seen. The speculative mode also humanizes experimental philosophy because it removes it from the laboratory, reminding us that natural philosophers are royal subjects and family members. Speculative writing envisions how natural philosophy operates within society and custom, so as to “spatially represent and enhance” new discoveries (Greenberg 117). Put differently, speculative writers frame natural philosophy in a new way, sharing in the new knowledge while also making it their own.

In addition to speculative writers participating in natural philosophy through their conjecture, I argue that the speculative mode was also contributing to the development of natural philosophy. Andrew Cunningham notes that when scholars try to construct a history of science, they construct that origin narrative by pointing to practitioners such as Copernicus, Kepler, and Newton. This kind of narrative leads to agreement among scholars as to “what does and what does not ‘count as’ past science and who does and who does not qualify as a past scientist” (365-66). Such consensus about the origins of science often excludes speculative thinking and writing, never considering that perhaps the kinds of observations and speculations found within imaginative writing might also

classify as “scientific.” The main feature common to the speculative mode is that it intends to be fictive rather than factual, perhaps one of the reasons for why it is often overlooked as part of the discourse surrounding natural philosophy. Broadening our conceptions of the history of science means that we must look to the ways in which people of the time understood and described their own activities, and those descriptions should trump our own assumptions of what we think it meant to practice science (Cunningham 278). The framework I will employ allows us to investigate seventeenth- and eighteenth-century works that have received little scholarly attention, looking first at the “scientific” society written about in speculative prose, as a means through which to explore the implications of a culture led by “scientists,” and then at the fictive individual practitioner in drama as representative of disorder and chaos within the domestic space.

The Royal Society did not publicly acknowledge the importance of the speculative to knowledge formation, and in fact, sought to denigrate the speculative as a valid path to truth. The speculative, as represented in the Society’s rhetoric, was inferior because it placed value not on the senses and what can be observed, but on conjecture and theory. As experimental philosophy positioned itself as superior to speculative philosophy, writers in the speculative mode exemplify the fact that “the extraordinary and the unreal are not necessarily a retreat from the world around us. Rather they are vehicles to express [relevant] fears and possible solutions” (Conrad-O’Brian 28). Writers of the Restoration and eighteenth century who were composing in the speculative mode encouraged readers to reconsider the world around them in light of emerging epistemological and technological shifts. Accordingly, exploring the speculative mode

allows us to trace how we came to be where we are in “our attitudes toward science” (Conrad-O’Brian 28-9).

In exploring the speculative mode, it is essential to first establish the many ways in which terms associated with natural philosophy were understood, both by non-practitioners and by the Society, itself. As such, the organization of my project reflects the need to establish a sense of the differences between experimental and speculative philosophy – differences I establish in the next two chapters. What follows these delineations are chapters that explore how speculative writing enters into this discourse, which I undertake by first looking at literature that responds to the society as an institutional unit and then by investigating representations of its individual practitioners.

As I have indicated, the speculative is a cultural response to natural philosophy, so understanding how some of the ways that public may have understand natural philosophy proves useful to analyzing the varied responses represented in speculative writing. Because much of the public would not have had expertise in natural philosophy, dictionaries became a valuable tool through which to communicate terminology related to natural philosophy. In chapter two, I investigate the role of dictionaries printed at the end of the seventeenth century and the beginning of the eighteenth century in order to demonstrate how knowledge about natural philosophy was disseminated into the culture at large. Definitions of words such as “natural philosophy,” “speculation,” and “imagination” illustrate how frequently they were conflated with one another, exposing the complex and contradictory ways that natural philosophy was understood. These dictionaries illuminate a divide between speculative philosophy and experimental

philosophy – a divide that nevertheless could define the category of natural philosophy. Speculative philosophy, as defined at the time, focuses on contemplation of the natural world and/or the divine by methods that rely both on observation and theory. Experimental philosophy, on the other hand, attempted to abandon any truth that was not derived from observation and experiment; however, speculative questioning and speculative philosophy continued to coexist even as experimental philosophy was rhetorically positioned as superior. Not only did these dictionaries ascribe speculation to natural philosophy, but as I will demonstrate, Fellows within the Royal Society continued to rely on speculation as part of their method. Uncovering what the general reader's conceptions of natural philosophy might have been allows me to demonstrate the Janus-faced nature of the emerging "new science": the dictionaries will reveal that newer philosophical methods were still immersed in older methodologies. Because these dictionaries assisted readers with comprehending complex ideas about natural philosophy, acknowledging the ways in which dictionaries combined older and newer methods provides us with a more nuanced understanding of the rate at which these ideas were disseminated into the larger culture.

In addition to the dictionaries explored in the second chapter, which contributed to the understanding and popularization of natural philosophy, Sprat's *The History of the Royal Society* became another way for the reading public to engage with emerging epistemologies. Chapter three focuses specifically on the formation of the Royal Society in 1660 and its incorporation in 1662 because of the public nature of this corporate approach to natural philosophy. As their rhetoric demonstrates, the Society legitimized its

methods, at least partly, by advocating for approaches that could be practiced as part of a community and public demonstrations of experiments were a crucial component of this cooperative approach.

The Royal Society, I argue, was extremely concerned with its public image, prompting the Society to commission its written history a mere seven years after its formation. The Royal Society as an institution came to stand for the new experimental philosophy, exemplified by Thomas Sprat's *History* and Abraham Cowley's opening ode to the Society. Analyzing Sprat's and Cowley's rhetoric showcases how the Society separated itself from speculative philosophy. In exploring these two works of propaganda, it becomes clear that the Royal Society desired a strong public statement in favor of their own methods and in opposition to speculative methods. In denigrating speculative methods of philosophy, the Society was able to promote what it saw as a more valid avenue to truth – philosophy grounded in observation and experimentation; however, its call to demote and dismantle speculative thinking draws more attention not only to how much the Society relies on it themselves, but also to how vital speculative thinking is to the public's understanding of natural philosophy. Sprat's *History* and Cowley's ode, therefore, become an additional vantage point through which we can ascertain how the public may have conceived of natural philosophy, important groundwork to understanding why speculative writers were so critical of these developments.

After laying the foundation for what messages the general public received about natural philosophy through sources such as dictionaries and Sprat's *History*, I analyze

examples of speculative writing that react to the Society's rhetoric. One of the Society's main messages centered on the Society as a healing institution of moderate men who come together in multitude so as to rectify defaults in one another. Chapter four opens with Francis Bacon's speculative society of philosophers in *New Atlantis* (1627) so that I can draw comparisons between the envisioned society and the actualized one. *New Atlantis* also sets the stage for an exploration of Margaret Cavendish's *Blazing World* (1666). Cavendish's speculative society seems to be a direct attack upon the Royal Society's vision and clearly warns the reader about a civilization that grounds all its truth on experimental philosophy. Cavendish's speculative narrative argues for an epistemology that embraces both the speculative and the experimental, since knowing anything for certain is impossible. Her prose narrative, therefore, represents combined methods as necessary to creating the most comprehensive truth.

Despite Sprat's insistence on a fair and objective approach, based only on observation and experimentation, natural philosophers often became objects of ridicule, and their antics became cautionary tales in speculative writing about the Royal Society and its practitioners. In chapter four, I explore how the speculations about societies run by natural philosophers revealed the dangers of disorder to society, at large. In chapter five, I shift the focus from the general to the specific, looking at the individuals who contribute to the society. The individual practitioner is considered in both poetry and prose, but the main focus is on speculative Restoration theatre because of its ability to highlight the individual as a character to be viewed and judged in a public forum.

Even though experiments were performed within the Royal Society, Fellows were practicing individually in their own homes, as well. When exploring the speculative mode that focuses on the individual philosopher, natural philosophy becomes much more localized. We are reminded that the collective cannot happen without the individual, but this reminder also serves as a source of anxiety if the collective is composed of disordered individuals. When readers and spectators are also reminded that these disordered individuals are husbands and fathers, then the speculative anxieties over natural philosophy become more personal. I explore how Thomas Shadwell's *The Virtuoso* (1676) and Aphra Behn's *The Emperor of the Moon* (1687) participate in a kind of questioning regarding the role that natural philosophers might have in the home. This questioning reveals apprehensions toward the natural philosopher as connected to larger concerns regarding national identity. The speculative writing in this chapter also explores the dangers of the immoderate natural philosopher's compromised masculinity and his disordered household, which underscores lingering anxiety about the stability of the nation due to political unrest.

Chapter six closes this study by looking forward, linking the beginnings of the speculative mode in the Restoration period to a popular eighteenth-century text – *Gulliver's Travels* (1726). Jonathan Swift's Book III is often cited by science fiction scholars as representative of the beginnings of the science fiction genre. In exploring the varied responses to Jonathan Swift's Book III, I ponder why speculative texts are often misunderstood as lacking cohesion or as absent of serious themes, and I draw some conclusions regarding why speculative writing has received little scholarly attention. I

end with a call to understand the cultural moment better by joining together works of science and art as both valid and necessary avenues toward knowledge. Although we live in a world where the line between science and art is clearly drawn, and although we understand that division well, it is harder for us to make sense of texts that combine science with art. Speculative writing enters into that in-between space and serves as a bridge between literature and science. It is within the in-between, I argue, where we realize how similar both pursuits are and where we can understand how both pursuits are necessary and equally vital components of knowledge formation.

CHAPTER II

“INTERPRETING ALL SUCH HARD WORDS”: DICTIONARY DEFINITIONS AS INSTRUCTION AND POPULARIZATION OF NATURAL PHILOSOPHY FOR GENERAL READERS

Scholars who study the history of science, whether they are historians, rhetoricians, or literary scholars, are often faced with the problem of terminology regarding science and natural philosophy. During the seventeenth and eighteenth century, for instance, the term “science” was understood differently from the way the term is currently used.¹ Just prior to the Restoration, John Rider’s 1640 dictionary defined science as “art and knowledge.” Henry Cockerham’s 1651 definition was a bit simpler in that he defined science merely as “knowledge.” In addition to knowledge, Thomas Blount’s dictionary, which was published in 1661 right before the incorporation of the Royal Society, broadens the meaning of the word “science.” Marking it as more than a type of knowledge, Blount delineates the term as also meaning “cunning, skill,” and “learning.”² Clearly, our modern understanding of the word “science” does not correlate with meanings of the time in that we understand science to mean more than just

¹ Gaukroger notes that our modern understandings of the word “science” and “scientist” are derived from the nineteenth century. These modern understandings are very different from the Latin term *scientia*, which “denotes a form of wisdom that derives from the systematic organization of material, at least in the Aristotelian tradition” (2).

² So as to not belabor the point, there are several other dictionaries that define the term science in similar ways. See dictionaries published by J.B. in 1680, John Kersey (1702 and 1715), Edward Phillips (1706), and Edward Cocker (1724).

knowledge or skill. However, scholars who study the history of science often do not adequately differentiate between modern denotations of the term and its original context. It is problematic to use these terms interchangeably because doing so ignores the context of what these words signify. Even with the term “natural philosophy,” there is extraordinary disagreement about what that category means, so it seems bizarre and inaccurate to interchange “science” and “natural philosophy.” Aside from including elements that would not be accepted as part of modern notions of science (such as magic), the complex definitions of natural philosophy discussed below illuminate how important the category is because it means so many things.

Investigating the usage of these terms sheds light on the eventual disciplinary boundaries established in the wake of the categorical work being done at the time in attempting to differentiate the value of meaning derived from “science” versus meaning derived through more speculative inquiries (which eventually get associated with the imagination and art). Today, of course, university systems contain separate departments for the study of humanities and sciences. Culturally, we are in a time where science marks off a separation for defining and organizing knowledge. These distinctions become clearer when we look to the *Oxford English Dictionary* and notice the differentiation that happens over time. The *OED* marks certain definitions of “science” as archaic, rare, and obsolete – namely those that focus on science as a broad kind of knowledge, skill, or type of study.³ These definitions delineate science as mastering *any* branch of learning. Most of these definitions range from the twelfth century through the beginnings of the

³ “science,” *OED*.

eighteenth century. Starting with entries dated from the late eighteenth century to present day, the *OED* designates science as rooted in “trustworthy methods” such as the “scientific method.” Within the many and evolving definitions of science, the *OED* distinguishes the difference between early and later usage, showing a clear separation from other types of learning when it defines science as “scientific disciplines distinguished from other departments of learning.” In light of these and other definitions I investigate later in this chapter, there is a preponderance of evidence that “science” is not the term typically used to describe activities associated with natural philosophy, unless referring to natural philosophy as just one type of knowledge among many.

Perusing recent publications about seventeenth and eighteenth century natural philosophy (both historical and literary) yields title upon title that employs the word “science,” and often within the body of the argument, there is no mention of why the word “science” or “new science” is the chosen term or why “science” is standing in for the terms associated with what we might call “pre-science.” In fact, in 1980 Simon Schaffer drew attention to terminological issues when he argued that there is a “problem of definition” when it comes to understanding how to define natural philosophy (71). Eight years later, Andrew Cunningham also took issue with the way scholars at the time were often interchanging the word “science” with other terms such as “natural philosophy.” Cunningham maintains that it is important for scholars to discuss “science” in the same way that most people at the time would have understood the term and the activities associated with it. What scholars often describe as “scientific” would have either been called philosophy or natural philosophy in the late seventeenth and early

eighteenth centuries. “More particularly,” Cunningham notes, natural philosophers of the time “might have described their enterprise as ‘anatomy’, ‘chemistry’, or whatever – as a branch or sub-discipline of Philosophy or ‘Natural Philosophy.’ This is what they called it” (379). Cunningham poses the following question: might people in the past also have described their engagement with natural philosophy as being “science?” He definitively answers that question in the negative, arguing that no one, until at least 1750 and maybe as late as 1800 would have used the terms “science” and “natural philosophy” synonymously (380).⁴ It is problematic, therefore, to discuss natural philosophy as “simply renamed as Science: as if the two terms are simply alternatives for an earlier and later practice of the same activity.” Despite the differences in meaning between “science” and “natural philosophy,” scholars, according to Cunningham “have tended to slip happily back and forth between the two terms” (381). I include both Schaffer’s and Cunningham’s decades-old arguments to establish the long history of defining “natural philosophy” and the issues that arise when we replace terms of the past with our own.⁵

Schaffer and Cunningham draw attention to a history of terminological difficulty, which has continued into recent scholarship. A decade after Cunningham’s admonishment of scholars who use the terms interchangeably, James R. Jacob defines natural philosophy as what we now call “science” (xiv). In 2000, Roy Porter employs the

⁴ Cunningham remarks that in the seventeenth and eighteenth centuries, they had the word “scientia,” but it referred to speculative subdisciplines of Philosophy or Natural Philosophy [...] it did not refer to the same set or ‘family’ of disciplines and activities that our modern word ‘science’ does. Indeed, into the late eighteenth century and beyond, all sorts of studies that we would exclude from science were described quite validly as ‘sciences’; such were logic, grammar, theology and ethics” (380).

⁵ Because scholars so often refer to natural philosophy as “science” or as “scientific,” it is nearly impossible to exclude these terms from my own work. However, when I use such terms, it is always in relation to another scholar’s use of that word, and I indicate that by placing those words in quotation marks.

term “new science” as interchangeable with “natural philosophy,” going so far as to argue that what we call “new science” was previously known as natural philosophy (131). In his endnotes to this description, he defines natural philosophy as “the contemporary term for what would later be modified into ‘science’” (524). Evidently, despite calls to discuss natural philosophy in the terminology of the day, scholars still prefer discussing natural philosophy as a type of “science,” a fact Peter R. Anstey and John A. Schuster both highlight again in 2005 in *The Science of Nature in the Seventeenth Century*. They detail the ways that scholars often use the term “natural philosophy” as tantamount to “science,” and they make it clear that doing so poses problems (2). Despite multiple scholarly attempts to encourage correct terminological usage, scholars consistently rely on the word “science” to discuss natural philosophy. In 2007 Edward Grant attempted to provide justification for such a practice in his book that recounts the history of natural philosophy. He discusses how natural philosophy, prior to the seventeenth century, was once an independent practice, something that was “isolated from mathematics” and other “exact sciences.” However, in Grant’s view, natural philosophy during this time became highly mathematical, and this resulted in natural philosophy becoming “synonymous with the term science, which came into use in the nineteenth century” (xii). Grant seems to take no issue with anachronistically assigning a nineteenth-century term to the seventeenth century, despite the fact that practitioners of natural philosophy would not have used that term to describe their activities. As recently as 2012 Gregory Lynall posits that “in the eighteenth century ‘science’ was often used to refer to ‘philosophy,’ including natural philosophy” (4).

In examining literary and history scholars who study “science,” one of three trends emerge when considering the terminology they use. Some of them, as discussed above, disregard the differences in meaning between “science” and “natural philosophy.” Others acknowledge what natural philosophy was and then briefly define it, but then they replace the term with either “science” or “new science,” often without any justification or explanation for why they are doing so. Finally, some scholars do not acknowledge a difference at all and find no qualms with replacing “natural philosophy” with “science.” These scholars do not establish the fact that “science” meant something completely different from what it means today. It remains unclear as to why many scholars have chosen not to represent the terminology of the day or why they often, without reason, choose one term over another. Perhaps certain assumptions exist among scholars that other scholars working in the history of science will implicitly know and, therefore, understand the differences between science and natural philosophy. Nevertheless, that assumption in itself is problematic, for so many scholars define natural philosophy in divergent ways, often in ways that depart from understandings of the term during the Restoration and early eighteenth century. Perhaps other scholars do not distinguish between the terms because the words are confused even in the period, but I see this confusion as indicative of the slow nature of the shift between old and new epistemologies. This confusion also highlights how dependent experimental philosophy was on older, speculative methodologies. The only way we can be as precise as possible about these early conceptions is to use the term “natural philosophy” instead of “science.”

This chapter attempts to examine the roots of terminology associated with natural philosophy by exploring what these terms might have meant for a general reader of the time. In this chapter I focus on dictionaries printed from 1640 to 1755, highlighting these references as one of the ways that difficult concepts were communicated to non-practitioners.⁶ The dictionary definitions are important because they capture a more nuanced understanding of how the philosophical revolution occurred, showcasing that the revolution was not linear. The dictionaries also shed light on how the public did not have a clear or consistent idea of what natural philosophy was since it was often still immersed in older methodologies. The explanations found in these dictionaries do not define natural philosophy as “science,” and many of them do not even refer to natural philosophy as such, instead favoring the term “physics.” While modern scholars refer to practitioners as “natural philosophers,” the term that dictionaries often use is “naturalists.” Moreover, the word “empiricism” is absent from these dictionaries altogether, yet it is a term frequently employed in scholarship today when referring to the rise of “science.”⁷ Understanding the way dictionaries of the day grappled with such terms showcases how the philosophical revolution occurred slowly and did not result in immediate shifts or agreed upon ideas, although many of the aforementioned scholars use terminology that would lead us to believe it was. These dictionary definitions also shed light on the “speculative,”

⁶ The dictionaries I will investigate are the ones available on *Early English Books Online* and *Eighteenth Century Collections Online*, admittedly, only a sampling of what would have been available to a reader at the time.

⁷ Because of a long and established history in scholarship on this topic, avoiding the term “science” will be nearly impossible in this and following chapters, despite my rejection of the term. Even when scholars themselves consider the term anachronistic, they often rely on it throughout their work. Although I prefer the term “experimental philosophy” because it adequately describes how the Royal Society envisioned their own work, as we will see in the next chapter, I also frequently rely on the term “natural philosophy” in this chapter to represent this phase of “pre-science.”

sometimes marking the beginnings of a tendency to place speculative philosophy in opposition to experimental philosophy. The Royal Society sees experimental philosophy as their term, and the dictionary definitions capture the difference between the speculative and the experimental. When the term “speculative” is viewed in tandem with the definitions of “fancy” and the “imagination,” an important link is exposed between the speculative and the imaginative, as speculative philosophy relies on deductive reasoning, supposition, and conjecture, none of which are observable through the senses.

Defining Natural Philosophy

Before turning to historical definitions, I discuss how recent scholars have characterized natural philosophy in order to establish the differences between the way natural philosophy is represented in scholarship and the way it may have been understood within culture at the time. R.S. Woolhouse’s work on empiricism defines natural philosophy as a “body of knowledge based firmly on the experienced facts of experiment and observation” rather than on logic and categories (67). It is important to keep in mind Woolhouse’s reliance on experiment and observation as key aspects of natural philosophy, especially when later contrasting this idea with seventeenth- and eighteenth-century notions. Steven Shapin designates natural philosophy as inquiries into nature and its “causal structure” (5-6). Similarly, Peter Dear marks it as the main discipline that concerned itself with the knowledge of nature. He extends this definition by asserting natural philosophy’s prominence among medicinal and mathematical sciences since its chief objective was to offer a “philosophical explanation of all aspects of the natural

world, from plants to planets” (3).⁸ Likewise, Anstey and Schuster expand the definition of natural philosophy to provide ideas of what types of inquiry natural philosophy maintained. They refer to natural philosophy as the “Science of Nature” but designate it more specifically as concerned with “the cosmological structuring and functioning of matter and the proper method for acquiring or justifying knowledge of nature” (1).

Lynette Hunter and Sarah Hutton also make natural philosophy a term that encompasses various disciplines: astronomy, chemistry, physics, and biology (2). Likewise, Stephen Gaukroger designates natural philosophy as an umbrella term, noting that it is a practice that includes the aforementioned physics, chemistry, and biology; however, he adds alchemy and physiology to the mix and excludes disciplines that we might label as “science” – those of medicine and mathematics (1). Consequently, these scholars assign various meanings to natural philosophy, some including or excluding a wide range of practices from medicine to botany and from astronomy to the scientific method; again, these divergent conceptions of natural philosophy among recent scholars are important to consider when attempting to differentiate between scholarly and contemporary designations. John Gascoigne’s definition makes the issue of terminology even more problematic. Admittedly, his essay, published as part of *The Cambridge History of Eighteenth-Century Philosophy*, is meant to represent natural philosophy in broad strokes; however, the multiplicities of foci that Gascoigne ascribes to the study of natural philosophy shed light on how difficult it can be to pinpoint an exact definition of natural

⁸ Many of the early modern definitions define philosophers generally as someone who studies wisdom or has a love of wisdom (see J.B., Blount, Phillips, Rider, Bailey, *Glossographia*, and Kersey). Several of them divide philosophy into different types of knowledge, one of which is knowledge about the natural world (see Blount, Phillips, Bailey, Chambers, *Glossographia*, and Kersey).

philosophy. He argues that by the end of the seventeenth century, natural philosophy became a separate discipline that departed from “qualitative” and “speculative” methods (854-55).⁹ Some of the main developments that transformed natural philosophy were its emphasis on the empirical and the experimental (855). At the same time it was transformed, it was also still very much reliant on its “long scholastic heritage” of searching for the causes of “natural phenomena” and the causes of motion. Furthermore, “early eighteenth-century definitions of natural philosophy [...] still reflected the traditional view that the task of natural philosophy was to arrive at an understanding of the basic causes of change” (856).

From whence do the aforementioned scholars arrive at their definitions and why are they so different? Often the scholar does not provide this answer. Although not every scholar provides the sources that inform these definitions, their variety can be partially explained by the many inconsistent definitions of natural philosophy in earlier texts; however, some of these modern definitions also impose modern notions of science on natural philosophy. Perhaps some scholars reflect their own research interests in the definition they choose. As Cunningham notes, some scholars seem to refer to the actual activities associated with science; other scholars are concerned with what we might call scientific research.¹⁰ Some studies are more focused on epistemological shifts, while others attempt to analyze reactions to those shifts. Still other studies use “science” or “natural philosophy” to focus on more than one of the above concerns. Despite the

⁹ Gascoigne notes that these separate disciplines were no longer united under a “common philosophical endeavor” (855). The separate disciplines that eventually emerged were disciplines such as biology, natural history, chemistry, astronomy, physics, and mathematics.

¹⁰ Cunningham draws a distinction between those scholars who research the activities that go into “making science,” while other scholars focus more on the production of research.

slipperiness of these terms, “we rarely specify which meaning we intend at a given time, relying on our readers or listeners to recognize which one we mean” (Cunningham “The Identity” 260).

The multiple designations of what natural philosophy can mean should prompt scholars to consider which historical texts they should rely on for an understanding of the category and why those texts best serve their research questions. In studying speculative writing as a type of response to natural philosophy, it is important to consider a general reader’s perception about what natural philosophy was, since a general reader might not have access to or understand the ways in which various natural philosophers conceived of their own work.¹¹ Looking to what general readers understood helps us to better appreciate the interactions between the public and new epistemologies while also highlighting how each influenced the other. As David Layton asserts, “the mathematical expression of scientific theories, the development of concepts remote from common sense, the growth of a technical vocabulary, and the increasingly vast range of scientific knowledge all tended to remove science from within the grasp of a member of the general reading public” (221).¹² One such way that the public could attempt to grasp the new philosophical movements was to refer to a dictionary. “Scientific” progress did result in communication problems, which “influenced the need for, and development of, general dictionaries” (226). Additionally, as “scientific discourse” began to develop and

¹¹ When I refer to “imaginative, literary accounts,” I am using that phrase to designate works that scholars today would refer to as “literature,” understanding that these works would not have been classified as such during the time. See notes in the introduction regarding my use of “imagination,” as well as dictionary definitions in this chapter regarding the distinctions between “fancy” and the “imagination.”

¹² Layton discusses the role of dictionaries in defining “science” from the mid-seventeenth century through the end eighteenth century.

philosophers sought to write about “scientific” matters, this often “required glossaries or interposed explanations of technical or 'philosophic' words” (222). According to Layton, dictionaries that included philosophical definitions served two purposes for the reading public. First, for those who did not have access to a university education, dictionaries played a vital part in disseminating “scientific” knowledge (234). Moreover, and more importantly to my argument, because these dictionaries attempted to interpret and explain difficult philosophical concepts and words, they directly and importantly contributed to “the popularization of scientific knowledge” (222). Carey McIntosh speaks to the pedagogical aims of dictionaries and encyclopedias of the day, noting that the audience for both is a popular one and that the goal of the genre is to instruct or inform (8).¹³

We should not disregard the significant information that dictionaries and encyclopedias can provide when considering the public’s understanding of natural philosophy since the point of these dictionaries was to instruct general readers regarding unfamiliar terminology. Although we cannot assume that dictionaries contained “correct” information or that they represented the practitioners’ understanding, they provide valuable insight into how “scientific” ideas were disseminated by the compilers of these works. Both dictionaries and encyclopedias “aim to supply a comparatively unknowing readership with as much advanced and scholarly information as it is looking for” (McIntosh 8). McIntosh establishes that these dictionaries would not offer a reader a specialist’s or practitioner’s view of natural philosophy, but that kind of specialized knowledge would also not be what many readers would be looking for. Of course, many

¹³ McIntosh notes that encyclopedias are now viewed as a different genre, but that in the Renaissance and eighteenth century, there were no clear distinctions between the two.

of the lexicographers that I will discuss were not natural philosophers themselves, although their dictionaries define words in the lexical field of natural philosophy. Furthermore, dictionaries were often works of compilation, and it was not always typical for them to compile from primary sources (Layton 226). Edward Phillips, whose dictionary appeared shortly after the turn of the century, was not an “expert” on the philosophical movements; therefore, his definitions provide an interesting mixture of “old learning” with a little bit of the new (Layton 223). Despite Layton’s attention to Phillips’s inconsistencies, it was not uncommon to find lexicographers contradicting statements in different parts of the same dictionary. With the publication of John Harris’s *Lexicon Technicum: or, an Universal Dictionary of Arts and Sciences*, the first general scientific dictionary was realized (Layton 226). Harris’s *Lexicon* is viewed by Layton as an “up to date and a sound compilation of contemporary scientific knowledge” (227). With John Kersey’s 1706 dictionary *Dictionarium Anglo-Britannicum*, which was a revision of Phillips’s, the number of definitions concerning natural philosophy increased and some of Phillips’s definitions were corrected, but Kersey was able to draw from Harris’s *Lexicon* (Layton 223). In the following year *Glossographia Anglicana Nova* was printed, and “it was characterized by a special interest in science.” It also “was an advance on previous works including scientific terms, in that it made an attempt to familiarize contemporary scientific knowledge in a cheap and handy form” (Layton 224). Likewise, lexicographers such as Chambers and Bailey included “scientific” content within their text, with Chambers’s *Cyclopaedia* attempting to meet “the difficulties raised by the vocabulary of science,” and “the increasingly vast range of scientific knowledge” (Layton 228).

As discussed above, the term that is often used by scholars to discuss “science” in the Restoration and eighteenth century is “natural philosophy,” a term that also appears in contemporary dictionaries. Most of these dictionaries, however, do not define the term as explicitly or assuredly as scholars use the term today and, instead, often conflate natural philosophy with physics. In *Riders Dictionarie* (1640), for instance, the term “natural philosophy” was not included; however, listed under the word “Nature” was “Physica,” which signified “a searching out of natural things, or reasoning of the nature of anything.” I include this definition because of the tendency in these dictionaries to connect natural philosophy with variants of the word “physica.” J.B.’s 1641 printing of *An English Expositour* appears to be one of the first to mention and attempt to define natural philosophy, not as a stand-alone term but also as part of the larger term “philosophy.”¹⁴ In general, philosophy is described as the “study of Wisdom, a deep Knowledge in the nature of things,” and J.B. delineates natural philosophy as “teaching the nature of all things, and containing, besides Arithmetick, Musick, Geometry, and Astronomy.” Although J.B.’s dictionary does define natural philosophy, there are others prior to his that only define the term based on who practices it. Again, Rider’s dictionary remains the outlier in light of his chosen terminology in that he marks the practitioner of the study of natural things as a “physiologia” or “he that searcheth out natural things, or disputeth of natural causes.” After J.B., dictionaries printed in 1658 and later define the

¹⁴ J.B. is noted in this edition as a “doctor of physic.” In the 1707 edition, available on *Early English Books Online*, he is identified as John Bullokar. J.B.’s first edition of *An English expositor* was printed in 1616, but the word “philosophy” does not appear in that printing. His definition of “physica” remained at least until the 1775 printing, as viewed on *Eighteenth Century Collections Online*. When I say this is a “first,” I acknowledge the limitations of my research, in that I am limited to dictionaries available only on *EBBO* and *ECCO*.

work of natural philosophy as that performed by “naturalists,” not necessarily “natural philosophers” as scholars often prefer. Edward Phillips’s *The New World of Words* (1658) lists a naturalist as “one that understandeth natural causes.” Blount’s 1661 *Glossographia* includes that a naturalist is “one skilled in the Reason, the causes of natural things,” and J.B.’s *English Expositour* (1680) and Kersey’s *A New English Dictionary* (1702) defines the naturalist as simply “a natural philosopher” and “one skilled in natural Philosophy,” respectively.¹⁵ Taken together, one can already see that when attempting to define the practice of natural philosophy, the notions of what it exactly is in the latter half of the seventeenth century are not homogeneous. Nevertheless, it is clearly tied to practice that investigates the natural world and its causes. We can conclude from these definitions (and/or omissions) how difficult this concept might have been to define in the early and developing days of natural philosophy. Indeed, some dictionaries do not even attempt to define what natural philosophy is and instead resort only to pointing out that naturalists perform natural philosophy.

As established previously, I included Rider’s definitions, which intertwine the terms “nature” with terms like “*physica*” because these terms are often interchangeable in the first part of the eighteenth century. Peter Dear is one of the few scholars to clarify the connection between physics in the seventeenth and eighteenth century and its relationship to natural philosophy. Natural philosophy, he explains, was originally tied to Aristotle’s

¹⁵ This trend of identifying one who performs natural philosophy as a Naturalist continues for decades, despite Shapin’s assertion that relevant practitioners of natural philosophy should be designated as natural philosophers (6). Naturalists are described in the following ways – Phillips (1706) and Kersey (1715): “one who understands natural Causes, or is skill’d in Natural Philosophy”; Blount (1707), Bailey (1730), and Defoe (1735): “one skill’d in Natural Philosophy”; Coles (1713): “a natural Philosopher, skilled in the causes of natural things”; Cocker (1724): “one who studies the Causes of Natural Things”; Johnson (1755): “A student in pysicks, or natural philosophy.”

writings, and Aristotle had used the Greek word *physis* when speaking about the natural world. “Consequently, the medieval Latin word *physica* or ‘physics,’ was routinely used as a synonym for ‘natural philosophy’” (3). Dear also provides his readers with a glossary of terms, in which he defines natural philosophy as a practice also known as physics and physics as a “practical synonym” for natural philosophy (195). Scholars, however, infrequently employ the term “physics” and almost exclusively (if they do not use the word “science”) speak of this era’s “scientific” practice as natural philosophy. Gaukroger explains one possible justification for not using the term physics: because its meaning signifies something so different from what physics today means, he prefers to use the term “natural philosophy” (1).

Regardless of the reasons for why one term might be more appropriate for scholars today, it is important to remember the deep connection that contemporary dictionary writers and readers made between Aristotelian physics and the developing practice of natural philosophy, for it reminds us that change is never instantaneous. In this case, the study and understanding of nature seems tied, at least in popular conceptions, to earlier understandings of nature and what is studied in the natural world. Such earlier understandings involve speculative practices (sometimes designated as contemplation), which I define and discuss later in this chapter. Other earlier understandings can be found in definitions that align natural philosophy with causes since looking for causes came from Aristotelian ideas that sought to understand the “why” behind how nature operates. Such a process of accretion is not surprising, but it is easy for modern readers to forget about this layering or integration of new with previous systems. In order to better capture

the consistent similarities across lexicographers and times, I have organized this material in Table 1, which appears below, to visually represent natural philosophy’s connection to physics.¹⁶ Some dictionaries do not even list a separate definition for natural philosophy but instruct their readers to see the entry for physics. Others who do define natural philosophy offer explicit connections between the two terms, as though one thing is actually the other. It is not until Samuel Johnson’s dictionary in 1755 that readers get a clear differentiation between natural philosophy and the work of physics.

Johnson’s dictionary notes that originally “physick” had signified natural philosophy, but that the word had come to mean medicine, which is still different from today’s definition.

Table 1. Definitions of Physics and Natural Philosophy

Dictionary Name, Author, and Publication Date ¹⁷	Physics	Natural Philosophy
<i>An English Expositour</i> – J.B., 1680 ¹⁸	No entry	Teaching the nature of all things, and containing, besides Arithmetick, Musick, Geometry, and Astronomy

¹⁶ My research included exploring dictionaries published from 1640 to 1730, with the inclusion of Johnson because his dictionary is so well known and is a touchstone for dictionaries of the day. These dictionaries were found through *Early English Books Online* and *Eighteenth Century Collections Online*. The chart only includes, however, those dictionaries that defined either the term “natural philosophy” or the term “physica.” Additionally, for dictionaries that had later editions printed under the same name, I did not include those duplicates if the definitions from the first edition remained unchanged.

¹⁷ The following dictionaries do not contain entries for either physics or natural philosophy: *Glossographia, or, A Dictionary Interpreting All Such Hard Words* – Thomas Blount, 1661 and *An Alphabetical Dictionary* – John Wilkins, 1668. However, Blount’s dictionary does define a naturalist as a natural philosopher (or one who understands the causes of natural things.) Additionally, John Kersey’s *A New English Dictionary* (1702) does not define “Physics” or “Natural Philosophy.” However, in addition to describing “Natural Magick” as natural philosophy, the term “Physiology” is identified as “Natural Philosophy, treating of the nature of things, by their causes, effects, &c.”

¹⁸ J.B.’s dictionary does not contain a separate entry for “natural philosophy.” Instead, the term is defined under “Philosophy,” as one of the three types of philosophy.

Dictionary Name, Author, and Publication Date	Physics	Natural Philosophy
<i>The New World of Words</i> - Edward Phillips, 1706	Listed as “Physica” – “Physicks or Natural Philosophy; or Books treating of that Subject”	“see Physica”
<i>Glossographia Anglicana Nova</i> – 1707	Listed as “Physicks” – “is the speculative knowledge of all Natural Bodies, and of their proper Natures, Constitutions, Powers and Operations”	“(the same with Physicks) is that Science which contemplates the Powers of Nature, the Properties of Natural Bodies, and their mutual action one upon another”
<i>Lexicon Technicum</i> - John Harris, 1708	Listed as “Physicks” – “or Natural Philosophy, is the Speculative Knowledge of all Natural Bodies and of their Proper Natures, Constitutions, Powers, and Operations”	“Is the same with what is usually call’d Physicks. That Science which contemplates the Powers of Nature, the Properties of Natural Bodies, and their mutual Action one upon another.”
<i>An English Dictionary</i> - Elisha Coles, 1713	Listed as “Physicks” – “natural Philosophy”	No Entry
<i>Dictionarium Anglo-Britannicum</i> - John Kersey, 1715	Listed as “Physica” – “Physicks, or Natural Philosophy”	Listed as “Physicka or Natural Philosophy” – “a Science which shews the Nature of Things, with their various Causes, Effects, Properties, and Operations”
<i>Cocker’s English Dictionary</i> – Edward Cocker, 1724	Listed as “Physicks” – “natural philosophy”	No entry

Dictionary Name, Author, and Publication Date	Physics	Natural Philosophy
<i>Cyclopædia</i> – Ephraim Chambers, 1728	Listed as “Physicks” – “by the <i>Latins</i> call’d PHYSICA [...] by us frequently PHYSIOLOGY, or <i>Natural Philosophy</i> ; is the Doctrine of Natural Bodies, their Phenomena, Causes, and Effects; their various Affections, Motions, Operations.”	Natural Philosophy – that Science which considers the Powers of Nature, the Properties of Natural Bodies, and their mutual Action on one another; otherwise call’d Physics
<i>Dictionarium Britannicum</i> - Nathan Bailey, 1730	Listed as “Physicks” – “natural Philosophy or Physiology; is the Doctrine of natural Bodies, their <i>Phænomena</i> , Causes and Effects; their various Affections, Motions, Operations, &c. or is in general the Science of all material Beings, or whatsoever concerns the System of this visible World.”	“Is that Science which considers the Powers of Nature, the Properties of natural Bodies, and their mutual Action on one another, called also <i>Physicks</i> ”
<i>A Dictionary of the English Language</i> – Samuel Johnson, 1755 ¹⁹	“Originally signifying natural philosophy, has been transferred in many modern languages to medicine”	No entry ²⁰

¹⁹ This dictionary also lists an entry for “speculatively,” signifying it as “contemplatively; with meditation 2. Ideally theoretically; not practically.”

²⁰ The term “natural philosophy” does appear in Johnson’s dictionary as part of other definitions. For instance, his definition of “mechanick” includes, “Constructed by the laws of mechanicks.” Johnson relies on a passage from Newton in drawing this delineation, and the passage he quotes discusses the “main business of natural philosophy” as being to “argue from phenomena without feigning hypotheses.” He also mentions it in a quotation he uses to define the word “moral” as meaning, “known or admitted in the general business of life.” In this case he relies on a passage from Tillotson: “Mathematical things are capable of the strictest demonstration; conclusions in natural philosophy are capable of proof by an induction of experiments.” In defining the word “physicotheology,” Johnson says it is “divinity enforced or illustrated by natural philosophy.” Johnson also defines a “naturalist,” as a “Student in physicks, or natural philosophy.”

For readers seeking an understanding of the term “natural philosophy” in these dictionaries the definitions may not have provided them with a complex understanding. Most definitions do make it very clear that natural philosophy concerned itself with increasing knowledge about nature. Furthermore, the entries signify that knowing more about nature means understanding the causes and effects of natural occurrences, as well as the motions and operations within the natural world. Sometimes, however, what is not defined can reveal just as much as what is clearly delineated. Unlike recent scholars, who tend to define specifically which categories natural philosophy investigated, none of the aforementioned definitions classifies realms of inquiry. The lexicographers also do not specify whether natural philosophy excluded alchemy, astrology, or other occult or metaphysical practices or beliefs. In fact, several dictionaries ascribe methods that today we would not deem “scientific” to natural philosophy and its practices. Kersey’s *A New English Dictionary* (1702) and Chambers’s *Cyclopedia* (1728) equate natural philosophy with “Natural Magick.” On the one hand, “Natural magick” is defined by Kersey as “natural Philosophy, a lawful, and useful Science.”²³ On the other hand, Chambers ascribes some focus on the supernatural in his explanation of physics when he reports that “Mr. *Locke* would likewise have GOD, Angels, and Spirits, come under *Physicks*, which are more usually referr’d to *Metaphysics*.”²⁴ Chambers has been characterized by McIntosh as an “up-to-date and science-minded scholar,” but even he included in his

²³ Interestingly, the actual definition of “magic” is listed as a black art that deals with familiar spirits, and a magician is denoted as a conjurer or sorcerer.

²⁴ In his *Essay concerning Human Understanding* Locke lauded the philosophical discourse of natural philosophers. Gascoigne argues that natural philosophy’s “methods and successes were regarded as establishing goals which other branches of philosophy could emulate” (856). Chambers’s definition, which alludes to Locke’s desire to incorporate natural philosophy into metaphysics, exemplifies the tendency to integrate natural philosophy with other methods of knowledge.

definitions of “natural philosophy” “‘wondrous curiosities and supernatural cures’ in his dictionary-like *Cyclopaedia*” (4).

Both Kersey’s and Chambers’s definitions link traditional epistemologies with emerging ones, as discussed above in the connections between Aristotelian physics and natural philosophy. These traditional epistemologies, nevertheless, could include both Aristotelian methods and what many considered the occult or magic. In fact, some theories that today we know as modern “science” could fall under the category of the occult during this time. Within Kersey’s dictionary there contain what McIntosh refers to as “startling irrationalities” in which the emerging “science” is aligned with outdated modes of knowledge formation (4). When positioning natural magic as a form of natural philosophy, the concerns of natural philosophy become aligned with “occult qualities” (Grant 291). Grant contends that “Isaac Newton’s universal theory of gravitation was regarded as an occult phenomenon” (291-92); however, natural magic included practices such as astrology, which position natural magic as a type of knowledge that was concerned with more than attaining knowledge for occult causes and effects (292). Additionally, instrumentation, such as the microscope and telescope, combined with experimentation were often used together so as to explain occult causes (291). Although definitions of natural philosophy that contain occult explanations do appear in some of the dictionaries, later dictionaries distanced themselves from superstition and magic: the “general trend” was a move in dictionaries published in the latter half of the eighteenth century toward definitions that resemble more what today we would regard as

“science” (McIntosh 4).²⁵ Nevertheless, we cannot deny that these types of definitions were in circulation within the general public or that a public audience would not be under the impression that natural philosophy perhaps allowed for superstitious explanations of natural occurrences.

These dictionaries represent the thinking of the time. Such a supposition is not problematic because of the way some definitions got recycled by later editions or by author compilers. Each new dictionary “drew heavily” on dictionaries published prior to theirs, and older and what may seem to be outdated dictionaries “tended to stay in print” (McIntosh 3-4). Because the dictionary was intended for a varied and current readership and because it would be a financial risk for a publisher to print words and definitions no longer in use, booksellers would not have printed a dictionary “that seemed completely out of touch with current usage” (McIntosh 4). When lexicographers like Johnson (1755) copied Bailey (1721), who copied Kersey (1708), those compilations must have meant that the writers “judged that the old definition was current enough” (McIntosh 4). These general dictionaries from the first half of the eighteenth century, therefore, did impact and circulate “scientific” knowledge to the public. Dictionaries such as the *Glossographia Anglicana Nova* intended to explain “hard words” and instruct the reader, while works by lexicographers such as Bailey intended to “entertain the curious.” Surely, these “dictionaries must have opened the doors to scientific knowledge for many and been an important agent in popularization” (Layton 226).

²⁵ When McIntosh refers to “later dictionaries,” he includes those from the mid to late eighteenth century, including Johnson (1755), John Ash’s *The New and Complete Dictionary of the English Language* (1775), and Thomas Sheridan’s *A General Dictionary of the English Language* (1780).

Empiricism and Experimental Philosophy

One subset of natural philosophy that was publicly promoted by the Royal Society and was, therefore, becoming popular with general readers was experimental philosophy, which employed methods that we today recognize as empirical. Often when one refers to the “scientific revolution,” one of the epistemological shifts discussed or referred to is a move from deductive to inductive reasoning. Inductive reason uses observations, experience, and (sometimes) experimentation to draw conclusions about the natural world. Typically, we refer to this shift as the rise of empiricism. Although it is anachronistic to use the term “empiricism,” the term represents a principle of knowledge that is gained through the use of the senses. The term “empiricism,” like others discussed here, is contentious and often invokes modern conceptions of empiricism to explain a concept that was not yet developed or fully employed during the late seventeenth and early eighteenth centuries. Using the word “empiricism” presents us with a problem different from using the term “natural philosophy” to distinguish the complex nature of a series of overlapping practices in the Restoration and early eighteenth century: practices of “empiricism” represent just *one* of the defining features of “pre-science.” Likewise, using the term “empiricism” in place of “experimental philosophy” disregards the term used by the Royal Society to describe its own work. Although we may now see such activity as empirical, we are better served by relying on the Society’s conceptions of experimental philosophy. When we define natural or experimental philosophy as inherently empirical we disregard the emerging and mixed methods of the time. It could also be argued that empiricism is one of the methods that survive the mixed methods

associated with natural philosophy, and is therefore, a method that scholars today identify as a crucial attribute of the philosophical revolution.

As noted above, however, it is vital to consider historical denotations of terms that we, as scholars, use so casually when discussing the “science” of the day. Notably, the term “empiricism” as a way to describe practices within “natural philosophy” was not defined in any of the early modern dictionaries included in my research. It is not until Samuel Johnson’s dictionary was published that the word “empiric” appears in a dictionary, defined as “a trier; an experimenter; such persons as have no true education in, or knowledge of physical practice, but venture upon hearsay and observation only.” This definition, in itself, is complicated but, in some ways, relates to our current understandings of the methodologies associated with empiricism, namely practices that center on experimentation and/or observation; but, Johnson’s definition is pejorative in that the “empiric” also relies on hearsay and has no formal training or knowledge. Notably, Johnson is also not specifically designating the empiric as someone who also practices natural philosophy, a significant omission because he does, when defining other terms, refer to natural philosophy as a type of example in his definitions. For instance, when Johnson defines “scientifick,” two of the four examples that he uses of the term in context refer to natural philosophy as scientific, meaning that it produces “demonstrative knowledge” or “certainty.”²⁶ Turning to the *Oxford English Dictionary* provides some

²⁶ He cites Brown’s *Vulgar Errors*. Brown states, “Natural philosophy proceeding from settled principles, therein is expected a satisfaction from *scientific* progressions, and such as beget a sure or rational belief.” He also cites Locke. Locke’s use of the term “scientific” undercuts natural philosophy’s ability to create certainty when he argues, “The systems of natural philosophy that have obtained, are to be read more to know the hypotheses, than with hopes to gain a comprehensive, *scientific*, and satisfactory knowledge of the works of nature.”

insight as to why the word “empiricism” might have been excluded in these early modern dictionaries. The *OED* lists the first printed use of the term “empiricism” in 1658.

Originally, an empiric referred to the person who practiced a type of medicine that was based in experience and observation instead of on deduction from theoretical principles.²⁷

Empiricism as a philosophical term, meaning a “doctrine or theory that emphasizes or privileges the role of experience in knowledge, esp. claiming that sense experience or direct observation rather than abstract reasoning is the foundation of all knowledge of reality,” did not appear in print until 1796.²⁸ However, the *OED* does record the term as meaning a way to draw conclusions based on observation and experiment and lists the first textual reference as occurring in 1724.²⁹ The *OED* also notes that the word was employed “sometimes with somewhat negative connotations,” especially in its early usage.

Although many recent scholars use “empiricism” to describe the activities of natural philosophers, I use “experimental” and “experimental philosophy” because Thomas Sprat uses these terms to designate the methods advocated publicly by the Royal Society. Because Sprat’s *History* also marks a clear divide between the speculative and the experimental, using the term “experimental philosophy” allows me to designate the

²⁷ The *OED* lists the first occurrence of the term under this meaning in George Starkey’s *Natures explication and Helmont’s vindication*. Interestingly, it also appeared in a postscript against empiricism in the Royal Society’s *Philosophical Transactions* in 1744.

²⁸ In Friedrich A. Nitsch’s *A general and introductory view of Professor Kant’s principles concerning man, the world, and the deity*.

²⁹ Peter Shaw’s *Juice of a Grape*. Shaw states in the preface, “In effect, the Distinction between a Medicine and a Meal, is a mere Empiricism (iii). In this case, Shaw does not appear to use the term scientifically, but instead as a general conclusion or observation. The first definition that the *OED* lists that also seems to have a direct connection to empiricism as science is listed as occurring in 1846 in John Stuart Mill’s second edition of *A System of Logic, Rationcinative and Inductive: Being a Connected View of the Principles of Evidence and the Methods of Scientific Investigation* (III, xii).

perceived differences between the two approaches. Despite the historical context and the consistent absence of the term “empiricism” during the late seventeenth and early eighteenth centuries, scholars often use the term to describe the activity of natural philosophers of the time because experimental philosophy relied on observation, experimentation, and induction, all practices we today associate with empirical methods.³⁰

The collective experience, at least for early modern natural philosophy, was a key component of what the Royal Society referred to as experimental philosophy and what scholars often label as part of the Society’s “empirical” methodology. John Henry locates the origins of English empiricism in the “tendency for natural philosophers to come together in informal collaborating groups” (182). In that case, “collective” refers to natural philosophers meeting together to observe and experiment or to witness

³⁰ See Stephen Pumfrey who argues that natural philosophy was becoming prominent because “its more empiricist proponents claimed to be replacing the false ‘opinions’ of the ancients with the authority of certain deductions based on first-hand observations and experiments on nature” (48). Barbara Shapiro recounts how scientific thought at the time became “reoriented” when empiricism became a chief component of “scientific endeavor.” She argues that it was the “empirically grounded sciences,” which sought to examine nature and that were unlike mathematics in a search for certainty (9). Woolhouse designates the empiricist as someone who relies on the senses, experience, and observation in order to formulate knowledge. The empiricist is committed to the philosophical ideal that experience is the “touchstone of truth and meaning, and that we cannot know, or even sensibly speak of, things which go beyond our experience” (Woolhouse 2). Shapin and Dear offer similar discussions of the aim of empiricism. The “root idea” behind the concept of empiricism, according to Shapin, is that knowledge is derived from “direct sense experience,” meaning that one should look to what nature testifies rather than what humans do, in addition to preferring things over words (69). Dear classifies empiricism as a “philosophical stance,” and notes that knowledge is derived from the senses and the experiences that the senses provide (194). Although empiricism is clearly aligned with epistemology, empiricism can also be a methodology, Woolhouse argues. Woolhouse describes Francis Bacon as someone who was “purely a methodologist” when it came to empiricism. He explains that Bacon “enthusiastically advocates and describes certain empirical procedure by which knowledge should be sought; but he does not reflect on the relationship between knowledge and ideas on the one hand, and experience on the other” (Woolhouse 2-3). Scholars usually position Bacon as a proponent of empiricism, and the argument is often made that English science developed and progressed because of its “emphasis on Baconian fact gathering and empiricism” (Henry 202).

experimentation. But the collective could also refer to the repeatability of an experiment in which the same results were observed each time. Shapin and Schaffer refer to this type of collective experiment when they discuss Boyle's determination of what constitutes "matters of fact." Firstly, the members of "an intellectual collective" had to come to mutual understanding and assurance in the fact that "empirical experience was warranted" (25). Shapin and Shaffer note:

Matters of fact were the outcome of the process of having an empirical experience, warranting it to oneself, and assuring others that grounds for their belief were adequate [...] An experience, even of a rigidly controlled experimental performance, that one man alone witnessed was not adequate to make a matter of fact. If that experience could be extended to many, and in principle to all men, then the result could be constituted as a matter of fact. (25)

The empirical, therefore, does not result in "scientific knowledge" unless many can experience and observe the same outcome or result. That might mean either a collective experience in which an experiment is repeatedly performed in front of a group so that the results can be observed and verified by others, or the repeatability of the experiment performed by others separately could make it fact. Natural philosophers could feel confident in matters of fact because those matters were not of their own making; "they were, in the empiricist language-game, discovered rather than invented" (Shapin and Schaffer 67). What we see with Boyle's designation of how matters of fact become established is an acknowledgement of how the empirical is tied to "experimental performance." Experimentation becomes a type of sensory experience and a kind of observation that can result in knowledge. In recent scholarship empiricism and experimental science are often used interchangeably, in the sense that empirical "science"

means a reliance on experimentation. “Experimental philosophy” is a term that was used by Boyle and other members of the early Royal Society to designate a type of natural philosophy that centered on gathering knowledge from both observation and experimentation (Dear 194). Experimental philosophy relied on methods that we associate with empiricism, upholding the importance of the senses and denigrating the “use of mere reason in generating hypotheses” (Anstey 215). Henry notes that English natural philosophy set itself apart from what was happening in other European countries because it was “fundamentally empirical.” He acknowledges that English naturalists were not the only ones performing experiments, but that “only English natural philosophers can be said to have been experimentalists,” something he clearly designates as empirical (182). Although scholars notice this shift into experimental and therefore empirical philosophy, the dictionaries tell a different story. *If* the experimental philosophers within the Royal Society were “fundamentally empirical,” then the dictionaries written for general audiences highlight that the hegemony of the empirical was very slow to dislodge earlier approaches to the natural world as understood by the public.

The dictionaries of the time show a mixture of old and new; however, the new, in the form of experimentation, began making appearances in these dictionaries, although not necessarily tied to definitions of natural philosophy. Some of the earlier dictionaries define what it means to experiment without connecting the activity to practices associated with natural philosophy, while other dictionaries perhaps imply an association with natural philosophy because they define experiments as one way to discover truth about nature. According to recent scholars, experimentation, as a key component of empirical

natural philosophy, resulted in a break away from antiquated knowledge formation. Dictionaries of the day seem to capture this connection between empiricism and experimentation, in that the definitions of experimentation align with what scholars today label “empiricism.” Several dictionaries minimally define the word “experiment” as a trial, an essay, or a proof.³¹ However, other dictionaries make a clear connection to experience, observation, or the senses. Phillips’s *The New World of English Words* (1658) describes experimentation as a practice that results in certainty that can be verified by the senses, so much so that it produces an effect that is “physically evident.” The level of certainty is so high that the only way an experiment can deceive is with a supernatural intervention, or through a “miracle.” The supernatural, it seems, remains a large part of the worldview and can override even the most tangible and observable evidence. Phillips places much faith in the ability of experimentation to produce truth, a kind of truth that becomes apparent through observation. Furthermore, J.B. defines “experiment” as merely “an experience” in *An English Expositor* (1680). Although his definition appears simple, his use of the word “experience” denotes discovery and proof through “trial” and “observation.”³² In *Glossographia Anglicana Nova* (1707), an experiment is described as a type of proof or trial “wherein the Senses are judges of the truth of it.” Similar to Phillips’s definition, this entry underscores how experimentation leads to truth, but only because the senses become the authority, able to judge and perceive a level of certainty unable to be reached without empiricism.

³¹ See Blount’s *Glossographia* (1661); J.B.’s *An English Expositor* (1680); Kersey’s *Dictionarium Anglo-Britannicum* (1715); Cocker’s *English Dictionary* (1724).

³² “experience,” *OED*.

Several of the later definitions turn attention to the connection between experimentation and discovery. Bailey's *Dictionary Britannicum* (1730) designates the purpose of experimentation: it is done "in order to discover something of the laws and natures" of "natural bodies." Likewise, Johnson's *Dictionary* asserts that an experiment is performed "in order to discover an uncertain or unknown effect." Each of these definitions expounds upon the designations that connect experiment to truth or certainty. Discovery implies that there is some certain truth that can be observed about the natural world. Furthermore, Johnson's use of the words "uncertain" and "unknown" as the inverse of experimentation highlights the epistemological stakes at play with empirical methodology and experimental practices. Consequently, what one can arrive at through experimental natural philosophy is that which is certain and that which can be known. Finally, Chambers's *Cyclopædia* (1728) draws a line in the sand between the ancients and the moderns. Although he does not define the word "experiment" on its own, he includes it as part of his definition of "philosophy." He clearly positions the term as part of natural philosophy because he labels the practice as "experimental physics," describing it as a way to enquire into the "Reasons and Natures of Things." He also characterizes the practice as something that has been "cultivated since the Time of my Lord Bacon." The key part of the definition comes, however, when he connects experimentation specifically to the Royal Society, claiming that the Society's experiments have been of "infinite Service in Physicks, and 'tis to these, in great measure, that the Advantage of the modern Philosophy above the ancient is due." Consequently, in Chambers's definition, experimentation becomes a means through which natural philosophy has advanced but

also marks natural philosophy, specifically the type practiced by the Royal Society, as a superior way to formulate knowledge about the natural world.³³

Speculative Philosophy

Another path to knowledge about the natural world – and the one associated with outdated methods – was speculative philosophy, a term that was becoming contentious and pejorative. Speculative philosophy was associated with the ancient way of learning and was criticized for formulating knowledge based only on contemplation (Anstey 216). However, epistemological shifts do not happen radically, in that natural philosophy during the Restoration and early eighteenth century did not always cast-off speculation and hypothesis. Speculative philosophy was synonymous with the ancient ways of learning in schools and it was associated with a kind of contemplation that depended upon supposition. Speculative philosophy, therefore, is another example of older systems combining with newer epistemologies. One of the main differences between speculative philosophy and experimental philosophy is that conclusions drawn from contemplations and speculations were often untestable (Anstey 221). Conversely, experimental natural philosophy positioned itself as participating in something new because of the way in which it relied on sensory data to formulate conclusions (Anstey 222). Said another way, speculative natural philosophy seeks to understand and explain the natural world without

³³ Although “nature” can mean many objects of study, there does not appear to be much contention or disagreement among modern scholars as to what “nature” as an object of study meant. Gascoigne notes the study of nature under Aristotelian philosophy included all organic and inorganic natural things (form, matter, cause, and motion) (854). Natural philosophy in the Restoration and eighteenth century focused on the “basic causes of natural phenomena” and the “basic causes of change” and motion (856).

“systematic observation and experiment,” while experimental philosophy seeks, collects, and orders observations in order to use those observations as a way to explain the natural world (Anstey 215).

Bacon formulated the division between speculative and experimental philosophy; however, he used the terms “speculative” and “operative,” with the speculative being purely theoretical, while operative knowledge was applicable to practical situations.³⁴ According to Woolhouse, Bacon continued to be focused on both types of learning: “the knowledge of formal causes, to which his method is designed to lead, is pure and ‘speculative’; while his stress on the practical usefulness of science, and his frequent discussions of the mechanical arts, shows a deep interest in the ‘operative’ and technological” (25). In Part I of *Novum Organum* (1620), Bacon speaks against any kind of futile speculation and promotes experimentation as the avenue toward knowledge.³⁵ Despite this assertion, the two types of knowledge are still “intimately connected” for Bacon because speculating about causes should and can lead to an operative practical philosophy (Woolhouse 25-6).

In addition to his claim that speculation and experimentation coexist in Bacon’s work, Anstey argues that scholars today rarely acknowledge both the divisions and blurred lines between experimental and speculative natural philosophy in spite of the fact that writers from the 1650s to the beginning of the eighteenth century acknowledged

³⁴ In *De dignitate et augmentis scientiarum* or *The Dignity and Advancement of Science* (1623).

³⁵ In aphorism 10, Bacon notes that men “indulge” in “speculations” that cannot capture the “subtlety of nature,” and he says that the only hope for science lies in “true *Induction*” (aphorism 14). In aphorism 19, he notes that “investigating and discovering truth” arises when one relies on the senses and “particulars” to arrive at “highest generality last of all.” The other way of understanding nature (ancient philosophy) only “just touches on experience and particulars cursorily” (aphorism 22), but “all truer interpretation of nature” is accomplished from “apt and appropriate experiments” (aphorism 50).

differences in these two categories. What was being called “physics” in the 1650s started being divided into speculative or experimental physics. Moreover, in the latter half of the seventeenth century, many English writers were discussing this separation (Anstey 215-16). For example, in 1665, Joseph Glanvill’s *Scepsis Scientifica* denies any focus on speculation within the Royal Society.³⁶ Glanvill’s assertion implicitly criticizes speculative philosophy and advocates for the methods of experimentation and observation found in the Royal Society. By the end of the seventeenth century, writers such as John Dunton attempt to differentiate between the two philosophies in *The Young Students Library* (1692): Philosophy, according to Dunton ‘may be again Subdivided into *Speculative* and *Experimental*’ (qtd in Anstey 215). Anstey argues that, except for Hobbes, experimental natural philosophy was preferred “by almost all natural philosophers in early modern England” (215).³⁷ Although such sweeping generalizations can be troublesome, Anstey’s claim highlights, at minimum, the rhetoric surrounding knowledge formation at the time and attempts to shed light on why speculative philosophy was deemed inferior.

Anstey contends that the Royal Society took on the term “experimental philosophy” as one of its main categories.³⁸ Using such a term allowed the Society to promote the type of natural philosophy that they were practicing (220). In aligning

³⁶ Glanvill was a Fellow and apologist for the Royal Society. He says that the Royal Society is not focused on “little Projects of serving a Sect, or propagating an Opinion; of spinning out a subtle Notion into a fine thread, or forming a plausible System of new Speculation” (5).

³⁷ Anstey also notes that Cavendish’s chapter on ancient learning in *Observations upon Experimental Philosophy* vocally opposes favoring only experimental philosophy.

³⁸ Anstey references correspondence by Henry Oldenburg in which he wrote that the Society “aimes at the improvement of all usefull Sciences and Arts, not by meer speculations, but by exact and faithfull Observations and Experiments.” Oldenburg to Norwood, 10 February 1667/8.

themselves with experimental philosophy, they demonstrated a desire to distance themselves from the ancients. In fact, Anstey refers to their differentiation between speculative and experimental philosophy as having a “strong polemical agenda.” He argues:

It was the new natural philosophers, and in particular those aligned with the newly formed Royal Society and its precursor groups, who first used the distinction. They did this not simply to emphasize the fact that they were experimentalists or saw an indispensable need for experimentation, but also to distance themselves from the old speculative way of proceeding in physics or physiology (as natural philosophy was often called). (221)

Essentially, therefore, marking a difference between speculative and experimental natural philosophy criticizes the former and recommends the latter (216). Accordingly, “speculative” becomes a derogatory term within the contexts of some discourses on natural philosophy (220). Within the dictionaries of the time and rhetoric associated with the Royal Society, speculative philosophy is often aligned with drawing hypotheses. Today we tend to think of hypotheses as part and parcel of the modern scientific method; however, at this time, hypotheses were aligned with the speculative philosopher.³⁹ The speculative natural philosopher was “one who indulged in hypotheses without recourse to observation and experiment at all, or only as an afterthought” (Anstey 223). These delineations shed light on the status of hypotheses during this period. For early modern natural philosophers, according to Anstey, a hypothesis would refer to what we think of

³⁹ Peter Dear discusses the Society’s view of hypotheses in “Toitus in verba: Rhetoric and Authority in the Early Royal Society.” According to Dear, hypotheses were problematic because they “could not be grounded in the bedrock of the new authority.” Hypotheses, he notes “remained a matter of choice, at best of heuristic, and could play no active part in the furtherance of the experimental philosophy that was the basis of the Royal Society’s cooperative scheme. Outside the limits of the Society’s activities, however, the individual natural philosopher could quite properly utilize hypotheses” (70).

as a “generalization, or even a theory,” and the word was used synonymously with terms such as conjecture and speculation (223-4). Hypotheses, consequently, were seen as “castles in the air, mere speculations, fancies, phantasms, chimeras, and so on” (Anstey 225).⁴⁰ When seen in this light, what is really being denigrated about the way in which speculative philosophy arrives at knowledge and truth? Speculation, on some level, relies explicitly on what will come to be called the imagination as a means through which to contemplate. Although one might argue that conjecture or supposition is at the root of at least the first stages that lead toward experimental philosophy, it becomes clear that asserting its reliance exclusively on empirical truths was a way for experimental philosophy to distance itself from the trappings, deceptions, and potential errors that were often associated with the imagination.

Before discussing the definitions of some of these words in popular dictionaries, it is important to recognize that even with such divisive rhetoric, natural philosophy was not practiced in solely one way. In fact, experimental philosophy was not necessarily equivalent to natural philosophy because there were natural philosophers at this time practicing in a speculative manner. At stake, of course, is a “cluster of epistemological issues that underlie the terms ‘experimental’ and ‘speculative’” (Anstey 220). When these terms are really explored, however, we see that the methodologies of natural philosophers ranged widely, and some who claimed to be experimental philosophers ultimately

⁴⁰ This distinction Anstey makes to speculation as “fancies” or “phantasms” becomes important in my later exploration into dictionary definitions on the imagination. The speculative seems inherently tied to the imagination. Anstey references the physician Thomas Sydenham’s *Tractatus de podagra et hydrope* (1683): “Had I begun with my hypotheses, I should have shown the same want of wisdom that a builder would show who began with the roof and tiles, and ended with the basement and foundation. But it is only those who build castles in the air [Aere Castella] that may begin at either end indifferently” (165-66).

“incorporated elements normally attributed to speculative philosophy” (Anstey 220). As we will see from some of the dictionary entries, there were no clear-cut ideas about what some of these terms meant. Terms such as “hypothesis,” “experiment,” and “probability” were being discussed and debated. The unclear meaning of some of these terms and the way in which they are sometimes used interchangeably emphasize that natural philosophy confronted ideas that were fluctuating. As such, the methodologies that various natural philosophers employed were not fully developed yet, and instead were often provisional, uncertain, and at times, inconsistent (Anstey 221).

Hypothesis, Speculation, and the Imagination

As with some of the terms discussed previously, it is necessary that we are reminded of and appreciate the popular conceptions and understandings of these ideas. Since hypothesizing is often connected to speculation and both were tied to the imagination, it is useful to explore the way the public was informed on what it meant to hypothesize. Every dictionary that contains the word “hypothesis” defines it as a supposition.⁴¹ “Supposition” denotes assumption or inference – basically the opposite of what experimental philosophy promoted itself as doing. The *OED* records supposition as a type of assumption that, despite being used as a basis for an argument, does not call attention to whether that assumption is true or false. Suppositions contain indeterminate beliefs and are sometimes inaccurate. Furthermore, in spite of its possible mistakenness, a supposition is often assumed to be probable or true or to be “at least admitted as possibly

⁴¹ *The New World of Words* (1658, 1706); *An Alphabetical Dictionary* (1668); *Dictionarium Anglo Britannicum* (1715); *Cocker’s English Dictionary* (1724); *Dictionary of the English Language* (1755).

true.”⁴² Phillips’s *The New World of Words* (1658) speaks to this kind of uncertainty in part of his definition for the word “hypothesis” when he describes it as a type of argument that is laid out and “taken for granted for Argument’s sake.” The 1706 update to the term says that the inference is taken for granted so as to solve problems and answer questions, especially in natural philosophy. Kersey’s 1715 definition reiterates Phillips’s, exemplifying how the general reader might believe that natural philosophy and naturalists were still engaged in speculative philosophy. Further proof can be found in the fact that no definition of natural philosophy in the dictionaries I refer to includes any words related to experimentation, but several of them do define hypothesis and speculation as practices that define natural philosophy. The term “hypothesis” can be and was interpreted and discussed in a negative way, especially by practitioners in the Royal Society who sought to promote a different kind of knowledge acquisition. Supposition, however, leaves open the possibilities and multiplicities of truth and knowledge because it allows for conclusions not based solely in observation and experiment and allows for a type of thinking that could involve the imagination. Moreover, as defined by these various dictionaries, a general reader might have understood natural philosophy as a practice that still involved drawing conclusions based on unknowns. As we will see, the term “hypothesis” also has a clear connection to speculation, a type of activity that some writers were engaging in as they responded to natural philosophy.

Since dictionaries from the first decade of the eighteenth century still attribute speculative modes to natural philosophy, one has to consider that methodologies often

⁴² “supposition,” *OED*.

were mixed, but also that older notions of what constituted natural philosophy continued to linger. Both *Glossographia Anglicana Nova* (1707) and Harris’s *Lexicon Technicum* (1708) define physicks as the “speculative knowledge of all Natural Bodies.” Each also assigns natural philosophy as a type of “science” that “contemplates” the powers of nature. The word “contemplation” appears in most of the definitions of speculation. Speculation and the speculative will prove relevant to my later arguments about how other texts entered discourse about natural philosophy, so it is necessary to chart the various ways in which these terms were defined. These definitions can elucidate some of the epistemological ideas to which many practitioners of the early Royal Society were opposed, as is evident in the rhetoric of Sprat’s *History*, which will be discussed in the next chapter.

Table 2. Definitions of Speculation

Dictionary Name, Author, and Publication Date ⁴³	To Speculate	Speculation	Speculative
<i>Glossographia, or, A Dictionary Interpreting All Such Hard Words</i> – Thomas Blount, 1661	To watch in an high Tower, or other like place, to see far, to espy, search out, to consider diligently, to behold and gaze upon	A spying, a watching in an open place, a discovery, a considering, or observing	No entry
<i>A New English Dictionary</i> – John Kersey, 1702	No entry	Contemplation	Belonging thereto

⁴³ The following dictionaries contain no entry for speculate or any derivative of that word: *An Alphabetical Dictionary* – John Wilkins, 1668; *An English Expositour* – J.B., 1680; *Lexicon Technicum* - John Harris, 1708; *An English Dictionary* - Elisha Coles, 1713; *Cyclopædia* – Ephraim Chambers, 1728.

<i>Table 2. Definitions of Speculation</i>			
Dictionary Name, Author, and Publication Date	To Speculate	Speculation	Speculative
<i>The New World of Words</i> - Edward Phillips, 1706	To contemplate, observe, or view; to consider seriously, to meditate upon	The <i>Theory</i> , or study of an Art or Science without regard to the Practice.	Studious in the observation of things Divine or Natural: <i>Speculative</i> is also more especially opposed to Practical
<i>Glossographia Anglicana Nova</i> – 1707	No entry	Contemplation	No entry
<i>Dictionarium Anglo-Britannicum</i> - John Kersey, 1715	to observe, or view; to consider seriously	the Art of Speculating, contemplating, &c. an Espial, a Notion: Also the <i>Theory</i> , or study of an Art, or Science without regard to the Practice	belonging to Speculation, apt to speculate
<i>Cocker's English Dictionary</i> – Edward Cocker, 1724	No entry	Observing and inquiring	No entry
<i>Dictionarium Britannicum</i> - Nathan Bailey, 1730 ⁴⁴	to contemplate, observe, or view; also to consider seriously upon, to mediate upon.	Contemplation, &c. also an Espial, a Notion; also the Theory or Study of an Art or Science, without Regard had to the Practice of it	of, or pertaining to Speculation; studious in the Observation of Things divine or natural; <i>speculative</i> is also opposed to <i>practical</i>

⁴⁴ This dictionary also lists an entry for “speculativeness,” signifying it as a “Propenseness to Speculation, Studiousness in Observation. Speculativeness is the Opposite of Practicalness.”

Dictionary Name, Author, and Publication Date	To Speculate	Speculation	Speculative
<i>A Dictionary of the English Language</i> – Samuel Johnson, 1755 ⁴⁶	To meditate; to contemplate; to take a view of any thing with the mind’ to consider attentively; to look through with the mind	1. Examination by the eye; view 2. Examiner; spy. 3. Mental view; intellectual examination; contemplation 4. A train of thoughts formed by meditation 5. Mental scheme not reduced to practice	[from Given to speculation; contemplative 2. Notional; ideal; not practical

In surveying the chart above, we can see that one of the definitions of speculation that appears in many of the entries is contemplation. To contemplate something requires thought and attention, and this term also implies sustained study, to think and ponder over something again and again. Several of the definitions of speculation draw attention to the seriousness of this type of activity. Philosophers who speculate are “diligent,” “serious,” “studious,” and “attentive.” There is also some connection to relying on the senses, in that almost every definition aligns speculation with watching, viewing, and observing. Furthermore, some of the above entries speak to what the speculative philosopher examines or probes into – the “Natural.” Like natural philosophy or experimental philosophy, speculative philosophy investigates the causes of the natural world and does so through observation and study. However, the departure of the speculative from the

⁴⁶ This dictionary also lists an entry for “speculatively,” signifying it as “contemplatively; with meditation 2. Ideally theoretically; not practically.”

experimental is addressed in many entries above as well. The speculative, unlike experimental methods, is not concerned with the practical. In fact, the entries that highlight the absence of practicality identify speculation as *opposed* to the practical. The speculative, therefore, is more concerned with theory and less focused on implementing those theories into practice. The early Royal Society, along with apologists such as Sprat, went to great lengths to convince readers of the usefulness of empirical/experimental natural philosophy. That, of course, does not mean that early natural philosophers completely abandoned speculation or that all of their concerns addressed the practical. The other clear point of divergence between definitions of natural philosophy and of experiment is that the speculative is often described as studying not just the natural world but also the divine. Contemplation of the divine moves natural philosophy outside of what can be empirically known. Despite the fact that many early members of the Royal Society claimed that part of the usefulness of experimental philosophy was that many discoveries reinforced and pointed to the existence of a higher power, experiment and empiricism rely on what can be directly experienced and observed within the limits of the human body and developing technologies.

Speculation, as signifying meditation and contemplation, can allow for the importance of the imagination. Within Table 2, Johnson describes the action of speculating as taking a view of “any thing with the mind.” As early as 1706, Phillips’s *The New World of Words* delineates the imagination as applying something to the mind, even if that “thing” is “impressed upon the brain through thought.” To imagine, according to Phillips, is to both fancy and to conceive or suppose. The definitions in

Dictionarium Anglo-Britannicum (1715) and *A Compleat English Dictionary* (1735) reinforce this connection, aligning not only speculation, but also hypothesizing with the imagination – each describing it partly as “to suppose.” Supposition, as discussed above, was one of the predominant definitions of hypothesis. The imagination, of course, is also a contested term, which many scholars have defined in divergent ways; Table 3 lists the many ways in which the imagination was defined at the time. Even though the term “imagination” can have many different meanings, relying, once again, on dictionary definitions for general readers provides us with insight into how the imagination was understood at the time and also provides some interesting and explicit connections to how the imaginative relates to the speculative.

Table 3. Definitions Related to the Imagination

Dictionary Name, Author, and Publication Date ⁴⁷	Fancy	Phantasy	Imagination/Imaginary /To Imagine
<i>The English Dictionarie</i> - Henry Cockerham, 1642	No entry	No entry	Imaginary – that which is conceived in the mind
<i>A French-English Dictionary</i> - Randle Cotgrave, 1650	Not listed, but referenced in definition for Imagination	No entry	Imagination - fancie, conceit, thought, a surmise, or surmising
<i>An English Dictionary</i> - Elisha Coles, 1676	Not listed, but referenced in definition for Imagination	No entry	Imagination - feigning, also the phansie
<i>An English Expositour</i> - J.B., 1676	No entry	No entry	Imaginary – that which is conceived in the mind

⁴⁷ There are no definitions for the above terms in Rider’s *Dictionarie* (1640), Phillips’s *The New World of Words* first edition in 1658, or Blount’s *Glossographia* in 1661.

Dictionary Name, Author, and Publication Date	Fancy	Phantasy	Imagination/Imaginary /To Imagine
<i>The New World of Words</i> - Edward Phillips, 1706	Fancy - see Imagination Phillips also marks Fantasy as a synonym of Fancy and defines it as - Imagination, Humour, Crotchet, Maggot, Whim	An inward Sense or Imagination, whereby any thing is represented to the Mind, or imprinted on it	Imagination - an apply of the Mind to the Image of some Bodily Thing impressed in the Brain by Apprehension, Invention, Fancy, Conceit, Thought. To Imagine - to conceive or fancy, to think or suppose; to invent, devise, or contrive
<i>Glossographia Anglicana Nova</i> – 1707	No entry	An inward Sense or Imagination, whereby things are represented to the Mind, or imprinted on it	Imagination – is an application of the Mind to the Phantasm or Image of some corporeal thing expressed in the brain
<i>Lexicon Technicum</i> - John Harris, 1708	See Phantasy, or Imagination	An Internal Sense or Imagination, whereby any Corporeal thing is represented to the Mind, or impressed on the Brain by its proper Image	Imagination – is an Application of the Mind to the Phantasm or Image of some Corporeal Thing impressed in the Brain.

Table 3. Definitions Related to the Imagination

Dictionary Name, Author, and Publication Date	Fancy	Phantasy	Imagination/Imaginary /To Imagine
<i>A New English Dictionary</i> - John Kersey, 1720	No definition for fancy, but “fantasy” is defined as “fancy”	Phantasy – or Fancy, the <i>Imagination</i> ; the Second of the Powers, or Faculties of the sensitive or rational Soul, by which the Species of Objects receiv’d by the common Sense, are retain’d, recall’d, further examin’d, and either compounded or divided Others define the <i>Phantasy</i> to be that internal Sense or Power, whereby the Idea’s of absent Things are form’d, and presented to the Mind, as if they were present	Imaginary - that has no being at all, but in one’s fancy; An Imagination, thought or fancy. The Imaginative faculty To Imagine – devise, fancy, think, or suppose
<i>Cyclopædia</i> - Ephraim Chambers, 1728	See Phantasy, or Imagination	No entry	Imagination – a Power or Faculty of the Soul, by which it conceives, and forms Ideas of Things, by means of certain Traces and Impressions that had been before made in the Fibres of the Brain, by Sensation.

Dictionary Name, Author, and Publication Date	Fancy	Phantasy	Imagination/Imaginary /To Imagine
<i>Dictionarium Britannicum</i> - Nathan Bailey, 1730	The imagination	The <i>Fancy</i> or <i>Imagination</i> ; the second of the Powers or Faculties of the sensitive or rational Soul, by which the Species of Objects, received in by the common Sense, are retained, recalled, further examined, and either compounded or divided	Imagination – is an application of the Mind to the Phantasm or Image of some corporeal Thing impressed in the Brain: or, it is a power or faculty of the Soul, by which it conceives and forms Ideas of Things, by means of certain Traces and Impressions that had been made on the Brain by Sensation To imagine – to conceive or fancy, to think or suppose
<i>A Dictionary of the English Language</i> - Samuel Johnson, 1755 ⁴⁸	[contracted from phantasy] Imagination; the power by which the mind forms to itself images and representations of things, persons, or scenes of being; an opinion bred rather by the imagination than the reason		Imagination – Fancy; the power of forming ideal pictures; the power of representing things absent to one’s self or others To imagine – to fancy; to paint in the mind

The concept of the imagination and its function is as, or perhaps more, contested as each of the terms related to natural philosophy. When exploring the above chart for patterns, one commonality is the interconnectedness or synonymous relationship between

⁴⁸ Johnson also defines “To Fancy” as “To imagine; to believe without being able to prove.”

the words “fancy” and “imagination.” This will prove important to understanding Sprat’s rhetoric in his *History of the Royal Society*, in which he sets up fancy as part and parcel of the trappings of speculative philosophy. The dictionary definitions also capture this relationship between fancy and speculation. Many of the definitions share one common defining characteristic of the imagination: it is an action the brain engages in when imagining, and one of those actions listed is supposition. Hypothesis, a method associated with speculative philosophy, relies on supposition according to various dictionary definitions. Supposition implies an idea or thought that is based on assumptions and beliefs, not necessarily grounded in observable truth. In fact, the *OED* lists both the words “fancy” and “deception” as ways to define supposition.⁵⁰

The meanings found in some of the definitions may help us to better understand the way the imagination was conceived in general representations. Many of the definitions are grounded in the imagination as a thought or idea, but when we explore the other descriptors, the imagination is not always represented in the most positive light. “Deception” clearly has negative connotations, as do the words “feign” and “contrive,” two of the other frequent characteristics of what the imagination was considered to have been doing at the time. To feign means to “fashion factiously or deceptively,” to “contrive (a deception),” “to imagine” and believe “erroneously” and to “indulge in fiction.”⁵¹ Contriving has similar negative connotations, as it is a term that signifies making things up and is itself a word used to define what it means to feign. Inventing, another term used to describe what it means to imagine, is also defined in the *OED* by

⁵⁰ “supposition,” *OED*.

⁵¹ “feign,” *OED*.

contriving and feigning, but it also defines the term as what one does when they compose a “work of imagination or literary art.”⁵² Samuel Johnson describes the action of imagination as “painting with the mind.” Some of the other terms used to define imagination are as a “conceit,” a “maggot,” or a “whim.” None of these terms imply anything negative, but they do allude more to the fantastical. Johnson defines “maggot” and “whim” as an “odd fancy.” Chambers goes so far as to align strength of imagination as a symptom of mental decline. In *Cyclopæida* Chambers notes that the imaginative faculty is “very strong, representing many, extravagant and monstrous things” in those who are “melancholic” or “mad.” He does also align the imaginative faculty with artistic expression: “In Poets and Painters, that same Faculty is to be the Predominant one; to enable ’em to feign, and pursue and execute their Fictions and Fables with more Strength, Consistency, etc.” Whether an innocent whimsy, an artistic expression, or something more approaching deceit, imagination is not treated in many of these definitions as a respectable faculty.

One of the most telling descriptions of the imagination comes in the way the imagination is presented as a second power of the faculties. Johnson explains it best when he says that fancy is the imagination, or the “power by which the mind forms to itself images and representations of things, persons, or scenes of being; *an opinion bred rather by the imagination than the reason*” (emphasis added). It is reason that is able to distinguish what is good from what is evil and what is truth from what is falsehood (Johnson’s *Dictionary*). The speculative and the imaginative, therefore, both exist within

⁵² “invent” *OED*.

the mind, but their focus on what is fictive and what is hypothetical detract from natural philosophy's focus on what can be known and observed with certainty. When Kersey says that the imaginary has "no being at all, but in one's fancy," he gets at the heart of the ever-growing separation between the speculative and the experimental. That which is only conceived of in the mind cannot be proven in an empirical way. Kersey is correct in saying that imaginative thoughts and fictions have no physical presence, but they do have a power in shaping the public's reaction to and discourse with experimental philosophy. It is in the imagination that one contemplates the wonder of new discoveries and new technologies. The imaginative faculty is also a crucial component of experimental philosophy, for all ideas and theories must initially be conceived in the mind, before the first experiment can be performed.⁵³

Conclusion

James Engell argues that our conceptions of the imagination today originated in the late seventeenth century and continued into the eighteenth century in his book *The Creative Imagination*. He claims that much effort was focused on defining the idea of the imagination during this time. Engell argues that our understanding of "genius, poetic power, and originality, of sympathy, individuality, knowledge, and even ethics grew and took lifeblood from the idea of imagination" (3). The imagination, as envisioned by such philosophers as Thomas Hobbes in the Restoration, makes and intercedes on behalf of the

⁵³ As referenced in Table 3, of the eleven dictionaries that define the imagination, eight of them define the imagination as something that originates within the mind. The only three that do not make that distinction are Coles, Colgrave, and Kersey.

human experience; therefore, the imagination is not a passive faculty because it “actively forms our conception of the world and, compounded and regulated to form an end or design governing its function, it becomes the process of artistic creation” (Engell 13-15). Despite these positive conceptions of the imagination, Engell establishes that the imagination was also associated with emotions, passions, and desires (15). In the 1660s, according to Beverly C. Southgate, these characteristics associated with the imagination and the role the imagination was thought to play made the concept contentious (285). As William Rosky writes, early modern thinkers understood the imagination as an uncontrolled and immoral faculty. This faculty was inferior because it was “forever distorting and lying, irrational, unstable, flitting and insubstantial, haphazardly making and marring, dangerously tied to emotions, feigning idly and purposelessly” (73). The Royal Society, at least in in Sprat’s rhetoric, associates these types of deficiencies with the speculative. As will be established in chapter three, some of the rhetoric associated with the Royal Society goes to great distances to set up experimental philosophy as bereft of emotion and desire.

When considering the views of the imagination discussed in the next chapter, it is pertinent to consider the ways in which the imagination was seen as erroneous and misleading. Southgate establishes the way the word “imagination” was employed during the Restoration. She argues that the imagination was associated with Platonic traditions that deemed the imaginative faculty something that must be “controlled and kept subservient to our more reliable faculties” (286). Although the imagination has value, its negative qualities outweighed its unpredictable nature. Not only was the imagination seen

as resistant to reason's restraints, but it was also positioned as "disturbingly, even dangerously anarchic and irrational" (Southgate 286). In thinking about the Royal Society's belief that careful observation and a moderate approach to knowledge were both desirable and necessary, it is no wonder that the Society's rhetoric positioned the imagination as an avenue that led away from truth and into uncertainty. In delving further into the separation between the speculative (the ancient philosophy) and the experimental (seen as new), it is clear that the imagination "becomes associated with the vices of the old: it is what the true and real and safe philosophy has got away from" (Southgate 287). Thus, the term "imagination" became "a kind of shorthand – a sign to indicate what cannot readily be understood" in terms of the emerging natural philosophy. The imagination, consequently, "refers to something non-material, non-physical, non-mechanical; it relates to forces of the sort that we might describe as 'mental' or 'psychological'" (Southgate 281). Imagination, as envisioned by writers such as Sprat, stood for everything experimental philosophy was not, or at minimum, what it argued that it was not (Southgate 287).

In addition to trying to interpret the ways in which popular audiences conceived of natural philosophy, I also point to the connection between hypothesis, speculation, and imagination to draw attention to the ways reason was positioned as superior to these concepts. Is there value in the imagination, or are observation and experimentation the only reliable and practical sources of knowledge? Speculative writing serves as a bridge, connecting observation and experimentation with conjecture. This combination emphasizes the need for both speculation and experimentation, because it is in both that

one has access to a more complete path for ascertaining knowledge and understanding the possible consequences of the pursuit of certain kinds of natural philosophy. Speculation also becomes an important tool through which people could contemplate and, in some ways, participate in experimental philosophy and the discoveries and changes that it brought. Speculation and imagination, thus, disseminate, receive, and reconsider “scientific” ideas in ways that the rhetoric coming out of the Royal Society does not recognize. Speculative thought, no matter how much the Society attempted to distance itself from it, cannot be separated from experimental philosophy because it is crucial to the Society’s methods and its desire to capture the public’s imagination.

All of the definitions explored in this chapter suggest that public knowledge of natural philosophy may have differed from what Fellows in the Royal Society were actually practicing. But these definitions also capture the shifting epistemology of the day and the ways in which old and new methodologies and domains of knowledge collided, coexisted, and conflicted. Considering how terms such as “physics,” “natural philosophy,” “experiment,” and “speculation” were defined is a necessary task, even when it may seem like representations in dictionaries remain remote from actual practice. Viewing natural philosophy as a practice that was “intimately bound up with the practical role it played in the society” can help us determine how to define natural philosophy (Grant 264). One of the ways we can start to understand the role it played is to look at contemporary and popular representations of natural philosophy. Those representations might illuminate what function natural philosophy served and what it meant to contemporary audiences. Although scholars most often rely on the natural philosopher’s

writings and methods to define his practice, how the public interpreted the products of natural philosophy are just as much a “part of the identity of natural philosophy” as what we might deem more legitimate work (Grant 264).

CHAPTER III

“MEN OF HOT, EARNEST, AND HASTY MINDS” VERSUS “THE SOLID SUBSTANCE OF SCIENCE ITSELF”: THE ROYAL SOCIETY’S PUBLIC ATTEMPT TO EXALT EXPERIMENTAL PHILOSOPHY

For so there will be always many sincere witnesses standing by, whom self-love will not persuade to report falsely, nor heat of invention carry to swallow a deceit too soon; as having themselves no hand in the making of the Experiment, but onely in the *Inspection*.

Thomas Sprat, *The History of the Royal Society of London*¹

The excerpt above, taken from part two of Sprat’s *The History of the Royal Society* (1667), alludes to the collective experience that was seen as so significant to the Royal Society’s philosophy. This quotation, taken from Section VIII, “A defence of the largeness of their number,” attempts to explain why there are so many members in the Society and why the members represent many different types of studies. These many members, in addition to being Fellows themselves, become the necessary witnesses to the Society’s experimental philosophy. Witnesses are just as important as – or even more important than – the one doing the experiment, for it is the witnesses who can validate the truths demonstrated. The solitary philosopher, according to Sprat, might be tempted to falsify his report, so it is the public nature of the Society’s philosophy that legitimizes its position. The Royal Society envisioned a type of natural philosophy available to the

¹ Pg. 73. In *History of the Royal Society*, edited by Jackson I. Cope and Harold Whitmore Jones, 1959. All quotations taken from this edition. Cope and Jones note that it was entered into the Stationers’ Hall as entitled: *The History of the Instauration, designe and Progress of the Royal Society of London for the Advancement of experimental philosophy* (ix).

public, so not only did they publish their own history in 1667, but they also made demonstrations of experiments available to the public and began publishing records of their experiments in 1665 in their *Philosophical Transactions*. As established in the previous chapter, the public was likewise introduced to and educated about natural philosophy through other means, including dictionaries, which attempted to disseminate and explain the terminology related to natural philosophy. Those dictionary definitions exemplify a natural philosophy that was in flux, in that it looked forward to experimental philosophy and that which today we would refer to as “empiricism,” while also keeping ties to speculative philosophy and older epistemologies such as superstition and magic.² In addition to dictionaries that contributed to the understanding and popularization of natural philosophy, Sprat’s *History* became another way for the reading public to engage with emerging epistemologies.³ Sprat’s *History* is often cited when describing the relationship between the use of plain-style rhetoric and experimental philosophy, but not much attention has been paid to Sprat’s dichotomous presentation of the speculative and experimental philosopher.⁴ The distinction between the speculative and the experimental

² As noted in chapter two, the term “empiricism” was not a word that appeared in the dictionaries of the day when describing natural, speculative, or experimental philosophy. Empiricism, however, has become a popular term among scholars when discussing experimental philosophy, as practiced by the Royal Society. This experimental philosophy relied on observation, experiment, and inductive reasoning, methods that we today associate with “empiricism.” When I use the term “empiricism” I do so acknowledging its common usage among scholars and understanding that it is a term that has come to signify experimental philosophy.

³ Cope and Jones recount the multiple printings that Sprat’s *History* went through: the second edition was issued in 1702, the third in 1722, and the fourth in 1734. Hall says that Sprat’s *History* “had considerable influence at home and abroad – it was translated into French in 1669” and went through multiple English editions in the eighteenth century (52).

⁴ For more on Sprat’s discourse on rhetoric see Denise Tillery “The Plain Style in the Seventeenth Century: Gender and the History of Scientific Discourse” (2016); Tina Skouen “Science versus Rhetoric? Sprat’s *History of the Royal Society* Reconsidered” (2011); R.J. Stark *Rhetoric, Science, & Magic in Seventeenth-Century England* (2009); James McGuire “The Rhetoric of Sprat’s Defense of the Royal Society” (2005); Joel Reed “Restoration and Repression: The Language Projects of the Royal Society” (1989); Werner

that we find in the dictionary definitions appears as more lengthy explanations in this official statement representing the Royal Society's views. These distinctions that concerned these writers of official statements extended far beyond subdividing natural philosophy. Experimental philosophy, as opposed to speculative philosophy, would be championed as necessary to cultural and political stability.

The public rhetoric associated with the early Royal Society during the Restoration, therefore, becomes another point of crucial public communication to study when examining what natural philosophy might have meant to a general reader. Because the remaining chapters of this dissertation investigate speculative writing that responds to the formation and practices of the Royal Society, understanding how the Society rhetorically presented itself to the public is an important step. Sprat wrote his *History* at the bequest of the Society in order to trace its history, publicize its methods, and defend its philosophy to the world.⁵ It is divided into three parts: the first part, which recounts the state of ancient philosophy; the second part, which captures the Society's establishment and initial years; and the third part, which defends and recommends experimental philosophy.⁶ Prefacing Sprat's *History* is a poem by Abraham Cowley,

Hüllen "Style and Utopia: Sprat's Demand for a Plain Style Reconsidered" (1987); B. Vickers "The Royal Society and English Prose Style: A Reassessment" (1986); and W.S. Howell *Eighteenth-Century British Logic and Rhetoric* (1971).

⁵ According to Cope and Jones's introduction to Sprat's *History*, "As early as May 24, 1663, Sir Robert Moray mentions young Thomas Sprat's project." At the time he was a "young churchman of twenty-eight, whose name had been proposed for membership in the Society by John Wilkins as recently as April 1, 1663, and whose election had not taken place until April 29" (xiii). Sprat opens the *History* with a pronouncement that "I shall here present to the World, an Account of the First *Institution* of the *Royal Society*; and of the *Progress*, which they have already made: in hope, that this Learned and Inquisitive Age, will either think their *Indeavors*, worthy of its *Assistance*; or else will be thereby provok'd, to attempt some *greater Enterprise* (if any such can be found out)" (1).

⁶ As discussed in the previous chapter, "ancient philosophy" typically refers to a natural philosophy based in Aristotelian philosophy. However, Sprat's *History* details the many ancient philosophies that served as

entitled “To the Royal Society,” a pindaric ode singing the praises of Francis Bacon and acclaiming the Royal Society’s victorious emancipation of ancient philosophy from stagnation and deluded truth. As in the case of Sprat, the Royal Society had requested Cowley’s services, and his poem establishes the laudatory tone of Sprat’s work.⁷ Sprat’s *History* and Cowley’s poem represent the way the Royal Society attempted to influence the public’s perception of its endeavors. After briefly discussing how the Royal Society was formed, I analyze Sprat’s and Cowley’s rhetoric to elucidate how the Society separated itself from ancient philosophy. These two pieces of propaganda show that the Royal Society desired a strong public statement in favor of its own methods and in opposition to speculative methods of philosophy. In denigrating speculative methods of philosophy, the Society was able to promote what it saw as a more valid avenue to truth – philosophy grounded in observation and experimentation; however, its call to demote and dismantle speculative thinking draws more attention not only to how much the Society relies on it themselves, but also to how vital speculative thinking is to the public’s understanding of natural philosophy. Sprat’s *History* and Cowley’s ode, therefore, become an additional method through which we can ascertain how the public may have conceived of natural philosophy, important groundwork for understanding why speculative prose and drama reacted to these developments with such skepticism.

precursors to what he terms the “modern.” In part one, he lists the philosophy of the east (naming them “ancients”). These eastern philosophies include those associated with the Assyrians, the Chaldeans, and the Egyptians. Sprat then discusses the philosophy of ancient Greece and Rome, the “Primitive Church,” philosophy under the Church of Rome, and the philosophy of the “Schole-men.” (5-28). Sprat labels all of these “ancient philosophies” as “hindrances,” before moving into his focus on the philosophy of “the Moderns,” as that which is practiced by the Royal Society (28).

⁷ Jarvis notes that Sprat actually preferred to open with prose by Francis Bacon, but the Society selected Cowley’s ode (65).

Forming the Society

In order to better understand Sprat's and Cowley's views, it is useful to first establish a brief history of how the Society came to be and the context in which it arose. In addition to the public nature of the Society, it is worthwhile to study the Society because "it can be taken as a symbol of particular conceptions of natural philosophy in this period (Dear "Toitus" 55). The prototype for the Royal Society was an informal group of men who met together in London in approximately 1645 in order to further experimental science (Purver xi); however, the actual Royal Society was founded in London in 1660, and it received the Royal charter in 1662.⁸ The 1660s, in fact, can be seen as one of the most productive decades in the history of "science" (Vickers ix). The Society's foundation was innovative because it signified a new type of establishment; it was a public body "devoted to the corporate pursuit of scientific research," which was something unprecedented (Hunter *Establishing* 1).⁹ The formation of the Royal Society was an "important episode in intellectual history," for it "embodied a new philosophy and a new scientific attitude" (Purver xi). As a Society, the Fellows saw themselves as standing for something unique, and they felt as though their work was important, in that they would be making significant and "far-reaching contributions to science" (Purver 21-

⁸ Despite the royal patronage, Peter Dear notes that the monarch did not take much interest in The Royal Society. In fact, the king was known to have referred to its Fellows as "fools." He also allegedly mocked them for their attempts at weighing air (115).

⁹ Hunter, like other scholars cited in this chapter, uses terms such as "science" and "scientific" in a broader sense that includes natural philosophy. See chapter two for a more in-depth discussion on how scholars often use the term "science" to anachronistically refer to natural philosophy. Because so many scholars rely on this term, it is impossible for me to avoid, but I only do so when directly quoting from scholars. In regard to natural philosophy as a public good, see James R. Jacob in *The Scientific Revolution: Aspirations and Achievements, 1500-1700* (1998). Jacob discusses that Francis Bacon felt that science must be a collaborative endeavor, "directed, administered, and paid for by the monarchial, bureaucratic state" (57). In Bacon's view, this was not so that knowledge should be subject to state control but so that it could be made available for the public good.

2).¹⁰ Additionally, when the Society received its royal sanction, it was bestowed with a corporate personality, in that it was given the right to employ officers, own property, build colleges, have a seal and coat of arms, begin its own printing, and license its own books (3). Some of these rights directly benefitted the Society's mission to promote public experimental philosophy. The printing and licensing of books, for example, gave them a direct method through which they could communicate with the public, as exemplified in Sprat's *History*.

Part of their public mission seems also directly tied to their establishment during a time that coincided with a period of turbulence within the mid-seventeenth century. It is remarkable that this institution was established within months of the restoration of the monarchy, and the Society's Fellows, despite any previous political views, were quite enthusiastic about the restoration of the king (Lynch 157).¹¹ Brian Vickers argues that the Restoration ushered in a confidence in the social and political stability and that new sense of constancy "encouraged the institutionalizing of science" (Vickers ix). Hunter contends that this institutionalization occurred at a moment when there was a "general urge to organize various facets of intellectual and public life" (*Establishing* 6). The Royal Society was also intended to be enduring, constant, and safe, something that was necessary after "the uncertainties associated with the Interregnum of the mid-century" (Hunter *Establishing* 10). Its organizers, in fact, seem to have "sincerely believed that the

¹⁰ These ideas were based upon Bacon's views and the overall break from ancient ways of teaching. Bacon complained that the customs of schools and universities viewed the progress of science in an adversarial manner. Empiricism would usher in a new way of learning, and the Royal Society viewed their endeavors as not just changing England, but as changing the world.

¹¹ Lynch goes on to explain the remarkable nature of the Royal Society's organization in that it represented a reform of knowledge, which was an interesting undertaking considering that this was a period in which reform was viewed in an unfavorable light (157).

enterprise to which the early Royal Society was dedicated *was* healing, that it would in some sense escape from politics by bringing together reasonable men from a wide range of ideological positions” (Hunter *Establishing* 10). In other words, the members of the Royal Society saw themselves as meeting a public need for a nonpartisan and stable organization that could join people of differing opinions together under the common interest of “scientific” observation and experimentation. Consequently, the Royal Society and its methods were inseparable from broader attempts to stabilize the political arena after the civil wars. The Society’s interest in characterizing itself as a healing enterprise contributes to the Society’s interest in the public. In essence, the belief in experimental philosophy as a public good provided its mission with a larger purpose and justified the emerging epistemology as essential to a healthy nation.

The society justified its focus on experimental philosophy by claiming it to be a balanced and moderate approach to understanding the world, which becomes part of its public mission, as well. In an anonymous memorandum from the Royal Society, the Society’s purpose is stated: “to improve the knowledge of natural things, and all useful Arts, Manufacturers, Mechanick practices, Engynes and Inventions by Experiments – (not Meddling with Divinity, Metaphysics, Moralls, Politicks, Grammar, Rhetorick, or Logick)” (qtd in Hunter *Establishing* 56).¹² This focus on experiments and observations becomes a hallmark of the Royal Society and appears to create a dividing line between what the members saw as their business and what, to them, would not be worth undertaking. In their view, the proper focus for the Society was on observation and

¹² According to Mikuláš Teich, this appeared in a draft of the Society’s preamble of its statutes in 1663 and has been ascribed to Hooke (57).

experimentation, which was grounded in Francis Bacon's writings. In fact, the Society's "emphatic emphasis upon observation and experiment" and the utility of each was something that was repeated again and again in the organization's memos and discourse (Hall 9). Bacon did place importance on the utility of experimental philosophy, specifically on the benefits it would provide for Britain as a nation.¹³ Ultimately, the Royal Society claimed these same ideals as its own to ensure that "Bacon's name was continually associated with its own" (Dear 116).

Despite the attempt to present a unified mission and focused organization, it is important to acknowledge that there were not singular methods or conventional beliefs shared by all Fellows (Hunter *Science* 47). Bacon's ideas provided the Society with an ideal cooperative approach, but in reality, it "failed even to act as a successful coordinator of the projects of individuals. Shared ideals among the early Fellows did not, as a rule, translate into shared projects or programs of research" (Dear "Toitus" 57). The individual Fellow within the Society, although part of a supposed cooperative organization, held his own views on natural philosophy, which did not always align with Bacon's ideas. Some Fellows, for instance, advocated for a "rigid Cartesianism," which others found "distasteful." Additionally, non-members practiced Baconian inductivism, similar to that practiced by many in the society, while also within the society were Fellows who relied on deduction (Hunter *Science and Shape* 104). Within the institution of the Royal Society

¹³ Please see the previous chapter for the difference between natural philosophy and experimental philosophy. Experimental philosophy is a part of natural philosophy, but its methods rely on observation and experimentation, while relying also on a collective experience of witnessing. See Francis Bacon's *The Novum Organum* for aphorisms on the utility of natural philosophy. For instance, "But the root cause of practically all the evils in the sciences is but one thing: that while we mistakenly admire and magnify the powers of the human mind, we fail to seek out true helps for it" (67). Also, "Thus truth and utility are (in this situation) the very things themselves" (187).

many were committed to experimental philosophy; however, others still looked to occult explanations for the natural world, relying on the “more arcane aspects of alchemy and astrology” (Hunter *Science and the Shape* 105).

This mixed approach to truth and knowledge is evident in my exploration of varied dictionary definitions of natural philosophy in the previous chapter. It also supports my argument that the public’s understanding of natural philosophy was one that incorporated both old and new epistemologies, especially when considering the mixed messages sent within the Society’s discourse. Understanding this mixed message helps us better appreciate the way experimental philosophy was understood at the time and how the Society’s rhetoric may have been received, which is especially important when considering that non-practitioners, as I will establish in later chapters, contributed to the Society’s discourse. When perusing the Society’s *Philosophical Transactions*, for example, a member of the reading public would just as likely come across a fantastical account of a monstrous birth as she would a detailed description of a beetle, indicating that they were apt to accept what we would now call fantastical as aligning with the experimental.¹⁴ The older and newer converging epistemologies resulted, at least in part, because the Society was founded in a moment in which Aristotelian science was “dethroned”; however, there was no established replacement that had materialized yet (Hunter *Science and the Shape* 105). The Royal Society, despite its public and vocal

¹⁴ The Royal Society’s secretary Henry Oldenburg headed the Society’s journal up in 1665, originally as a “money making venture” (Dear 118). Similar to Sprat’s *History*, the *Transactions* became a place to rhetorically position the Society as Baconian in philosophy and to stress the practicality of its work. Oldenburg’s prefaces tended to focus on championing empirical and experimental natural philosophy. Consequently, there was a “scarcity of articles in the journal that might have appeared too theoretical, hypothetical, or speculative” (Dear 118).

support of the experimental method, was still in the process of establishing the new methods of natural philosophy, but natural philosophy, at least during the Restoration, was still in transition. With that being said, the Royal Society very seldom entertained occult theories in its meetings, and during the isolated moments when the occult was discussed, the evidence in surviving minutes shows that such discussions led to discontent (Hunter *Science and Shape* 105).¹⁵ This type of discontent was associated with ancient philosophy, something the Society believed that observational and experimental methods would remedy. The Royal Society, therefore, “was representative of the general character of Restoration science,” but this, according to Hunter, “was largely due to random selection” (Hunter *Science* 47). Despite the fragmented views and practices of the Fellows, the Society was viewed during the Restoration as “the institutional embodiment of the new science” (Hunter *Science* 48).

Experimental Philosophy and the Royal Society

The Royal Society and its initial practices serve as inspiration for early speculative writing. Consequently, the Royal Society represents one available lens through which to analyze the relationship between speculative writing and the vast array of the era’s interest in natural philosophy. Although there were other “scientific”

¹⁵ See Birch’s *History* from his notes of the Society’s meeting on December 13, 1677, in which a Mr. Oliver Hill asks permission to discuss his theory at the next meeting. The president indicated he would be allowed even though “the method and business of the Society were very different from those [Hill] propounded.” On December 20, the notes from the meeting indicate Hill was called upon and he described how the “the skin of the pepper being very porous” [...] “was the cause of the receiving of the spirit of the air” and that these pores allowed for little creatures to hatch within the black pepper, claiming that these worms had been produced by the pepper without seed or egg but by the “spirit of nature.” Birch notes that the Society objected to Hill’s ideas (iii, 363, 366-7, 371).

enterprises at the time, including scholars who had enough financial means to conduct experiments in natural philosophy outside of the Royal Society, it is the public profile of the Society that inspired and galvanized a range of responses to its tenets and experiments.¹⁶ Peter Dear argues that the public presentation of the Society's members was one of the ways it "attempted to legitimize its role in English society" (116). Moreover, the Society's publication of its *Philosophical Transactions* reached a still wider public audience, in a way that in-person exhibitions of experiments could not. Through the *Philosophical Transactions* the Society circulated reports of experiments, and this was one avenue through which the Fellows attempted to gain the public's trust (Johns 249). Members of the reading public, which extended to virtuosi outside London, acquired access to the *Philosophical Transactions* despite not having direct access to the Society. Hunter goes so far as to argue that it was the *Transactions* that became a "public symbol of the [Royal] Society's vitality" (51). Many of the articles within the *Transactions* were written for actual practitioners of natural philosophy, but the "journal was also aimed at a wider public." Hunter notes that Henry Oldenburg, the publisher of the *Transactions*, positioned the journal as a commonplace book that is published in English so that any Englishman who is interested in "curious things" can benefit without having to know Latin (qtd in Hunter *Science* 53).

¹⁶ Michael Hunter establishes that the Royal Society was not the central research location for men with interests in natural philosophy and that the Society's Fellows did much of the work of experimental philosophy on their own (*Science* 46). Despite the fact that Hunter argues that experimental philosophers often worked outside the Society, he also posits that we must give credit to the Society for its ability to gain "social respectability by recruiting eminent public figures to its ranks. Its membership lists, profusely decorated with the names of (mainly inactive) bishops, statesmen and aristocrats, enjoyed wide circulation, disseminating esteem for the Society among non-members at home and abroad" (48).

Exhibitions of the Society's experiments were also made public, and collective observation of those experiments became a vital component of the Society's stance on experimental philosophy. Steven Shapin notes, "The Royal Society vigorously advertised its experimental program throughout Europe" (96). Shapin details the importance of public demonstrations of experiments:

English empirical tradition laid special emphasis on factual particulars as the secure foundation for national philosophical knowledge. If particular experience was to serve that function, however, their authenticity as actually occurring, historically specific happenings somehow had to be guaranteed and made persuasive to a community. Consequently, if such particulars were to become part of a shared stock of knowledge, reliable ways had to be found to make them travel, to extend them from an individual to many others. (106-7)

Experimental philosophy, according to Shapin, depended upon the conveyance of fact in a way that would be believable to the public; therefore, an imperative project within experimental philosophy was finding ways to get the discoveries to travel from person to person. Thus, public observation and understanding of experimental philosophy is crucial, and conclusions about the way the natural world works have to reach the public in order to become an accepted part of knowledge. In order to persuade the general public of the findings that experimental philosophy yields, those experiments have to be made available to the public. Essentially, experimental philosophy stressed the notion that observations and conclusions derived from those experiments only had value when they could be observed collectively, and it was ideal if those experiments could be repeated (Johns 247). Shapin specifically discusses the demonstrations of the air pump for

audiences.¹⁷ Robert Boyle found that certain techniques could be demonstrated on instruments such as the air pump, and the air pump could be brought to many locations. Demonstrating the air pump for public audiences extended experimental philosophy's reach from the "individual to the public domain." These public demonstrations allowed for more witnesses to observe the experiment, lending credence to its authenticity. Shapin establishes such public experimentation as "a routine feature of the meetings of the Royal Society" (107).

As Sprat's *History* will show, the Society insisted on forwarding knowledge that comes only through observation and experiment because of their belief that they were creating an organization free from political, religious, and social bias, adding to their mission of stabilizing the political environment after the Interregnum. Bacon's teachings allowed the Society to pursue its cooperative endeavor, in that Bacon believed that experimental undertakings should be taken on as a community.¹⁸ We also know that Bacon's ideas were prominent in the minds of the founding members of the Royal Society because his image was chosen as one of the two men represented on the frontispiece to Sprat's *History of the Royal Society*.¹⁹ Bacon's philosophy, therefore, represented an ideal philosophy for the Royal Society, since it was centered on gathering

¹⁷ The experimentations and demonstrations with the air pump took place in the 1660s. The air pump was a device used for experimenting with the pressure and volume of air within a closed system. At the top of a machine sat a globe made of glass, into which objects and small animals could be placed, such as candles and mice.

¹⁸ In *The Great Instauration* Bacon says all must "join in consultation for the common good" (75). In Book One, aphorism 113, Bacon advocates for the "gathering in of experience" in which the labors of men may be "brought together." Bacon's "Preparative Towards a Natural and Experimental History" acknowledges that the work of natural philosophy cannot be done without "great labor," "requiring as it does many people to help" (190).

¹⁹ The other man pictured is King Charles II.

observational data, an action that the Society felt was “impartial” and “balanced.” Relying on experimental philosophy, at least in their opinion, “would end the divisiveness which traditional intellectual activity was often deemed to have fostered” (Hunter 10).²⁰ Sprat stresses the Society’s philosophy of community and togetherness, in that he saw the application of experimental philosophy as benefitting everyone; Sprat asserts of the early Fellows of the Royal Society that “they openly profess, not to lay the Foundations of an *English, Scotch, Irish, Popish, or Protestant Philosophy*; but a *Philosophy of Mankind*” (Hunter 63).

The experimental method, therefore, did take center stage at Royal Society meetings. They may not have intended to exclude mathematical or speculative science, but the experimental method dominated meetings for practical reasons. For example, mathematics did not prove to be a topic that was “suited for discussion at meetings” because the members who attended would have had “diverse interests,” and many of these men were virtuosos (Hall 10). Virtuosos found experimental philosophy to be enjoyable to watch, but they were not “mentally or temperamentally equipped to investigate it themselves” (Hall 10).²¹ Additionally, the discourse of speculative philosophy, which included hypotheses, was seen as something that led to disputes and “wranglings, upsetting the properly quiet atmosphere of learned debate, while experiment and observation could usually be spoken of without passion and dispute” (Hall 11). As

²⁰ The institution felt that the consensus that experimental philosophy allowed for, in addition to its mixed membership, created a more balanced approach to knowledge, something that Cartesianism, for instance, would not have fostered (Hunter 10). The public, according to Hunter in *Science and Society*, were looking for consensus and rationalism (27).

²¹ Hall establishes that virtuosos were not “learned” but instead were only interested in nature and others’ discoveries; therefore, they participated in natural philosophy in its “simplest form,” often just observing and not experimenting or by “collecting rarities” (10).

seen later in this chapter when I examine Sprat's *History* in more detail, debate and disagreement are positioned in opposition to the experimental method because impassioned dispute was associated with divisive ancient and speculative philosophy.²²

The Royal Society did its best to put forth an image of community, but the public did not always see the Society as existing for the greater good. The Royal Society had a “rather naïve” presumption that the new science was “not only harmful to no one,” but that the public would also find it positive and appealing (Hunter 56). One of the goals of Sprat's *History* was to explain the broader role of experimental philosophy, and the Society hoped this explanation would not offend anyone. Instead, “the Society's organizers found that they had stirred up a hornet's nest of hostility, illustrating that some of the religious, intellectual, and political implications of the new science *were* potentially more controversial than they seem to have appreciated” (Hunter 65).²³ Sprat's attempt to offer a rebuttal to these early criticisms of the Royal Society, therefore, did not quell the stream of criticism lobbed at the Society. Nevertheless, his *History* was issued as an apology, in part because of the constant scrutiny. In the opening to the third part, which serves as the Society's defense, Sprat contends:

It is therefore fit that they alone, and not others, who refused to partake of their burden, should be Judges by what steps, and what pace, They ought to proceed. Such men are then to be intreated not to interrupt their *Labours* with impertinent rebukes; they are to remember that the *Subject* of their *Studies* is as large as the

²² See the previous chapter for an in-depth explanation of the differences between speculative and experimental philosophy and why hypothesis was viewed pejoratively.

²³ Hunter explains that the publication of Sprat's *History* was a disaster in England (65). For several years after it was printed, some of the most serious attacks on new science were published: Meric Casaubon's *Letter...to Peter du Moulin* (1669) and Henry Stubbe's *A Censure upon Certain Passages Contained in the History of the Royal Society, As being Destructive to the Established Religion and Church of England* (1670).

Universe: and that in so vast an Enterprise, many intervals and disappointments must be recon'd upon. (318)

Sprat entreats those not involved in experimental philosophy to remain silent in their judgments, claiming that only those who practice experimental philosophy are in positions to critique the Society's past. Only those who have taken on the "burden" can decide what methods will best serve the Society's goals. Sprat's plea centers on the important work the Society has undertaken, reminding his reader that "impertinent rebukes" only detract from the very real and very significant business of understanding the universe. Sprat does not claim infallibility but instead acknowledges the time it will take and the mistakes that will be made in such important and large studies. Despite Sprat's attempt at public relations and despite the public's fascination with following what experiments had recently been performed by the Royal Society, this did not keep writers from turning experimental philosophy and its practitioners into objects of ridicule. But the poets and dramatists who ridiculed and attacked the Royal Society and its new philosophy actually increased the popular interest in experimental philosophy (Stimson 86).

Sprat's *History*

In 1662, the same year of its royal sanction, the newly founded Royal Society considered publishing a defense as a means to ensure its "continued existence" (Morgan 27). According to John Morgan, Sprat had little interest in experimental philosophy, but he did "already have a reputation as a 'wit,'" so he was asked to join the Society to write

its history, which was printed in 1667 (27).²⁴ Ereck Jarvis agrees with Morgan's assessment, asserting that Sprat's sole reason for becoming a Fellow was to write the defense and that he never actually practiced experimental philosophy (55).²⁵ For those reasons, Jarvis also believes that Sprat did not have the ability to "accurately explicate the Society's early methodologies" (55). Morgan goes so far as to label Sprat's propaganda as both "forceful" and "inaccurate" (27), and he lists some of the following errors of Sprat's *History*: it relied too heavily on Bacon's influences, it underplayed the contemporary impacts on the Society, and it downplayed the speculative and mathematical activity taking place within the Society (Morgan "Sprat"). Although Morgan and Jarvis would have us believe that Sprat's representation of the Society should not be trusted, they both include information that complicates such an assertion. For example, each of them lists the many reviewers who oversaw Sprat's work. Morgan details how a council was created in 1664 to select materials to be included in the text when Henry Oldenburg became concerned that the text did not provide enough "evidence of the society's scientific productivity" ("Sprat"). Furthermore, another committee was established to review Sprat's text in 1665, and, in 1667, John Wilkins penned an abridgement of some of the society's statutes, which were included in the *History* (Morgan "Sprat"). Jarvis also acknowledges Sprat's unique position as writer of the history, noting that since he was a Fellow, he "was drawn into the group's complex

²⁴ Sprat's early poetry is what marked him as a wit. Morgan lists the following poems by Sprat in the *Oxford Dictionary of National Biography*: "Ode on the English Ovid" (1657), about Abraham Cowley; contributions to "Naps upon Parnassus" (1658); "To the happie memorie of the most renowned prince, Oliver, lord protector" (1659); and "The Plague of Athens" (1659), which imitated Cowley's style.

²⁵ Sprat did remain a member of the Society until his death, despite his inactivity (Morgan "Sprat").

negotiation of authority” and that his writing was mediated by the Society (56).²⁶ Additionally, J.R. Jacob details the Fellows who, in addition to Wilkins, would have inspected Sprat’s work before publication: William Brounker, president from 1662 to 1677; Sir Robert Moray, president of the Society before its incorporation; John Evelyn, the Society’s secretary, and Robert Boyle, “probably the most respected natural philosopher in Restoration England” (“Restoration” 25). Jacob uses this list of reviewers to suggest that Sprat’s views would have had to be shared with some of the principal founding members of the Royal Society. He admits that Sprat’s *History* cannot be representative of every single Fellow, but that it “does hold for the leading Fellows” (“Restoration” 25).

Based on these divergent opinions, it would be problematic to state that Sprat’s rhetoric stands in for all beliefs held by all Fellows. As I have established, the emerging experimental philosophy did not immediately replace other methods, so Sprat’s *History* does not represent these other philosophical methods that were present within the Royal Society. I do not propose that Sprat’s *History* be read as representative of each individual member; however, I do think Sprat’s *History* is valuable because it was written during a time in which England was still experiencing turmoil and because it promotes the Society in a way that proved “amenable to a Restoration audience” (Jarvis 63). No matter how inaccurate Sprat’s representation of the Society might be, we cannot disregard the fact

²⁶ Jarvis draws attention to Sprat’s aforementioned desire to preface the *History* with Bacon’s prose. His plan for the work, however, did not materialize; instead Cowley’s ode prefaces Sprat’s text. Jarvis argues that this incident reveals Sprat’s “authorial positioning” and showcases his membership in the collective: “the dialectical figure of association at once requires the elective participation of individuals to constitute its authority and yet subjects each individual, including Sprat, to the mediation of the group” (65).

that many important founding members reviewed and gave his work their stamp of approval, and we cannot deny the message the reading public received about the ideals of the Royal Society. It is propaganda, and there are overstatements, misrepresentations, and inaccuracies, but that does not negate the impact of the message or the influence it might have had on the public's conceptions of experimental philosophy.

One of the reasons for the Society's success was because of the public ways in which they promoted experimental philosophy, and Sprat's *History* was one of those essential forms of promotion. Although Charles II's charter provided the Royal Society with valuable support, his royal sanction "did not eliminate the perceived need for Sprat's history as both a justification directed at potential critics and a basic primer in science for the uninitiated" (Hillyer 32). Similar to the dictionaries, Sprat's *History* informed a reading public about a field that was very new, so new in fact that its founding members also struggled toward defining their enterprise (32). The public, however much it desired definition, did not necessarily embrace experimental philosophy without reservation because they often took issue with the way the Royal Society redefined the objectives of inquiry as departing from deduction and theoretical suppositions to relying on inductive methods. Consequently, this new approach brought with it the need for legitimacy. In the early years of the Royal Society, it seems that much energy was spent doing just that (Gaukroger 1). Sprat's *History* not only promoted its work but also combatted its critics. The main focus of the *History* is a passionate defense of and support for experimental philosophy. In advocating for experimental philosophy, Sprat also devotes much attention to explaining why speculative philosophy, which relies on hypothesis, is in opposition to

the Society's methods. Sprat's *History*, consequently, became the Society's "major platform for propaganda" (Dear 116).

Despite Sprat's insistence on the opposite, experimental philosophy and speculative philosophy were not clearly distinguished from each other in the seventeenth century. Myth, magic, alchemy, and hypothesis would all be considered to be speculative in nature. Sprat, due to the type of the apology he was writing, set up a somewhat "artificial polarization between science and magic, between the clarity of the aims and method of the new empirical science and the obscurity" of speculative philosophy (Hunter *Establishing* 55). Essentially, Sprat's *History* gives the impression that members of the Royal Society "wholly eschewed a concern with magical phenomena" or with alchemical investigations, when in actuality, "a more mixed position was the norm" (Hunter *Establishing* 55).²⁷ Furthermore, Sprat does present and examine a list of hypotheses made by the Royal Society, which must mean that speculation and theory building were a vital part of the early activities of the Society. However, Sprat continually takes a defensive position against speculation.²⁸ Barbara Shapiro suggests

²⁷ G. MacDonald Ross notes how natural philosophers in the seventeenth century "had a considerable problem if they wanted to maintain that they were different in kind from the magicians of old and were not simply the first generation of *successful* magicians" (102).

²⁸ Thomas Birch reveals a Society that was very concerned with separating itself from hypotheses. He details the instructions the Society gave Robert Hooke in 1664 before they would print his *Micrographia*. They wanted him to specify in a dedication that the Society licensed the book "yet they own no theory, nor will be thought to do so: and that the several hypotheses and theories laid down by him therein, are not delivered as certainties, but as conjectures; and that he intends not at all to intrude or expose them to the world as the opinion of the society" (490). Hooke did meet the Society's request. He begs for their pardon in the preface to *Micrographia* and says, "The rules YOU have prescrib'd YOURselves in YOUR Philosophical Progress do seem the best that have ever been practis'd. And particularly that of avoiding *Dogmatizing*, and the *espousal* of any *Hypothesis* not sufficiently grounded and confirm'd by *Experiments*." He admits there may be some expressions of his which will not suit the "prescriptions [they] permit" so he makes sure to note that his conjectures were not done by the Society's directions. For, Hooke says, "it is most unreasonable, that YOU should undergo the *imputation* of the *faults* of my *Conjectures*."

that Sprat may have been aware that some of his readership would have found hypothesis “to be inconsistent with the primary task of gathering empirical data and experimentation” (47-8). Whatever Sprat’s justification for acknowledging speculation as part of the Society’s work, while also criticizing it, it is important to note that the *History* provides a bit of a mixed message concerning speculation. This mixed message highlights how early experimental philosophy had not divorced itself from speculation, despite the public rhetoric that insists on the superiority of experimental philosophy.²⁹

The rhetoric in Sprat’s *History* clearly sets up a divide between the speculative and the experimental. In the epistolary dedication to the King, Sprat states, “a higher degree of Reputation is due to Discoverers, than to the Teachers of Speculative Doctrines.” This leaves no room for argument. Sprat clearly denigrates those who spread speculative knowledge, by creating a hierarchy in which the “Discoverers,” or those who engage in experimental philosophy, deserve more esteem than those who pursue other avenues of knowledge. Sprat continues to set up experimental philosophy in opposition to older forms of learning. He first brings up ancient methods of natural philosophy, or those associated with Aristotle, and says of the men who practiced and still continue to practice it that they are

Men of hot, earnest, and hasty minds: and so lov’d rather to make *sudden*
Conclusions, and to convince their hearers by argument; then to *delay* long,

²⁹ It is important to remember the distinctions between what we know today as hypothesis and the way hypothesis was understood at the time. During the Restoration and early eighteenth century, hypothesis and theory were aligned with speculation, supposition, and conjecture. Because of these connections, hypotheses had a clear connection to the imagination. Even though we associate hypothesis today with an essential part of the scientific process, this term was used pejoratively at the time. For more information about this, please see chapter one.

before they fixt their judgments; or to attend with sufficient patience the labour of Experiments. (7)

The attacks Sprat makes against Aristotelian philosophy also implicitly enforce the ideals put forth by the Royal Society – those of moderation and balance. Ancient philosophers exhibit, in Sprat’s view, an excess of passion or fervor: their minds are too intense. Their decisions are made too quickly, and their egos are too entrenched in rhetoric and persuasion, when they should instead exhibit patience by conducting experiments and avoiding hasty conclusions. As mentioned previously, the Royal Society regarded itself as an institution that might be able to heal the nation after the strife associated with the civil wars and Interregnum, and part of that healing is tied to the Society’s moderate methods. Sprat’s attack on Aristotelian methods of natural philosophy was more than just a break from the ancients; therefore, references to the excessive passion of ancient philosophy resembled the intensity associated with political instability. Conversely, Sprat saw the experimental method as something that could rebuild English nationhood (Lynch 32). The Restoration itself resulted in a “flurry of examination,” focused precisely on what united the English as a nation (159). What tended to emerge, especially in opposition to what was seen as the frenzied enthusiasm associated with the civil war, was a focus on moderation. Sprat’s *History* attempts to align the natural philosopher with the values of English moderation, exemplifying a model citizen (160). Ultimately, Sprat positions the ancient method of formulating knowledge as part of the type of excess that led to the civil wars and Interregnum.

Sprat continues his attack by shifting his focus to university learning or what he refers to as “the Philosophy of the Schole-men.” In the case of this type of learning, Sprat condemns it because the only course such learning takes is “that of *disputing*.” He contends: “the very way of *disputing* itself, and inferring one thing from another alone, is not at all proper for the spreading of knowledge” (17). Sprat admits that disputes are advantageous to making men’s minds more versatile and sharpening their wits, but disputation also leads men to defend “Principles, which they already know.” Such knowledge can never replace “the *solid substance* of *Science* itself” (18).³⁰ Sprat lists several complaints that he says men make against the type of learning and knowledge found in ancient and university education: it makes men “unsettled”; it takes up too much of their time; it makes them “Romantic”; it makes men “become averse from a practical course”; it makes them too concerned about “things” and things have no “use in the world”; and it makes them too intent on looking to the past, causing them to neglect their own time (331).³¹ Sprat contends that experimental knowledge “contains the best remedies for the distempers which some other sorts of Learning are thought to bring with them” (332). In referring to “distempers,” Sprat speaks of individual bodies that suffer the consequences brought on by other philosophical methods. In this case Sprat relies on

³⁰ Sprat uses the term “science” to compare ancient philosophy with experimental philosophy. It is disputing and deductive reasoning that sharpens “mens wits” and allows them to defend principles they “already know,” but those methods do not produce the substance that experimental philosophy does (18). In this context, it seems Sprat is relying on the understanding of “science” to mean “the state or fact of knowing,” especially since he dismisses ancient philosophy for focusing on that which is already known (“science,” *OED*).

³¹ Sprat explains that being “Romantic” is associated with making men “subject to frame more perfect images of things, than the things themselves will bear” (331). Sprat’s usage seems to align most with the *OED* definition of Romantic as meaning: “arising from, suggestive of, or appealing to, an idealized, fantastic, or sentimental view of life or reality; atmospheric, evocative, glamorous.” (“romantic,” *OED*).

older philosophy, referring to humoral theory to justify the new methods. Being distempered was associated with a disordered mind, once thought to be associated with an imbalance of humors.³² Again Sprat aligns knowledge that departs from experimental methods as connected to disorder, imbalance, and disease. The fact that he positions the new experimental philosophy as a “remedy” implies that England is in need of healing and the source of that cure will come in the form of Baconian philosophy. By aligning knowledge associated with former philosophies as excessive and unhealthy, Sprat is able to legitimize the Royal Society because of his fundamental “appeal to objectivity and non-partisanship, what later became the idea that science should be value-free” (Gaukroger 1-2).

Sprat characterizes imbalances as dangerous to the nation, but these same imbalances are also ones that he sees as detrimental to the individual. Drawing attention to the deficiencies found in the man who practices speculative philosophy provides Sprat with an additional way to uphold experimental philosophy as superior. It is the speculative philosopher, or he who “only contemplates,” who is inclined to the weaknesses mentioned above. This inferior type of philosophy seems, at least in Sprat’s apology, to originate in the weaknesses associated with the imagination.³³ Of all men, it

³² “distemper,” *OED*.

³³ Sprat contrasts the experimental philosopher with the speculative philosopher. Of the experimental philosopher, Sprat argues that the satisfaction he finds is “real,” “not *imaginary*.” Instead of drawing knowledge from things that are not “out of the world,” he draws knowledge from within the world. The speculative philosopher gets carried “farther off” by his suppositions, while the experimental philosopher is brought “nearer to Practice.” (336). In this case, Sprat’s use of the word “imagination” does provide the reader with an understanding that speculative philosophy focuses on drawing truth from things which can only be supposed in the mind and not observed by the senses and known for certain. For more discussion on the ways the term “imagination” was understood, refer to the discussion and Table 3 of dictionary definitions in the last chapter.

is the “*Speculative Men*” and their “solitary imagination[s]” that are the most prone to distraction from the business of the world because their imaginations make them “converse in the shadow with the pleasant *productions* of their own *fancies*” (335-36). Sprat insinuates that it is speculative philosophy that relies on the imagination for discovery, a type of discovery, however, that is opposed to everything experimental philosophy relies on to alleviate any public anxieties and concerns. It is not, according to Sprat, the community of experimenters that one ought to fear; it is the individual who allows himself to be pulled into the darkness of contemplations within his own imagination. Those solitary ruminations and fancies are products of substandard methods and thinking, leading to unfounded fears about the world. In fact, Sprat aligns speculation with the “poets of old,” whom he sees as the origins of some of this false thinking:

And as for the *terrors* and *misapprehensions* which commonly confound the weaker minds, and make mens hearts to fail and boggle at Trifles; there is so little hope of having them remov'd by *Speculation* alone, that it is evident that they were first produc'd by the most *contemplative* men amongst the *Ancients*; and chiefly prevail'd of late years, when that way of *Learning* flourish'd. The *Poets* began of old to impose the deceit. They to make all things look more venerable than they were, devis'd a thousand false *Chimæras*; on every *Field, River, Grove,* and *Cave*, they bestow'd a *Fantasm* of their own making; With these they cloath'd with what shapes they pleas'd; by these they pretended, that all Wars, and Counsails, and Actions of men were administered. And in the modern *Ages* these *Fantastical Forms* were reviv'd and possess'd *Christendom*, in the very height of the *Scholemens* time: An infinit number of *Fairies* haunted every house; all Churches were fill'd with *Apparitions*; men began to be frighted from their *Cradles*, which fright continu'd to their *Graves*. (339-40)

In Sprat's view, “terrors” and mistaken beliefs confuse those who exhibit deficient minds. It is these kinds of minds that are startled by stories and fictions. Speculation, according to Sprat, will never be able to repair these inadequacies because speculation is the root of

these problems. Sprat briefly traces the root of contemplation to ancient philosophy, and he faults the poets of that time for creating a type of deceit. The ancients may have started it, but Sprat asserts that in the “modern *Ages*” these forms have been “revived,” putting deceit in an authoritative position within schools and churches. Sprat aligns this kind of poetry (and speculative philosophy) with falsity, and he admonishes those poets for creating worlds where there are none. These types of poets, like the speculative philosophers, manifest what they want, with meanings and conclusions that please them. He claims their poetry produces “chimeras,” “fantasm[s],” “fairies,” and “apparitions.” This kind of poetry creates a type of knowledge based on mere fables and hallucinations. Speculation, therefore, is of the supernatural. It takes what is invisible and makes it appear to be real and visible, which is in direct opposition to experimental philosophy, which seeks to take that which is visible and understand it. It is speculation that creates and perpetuates fears, and these false representations of the world have infiltrated both schools and churches. For Sprat, it is speculative thinking that will keep man “possess’d.”

When contrasted with the speculative philosopher above, the experimental philosopher is made moderate and his passions temperate because his philosophy takes place as part of a communal effort. It is when the collective comes together to pursue truth that they will find “an excellent cure for that *defect*” (85). In this case, the defect to which Sprat refers is the defect of an imagination that runs too swiftly. Part of the cure comes from the way this type of natural philosophy – that is, experimental philosophy – is practiced, in that it requires multiple observations and repeated experimentations by more than one man in order to draw definitive conclusions:

For this, the best provision must be, to join many men together, for it cannot be imagin'd, that they should be all so violent, and fiery: and so by this mingling of Tempers, the *Impetuous* men, not having the whole burthen on them, may have more leisure for intervals to recruit their first heat; and the more *judicious*, who are not so soon possess'd with such raptures, may carry on the others strong conceptions, by soberer degrees, to a full accomplishment. (85-6)

Although this may have not been the case in actuality, Sprat formulates and envisions a Royal Society that promotes a checks and balances of sort. By mingling together various temperaments, from the “fiery” to the “judicious,” the Society is able to achieve a type of moderation through the joining of many men. Because the philosophers are working together, the strengths in one cover over or rectify the weaknesses in another. This balanced approach to experimental philosophy allows them to guard “themselves against themselves” so that their individual thoughts do not lead them into error (92). Those who do not practice experimental philosophy open themselves up to the strengths of their own beliefs, as well as exhibiting too much confidence in their own abilities. In other words, Sprat contends that the individual is too prone to error because of how easy it is for him to focus on his own thoughts, successes, and discouragements, and such views do not allow for objectivity. When attempting to formulate knowledge about the natural world, there is also a risk of error. The senses can deceive, and our understanding can fail, both of which could undermine the conclusions derived from observation. This problem of fallibility is also partly what Sprat addresses by drawing attention to “many men together.” Essentially, he and the Royal Society believed that “collective efforts by many investigators, over time, would achieve relatively error-free findings that, if not ‘certain’ in the old sense, would at least attain to the highest level of the probable” (Shapiro 5).

Clearly, Sprat's *History* denigrates speculative philosophy so that experimental natural philosophy can be lauded and defended. Sprat calls the experimental philosophers the "*new Philosophers*." Experimental philosophers not only disagree with the ancients but have also taken it upon themselves to rectify philosophy's aims by focusing on experimenting (35). Unlike the speculative philosophers and poets detailed above, the experimental philosopher is freer because "the satisfaction he finds, is not *imaginary*, but *real*: It is drawn from things that are not out of the world, but in it" (336). Again, Sprat makes a distinction between speculative/imaginary and experimental/real to align the project of the Royal Society with more practical and tangible aims. In describing the aims of the experimental philosopher, Sprat's imagery is reminiscent of the faults he finds with speculation and poetry. Those "few" philosophers who experiment "must divest themselves of many vain conceptions, and overcome a thousand false Images, which lye like Monsters in their way" (35). These terror-filled fancies are a hindrance to the new philosopher's direction and project. He cannot just begin his experiments, but he first has to contend with all his false thinking. Sprat comes back to these types of metaphors again and again when speaking of the plight of the experimental philosopher. He must perform a type of unlearning in order to move forward.

This separation that Sprat creates between the speculative and experimental allows him to position experimental philosophy as useful, not only to discovery, but to the health of the nation. Experiments provide not only help to public and civil life, but they also assist British subjects with the "management of the privat [*sic*] motions, and passions" (342). Speculative philosophy moderates both public and private life by

keeping one's passions and emotions under control. Although he blames speculative philosophy for being fantastical and impractical, Sprat finds even more blame to place upon conjecture when he associates indolence with speculation. Sprat argues that when we consider what causes "violent *desires*, malicious *envies*, intemperate *joys*, and irregular *griefs*," we find that "they are chiefly produc'd by *Idleness*," and experimental philosophy can cure that idleness with the diversion of "*innocent Works*" instead of the delusions provided by idleness" (342). Explicitly, Sprat aligns indolence with delusions, and idleness also denotes trivial and worthless activity.³⁴ The danger, therefore, to the individual who meddles in speculative philosophy is the cultivation of negative emotions. The individual is prone to longing or feelings that are dangerous, sinful, disorderly, and unregulated. Even positive emotions such as joy are tinged with excess, in that pleasurable feelings should also be moderated. Once again, it is experimental philosophy that is positioned as a rectifying and moderating activity. Because the "*Art of Experiments*" is "active, and industrious," it has "power enough to free the *minds* of men from their vanities, and intemperance" (343). Instead of idleness, Sprat champions experimental philosophy because it is more practical, which harkens back to the dictionary definitions of the new philosophy, as well.³⁵ Unlike the experimental philosopher, the speculative philosopher "vainly reduces every thing to grave and solemn general *Rules*, without discretion, or mature deliberation" (Sprat 341). Experimentation, on the other hand, is a "more practical way, to prepare their *minds* for the world, and the

³⁴ "idleness," *OED*.

³⁵ In the previous chapter, I detailed several dictionary entries for the term "speculative." Phillips (1706), Bailey (1730), and Johnson (1755) all define the speculative as being opposed to the practical because of its focus on the theoretical. Experimental philosophy, at least the type practiced by the Royal Society, defended their project, partly, because of the usefulness of these experiments to practical life.

business of human life” (329). Sprat’s praise of experimental philosophy focuses on its utility for the nation, as a whole, in both private and public behavior.

A society that calls for an apology and history after a mere seven years is one that definitely has a public relations problem, a fact that Sprat concedes when he says, “*Experimental Philosophy* has met with very hard usage” (26).³⁶ Sprat acknowledges the public’s criticisms of experimental philosophy throughout his explanations when he admits the Society and its visions could fail:

But if all this should fail; there still remains a refuge, which will put this whole matter out of dispute: and that is, that the *Royal Society* will be able by degrees, to purchase such extraordinary inventions, which are now close lock’d up in *Cabinets*; and then to bring them into one common Stock, which shall be upon all occasions expos’d to all mens use. This is a most *heroick Invention*: For by such concealments, there may come very much hurt to mankind. (75)

Essentially, Sprat contends that even a failed experimental philosophy is a worthwhile endeavor because of its mission to bring the individual speculator into a collective, where observation, speculation, and conclusions happen in a community. In so doing, truth that has been kept private and hidden will become part of public knowledge. Truth will be available to any who want to discover it. Not only does the speculative pose a danger to Britain, as a whole, or to the individual subject, but speculative philosophy poses a danger to “mankind” because it keeps discoveries and technologies hidden and locked up.

³⁶ I use the term “apology” to signify a type of writing meant to defend and/or vindicate from accusations and attacks. For more on how the Royal Society was ridiculed and critiqued see: Dorothy Stimson, *Scientists and Amateurs: A History of the Royal Society*; Margery Purver, *The Royal Society: Concept and Creation*; Marjorie Hope Nicolson, *Pepys’ Diary and the New Science*; Michael Hunter, *Establishing the New Science: The Experience of the Early Royal Society*; Marie Boas Hall, *Promoting Experimental Learning: Experiment and the Royal Society 1660-1727*; Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*; and Frank Boyle, “Old Poetry and New Science: Swift, Cowley, and Modernity.”

Experimental philosophy, on the other hand, turns the private cabinet of curiosity into a “*publick Treasure*” (74).

As much as Sprat and the Royal Society distanced themselves from speculative philosophy and presented those methods as the foundation of many societal ills, Sprat has to acknowledge speculation in the work being done by the Royal Society at the time. P.B. Wood asserts that Sprat could not ignore the Society’s speculative (or theoretical) activity because he is replying to the Society’s critics: “yet the brevity of this section and the lack of concrete examples indicate that, had it not been necessary to silence the critics, discussion of the Society’s theoretical interests would have been omitted” (Wood 12). Even in acknowledging that natural philosophers in the Royal Society do sometimes have to speculate, Sprat is careful to keep certain divisions in place:

I will next declare, what room they allow’d for conjecturing upon the *Causes*; about which they also took some pains, though in a farr different way from the antient *Philosophers*; amongst whom, scarce any thing else was regarded, but such *general contemplations*. This indeed, is the *Fatal point*, about which so many of the greatest *Wits* of all Ages have miscarried; and commonly the greater the Wit, the more has been the danger: so many wary steps out to be trodden in this uncertain path: such a multitude of pleasing *Errors*, false *Lights*, disguised *Lies*, deceitful *Fancies* must be escap’d: so much care must be taken, to get into the right way at first: so much, to continue in it; and at last, the greatest caution still remaining to be us’d; left when the treasure is in our view, we undo all, by catching it too soon, with too greedy, and rash a hand. (101)

When Sprat speaks of conjecturing, he means speculative philosophy. That becomes clear because of the way he associates conjecture with the ancient philosophy and because of the detriments he lists as associated with missteps and dangers of too much speculation. His repetitive warnings against errors, deceit, and falsity continue, even as he attempts to

justify any dabbling in the speculative. Sprat attempts to legitimize any small need for speculation by making sure to note that experimental philosophers only engage in it after much caution beforehand and by making sure they use speculation for different ends than the ancients did. Sprat contends, “It is their study, that the way to attain a *solid Speculation*, should every day be more and more persued: which is to be done, by a long forbearing of *speculation* at first, till the matters be ripe for it; and not, by madly rushing upon it in the very beginning” (107). By using the word “solid” to describe the type of speculating experimental philosophers perform, Sprat still relies on a binary of good versus bad. Experimental methods, even those that rely on the speculative, are strong and based upon reason or sound principles. It is not frivolous, but instead represents a serious study.³⁷ Implicitly, he aligns the former speculation with a methodological hollowness, bereft of the gravity such study should have. Speculation is only considered slowly, thoughtfully, and moderately by members of the Royal Society, as opposed to “madly rushing upon it.” Fundamentally, it is avoided; it is a last resort. Sprat’s defensive tone insinuates some level of embarrassment in admitting that Fellows in the Royal Society do theorize and hypothesize (Wood 12). The humiliation of disclosing that seems evident when Sprat admits that his readers would “imagine” that any reliance on speculation does not mesh well with their purported “Method, and with the main purpose of their *Studies*, which I have often repeated to be chiefly bent upon the *Operative*, rather than *Theoretical Philosophy*” (257).

³⁷ “solid,” *OED*.

Sprat's justification for the Society's members' dabbling in speculation is grounded in the assertion that speculation done well and carefully *might* lead to new knowledge in the future. The Society, overall, abstains from unnecessary and untimely speculation because they prefer facts and experiments; however, they did not "deny the possibility of discovering true theories at some future date" (Wood 10). Any speculative activity by the Royal Society takes place only to further experimental philosophy. Sprat seems to be aware of how the Society's principles conflict with their practice, but he hopes that any doubts the public may have will be rectified by knowing that the Society does not rely on speculation as an "absolute end, but only use them as a means of farther *Knowledge*" and to ultimately "promote our *Experimenting*" (257).³⁸ Throughout the *History* there is sustained focus on the usefulness of experiments and observations; therefore, any acknowledgement of speculative pursuits has to be either downplayed or justified for "their ability to further the fundamental utilitarian aims of the Society" (Wood 12). Sprat presents theoretical/speculative philosophy as inferior to empirical/experimental philosophy, a claim to which fictive responses in prose, poetry, and drama will critique and investigate in relation to society and the individual, as I will explore in subsequent chapters. Margaret Cavendish, for instance, will present readers with a natural philosophy that incorporates the speculative with the experimental, while Restoration playwrights will speculate about the practitioner's inability to practice experimental philosophy without speculation.

³⁸ In this quotation, "them" replaces the words "principles" and "speculations." The complete quotation is: "I hope [the reader] will be satisfied, if he shall remember, that I have already remov'd this doubt, by affirming, that whatever *Principles*, and *Speculations* [the Society] now raise from things, they do not rely upon them as the absolute end, but only use them as a means of farther *Knowledge*."

Cowley's Ode

Many of Sprat's positions on the best way to formulate knowledge and his views on why speculation should be avoided are reiterated in Abraham Cowley's ode.³⁹ In March 1667, Cowley, who was then in retirement, received a letter from John Evelyn, who complained that the Royal Society had become the 'subject of satyr and the songs of drunkards.'⁴⁰ Evelyn requested that Cowley write a poem in support of experimental philosophy and the Royal Society.⁴¹ In May, Cowley agreed to the request, "happy to inform Evelyn that he had seen Thomas Sprat's soon to be published *History of the Royal Society of London*" (Green 69). Cowley's subsequent "Ode to the Royal Society" opens Sprat's *History*. Cowley proclaims allegiance to Baconian experimental philosophy, praises the work done in the Society, and "declares its noble purpose and destiny" (Butler 1). In addition to championing the cause, Cowley uses his poem as an opportunity to chastise those who disparage the Society. According to Cowley, the new philosophy is "despised" and criticized for being "impertinent" and "vain" (lines 152-3). The public's attacks on the Society highlight what they see to be absurd, trivial, and useless practices,

³⁹ Not much work has been done on Cowley's poem. His ode is often referenced in relation to Sprat's *History* but frequently in a tangential way. Similar to Sprat, scholars who have discussed Cowley's ode focus on the language reform project of the Royal Society. See Peter Dear's "Toitus in verba: Rhetoric and Authority in the Early Royal Society." Dear notes that Cowley's poem forwards the momentum of "rhetorical plainness in Restoration England" (104). Jeffrey Gore claims that "Cowley penetrated more deeply into the problem with rhetoric than Sprat does (362). Other discussions of Cowley's ode focus on his knowledge of Bacon's writings. Green, whom I cite in this chapter, focuses on Cowley as a transitional figure in the debate about the function of poetry and sees his championing of Baconian ideals as what contributes to that transition. Achsah Guibbory discusses Cowley's Baconianism in "Imitation and Originality: Cowley and Bacon's Vision of Progress." She reveals the relationship between authority and originality in Cowley's work. Hinman, whom I also cite in this chapter, disagrees with the idea that Cowley turns his back on poetry in favor of the new science. Hinman argues that Cowley sees the poet as someone who could unite experimental philosophy with imagination. As with Sprat, other scholars have not explored the divide each paint between experimental and speculative philosophy.

⁴⁰ Evelyn was one of the founding members of the Royal Society.

⁴¹ Interestingly, Cowley and Sprat were friends. Sprat wrote Cowley's first biography.

but Cowley refers to these accusations as “blows of ignorance” and the “sharp points of envious wit” (lines 158-9). Part of Cowley’s rhetorical purpose, like Sprat’s, is to convince his reader of the “virtuous” aims of experimental philosophy and its usefulness for all humans (150-51).⁴²

The poem, written as a Pindaric, is divided into nine parts and contains 184 lines devoted to praising Francis Bacon and the work being done within the Royal Society.⁴³ Cowley’s use of the Pindaric form brings grandeur to his representation of experimental philosophy as a stagnant knowledge rescued by Francis Bacon, whom he aligns with Christian and Greek heroes.⁴⁴ The poem opens with Cowley setting up a clear divide between the ancients and the moderns, or between ancient philosophy and the philosophy performed by the Royal Society. Cowley’s description of the history of philosophy

⁴² According to the Alexander Lindsay, Cowley was interested in experimental philosophy, although he was never a member of the Royal Society. In 1661, his short pamphlet on experimental philosophy was printed, entitled “A proposition for the advancement of learning.” “This is an appeal for the foundation of a college for the pursuit of experiments, to which is attached a school providing a scientifically orientated education for boys.” Cowley’s ode is the last one published before his death and may also be the last one he wrote.

⁴³ Part I begins the history of natural philosophy over the past “three or four thousand years” and the claim that natural philosophy has remained stagnant due to negligence and ambition. Part 2 and 4 lists the many ways that natural philosophy has been distracted over the years by certain types of wit, poetry, art, and images within one’s fancy until Francis Bacon rescued it. Cowley lists the many accomplishments of Bacon in part 3 and announces that Bacon has set knowledge free for all to gather their “fill,” and it is in part 5 where Bacon is pronounced the metaphorical Moses leading natural philosophy out of a barren desert. In part 6 and 7, Cowley shifts the focus to the Royal Society, first by proclaiming it as Gideon’s army picked by God himself as the victors and celebrating the discoveries in nature it has already accomplished. Cowley then chastises anyone who might dare to laugh at or scorn the Society, labeling those attacks as ignorant and envious before concluding his poem in the final part with praise for the Society’s courageous work in removing errors from natural philosophy, partly through its attempt to focus less on language and more on a “candid Stile” to represent nature.

⁴⁴ Scott Brewster notes that the Pindaric was originally written to “celebrate athletic victories in ancient Greece, serve particular occasions – including marriages, funerals, success in warfare – and bestow praise on monarchs, generals, the nobility, scientists, and writers.” Cowley’s odes, Brewster argues, are generally celebratory but can also be critical of power (64). *The Concise Oxford Companion to English Literature* defines the Pindaric as typically “passionate, visionary, and sonorous” (512). For more on Cowley’s use of the Pindaric, see Trotter who claims that Cowley saw the Pindaric as a mode of argument and knowledge formation (141-42).

“denounces both scientific endeavour in a generalized past [that] stretches back into antiquity,” as well as the most recent past just prior to the Civil War (Sawday 237). One way in which Cowley positions old philosophy against the newer methods practiced by the Royal Society is through anthropomorphizing natural philosophy in line 5, referring to it as “he” and claiming philosophy as a “male-virtue” (6). Cowley’s characterization of experimental philosophy as male supports his hierarchical separation of the old from new methods since prior philosophical practices were often gendered female. Although Sprat positions both speculative and experimental philosophy as male, the deficiencies he associates with the speculative – excesses of passion and emotion and being prone to the distractions of the imagination – could clearly be aligned with his culture’s views of feminine attributes. Jonathan Sawday notes, “a female *Philosophia* would never do for this resolutely masculine endeavor” (237). The Biblical Fall has not affected this male figure, but he has also not advanced because of selfish men’s mismanagement of him (Boyle 83). These “negligent” and “ambitious men” would not let natural philosophy be free (Cowley 15-16). Although natural philosophy has aged, they have kept him immature, unaware of his great abilities. Consequently, the kind of natural philosophy practiced prior to the formation of Royal Society (that which Sprat marks as ancient philosophy) restrained, instead of advanced knowledge of the natural world. In the last line of the opening stanza, Cowley accuses ancient philosophers of never being willing to let natural philosophy be “free, / Or his own natural powers to let him see, / Lest that should put an end to their authority” (16-17). Authority, in this case, is “associated with a blind submission” to the methods of ancient philosophy, particularly those of Aristotle

(Butler 2). As with Sprat, there are clear political implications in Cowley's description of how knowledge has been represented. Negligence, imprisonment, "long-oppressed right[s]" (36), and selfish authority are what have kept philosophy from reaching its potential. As Catherine Martin argues, we can read Cowley's ode as a testament "to the post-revolutionary hype" of attempting to free truth from the impact of human error (97).

Cowley's allusions to war and strife become more focused with his extended metaphor of Francis Bacon as the rebel, warrior, and spiritual leader who sets philosophy free from the detriments of ancient or speculative philosophy.⁴⁵ Figuring the epistemological shift from ancient to experimental philosophy as war, Cowley hyperbolically captures what is at stake – the old has been vanquished to usher in a new and restored philosophical kingdom. Following the civil wars and Interregnum, the parallel would not be lost on the reader. The Royal Society prevails, it seems, just as the monarchy is restored. Throughout the poem, Cowley relies on powerful imagery to capture Bacon's role in this metaphorical battle: he is a "mighty man" (38), the "Lord Chancellor" chosen by nature (40), and "like Moses" (93). Bacon, in reality, was appointed Lord Chancellor, the most powerful position in England, in 1618. He was removed from that position, however, under charges of corruption. Interestingly, Cowley places nature as the appointer of Bacon's important place in British society, perhaps implying that Bacon was wrongly removed from his position. Not only does Cowley remind his readers of Bacon's important position in the nation, but he also compares him to the prophet Moses, leading his people to the promised land of experimental

⁴⁵ For more on Cowley's representation of Bacon see Achsah Guibbory, "Imitation and Originality: Cowley and Bacon's Vision of Progress."

philosophy. The Royal Society is described as “Gideon’s band” (117); since Bacon is their leader, that would mean he is their Gideon, as well as their Moses. In this allusion, Cowley represents Bacon as a warrior since it was Gideon’s military prowess that helped free the people of Israel. Moreover, Cowley seems to align Bacon with a knight-like figure when he imagines him to have destroyed the ancient figure of authority:

“Authority, which did a body boast, / Though ‘twas but air condens’d and stalked about, / Like some old giant’s more gigantic ghost” (41-43). Ancient philosophy is represented as a giant, but a giant only filled with air. This seems to allude to Orgoglio, the giant filled with air that symbolizes pride in Edmund Spenser’s *The Fairie Queene*.⁴⁶ Bacon, represented here as one of Spenser’s knights, is able to break through “th’ orchard” (51) enchanted by the “phantom” (49) of Authority. The prize at the end of the hero’s journey is a free and opened orchard with “ripened fruit,” available to all who desire it (61). Albeit a much more metaphorical conceit than what we find in Sprat’s three-volume defense, the goal is the same for both Cowley and Sprat. Speculative philosophy must appear to be detrimental so that experimental philosophy can be appreciated for its healing and restorative powers.

Clearly, Bacon is the champion and the leader that the Society follows, but what exactly has he battled against and won? Cowley credits Bacon’s victory to his attack on words. In “recognizing the ways words are untrustworthy, Bacon moved philosophy from the delusory grip of words to the verity of mechanics” (Boyle 84). In Cowley’s ode philosophy has suffered because it has been distracted all these years with poetry, wit,

⁴⁶ Orgoglio’s defeat is described by Spenser as “That huge great body, which the Gyaunt bore, / Was vanisht quite, and of that monstrous mas / Was nothing left, but like an emptie bladder was” (1.8.24).

and discourse, and it is Bacon who arrives to liberate philosophy from its prison. He is the hero that has come “at last” (37, 93).⁴⁷ Tita Chico notes that Cowley “narrates the emergence of scientific practice as a victor vanquishing the delusional forces of the imagination that have obscured true understanding” (145).

In promoting Bacon and his followers in the Royal Society, Cowley, like Sprat, implies a division between the imagination and reason. Cowley does rely on the term “reason” to describe how the ancient philosophy is vanquished, but what we would now deem imaginative creations are not named as such in Cowley’s poem.⁴⁸ Criticizing those philosophers who came before, Cowley accuses art of being responsible for the languishing and stagnation of experimental philosophy for “Three or four thousand years” (10). He then lists the many injuries experimental philosophy has suffered when still under ancient authority:

They amus'd him with the sports of wanton Wit,
With the Desserts of Poetry they fed him,
Instead of solid meats t' encrease his force;
Instead of vigorous exercise, they led him
Into the pleasant Labyrinths of ever-fresh Discourse:
 Instead of carrying him to see
The Riches which doe hoorded for him lie
 In Natures endless Treasurie,
 They chose his Eye to entertain

⁴⁷ L.C. Martin notes that Cowley was “essentially modern in his philosophical outlook, turning his face from the darkness of superstition and welcoming the great Enlightenment.” He argues that Cowley does disparage poetry in this ode and that he does so “without seeming to realize how much he was slighting his own profession or how he was helping to create an atmosphere in which poetry might seem to be no more than an elegant way of saying things” (ix).

⁴⁸ Cowley describes discourse as a “pleasant Labyrinth,” describes paintings as “pageants of the Brain,” and discusses the “images” which can be found in our own “fancy.” He also refers to the ancient philosophy as a “conquer’d Phantome.” As I established in the last chapter, there is a connection between Phantasy, Phantoms, Fancy, and Imagination in the dictionary definitions. See chapter two for a more in-depth explanation of the way dictionaries conceived of the imagination.

(His curious but not covetous Eye)
With painted Scenes, and Pageants of the Brain. (20-30)

In Cowley's account, experimental philosophy has been led astray by deformed poetry, art, and rhetoric, and those deformations lead, in turn, to a diseased imagination. Cowley again anthropomorphizes experimental philosophy in line 20, referring to "him," and he argues that philosophy was someone whom other philosophers have not used but instead have merely amused over the years. That is, experimental philosophy has been led astray by being preoccupied with distortions and distractions. The first distraction is the sport of "wanton Wit." The word "sports" repeats the idea of a type of diversion, in this case being entertained by false wit.⁴⁹ Wit does allude to a type of cleverness, often a type of creative genius that relies on the imagination, but wanton wit is positioned as "unruly," "unrestrained" and "ungoverned," ideas that were frightening in the wake of the Interregnum.⁵⁰ Cowley then moves on to attacking the "desserts of poetry" (21). Experimental philosophy, instead of being fed with meat and receiving the kind of nutrients it needed, was given, instead, a kind of poetry that lacks sustenance. Jeffrey Gore argues, "in Cowley's account, we see that one kind of learning – in this case Poetry – serves to 'spoil our supper'; it is the dessert that keeps us from eating our meat (i.e. from nourishing ourselves with Science's 'real' learning)" (362). Gore also argues that

⁴⁹ See Cowley's poem on wit, "Ode. To Wit" printed in 1668 in *The Works of Abraham Cowley*. In it, he describes the difference between a true and false wit, noting that it is easy to misinterpret false wit as genuine, like birds who fly to "painted grapes" (line 12). Wit comes in a "thousand different shapes" (line 6), and he defines wit mostly by what it is not (line 56). Wit is not "a tale" or a "jest" (21), it is not "florid Talk" (23), and it is not a forced "lifeless verse" (25). Wit is not "An'grams and Acrostiques" (44), lines that "crack the *Stage*" (49), or "tall Meta'phor[s]" (51). True wit brings divergent things into an integrated whole without "forcing an odd similitude" (54). See also the *OED* definition on wanton.

⁵⁰ "wanton," *OED*.

we should read poetry as synecdoche, as poetry standing in “for the embodied conventions of language that allow for poetic enframing, or rhetorical invention, and would be much more invested in the preservation of the past than in the invention of anything ‘new’” (363). On the other hand, Robert Hinman, establishes that Cowley is often accused of attacking poetry and the imagination in this Ode, but that he is, instead, attacking empty words. Cowley, Hinman notes, is against those who insist that their imaginations have a “phenomenal reality” and that is what leads natural philosophy astray. When they feed philosophy with the “desserts of poetry,” they bring disgrace to both natural philosophy and poetry. Cowley, therefore, laments those who pay too much attention to ornamentation instead of matters of more substance, such as poetry that takes on the phenomena of the natural world as its subject matter.

Cowley’s focus on poetry is an important one because of his insistence on referring to philosophy as male. Perhaps, then, ancient philosophy was not originally feminine, but was instead emasculated and “feminized by a sickly-sweet diet of poetic tropes and figures” (Sawday 237). The ancient paths to knowledge have taken away his power and force, essentially seducing him away from his original aims. Furthermore, instead of exercising him, they entertained him with rhetoric and “painted scenes” and “Pageants of the brain” (30), or paintings and plays. Overall, Cowley has managed to denigrate certain aspects of language and the arts because of their tendency to distract. Although this kind of discourse has kept ancient philosophy entertained, it led experimental philosophy astray. In referring to hoarded riches and treasures available in the proper study of nature, Cowley implies that there are great gains to be made if

philosophy is willing to switch its focus from speculation to experimentation. He says when we rely on speculation or that “within our selves,” we make ourselves like deities and determine “truth and falsehood,” “Good and Evil,” without the use of our “sences aid.” It is only God, says Cowley, who can find truth in his mind (64-68).

In speaking of the downfalls of speculation or drawing truth from “our selves,” Cowley, like Sprat, is also able to promote the Society’s methodology as something that heals and rectifies. In lines 69-73, Cowley again relies on Bacon’s leadership to demonstrate the changes he inspired:

From words, which are but pictures of the thought,
(Though we our thoughts from them perversely drew)
To things, the mind’s right object, he it brought,
Like foolish birds to painted grapes we flew;
He sought and gather’d for our use the true;

Bacon brought the focus of experimental philosophy from “words” to “things.” Words, Cowley contends, merely represent the image in our thoughts. It is humans, therefore, who are at the root of the problems associated with ancient philosophy when they perversely draw their thoughts from words and not things. Words as a source of truth, therefore, are unreliable and untrustworthy. Bacon’s methods moved philosophy from the grip of words to mechanics, shifting philosophy’s focus from human descriptions of objects to concentrating on how the things can be independently observed outside of language (Boyle 84). Cowley, therefore, contrasts those who studied the “painted grapes” instead of the real thing. In Cowley’s view, Bacon and experimental philosophers, not wanton wits and desserts of poetry, are better able to represent the natural world because

they rely on a clean style of language (179). They are able to capture all “the Beauties Nature can impart [...] without the paint of Art” (186-7). Within his poem, Cowley issues a call to action, directing experimental philosophers to judge the “real object” of their eyes (83-4, 87) and to not rely on the “ideas and images which lie / In his own fancy, or his memory.” According to Chico, “Bacon’s epistemological innovations turn the observational, and thus discriminating, eye *outward*, ennobling sensory perception as the proper and true avenue for knowledge acquisition” (145). Essentially, Cowley reinforces the dichotomy we find in Sprat’s apology: that which originates in the mind or fancy is an illusion and that which originates from sensory observation is somehow more reliable. One’s imagination leads to falsity, but empirical sight leads to truth. One has no value and has kept knowledge locked in chains; the other is useful and fruitful. It is the “monstrous god” (51) of ancient philosophy that misled us with uselessness, but the Royal Society, under Bacon’s methods, will save us with the practical (Stogdill 203).

One cannot help but notice that Cowley employs poetry to attack certain qualities to be found in poetry and other imaginative arts. Many critics have noted this irony, as well. As Boyle points out, “that Cowley used the Pindaric, among the most elaborate and formal of poetic forms, to celebrate the triumph of mechanical descriptions of nature and to condemn the cheat of words, might be taken as a textbook illustration of irony” (85). Cowley’s poem celebrates experimental philosophers as the successors to poets (84), yet Cowley is a poet trying to communicate experimental philosophy to the public. Cowley and many members of the Royal Society viewed words as “objects of suspicion, and any elaboration of words was likely to distort truth rather than provide access to it” (Butler 5).

His poem, of course, does not rely only on concrete descriptions, as Cowley does employ figurative language and allusions, both of which he claims are deceptive.⁵¹ Furthermore, Cowley associates certain kinds of poetry with a loss of proper focus due to its ability to enrapture readers and sidetrack them from more meaningful pursuits (4). Yet, it is poetry that Cowley finds the most fitting and capable form when attempting to fascinate the reader with new philosophy and gain his attention to the useful endeavors of the Society. Cowley also positions poetry as a female art, one that for centuries has emasculated experimental philosophy and feminized it away from its potential (4); however, despite his rigid insistence on philosophy as male and any poetry as detracting from the pursuit of fact, it is poetry that opens Sprat's *History*. Cowley claims that Sprat's *History* is a success because it is able to capture the beauty of nature "without the paint, of art" (184). This claim is misleading, nevertheless. There are plenty of instances where Sprat employs his own figurative language and allusions to communicate his ideas. His is not a stripped down, bare usage of words. For example, when attempting to explain the Royal Society's relationship with the past, Sprat employs a metaphor of an ancestor's grave. He also describes the advancement of experimental philosophy by allegorically aligning it with a journey and sea expeditions.⁵² Cowley's Ode and Sprat's *History* both depend on metaphorical language as they promote "the project of a plain and unadorned language as an unattainable goal" (Butler 5). Despite the goal of representing things more concretely, both works underscore how far they were from the ideal of a truly "scientific" lexicon

⁵¹ Andrew Black argues, "Cowley's flamboyant similes are the kind of 'specious tropes and figures' Sprat deplores, yet nonetheless preface the very text that purports to eliminate them (15).

⁵² These are just two examples in a book that is filled with figurative language.

and how the genre of philosophical writing was still emerging, forming, and drawing inspiration from one writing we today would call literary.

Conclusion

The methods and practices of the Royal Society and their study of experimental philosophy did rely more on experimental methods during the Restoration than on speculative philosophy, and experimental philosophers concerned themselves more with what they saw as matters of fact, meaning truth for which observable evidence and proof could be offered, making those conclusions “morally certain” (Shapiro 15). The new methods promoted by the Royal Society assigned a clear and central role to “experience, probability, and degrees of certitude, and primary, though not exclusive, emphasis was placed on the acquisition and analysis of empirical data” (Shapiro 15).⁵³ Sprat’s *History* exemplifies the Society’s main focus as aligned with a type of knowledge that was based on observation and experimentation. Additionally, Shapiro notes that conclusions reached by means outside of observation and experimentation were not as respected and “were characterized as ‘fiction,’ ‘mere opinion,’ and ‘conjecture’” (4). The many attacks Sprat makes on speculative philosophy, even when having to acknowledge its necessity at times, highlights the beginnings of the divide between knowledge derived from what will become the category of “science” and certain elements associated with and valued as

⁵³ Shapiro draws her conclusions by looking at the ways that England and the Royal Society “adopted the Baconian research program.” She marks a break between a model of knowledge that was based on opinion and one based on “science” or data collection and experiments (16). Through exploring both “propagandists” and “practitioners” (such as Sprat, John Wilkins, Joseph Glanville, Robert Boyle, and Robert Hooke, among others), she traces changes in “theories of knowledge” and how “science” was discussed (17).

“art.” Because of Sprat’s rhetorical aim, creating a continuum of fact, which places speculation at the lower end of that continuum, diminishes the importance of speculation in the formation of knowledge. Speculation does not rely on conclusions drawn from thin air; it, too, relies on observations, as evidenced by the dictionary definitions discussed in the previous chapter. In contrast with experimentation conjecture allows someone to develop possible theories based on those observations. As I will establish in the next chapter with Margaret Cavendish and even Bacon to certain extent, there is value in the speculative because it can lead to outcomes that can be associated with knowledge formation.

Although it is nearly impossible to avoid hypothesizing and speculation within experimental philosophy, Sprat and Cowley would have us believe that experimental philosophy is opposed to speculation. Even within the dictionary definitions explored in the last chapter, one can notice that speculation and experimentation focus on what seem like divergent outcomes (the impractical vs. the practical, and deductive vs. inductive reasoning). It is true that “from a philosophical perspective, all hypotheses are fictional, but the most serviceable (those that appear to yield scientific truth) are the ones most probable, given the evidence and the prevailing rules of verification” (Bender 238). John Bender discusses the paradoxical need for hypothesis in the Royal Society, while acknowledging the damage that hypotheses can do to the Society’s ethos: the plausibility of hypotheses “renders them suspect because they are products of imagination that are

logically indistinguishable from poetic fictions” (238).⁵⁴ As we have seen with Sprat and Cowley’s propaganda, much attention was devoted to championing reason and observation, so it is ironic that speculation and experimentation must arise from the same imaginative process. Experimental philosophy *needs* the imagination and speculation because experimental philosophy relies on hypothesis and theory as much as it needs observation and experimentation; yet, rhetorically, Sprat’s and Cowley’s writing, which celebrate the Royal Society’s work, veer away from acknowledging this practice.

What the rhetoric associated with these defenses of the Society fails to appreciate is that speculative hypotheses, while they only represent possible truths, have persuasive storytelling capabilities (Bender 239). Bender promotes the idea that there is a “discursive space for scientific speculation,” and I argue that seventeenth- and eighteenth-century speculative writers, composing in various genres, seized some of that discursive space (239). The imagination’s power in formulating knowledge was being challenged by experimental philosophy, in works as important as Robert Hooke’s dedication to *Micrographia*.⁵⁵ Experimental philosophers, nonetheless, must first have to

⁵⁴ Bender compares hypothesis and empiricism in “science” to fictionality and verisimilitude in the eighteenth-century novel. He looks at the novels of Daniel Defoe, Samuel Richardson, and Henry Fielding, putting them into conversation with Isaac Newton’s views on hypothesis as the opposite of “inductive proof” (241).

⁵⁵ Hooke’s *Micrographia: or some physiological descriptions of minute bodies moade by magnifying glasses: with observations and inquiries thereupon* was printed in 1665. Hooke notes in his epistle to the King that “*Philosophy and Experimental Learning have prosper’d*” under his “*Royal Patronage*.” He then details in his preface the many errors that have kept experimental philosophy from progressing, errors in the senses and memory. After detailing the errors, he proposes some solutions, such as instruments to correct the senses and observations to correct the false conclusions of the mind. He says that philosophy must be reformed, and it is not the “strength of Imagination” or “depth of Contemplation” that is required for that reformation. Instead reformation will come from a “sincere Hand, and a faithful Eye, to examine, to record, the things themselves as they appear.” He goes on to argue that “the Science of Nature has been already too long made a work of the Brain and the Fancy: It is now high time that it should return to the plainness and soundness of Observations on material *and* obvious *things*” (n.p.).

imagine before they can discover or demonstrate (Lamb 188). The Royal Society grounded their philosophy in observation and experimentation and strove for a type of knowledge that they believed was practical and universal (187). Astronomy, for instance, relies on observation and the technology of the telescope, but the conclusions that must be drawn after peering through the telescope require a “deliberate use of the imagination” (Aït-Tourati 10).⁵⁶ In essence, the experimental philosopher *must* speculate regarding “phenomena that are “inaccessible or difficult to observe” (Aït-Touati 10). Knowledge of the real world can be ascertained when data, technology and “the operation of fancy” combine (Lamb 193).

In a work first printed nearly twenty years after Sprat’s *History*, Bernard de Fontenelle recognizes this connection between the imagination and experimental philosophy, instructing his reader of *A Discovery of New Worlds* to read astronomy like a “novel.”⁵⁷ We must also remember that when Cowley wrote about experimental philosophy he used poetry to do so and that Sprat relied heavily on imagery and figurative language to communicate his points. We can appreciate the interest taken by

⁵⁶ Aït-Tourati says this use of the imagination must be applied when “treating phenomena that are inaccessible or difficult to observe.” He argues that natural philosophers would have to call on their imagination in order to have an understanding of what they are studying. It is in “resisting received doctrine,” however, that he supposes that necessitates an even greater need for the imagination (10).

⁵⁷ This was published in French in 1686 as *Entretiens sur la pluralité des mondes* or *Conversations on the Plurality of Worlds*. The first English translation, by John Glanvill, was printed in 1687, followed by Aphra Behn’s translation in 1688. The passage in reference can be found in “The Author’s Preface,” where he instructs his reader to give the same attention to his theories about the plurality of worlds at they would to *The Princess of Cleves*, a French novel printed in 1678. Astronomy, he contends, has the same “Intrigue,” and “Beauties” as that novel, although his reader would be more familiar with the novel than with astronomy. But, he says of ideas about astronomy: “They are not more obscure than those of that Novel.” He goes on to say that his theories are not without a basis, that he is grounding his views in “Notions of Philosophy.” While these theories “satisfie the Reason, they content the Imagination with a Prospect as agreeable, as if they had been made on purpose to entertain it” (*A Discovery of New Worlds from the French, made English by A. Behn*, 1688, *Early English Books Online*).

writers who were not themselves practicing experimental philosophy but who seized on its possibilities for exploring other experiences. For such writers, poetry, drama, and the novel could be enlisted in these discoveries and reshaped by them. What Sprat and Cowley seemed unwilling to admit was “the interdependence between empirical knowledge and literature, form, and the isomorphism of science and literatures desire to make sense of the world” (Bratach 209). In other words, what we now consider imaginative literature and the modes of thinking that we now call science employed similar forms that interanimated each other and contributed to knowledge and imaginative discourse. With the printing of the Royal Society’s *Philosophical Transactions* beginning in 1665, the scientific report was forming as a new genre. Admittedly, the *Transactions* do contain speculation, but the purpose of these writings is to document experimental philosophy and educate the reader on discoveries. *The Transactions* show that the written word is just as important to the development of experimental philosophy as the experimentation itself (Bradbury 39). Thus, as experimental philosophers sought out new ways of writing, literary writers were also attempting new forms, inspired by the work of experimental philosophy. As Anne Bratach asserts, “new ways of knowing, then, emerge simultaneously with new ways of writing; genre and epistemology coeval” (214). As speculation lost its foothold in experimental philosophy, a type of speculating emerged in the writing of the day. As writing in the speculative mode attempted to capture the natural world, writers borrowed from experimental philosophy, and experimental philosophers (whether they admitted it

or not) drew upon poetic and figurative devices in attempting to communicate new knowledge.

In Sprat's *History*, he positions figurative language as deceptive and a wrongful use of the imaginative faculties; the proper use of one's fancy or imagination would be in contemplating Nature. Instead of using the imagination to craft criticism of the Society, writers should focus their imagination on nature in order to increase their knowledge. Toward the end of his *History* he offers, almost as an afterthought, his views on the relationship between experimental philosophy and those who write in response to it:

I will add as an appendix another benefit of *Experiments*, which perhaps it will scarce become me to name amidst so many matters of greater weight: and that is, that their discoveries will be very serviceable to the *Wits*, and *Writers* of this, and all future *Ages*. But this I am provok'd to mention by the consideration of the present *Genius* of the *English Nation*; wherein the study of *Wit*, and humor of *Writing* prevails so much, that there are very few conditions, or degrees, or *Ages* of Men who are free from its infection. I will therefore declare to all those whom this Spirit has possess'd, that their is in the *Works of Nature* an inexhaustible Treasure of *Fancy*, and *Invention*, which will be reveal'd proportionably, to the increas of their *Knowledge*. (413)

Sprat refers to his thoughts on writing about experimental philosophy as an "appendix," and these views are brought up approximately twenty pages before the end of the *History*. In a treatise that numbers over 400 pages, his thoughts about written responses to the Royal Society only number a few pages. Perhaps in his view, there were more important matters to attend to, but the remaining chapters of this study consider just how significant the public's response was in shaping the overall views of experimental philosophy. Despite repeated denigrations of fancy and adorned language, Sprat concedes that the discoveries made by experimental philosophers will be useful to writers of both this and

future times. At the same time, he notes that writing by false wits has had too much of an influence on the English nation; it has infected and kept them enraptured for far too long. The inspiration for writing, therefore, should not come from individual musings on fanciful conjectures; the only place to exercise the imagination is in considering Nature. Sprat elaborates: “It is now therefore seasonable for *Natural Knowledge* to come forth, and give us the *understanding* of new *Virtues* and *Qualities* of things; which may relieve their fellow creatures, that have long born the burden alone, and have long bin vex’d by the imaginations of *Poets*. This charitable assistance *Experiments* will soon bestow” (416). It is only experimental philosophy and writings based on the observations of nature, therefore, that can reverse the damage inflicted by a diseased imagination.

After all the admonishments and condemnations of speculation and imagination that Sprat laid out throughout his *History*, it would seem that any acknowledgement of a relationship between experimental philosophy and those who speculate about it might be a necessary concession. Unfortunately, we come to see that his admission was a ploy to disarm the Society’s most severe critics: “And now I hope what I have said will prevail something with the *Wits* and *Railleurs* of this *Age*, to reconcile their Opinions and Discourses to these *Studies*” (417). Effectively, Sprat admits that the whole point of his “long digression” into poetry and wit was to convince the wits that their opinions about experimental philosophy were wrong. Sprat’s warning to “these terrible men” is “that if they shall decry the promoting of *Experiments*, they will deprive themselves of the most fertile Subject of *Fancy*” (417). It is a crafty argument on his part. Instead of telling wits and railleurs to stop fanciful writing altogether, he attempts to persuade them that the

greatest source of imagination lies in exploring experimental philosophy. He is correct in assuming that the new philosophy will inspire the imagination; unfortunately, Sprat's *History* did nothing to deter writers from speculating about and evaluating the Royal Society. It seems Sprat understood that his apology would not detract the critics:

I acknowledge that we ought to have a great dread of their power: I confess I believe that *New Philosophy* need not (as *Cæsar*) fear the pale, or the melancholy, as much as the humorous, and the merry: For they perhaps by making it ridiculous, because it is *new*, and because they themselves are unwilling to take pains about it, may do it more injury than all the Arguments of our severe and frowning and dogmatical *Adversaries*. (417)

Here we find a humble admission. We see that Sprat is concerned about how the imagination, poetry, and speculation might lead minds astray; an even bigger concern, however, is his fear of the power such methods possess. When satire takes on experimental philosophy specifically, it becomes an even bigger fear for the Society. Sprat marks ridicule as the biggest slight because the wits take what the Fellows see as very serious and practical work and turn it into farce. It is ridicule that does the most damage; however, speculative writing, even that which satirizes the Royal Society, performs an important task in disseminating knowledge about the natural world and about experimental philosophy. In not just relying on the reality of what can be physically observed, the speculative literature explored in the following chapters draws attention to many aspects of the new philosophy that Sprat and Cowley seem unwilling to acknowledge – the limitations of methods that are absent of imagination, the conflicts that empirical science can create within society, the anxiety that new philosophy can inspire, and the inherent bias of all practitioners.

CHAPTER IV

“NATURAL PHILOSOPHY IS THE HARDEST OF ALL HUMAN LEARNING”: THE SPECULATIVE MODE AS AN EXAMPLE OF BALANCED AND PUBLIC INSTRUCTION IN FRANCIS BACON’S *NEW ATLANTIS* AND MARGARET CAVENDISH’S *BLAZING WORLD*

Men have proposed to answer two different, and contrary ends by the use of parable; for parables serve, as well to instruct or illustrate, as to wrap up and envelope: so that though, for the present, we drop the concealed use, and suppose the ancient fables to be vague, undeterminate things, formed for amusement; still the other use must remain, and can never be given up. And every man, of any learning, must readily allow that this method of instructing is grave, sober, or exceedingly useful; and sometimes necessary in the sciences: as it opens an easy and familiar passage to the human understanding, in all new discoveries that are abstruse, and out of the road of vulgar opinions. Hence, in the first ages, when such inventions and conclusions of the human reason, as are now trite and common, were new and little known; all things abounded with fables, parables, similes, comparisons, and allusions; which were not intended to conceal, but to inform and teach [...] For as hieroglyphics, were in use before writing; so were parables in use before arguments. And even, to this day, if any man would let new light in upon the human understanding, and conquer prejudice, without raising contests, animosities, opposition, or disturbance, he must still go in the same path, and have recourse to the like method of allegory, metaphor and allusion.¹

Francis Bacon, “The Wisdom of the Ancients”

Francis Bacon, Abraham Cowley’s metaphorical “Moses” of experimental philosophy, discusses the role of storytelling in his preface to “The Wisdom of the Ancients” (1609). As established in the last chapter, Thomas Sprat’s *The History of the Royal Society* (1667), along with Cowley’s “Ode” both present Bacon as the champion of

¹ In volume 3 of *The Works of Francis Bacon* (7).

natural philosophy, rescuing experimental philosophy, specifically, from the ancient grip of speculative philosophy and the trappings associated with certain kinds of rhetoric and poetry. To those ends, Sprat and Cowley both promote knowledge through experimental methods, devaluing the function and role of the imagination in contemplating truths about the natural world.² While there are similarities between Bacon's statements about parables and the kinds of language that Sprat and Cowley condemn, there are also differences. For example, in the passage above Bacon refers to fables as "vague, undeterminate things, formed for amusement." Such admonishments remind us of Sprat's claim that certain types of poetry produce "chimeras," "fantasm[s]," "fairies," and "apparitions."³ Cowley denigrates the speculative for its ability to distract and distort. In light of these examples, fictive stories and poetry might be seen as somehow deficient or lacking, due to their inability to lead a reader to definite or exact meaning.⁴ Furthermore, as established in chapter three, Sprat and Cowley's rhetoric demonstrates that imagined stories have the power to deceive a reader and lead them into falsehood, while also leading to foolishness and idleness.⁵

Bacon, however, as demonstrated in the excerpt above, concedes that experimental philosophy needs storytelling in order to communicate effectively with a

² According to Rhodri Lewis, "to judge from Sprat's *History of the Royal Society*, Bacon could not have thought [mythology] very useful at all [...]. For Sprat, the age of philosophy had superseded the muddle-headedness of the poets, and mythography had no place within the province of the new learning. [...]" This is a view that "is fundamentally at odds with Bacon's own attitudes to mythography" (Lewis 362).

³ *History of the Royal Society* (340).

⁴ "vague, adj., adv., and n.2," *OED*.

⁵ "fable, n.," *OED*. The *OED* actually quotes from Bacon's *Advancement of Learning* (1605) as an example of using the word "fable" to signify a type of story that is ridiculous and foolish: "After a...time...they [*sc.* narrations of miracles] grew to be esteemed, but as old wiuies fables."

general public who may struggle to understand new epistemologies.⁶ Unlike Sprat and Cowley, Bacon positions storytelling as something that society needs when he says that these stories “must remain, and can never be given up.” Although fables, parables, and other narratives can serve the purpose of mere entertainment, Bacon acknowledges that the general public can also be instructed through such stories.⁷ In other words, parables and allegories, although associated with falsehood in the Royal Society’s rhetoric, become valid ways of knowing, although that knowledge is gained indirectly instead of through observation. Every learned man, he says, “must readily allow this method of instructing” for it is “grave, sober, and exceedingly useful.” Stories, in this view, become a serious and an important way through which the public can be instructed on “discoveries that are abstruse,” meaning those methods that are too difficult for them to understand or that they do not have enough expertise to comprehend. Bacon also insinuates that representing new knowledge through fictional narratives results in less resistance from those who do not yet understand the “new light” that is “upon human understanding.” Although Bacon does not describe parables and fables as speculative, since they are methods of indirect knowledge, they do fit Sprat’s and Cowley’s definition of speculative thinking. At the same time, Bacon advances a system of knowledge based

⁶ Lewis argues that Bacon divided human learning into three categories – history (memory), poesy (imagination), and philosophy (reason). Within the category of poesy, Bacon considered narrative, drama, and allegories or parables (366). Each, therefore, is identified with the imaginative faculty, but Bacon placed more value on parable for its instructive capabilities.

⁷ My understanding of the terms “fable,” “parable,” and “allegory” is drawn from the *OED*. A “fable” is defined as “a fictitious narrative or statement; a story not founded on fact,” a “parable” as “an allegorical or metaphorical saying or narrative,” and an “allegory” as “a story, picture, etc. which uses symbols to convey a hidden or ulterior meaning, typically a moral or political one.” Each definition highlights narrative, storytelling, and representations that are metaphorical and not literal. These definitions all also allude to stories that are imaginative.

in observation and experimentation. In advocating for multiple methods of instruction, therefore, Bacon's philosophy implicitly supports turning to the instruction that imaginative stories can provide and for their ability to communicate experimental philosophy and its discoveries with the public.

In context, Bacon's passage is geared towards understanding the function of story telling in the ancient world; however, when viewed in light of the philosophical revolution happening during the Restoration, the justification for stories as a means through which to communicate discoveries in experimental philosophy seems quite fitting. Interestingly, Bacon's *New Atlantis* (1627) was printed with his philosophical treatise *Sylva Sylvarum*, illustrating how difficult philosophical concepts, when paired with a fable, can better communicate with the public on his ideas. After the formation of the Royal Society in 1660, another philosophical treatise and fictional narrative were printed together – Margaret Cavendish's *Observations upon Experimental Philosophy. To which is added, The Description of a New World Called the Blazing World* (1666).⁸ In both cases – *New Atlantis* and *Blazing World* – the writers rely on narrative fiction in prose to communicate their ideas about experimental philosophy to a general audience.⁹ As such, their fictional utopic societies, in which experimental philosophy takes center stage, educate readers. But in the pages that follow, I argue that these stories depend on

⁸ Through the remainder of this chapter I will refer to *Observations upon Experimental Philosophy* as *Observations* and *The Description of a New World...* as *Blazing World*. All quotations of *Observations* are taken from Eileen O'Neill's *Cambridge Texts in the History of Philosophy* (2001), and references to *Blazing World* are all from Kate Lilley's 1992 edited edition of Cavendish's text.

⁹ For other scholarship on the connections between *New Atlantis* and *Blazing World* see Bronwen Price, "Journeys Beyond Frontiers: Knowledge, Subjectivity and Outer space in Margaret Cavendish's *The Blazing World*," *Literature and History* (1998) and Marina Leslie, *Renaissance Utopias and the Problem of History* (1998).

the speculative mode as a means to communicate ideas related to experimental philosophy. Each example serves as an alternative to the emerging epistemology, which favored experimentation and denigrated speculation. Despite the Royal Society's emphasis on experimentation, *New Atlantis* and *Blazing World* serve as powerful examples that speculation still has an epistemological value. In conjecturing and imagining what a society might be like when experimental philosophers are given special designations and rankings by the state, Bacon and Cavendish also ask their readers to envision a world that is both similar to and different from their own. Their speculative writing becomes a means through which to communicate about experimental philosophy while enabling them to offer readers an approach to understanding the natural world that integrates knowledge taken from both methods, the experimental *and* the speculative.

Bacon and Cavendish each present the reader with speculative societies in which experimental philosophy is positioned as an important component to the two envisioned worlds. For Bacon, a society headed up by experimental philosophers creates a utopia, while Cavendish presents a society that while including certain utopian elements falters under the conflict fostered by experimental philosophy. Bacon's *New Atlantis* serves as a model for how the experimental and the speculative can both be used to understand experimental philosophy, but Cavendish takes this model and provides a critique of experimental philosophy. Each seems to realize that the world cannot be understood without relying on speculative modes of thought. In allowing for and focusing on the speculative to communicate ideas related to experimental philosophy, Bacon and Cavendish present us with a moderate and balanced approach to formulating truth, a

balance that is absent when considering the rhetoric in Sprat's *History*, in which knowledge found through experimental methods is promoted to the exclusion of other kinds of knowledge.

Their combined texts represent two purposes, one which details how experimental philosophers find and make knowledge, and the other exemplifies how such knowledge is to be written about. Scholars such as Bronwen Price have acknowledged how Bacon's story "stands on the cusp between the fictional and factual, the visionary and practical, utopia and utility, unknown and known" (Price 2). But there has been no sustained study into the impact such a mixture might have for a reader or why such a mixture may be necessary in allowing for varied and nuanced approaches to understanding the natural world. For Bacon, instructions about experimental philosophy are best communicated to the general public through storytelling, whereas for Cavendish, experimental philosophy must remember its ties to speculation. It is Cavendish's more integrated and balanced approach to experimental philosophy that she posits will keep disorder, divisiveness, and rebellion at bay. Subsequently, in pairing a philosophical treatise with a fantastical narrative, Cavendish offers not just a critique of experimental philosophy, but a vision and example of a unified approach to understanding the natural world, one that allows for knowledge grounded in sensory observation and imagination.

Francis Bacon and *New Atlantis*

The print history of *New Atlantis* sheds light on the purposeful interconnectedness between Bacon's paired texts *Sylva sylvarum: or A naturall historie In ten centuries* and

New Atlantis.¹⁰ According to David Colclough, the folio volume of Bacon's work appeared for sale not long after Bacon's death in April of 1626, and it was printed either in late 1626 or early in 1627 (181).¹¹ In the seventeenth century, *Sylva* was printed at least fifteen times, while also seeing additional printings in French and Latin. In all of the printings, *New Atlantis* was included.¹² At the end of *Sylva*, there is a note from William Rawley that explains what kind of work *New Atlantis* is and why it is paired with *Sylva*:¹³

This fable my Lord devised, to the end that he might exhibit there – in a model or description of a college instituted for the interpreting of nature and the producing of great and marvellous works for the benefit of men, under the name of Salomon's House, or the College of the Six Days' Works. And even so far his Lordship hath proceeded as to finish that part. Certainly the model is more vast and high than can possibly be imitated in all things; notwithstanding most things therein are within men's power to effect. [...] This work of the *New Atlantis* [...] his Lordship designed for this place; in regard it hath so near affinity (in one part of it) with the preceding Natural History.¹⁴

Rawley's note to the reader addresses intentionality.¹⁵ If we can assume the veracity of Rawley, who was Bacon's chaplain, it answers the question whether Bacon intended that these two works be paired together or whether it was done for other reasons. In Rawley's

¹⁰ *Sylva* consists of a list of 1,000 experiments, divided up into ten different centuries. The subject matter ranges from botany to fire and from brewing to acoustics. *Sylva* is 284 pages long, while *New Atlantis* is 50 (Colclough 182). All quotations from *New Atlantis* are taken from Brian Vickers edition of Bacon's work.

¹¹ Colclough lists the book as entered in the Stationers' Register in April 1626, but there are two different letterpress title pages that exist, one that lists 1626 and the other 1627 (181). Brian Vickers notes that *New Atlantis* "was one of Bacon's most popular and influential works" and that "it left its greatest mark in the seventeenth century on the many and diverse groups concerned with science" (788).

¹² See Gibson's *Francis Bacon: A Bibliography of his Works and Baconiana to the Year 1750* (xv, 147-58).

¹³ William Rawley was Bacon's chaplain, and Rawley was the one who posthumously published Bacon's work.

¹⁴ See "To the Reader," *The Works of Francis Bacon* (127).

¹⁵ According to Alan Stewart, Rawley was a literary editor who assisted Bacon in getting texts ready for publication. Stewart writes, "After Bacon's death Rawley devoted his life to creating an unblemished portrait of his master, compiling a volume of commemorative verse, and editing, translating, and publishing selections of his work" (n.p.).

account, Bacon wanted *New Atlantis* paired with his philosophical text. In fact, he designed it that way. The two texts – one a record of experimental philosophy and one a speculative work of fiction – form what Paul Salzman refers to as “an intersecting genre of natural history/fable, treatise/fiction, which readers were encouraged to see as inseparable” (44). Even if Bacon did not intend them to be paired, it remains a fact that original readers of these two texts encountered them as a pair, and whenever two or more texts are joined within a single volume, our interpretations of those texts should take the conjoining seriously (Colclough 183).

Since the so-called “father of empiricism” turned to speculative writing to represent experimental philosophy, while in other writings criticizing the speculative modes to truth, he must have seen a need for it.¹⁶ *New Atlantis* is, as Hutton argues, interesting because of its fictional qualities but it presents us with “an interpretative paradox” (48). This is Bacon’s only prose narrative, so it would seem to be a work of the imagination. At the same time, this is a text that represents Bacon’s viewpoint on how to advance learning and experimental philosophy, and Bacon is known for his aversion to “the charms of language” (Hutton 49). Bacon also draws influences from utopian and travel narratives, while making those genres work for his own mixed purpose of communicating his philosophical ideas through fiction.¹⁷ Scholars have noted that

¹⁶ See Bacon’s *Novum Organum* and a passage quoted later in the chapter as an example.

¹⁷ See Paolo Rossi, *Francis Bacon: From Magic to Science*; Jerry Weinberger, *Science, Faith, and Politics: Francis Bacon and the Utopian Roots of the Modern Age*; Charles Whitney, “Merchants of Light: Science as Colonization in *New Atlantis*”; J.C. Davis, *Utopia and the Ideal Society: A Study of English Utopian Writings 1516-1700*; Denise Albanese “The *New Atlantis* and the Use of Utopia;” Jerry Weinberger, *Science, Faith, and Politics: Francis Bacon and the Utopian Roots of the Modern Age*; and Susan Bruce, “Virgins of the World and Feasts of the Family: Sex and the Social Order in Two Renaissance Utopias” for discussions of Bacon’s influences.

Bacon's *New Atlantis* is actually part of his six-step plan of the Great Instauration.¹⁸ Since it presents the reader with a description of an academy and society run by experimental philosophers, *New Atlantis* is thought to be representative of Bacon's final step in the Instauration – "The New Philosophy; or Active Science." Part six is meant to forward how the "developed and established" new philosophy will become the "real business and fortune of the human race, and all power of operation" (Bacon "Great" 84). *New Atlantis*, therefore, is Bacon's speculative vision of how his philosophical vision might be executed. Reid Barbour notes that Bacon's tendency is to disregard the power of the imagination, but that fancy serves Bacon's purpose: it is "the one delightful, expansive, and powerful faculty that might serve to make the Instauration great" (179). Employing a speculative narrative as a way to communicate his philosophical ideas highlights the strong relationship between the speculative and the experimental, especially in light of readers who must receive and understand his theories. Essentially, as Kimberley Hurd Hale argues, it made Bacon's philosophy more "palatable to the public" (Hale 2). Admittedly, clear communication presented in an agreeable manner would be important to Bacon's project. On the other hand, in *Francis Bacon and the Style of Science*, James Stephens argues, that Bacon relies on myth and metaphor as a way to captivate his reader; instead of expecting them to accept his new ideas without

¹⁸ The Great Instauration was Bacon's plan to bring a state of peace back to the world through knowledge of truth. The first five steps are: "The Divisions of the Sciences," "The New Organon; or Directions concerning the Interpretation of Nature," "The Phenomena of the Universe; or a Natural and Experimental History for the Foundation of Philosophy," "The Ladder of the Intellect," and "The Forerunners; or Anticipations of the New Philosophy" (76). See Alfred B. Gough's edition of *New Atlantis*, F.H. Anderson, *The Philosophy of Francis Bacon*, and Jerry Weinberger *New Atlantis and The Great Instauration* for scholarship on *New Atlantis* and The Great Instauration.

speculative contemplation, he takes the reader's imagination and passions into consideration (Stephens 171). Stephens's comments portray a different purpose of Bacon's fictional narrative – it does more than instruct; it also entertains, which underscores the persuasive aspects that a pleasurable story about experimental philosophy might have on a reader and might have on the popularization of Bacon's ideas. Although scholars have noted Bacon's turn to fictional prose as a means through which to communicate his experimental methods, there has been no acknowledgement of how doing so can be seen as Bacon's participation in speculative modes of thought. At the same time, he is forwarding his new philosophy, he is employing methods associated with older epistemologies without acknowledging the benefit of one for the other.

New Atlantis presents readers with an adventure as they read about an unnamed narrator who travels to an unknown world and interacts with members of a society referred to as Bensalem. The narrator remarks, “we are beyond both the old world and the new” (Bacon 461). The narrator and his companions land in Bensalem after a storm at sea but are given permission to come ashore. Much of the story focuses on describing Bensalem's most important institution, known as Salomon's House. Centered on the study of experimental philosophy, Salomon's House is run by experimental philosophers. Bacon describes Salomon's House as “the noblest foundation (as we think) that ever was upon the earth, and the lantern of this kingdom. It is dedicated to the study of the Works and Creatures of God” (467). As an institution dedicated to experimental philosophy, it is a space composed of various laboratories and caves, in which state-sponsored experiments are performed. The Father of Salomon's House informs the narrator that the

purpose of their “foundation” is the “knowledge of Causes and secret motions of things” (Bacon 480). As such, their work is quite varied. Their endeavors include imitating and showing “meteorological phenomena”; “experiments of grafting”; “dissections and trials” on beasts, birds, and fishes; the preparation of medicine; and “demonstrations of all lights and radiations, and of all colors” (Bacon 481-83).

As a text used in tandem with Bacon’s philosophy, part of its purpose seems grounded in convincing his readers of the great value that experimental philosophy can have for society. The governor tells the narrator, “But thus you see we maintain a trade, not for gold, silver, or jewels, nor for silks, nor for spices, nor any other commodity of matter, but only for God’s first creature, which was *Light*: to have *light* (I say) of the growth of all parts of the world” (Bacon 472). The speculative society that Bacon envisions trades in knowledge. Assigning an economic value to knowledge and presenting it as something precious that can be traded like a commodity shows not only the importance Bacon places on experimental philosophy, but also what England can gain by participating in philosophic endeavors. Many of the commodities that the governor lists represent knowledge as a domestic resource and one that can be exported – gold, silks, and spices, for instance. Near the end of the story, when the Father of Salomon’s House tells the narrator about its system, he says, “I will give thee the greatest jewel I have. For I will impart unto thee, for the love of God and men, a relation of the true state of Salomon’s House” (Bacon 480). Bacon figures that just knowing the history and workings of a “scientific” society provides a material gain.

Once the Father begins listing the many commodities in which they trade, it becomes clear that Bacon's speculative society represents a way to attain superiority over other nations. For instance, when the Father remarks that Bensalem has "diverse mechanical arts, which you have not," he is referring to technologies used for experimental philosophy, such as microscopes and telescopes (Bacon 484). Although he does not go into any specifics as to what exact "arts" they have, they are more diverse than what would have been currently available to the English reader at the time. The Father lists several other advantages that can be found within Bensalem and that the narrator lacks, advantages that the Father makes a point to emphasize: Bensalem has "a number of fossils, and imperfect minerals, which you have not"; "harmonies which you have not [...] and diverse instruments of music, likewise to you unknown, some sweeter than any you have"; and "swifter motions than any you have" with muskets that are "stronger and more violent than yours are" (Bacon 485). These comparisons show the English reader just what they are lacking – things they may not have even been aware of – as a means through which to convince them of the great good, both in pleasure and power, that can be done for society when experimental philosophy is at the helm. Not only will they have access to minerals and fossils previously unknown, but their entertainments will also be improved, while becoming a stronger world power, as well. Greater and faster muskets, after all, can only help England to become even more dominant.

The Father not only brags about all the things experimental philosophy has provided for Bensalem and that England lags behind in, but he also draws attention to

how much they know that the narrator does not. They have, for example, found many means through which to produce light and all those means are “yet unknown to you” (Bacon 484). Metaphorically, the Father could be insinuating that Bensalem has discovered many avenues through which to produce knowledge and discover more truth, but his literal message is that they can see more, both near and far, within the human body, and rectify deficiencies in human sight. Bensalem also has discovered “precious stones of all kinds, many of them of great beauty, and to you unknown” (Bacon 485). The repetition of “to you unknown” is a subtle reminder of all that is left to still be discovered, if only one lived in a society devoted to discovery. These findings also have economic value. The “jewel” of knowledge mentioned earlier becomes literal jewels of material value. With that being said, each of the aspects the Father mentions – ranging from guns that shoot better to light that allows them to see the inner workings of the human body – have practical value, in addition to aesthetic value. This is not just experimental philosophy practiced only for the sake of knowing, but rather it is practice for its usefulness to the members living within Bensalem. Bacon’s speculative society, therefore, becomes a way for him to advocate for a civilization that values experimental philosophy because of its dual goals of pleasure and utility.

Knowledge and discovery as practical advantages, however, are not the only speculative aspects to Bacon’s utopic society of experimental philosophers; his utopian speculative society also has worth because it is a civilization that finds peace and

happiness because of its pursuits of experimental philosophy.¹⁹ Once the narrator is free from quarantine and able to explore, he goes abroad to experience what “was to be seen in the city.” After spending some time observing, he remarks: “obtaining acquaintance with many of the city, not of the meanest quality, at whose hands we found such humanity,” while also noting that the nation showed itself to be “compounded of all goodness” (Bacon 472).²⁰ The narrator’s first observations concern the pure benevolence of Bensalem’s citizens. Since Bensalem is a society run by experimental philosophers, Bacon’s text implies that the goodness of this place exists because the society has been fostered by experimental philosophy. The people of Bensalem live in such harmony that even though there are decrees and orders that the governor can put in place if he is disobeyed, those orders are “seldom needed because there is such reverence and obedience [that] they give to the order of nature” (Bacon 473). A respect for nature, in Bacon’s speculative society, equates with a respect for order, which results in a society that is governed but does not rely on laws and punishments to keep that order.²¹

Bacon’s society is one of balance, where its citizens understand their relationship both to each other and to nature. This balance creates, in addition to order, a lifestyle bereft of sexual sin. Joabin, a Jewish merchant, tells the narrator, “There is not under the

¹⁹ In speaking of knowledge as practical *and* speculative, I mean that Bacon’s predictions regarding the utility of experimental philosophy are speculative in nature because he is only theorizing on the benefits to society, since he has not seen his ideas come to fruition.

²⁰ The narrator, along with his companions, arrives in Bensalem after getting lost at sea. In order to be given permission to come ashore and explore the society, Bensalem’s officials require the narrator to be quarantined.

²¹ Just prior to the narrator’s conclusions about Bensalem, the governor tells him that Salomon’s House is dedicated towards the study of the “Works and Creatures of God” and that the House was instituted for “the finding out of the true nature of all things (whereby God might have the more glory in the workmanship of them, and man the more fruit in the use of them)” (253-54).

heavens so chaste a nation as this of Bensalem, nor so free from all the pollution or foulness. It is the virgin of the world [...] there is nothing among mortal men more fair and admirable than the chaste minds of this people” (Bacon 476). Experimental philosophy, when it grounds and becomes the foundation of a society, produces a nation that exemplifies innocence, restraint, morals, and honor. The inhabitants of such a society have excellent and uncorrupted minds. In calling Bensalem the “virgin of the world,” Bacon acknowledges the special place Bensalem has because of its religious steadfastness and because of the piety its members exemplify.²² In response to these descriptions (and after Joabin has listed the many manifestations of sin in Europe – brothels, prostitutes, unmarried libertines, marriage as a business transaction, infidelity, and unnatural lust), the narrator admits, “I confess the righteousness of Bensalem was greater than the righteousness of Europe” (Bacon 477). In this way, Bacon promotes his experimental program not only for its material, aesthetic, and practical gains, but also for its ability to stave off the many immoral and unsavory aspects found in other societies. These kinds of descriptions remind us of Sprat’s claims of the good of experimental philosophy for its ability to create moderation and balance in the lives of English subjects. This pure, religious, and ethical approach to life, evidently, also leads to

²² “Virgin, n. and adj.,” *OED*. Bensalem is actually a Christian society, in which supernatural explanations are readily accepted as truth. For example, we are told about a great pillar of light seen “twenty years after the ascension of our Savior,” one of the men of Salomon’s House prayed as follows: “Lord God of heaven and earth, thou has vouchsafed of thy grace to those of our order, to know thy works of creation, and the secrets of them; and to discern [...] between divine miracles, works of nature, works of art, and impostures and illusions of all sort” (Bacon 247). For scholars who discuss the intersections of science and religion in Bacon’s thought see Richard Westfall, *Science and Religion in Seventeenth-Century England*; John C. Briggs, “Bacon’s Science and Religion”; Stephen A. McKnight, *Religious Foundations of Francis Bacon’s Thought*; Jerry Weinberger, “On the Miracles in Bacon’s *New Atlantis*”; David Innis, “Civil Religion as Political Technology in Francis Bacon’s *New Atlantis*”; and Reid Barbour *Literature and Religious Culture in Seventeenth-Century England*.

happiness, as the narrator observes on the feast day where “there is an acclamation by all that are present in their language, which is thus: ‘Happy are the people of Bensalem’” (Bacon 474). Of course, Bacon’s imaginings are purely speculative, and he has ulterior motives in painting Bensalem in such an idyllic light. With that being said, Bacon’s story about a society run by experimental philosophers assists readers in contemplating a society different than their own, one that has not yet been established.

However impressive Bacon’s turn to storytelling is, what may be more impressive is that some of his speculative musings on a society run by experimental philosophers actually came to fruition when the Royal Society was formed in 1660. Granted this was not an entire society in the exact way Bacon envisioned, but the Society felt part of its purpose was to improve the nation through the pursuit of experimental philosophy. It is ironic that an institution dedicated to promoting experimental philosophy and to demoting speculative philosophy would draw its inspiration from a speculative text. Joseph Glanvill’s dedication in *Scepsis Scientifica* (1665) clearly links Bacon’s speculative society with the founding of the Royal Society when he describes the Society’s goals of being an “*Empire of Man over Nature*” and designates Salomon’s House as “a Prophetick Scheam of the ROYAL SOCIETY.”²³ Price also establishes a connection between Salomon’s House and the Royal Society: “the sanctioning of a collective scientific community by the State through royal charter, and the Royal Society’s aims to compile comprehensive data on the works of nature and art, and to develop practical and experimental knowledge for the benefit of mankind, are broadly

²³ “Address to the Royal Society,” *Early English Books Online*.

akin to the goals of Salomon's House" (15). Of course, the implementation of any organization outside the confines of utopia will not produce results nearly as perfect or nearly as accepted by greater society. In speculative writings during the Restoration that specifically focus on the Royal Society, for instance, the Society is often turned into an object of ridicule and is regularly criticized for its mission. In this chapter, that critique comes in Cavendish's speculative society found in *Blazing World*, and in the following chapter, we see the Royal Society mocked on the Restoration stage. Like Bacon, Cavendish pairs her speculative text with a philosophical one, and although her pairing is less favorable towards experimental philosophy, it serves a similar purpose for the reader. In allowing readers to conjecture and imagine the worlds they are presented with, they can better understand the philosophical concepts each writer wants to communicate, while also seriously contemplating the ramifications such an institution of experimental philosophers may have in actual society, of which Cavendish was particularly critical.

Cavendish and Her *Observations*

Cavendish is well known for her interest in natural philosophy, and many scholars have studied her interest in experimental philosophy in recent decades, as she is the only woman to publish works on experimental philosophy in the seventeenth century.²⁴

²⁴ For discussions of Cavendish's natural philosophy, see G. D. Meyer, *The Scientific Lady in England. An Account of her Rise, with Emphasis on the Major Roles of the Telescope and Microscope*; Stephen Clucas, "The Atomism of the Cavendish Circle. A Reappraisal"; Sarah Hutton, "In Dialogue with Thomas Hobbes: Margaret Cavendish's Natural Philosophy"; John Rogers, *The Matter of Revolution: Science, Poetry and Politics in the Age of Milton*; and Susan James, "The Innovations of Margaret Cavendish." On the gendered character of Cavendish's natural philosophy, see Carolyn Merchant, *The Death of Nature. Women, Ecology and the Scientific Revolution*; Sarah Hutton, "Anne Conway, Margaret Cavendish and Seventeenth-century Scientific Thought"; "Lisa T. Sarasohn, "A Science Turned Upside Down: Feminism and the Natural

Despite her writing about experimental philosophy and her clear interest in the subject, her requests to join the Royal Society were denied.²⁵ Even though she was never admitted as a member, she was granted access to the Society when they gave her permission to attend one of their meetings in 1667. Samuel Mintz details the Duchess's historic visit in "The Duchess of Newcastle's Visit to the Royal Society." Mintz notes that the Duchess's desire to attend a meeting was made known on May 23, but that the Duchess wished to be invited by the Society. Lord Berkley urged the Society to agree to her visit, so the Society took a vote. Despite "considerable opposition," due to the public ridicule the Society had been facing, which they were "not eager" to see increased by her visit, the Society voted to allow the Duchess's visit (171). Once approved, the visit was met with much anticipation by the members of the Royal Society, and Cavendish's presence was treated as any other visit by an aristocrat, meaning that her attendance was viewed by the Society more as "a social rather than a scientific event" (Nate 404). As they would do with any visit from a member of the nobility, they entertained her with the "usual visitors' program," performing a number of experiments designed to enthrall a spectator with

Philosophy of Margaret Cavendish"; Lorna Schiebinger, *The Mind has No Sex? Women in the Origins of Modern Science*; Sylvia Bowerbank, "The Spider's Delight: Margaret Cavendish and the 'Female' Imagination"; Eileen O'Neill, "Disappearing Ink: Early Modern Women Philosophers and Their Fate in History"; and Janet Kourany, *Philosophy in a Feminist Voice*

²⁵ Keller notes, "Although born and married into monied families, Cavendish lacked a formal education, and even though she knew some of the most influential scientific thinkers of her time, she was denied access because of her sex to the correspondence networks and the increasingly formal institutions that constituted the forums for contemporary scientific practice" (449). Cavendish was exposed to natural philosophy through her social circle and her family. Her husband was known to be a virtuoso who owned many telescopes, and her brother, Lord John Lucas, was one of the original Fellows of the Royal Society. Margaret Cavendish's writings on natural philosophy include: *Philosophical Fancies* (1653), *Philosophical and Physical Opinions* (1655), *Philosophical Letters* (1664), *Observations upon Experimental Philosophy* (1666), *Grounds of Natural Philosophy* (1668).

visual spectacle (Nate 404).²⁶ Cavendish's invitation represents the only time a woman is known to have attended a meeting of the Royal Society in the seventeenth century (Dear 127).

Clearly, Cavendish's visit during a meeting of the Royal Society showed interest in the organization; however, her writings on experimental philosophy prior to her visit were quite critical of the Society's methods (*Observations* and *Blazing World* appeared a year before her visit). Tessie Prakas argues that Cavendish's curiosity about the Royal Society and her decision to write on experimental philosophy show "a desire to participate in the intellectual exchanges that the Society fostered." But Prakas also contends that we can see her writings as emblematic of a frustration at being excluded from those "exchanges" (128). Prakas goes on to explain that Cavendish may have found "grounds for complaints" because of her exclusion since it highlights the true nature of the Society: "the Society's openness and commitment to experimentation was something of a fiction, and that it functioned ultimately to legitimize decisions made arbitrarily by a relatively small, elite group of gentlemen scientists" (Prakas 128). Prakas draws attention to the fact that Cavendish viewed her exclusion from the Society as symptomatic of the exclusivity of an organization that claimed to stand for inclusivity. Although we cannot know for sure why Cavendish focused so much attention on criticizing the Royal Society, Prakas makes a valid claim about the Society's unwillingness to accept certain members, despite its contrasting rhetoric – that anyone, regardless of viewpoint and status was

²⁶ Mintz notes that Robert Boyle was instructed to prepare: experiments with color, the weighing of air, and the dissolving of flesh with a "certain liquor" (172).

welcome. Scholars such as Eve Keller and Lisa T. Sarasohn argue that Cavendish's exclusion from the Society forced her to develop her own thoughts on how to formulate knowledge about the natural world. Since she was unable to join the Society and access the "male preserves of learning," Cavendish's only option was to reject the Society's methods and "develop her own speculative philosophy" ("A Science" 294).

Cavendish, as we will see, relies on a type of philosophy that values reason without experimentation, and Keller argues that she does so because "those were the only avenues open to her."²⁷ Sarasohn and Keller each argue that Cavendish created a new method through which to practice her own brand of experimental philosophy. Although I do not disagree with either, I also believe that Cavendish is doing more than inventing her own methods. Cavendish, like Bacon, combines her philosophical treatise with a fictional narrative. Instead of merely developing her own approach, Cavendish is combining approaches. This combination allows her to undermine the Royal Society's methods, which eschews speculation and hypothesis in favor of the experimental method. In this way, Cavendish's writing does not present her own practice of experimental philosophy or merely an alternative, but instead calls attention to the need for fancy and reason to coexist in the pursuit towards truth. Consequently, Cavendish forwards a type of knowledge about the natural world that *combines* ancient and emerging methods, so as to acknowledge the imagination's crucial role in experimental philosophy, a role that

²⁷ According to Keller, since Cavendish was not given a chance to participate as a member of the Royal Society and since she was unable to interact with and consider the technologies the Society made use of, "Cavendish had no alternative but to fall back on the only 'methods' that were available to her: what her unaided senses perceived and what she could 'reason out' for herself, without any training in logic or mathematics" (449).

practitioners within the Royal Society distanced themselves from. Cavendish's participation in and critique of experimental philosophy gives us an example of how a reading public interested in experimental philosophy may have conceived of the Society's methods. Keller positions Cavendish as an outsider, noting that Cavendish gives us a "stranger's account" of experimental philosophy, displaying "epistemological problems" associated with the new philosophy (Keller 450). Cavendish's viewpoints do not have the rhetorical purpose of promoting new methodologies and she had no need to fund or get support for an institution like apologists such as Sprat or experimentalists such as Robert Hooke did, both of whom Cavendish directly criticizes in *Observations*; therefore, Cavendish's stance on experimental philosophy is both important and "insightful precisely because it is spoken from outside the discursive and institutional forums it explores" (Keller 450). Thus, Cavendish's position (or lack of position) is strongly aligned with others in the public who were interested in experimental philosophy. Although her anxieties and questions quite possibly are not representative of those held by other non-practitioners, her writings still provide us with a valuable lens through which to understand the tension between speculative and experimental thinking.

Printed during the first decade of the Royal Society's foundation, Cavendish's critiques of experimental philosophy and her speculative society found in the *Blazing World* participate in a cultural response to the new philosophy. Cavendish's writings were printed during a time when experimental philosophy had not yet been accepted as the "right" way to understand nature and during a time when members of the Society were "routinely under attack for not producing incontestable results" (Keller 450). As

such, Cavendish's view of experimental methodology within the Society is critical of the use of technologies, such as microscopes and telescopes, for she believes those technologies were not able to "discover the interior secrets of nature" (Sarasohn "A Science" 292). As I will establish when discussing *Blazing World*, the schools of experimental philosophy that the Empress forms in her speculative society represent a break from the example we find in Bacon's *New Atlantis*. In Cavendish's view, the Royal Society has not stayed true to Baconian ideals because they "have lost sight of the usefulness of knowledge and the common good," and she recognized that focusing on experimental philosophy could lead to division instead of unity (Cottegnies 90). As Cavendish declares in her *Observations*, there is no way that anyone can know anything with absolute certainty; hence, her speculations could be as accurate or even more accurate than anyone else's (Sarasohn "A Science" 292-93).

Cavendish's *Observations upon Experimental Philosophy*, which precedes her *Blazing World*, is a direct and lengthy (more than 400 pages) critique of the Royal Society's methods, while also a treatise on her approach to understanding the natural world. Her treatise focuses on her rejection of Robert Hooke's (a prominent member of the Royal Society) ideas in *Micrographia* (1665).²⁸ Cavendish's system outlined in

²⁸ Chico argues that Hooke's *Micrographia* was a "monument to the Royal Society and the experimental method" (146). The main focus of *Observations* is a "point-by-point refutation of Hooke's findings, along with thorough critiques of Henry Power's *Experimental Philosophy in Three Books* (1664) and Robert Boyle's *Experiments and Considerations Touching Colours* (1664)" (147). Keller also notes that "the book Cavendish chose to attack—Robert Hooke's *Micrographia*—was a model of all the Royal Society promoted: lavishly printed with large, detailed engravings, the text recorded Hooke's extensive experiments with the microscope, which he had newly improved to better illuminate his subjects. The book was the first to publicize the revelatory powers of the microscope, and, because it bore the imprimatur of the Royal Society, its methods, illustrations and results carried the endorsement of the new institution of mechanistic science" (452). See Eileen O'Neill's "Introduction to *Observations* for a more detailed discussion of the philosophers that Cavendish is refuting. For more on Cavendish and Boyle see Stephen

Observations rejects his views in favor of her own theories of vitalistic materialism, which understands nature as infinite, sensitive, and alive. Cavendish argues in “Of Motions of Heat and Cold,” “Thus the variety of nature, is a stumbling block to most men, at which they break their heads of understanding, like blind men, that run against several posts or walls: and how should it be otherwise, since nature’s actions are infinite, and man’s understanding finite?” (Cavendish *Observations* 99). Because nature is varied and infinite and because humans are not able to view nature objectively since they are part of it, there is no way we can ever fully understand or know nature. Her perspective undermines the Society’s rhetoric of objectivity and “value-neutrality” (Keller 452). As humans, we lack the ability to see clearly, so the best we can do is make informed guesses and speculations, but we will never arrive at absolute certainty. Such viewpoints make Cavendish’s philosophy rationalist because she believes knowledge comes from reason and not from sensory perception. It is important to note that when Cavendish uses the word “reason,” she does so to indicate the rational, thinking mind, but as we shall see, for Cavendish, the term also includes the mind’s ability to imagine. Sensory perception, on the other hand, refers specifically to the five senses.²⁹ Consequently, in advocating for

Clucas, “Variation, Irregularity and Probabilism: Margaret Cavendish and Natural Philosophy as Rhetoric.” For discussions of Cavendish, Boyle, and Hooke see Lisa T. Sarasohn, *The Natural Philosophy of Margaret Cavendish*.

²⁹ Cavendish refers to the imagination as “fancy,” and she positions reason and imagination along the same continuum. She sees both reason and sense as material, but says the imagination is a “rational perception” and sense is a “sensitive perception” (81). In *Observations*, rational perceptions “being not encumbered with any other parts of matter, but moving in their own degree, are not at all bound to work always with the sensitive, as is evident in the production of fancies, thoughts, imaginations, conceptions, etc.” (150). In *Blazing World’s* “To the Reader,” Cavendish defines reason as “a rational search and enquiry into the causes of natural effects,” and fancy or imagination as “a voluntary creation or production of the Mind” (123). Gabrielle Starr concludes in a study of Cavendish’s understanding of imagination, that this faculty is, throughout her work, understood “as a tool of inquiry” (298). Of sense, Cavendish writes, “when I speak of sense, I mean the perception of our five exterior senses, helped (or rather deluded) by art, and artificial

a method that relies on reason, she is also promoting contemplative speculation as a means towards knowledge. As Mintz notes, *Observation* is Cavendish's appeal for less experimentation and more speculation in experimental philosophy (168). Such a plea is a critique of the Royal Society because in promoting rationalism and deduction, she is able to undermine the Society's focus on experiment and induction. Ironically, according to Battigelli, "the members of the Royal Society espoused experimentalism for the same reasons she espoused rationalism. Both Cavendish and the members of the Royal Society believed that their particular approach was best at avoiding the passions and madness that led to civil war" (Battigelli 89).

In rejecting sensory perception and technologies used to assist sensory perceptions (which she refers to as "arts"), Cavendish's foremost objection is her doubt that the senses and arts can lead anyone to undeniable truth.³⁰ Instead of sensory observations, she advocates for "rational and judicious observations, before deluding glasses and experiments" (4). "Delude" is a term that Cavendish frequently relies upon when denigrating experimental philosophy. Such a word connotes disappointment, fraud, and deceit. In the context in which she uses it, she seems to speak of the ability of experiments to "befool the mind." In misleading the mind with deceptive sight, falsehood

instruments: for I see, that in this present age, learned men are full of art, and artificial trials; and when they have found out something by them, they presently judge that all natural actions are made the same way" (*Observations* 99-100).

³⁰ When Cavendish refers to "art" she is engaging with Hooke's argument that "artificial instruments and methods" will correct the errors of human sensory perception. Chico argues that "for Hooke, sensory perception in its pure state is the only true way to acquire knowledge, and any physical limitations are themselves merely idiosyncratic and local. For Cavendish, the fact that sensory perception is not standard or universal impugns its reliability; all perceptions, therefore, are characterized by delusion and error" (147).

can be accepted as truth.³¹ It is ironic that Cavendish and Sprat both use similar accusations to denigrate the philosophy they are opposed to. For Cavendish, it is speculative philosophy that leads to truth because contemplation removes the barrier of misleading senses and technologies that deceive. But for Sprat, speculation involves conjecture, which relies on imaginative faculties, so it is speculation that deludes. In the section titled “Of the Motions of Heat and Cold,” Cavendish details exactly why she views human senses as unreliable:

I perceive, that oftentimes our senses are deluded by their own irregularities, in not perceiving always truly and rightly, the actions of art, but mistaking them, which is a double error: and therefore that particular sensitive knowledge in man, which is built merely upon artificial experiments, will never make a good philosopher, but regular sense and reason must do it; that is, a regular, sensitive, and rational inquisition, into the various actions of nature. (*Observations* 100)

The human senses, then, prove untrustworthy because they are imperfect. The observer, as she explains, does not always view things in the right way. Then, when something like a telescope is added to an already erroneous eye, it results in “double error.” The experimentalists constructed the technologies they employ, and if at the root of the senses is the potential for error, how can a human-made instrument be reliable? She asserts, “The truth is, most of these arts are fallacies, rather than discoveries of truth; for sense deludes more than it gives a true information, and an exterior inspection through an optic glass, is so deceiving, that it cannot be relied upon: Wherefore, regular reason is the best guide to all arts” (Cavendish *Observations* 9). The term “regular reason” appears after a

³¹ “delude, v.,” *OED*.

long discussion on why microscopes are unnecessary and deceptive. Regular reason, therefore, is directly contrasted with knowledge derived from the senses.

In “Of Human Sense and Perception,” Cavendish again juxtaposes regular reason with senses and technology. She writes, “Whatsoever the sensitive perception is either defective in, or ignorant of, the rational perception supplies. But, mistake me not: by rational perception and knowledge, I mean regular reason, not irregular; where I do also exclude ‘art’” (47). As established earlier, “art” refers to technologies used to assist the senses. Taken together, when Cavendish mentions “regular reason,” she means the mind’s ability to instruct and inform without reliance on tools such as microscopes. Cavendish expands her view of technologies and experimental philosophy in “Of Art and Experimental Philosophy”:

For how can a fool order his understanding by art, if nature has made it defective? or, how can a wise man trust his senses, if either the objects be not truly presented according to their natural figure and shape, or if the senses be defective, either through age, sickness, or other accidents, which do alter the natural motions proper to each sense? And hence, I conclude, that experimental and mechanic philosophy cannot be above the speculative part, by reason most experiments have their rise from the speculative, so that the artist or mechanic is but a servant to the student. (*Observations* 49)

In this passage, Cavendish draws attention to the mind as the root of all knowledge when she establishes that knowledge cannot be gained through art or the senses but instead through the speculative part, or reason. A person with deficiencies of mind— a fool — cannot have those deficiencies rectified by an artificial technology.³² On the other hand,

³² The *OED* defines a fool as “One who is deficient in, or destitute of reason or intellect; a weak-minded or idiotic person.”

people without mental deficiencies – or the “wise” – have objects presented to them through microscopes and telescopes and draw observations based on an image that is not true to life. Cavendish also reminds the reader that human senses are altered over the course of one’s life for various reasons, making the senses inconstant and unreliable. Even though Cavendish may fail to understand the actual benefits of microscopes and telescopes, she correctly asserts that the viewer’s faculties will always be flawed. At the end of her statement, she reaffirms the need for the speculative by positioning it as the chief faculty in ascertaining truth. Experiments and technologies, she argues, cannot exist without first contemplating and imagining them. In this way, Cavendish highlights a truth that Sprat would go to great pains to deny.³³

In rejecting the accuracy of experimentation and “arts,” Cavendish is able to advocate for the speculative – or fancy – as a better means to access truth. In so doing she also undermines the Society’s reliance on the tenet that experimental philosophy serves the greater good because of its practicality. This is a common criticism directed at the Royal Society, as will be explored more in the next chapter. If experimental philosophy has no practical value, then what good is it to see a flea enlarged 1000 times? In the opening epistle to *Observations*, entitled “To His Grace The Duke of Newcastle,” Cavendish sets up her point of contention early for the reader: “The truth is, My Lord, that most men in these latter times, busy themselves more with other worlds, than with

³³ Sprat’s *History* was first printed in 1667; however, Jackson I. Cope and Harold Whitmore Jones note that Sprat’s project was mentioned as early as 1663. They also establish that part of Sprat’s *History* might have appeared in print at the end of 1664 or the beginning of 1665 based on Sprat’s “An Advertisement to the Reader” in which he says, “much of this discourse was Written and Printed above two years before the rest [...] those having pass’d the Press so long ago, were out of my power of changing them” (xiii-xiv). Cavendish’s *Observations with Blazing World* was printed in 1666, with another edition printed in 1668.

this they live in, which seems strange unless they could find out some art that would carry them into those celestial worlds” (4). Essentially, Cavendish’s complaint is that viewing another planet through a telescope results in a lack of utility because the philosopher cannot make accurate assessments unless he were able to travel there. Without that possibility, there is no use or need to busy oneself with such sensory knowledge when there is more to focus on in their own world. On the other hand, traveling to another world is exactly what Cavendish pursues in *Blazing World*, but speculatively, of course. In essence, Cavendish advocates for imaginative travel as more likely to access truth than experimental methods can. In addition to her critique of examining subjects unworthy to study, which Cavendish sees as misguided, she poses the following rhetorical questions to her readers in order to help them understand what little can be gained by enhanced sight: “if it be true, that telescopies make appear the spots in the sun and moon, or discover some new starts, what benefit is that to us? Or if microscopes do truly represent the exterior parts and superficies of some minute creatures, what advantageth it our knowledge?” (Cavendish *Observations* 9). These questions are quite sound, and they implicitly ask her reader to consider whether there is any actual benefit to be gained from experimental methods. Her repetition of “if” connected to “truth” (“if it be true” and “if” they “truly represent”) undermines the supposed certainty these instruments are said to provide, while drawing attention to the little function they have to increasing understanding.

Cavendish’s critique of such inutility grows more blunt and aggressive as she turns her attention from the concept of experimental philosophy to the practitioner in the

section titled “Of Micrography, and of Magnifying and Multiplying Glasses.” Her focus on the individual practitioners highlights the flawed individuals who practice the experimental method and represents them as selfish and oblivious to what the public actually needs.

But could experimental philosophers find out more beneficial arts than our forefathers have done, either for the better increase of vegetables and brute animals to nourish our bodies, or better and commodious contrivances in the art of architecture to build us houses, or for the advancing of trade and traffic to provide necessaries for us to live, or for the decrease of nice distinctions and sophistical disputes in churches, schools and courts of judicature, to make men live in unity, peace and neighbourly friendship, it would not only be worth their labour, but of as much praise as could be given to them: But, as boys that play with watery bubbles or fling dust into each other’s eyes, or make a hobbyhorse of snow, are worthy of reproof rather than praise, for wasting their time with useless sports; so those that addict themselves to unprofitable arts, spend more time than they reap benefit thereby. Nay, could they benefit men either in husbandry, architecture, or the like necessary and profitable employments; yet before the vulgar sort would learn to understand them, the world would want bread to eat, and houses to dwell in (Cavendish *Observations* 52)

Cavendish’s tone is one of frustration as she admonishes the Society for its failure to do any public good. She lists many societal aspects that might be improved if attention given to experimental philosophy were diverted to more fruitful endeavors. Since these views represent someone on the outside of the Royal Society, Cavendish’s own philosophical ideas become important indicators of how the new and emerging epistemologies might have been received. In this passage, as an outsider to the Royal Society, she wants to know how the experimental methods benefit her or others in her society. If experimental philosophers were to use their new-found knowledge for the greater good and for utility (as they profess they do), then maybe that would mean demonstrable improvements to

food, housing, trade, religion, education, or law. On a larger scale, her accusations center on the presence of disputes and the absence of peace. If the Royal Society is as healing as they claim, then why has there not been an increase in unity? Cavendish admits that she is open to experimental methods and would be willing to lavish praise on the Royal Society if any of these utilitarian aims were approached. Instead the Society, in her view, is only deserving of “reproach.” In calling experimental philosophers “boys,” she insinuates that their methods lack maturity and proper aim, and referring to them as “addicts” only underscores even more how immoderate their approach really is and how useless their discoveries are.

Clearly, Cavendish finds much fault with experimental philosophy, and she advocates for her own methods, which are more speculative in nature. On the other hand, she admits that she does not “despise sense, or sensitive knowledge,” but that she prefers the study of contemplation, in which “reasons shall be [her] guide” (*Observations* 101). She acknowledges that we must employ our senses whenever we search out the causes of nature but that we should mainly rely on our reason when drawing conclusions “for, sense is only a workman, and reason is the designer and surveyor; and as reason guides and directs, so ought sense to work. But seeing that in this age, sense is more in fashion than reason, it is no wonder there are so many irregular opinions and judgments amongst men” (Cavendish *Observations* 99). Part of her critique, therefore, seems directed at misaligned priorities in valuing sense over reason. Earlier, she referred to sense as the student, and here she anthropomorphizes sense as the worker, but she argues that it is reason that guides both the student and the worker. Cavendish sees reason as able to

delve deeper into the meaning of things than sense, for “our exterior senses can go no further than the exterior figures of creatures, and their exterior actions” (*Observations* 100). Although it can be erroneous, reason is less likely to be because one is more likely to arrive at truth when he or she can “pierce deeper” and “consider” and “guess” (100). Cavendish’s approach to experimental philosophy, therefore, is not grounded in methods she has invented; rather, she combines methods from ancient and emerging philosophies, allowing both a role and an importance in understanding the natural world.

Near the end of *Observations*, Cavendish makes a final plea to her reader to see reason as the needed force towards ascertaining truth, emphasizing reason as the originator of all discoveries, technologies, and knowledge. She also seems to be speaking to views found within the Royal Society, which often denigrate and disregard the importance of speculation. She remarks:

Neither ought artists, in my opinion, to condemn contemplative philosophy, nay, not to prefer the experimental part before her; for all that artists have, they are beholden for it to the conceptions of the ingenious student, [...] and therefore speculation must need go before practice [...] Reason must direct first how sense ought to work; and so much as the rational knowledge is more noble than the sensitive, so much is the speculative part of philosophy more noble than the mechanical. (*Observations* 196)

Cavendish’s final critique centers on reestablishing the contemplative and speculative mind – or reason – as the source of all information, including the sensory data it receives. Whether experimental philosophers admit it or not, Cavendish argues that they cannot escape from reason; it occupies them and directs their efforts even when they believe they are guided by sensory observation and experiment. Speculative philosophy is at the core

of experimental philosophy, according to Cavendish, because it is reason that dictates how one will observe and what one will notice. When Cavendish remarks that reason and speculative philosophy are more “noble” than the sensitive and mechanical, she is attempting to assert reason as superior due to its intelligence and knowledge.³⁴ Despite what Cavendish thinks, she recognizes that her society does not value what she does. She mentions that experimental philosophers do not value rational arguments, seeing them as ‘tedious babble’ and inferior to sense.³⁵ Many experimental philosophers, she argues

Will not admit of rational arguments; but the bare authority of an experimental philosopher is sufficient to them to decide all controversies, and to pronounce truth without any appeal to reason; as if they only had the infallible truth of nature, and engrossed all knowledge to themselves. Thus reason must stoop to sense, and the conceptor to the artist, which will be the way to bring in ignorance, instead of advancing knowledge; for when the light of reason begins to be eclipsed, darkness of understanding must needs follow. (*Observations* 197)

Cavendish’s final words reveal her anxieties about emerging epistemologies. She cannot seem to make sense of how experimentation results in knowledge without the use of rhetoric or reason. In referring to experimental philosophers as having “bare authority,” she insinuates that their power lacks quality and sustenance, yet that authority is enough for “them to decide all controversies.” Cavendish also speaks to the experimental philosopher as having too much pride in himself and his methods. In assuming that his way is the only way to truth, he limits other avenues and methods. It is because of the Society that speculation has been lowered in esteem and has had to bow down to

³⁴ “noble, adj. and n.,” *OED*.

³⁵ Cavendish is quoting Glanvill here. In his “Address to the Royal Society,” he refers to rhetoric as “tedious babble.”

experimental philosophy, but in Cavendish's view that could have negative consequences for society. She issues her reader a warning that dismissing reason as inferior and invaluable will lead to a "darkness" in understanding. She fears that experimental philosophy will puzzle readers with "such a confusion of truth and falsehood," and will "confound both divinity and natural philosophy, sense and reason, nature and art, so much as in time we shall have, rather a chaos, than a well-ordered universe, by their doctrine" (Cavendish *Observations* 8).

If Cavendish had only written *Observations* and never attached her speculative account of the *Blazing World* to it, I might agree more with the aforementioned scholars who say Cavendish has invented her own philosophy, even though she advocates for a more blended approach to knowledge in *Observations*. However, Cavendish did pair this critique of the Royal Society and experimental philosophy with her fictional narrative, *Blazing World*. Pairing these two divergent texts not only exemplifies her philosophical beliefs, but also show how fancy, or speculation, can be employed as a means through which to understand. *Blazing World*, therefore, not only critiques experimental philosophy, but, as a speculative text paired with a philosophical one, it demonstrates to readers how the best understanding is derived from both ways of knowing. She offers her own approach as a speculative vision of how experimental philosophy might exist in more harmony with speculative philosophy.

Blazing World

In *Poems and Fancies* (1653), Cavendish attempts to justify her use of verse in her poem “To Naturall Philosophers.” She remarks that she writes in verse because “I thought errors might better pass there, than in prose; since poets write most fiction, and fiction is not given for truth, but pastime” (unpaginated). Although *Blazing World* is prose, the same rationale suffices. While someone could comb through her *Observations*, looking specifically for errors in thought, presenting the same ideas through fictional narrative removes the expectation that readers anticipate finding truth there. In her note “To the Reader,” Cavendish writes, “*fictions* are an issue of man’s fancy, framed in his own mind, according as he pleases, without regard, whether the thing he fancies, be really existent without his mind or not” (123). This is a powerful rhetorical strategy on Cavendish’s part because she is able to present her philosophical ideas in a way that shows she is cognizant of her reader. She has the potential to double her impact and her influence in writing these two different – and yet connected – texts on experimental philosophy.³⁷ It seems that Cavendish, like Bacon, understands the power of fiction to communicate and popularize her philosophical ideas.³⁸ Although Cavendish classifies

³⁷ Thell notes that Cavendish may have intended the work to appear in three instead of two parts. The original goal was to attach a play to *Observations* and *Blazing World*. In the end, “she abandoned her play after just two acts, although she published the incomplete version, “A Piece of a Play,” in her *Plays, Never before Printed* (1668) (Thell 31). In the play’s “Advertisement to the Reader,” Cavendish sheds light on why the play remained unfinished: “the following Fragments are part of a Play which I did intend for my Blazing-World, and had been Printed with it, if I had finish’d it; but before I had ended the second Act, finding that my Genius did not tend that way, I left that design” (2). Thell argues that Cavendish’s comment that her “Genius did not tend that way” “raises the possibility that she may have found drama an inappropriate genre for exploring the content of *Observations* and *Blazing World*, while it also implicitly emphasizes that *Blazing World*’s genre is suitable for her project (31).

³⁸ Even though *New Atlantis* was a source of inspiration for Cavendish, she does not mention Francis Bacon. Cottegnies argues that the “conspicuous absence of Bacon, when she does mention him elsewhere, is somewhat surprising” (72).

Blazing World as a work of fiction and *Observations* as an inquiry into knowledge, Keller notes that the first part of *Blazing World* has much in common with *Observations*, in that it acknowledges many of the same issues: “the questionable value of the experimental method, the untrustworthiness of optical instruments, the contentiousness and unproductiveness of scientific societies” (461).³⁹

Cavendish provides readers with some insight into why she may have paired these two texts. In *Observations* and in *Blazing World*, Cavendish addresses her readers, presenting them with rationales for her choices. In *Blazing World* Cavendish tells her reader, “If you wonder, that I join a work of fancy to my serious philosophical contemplations; think not that it is out of a disparagement to philosophy,” but is instead a way for her to join philosophy and fiction “as two worlds at the ends of their poles” [...] “to delight my reader with variety” (Cavendish 124). Tito Chico argues that Cavendish’s rationale “explicitly indicates the appropriateness, and even necessity, of a literary approach to natural philosophy” (147). Chico’s assessment draws attention to the fact that Cavendish sees this approach as necessary; however, when we compare her messages to her readers in both *Observations* and *Blazing World*, it seems that Cavendish, as a reader of philosophy herself, appreciated the need to be understood by one’s reader. In *Observations*, Cavendish mentions the difficulty in understanding writings on

³⁹ See other scholars who have mentioned the pairings between *Blazing World* and *Observations*: “The duchess’s writings are a curious combination of scientific speculation and fantasy, largely uncritical and hopelessly repetitive” (Sarason 290); “Her texts were consciously self-contradictory, paradoxical, and admittedly fanciful. Her natural-philosophical conceptions were intentionally detached from any trace of empirical foundation” (Mascetti 15); “Appending a work of fiction to *Observations* was also part of a larger strategy aimed at highlighting the inner life of the mind and its vagaries, which the experimentalists seemed to overlook” (Battigelli 102).

experimental philosophy: “Their hard words did more obstruct, than instruct” [...] instead of making hard things easy, make easy things hard” (12). Cavendish poses the following question to her readers, “what benefit would it be to me, if I should put forth a work, which by reason of its obscure and hard notions, could not be understood? especially it being well known, that natural philosophy is the hardest of all human learning” (Cavendish *Observations* 11). In admitting how difficult it is to understand experimental philosophy, Cavendish demonstrates an understanding of her audience’s need, something she also mentions to them in her address in *Blazing World*:

Fancy creates of its own accord whatsoever it pleases, and delights in its own work. The end of reason, is truth; the end of fancy, is fiction: but mistake me not, when I distinguish *fancy* from *reason*; I mean not as if fancy were not made by the rational parts of matter; but by *reason* I understand a rational search and enquiry into the causes of natural effects; and by *fancy* a voluntary creation or production of the mind, both being effects, or rather actions of the rational parts of matter; of which, as that is a more profitable and useful study than this, so it is also more laborious and difficult, and requires sometimes the help of fancy, to recreate the mind, and withdraw it from its more serious contemplations. (124-25)

Although Cavendish distinguishes fancy from reason based on their end goals – fiction versus truth – she acknowledges that both truth and fiction originate within the rational part of the brain. Rationality, therefore, is composed of both fancy and reason. Because experimental philosophy is difficult to understand, it requires this diverse approach.

Fancy is able to assist reason in contemplation, leading readers to a “more profitable and useful study.” In other words, the speculative actually helps to create truth because in conjecturing, the mind is able to reason its way through abstruse ideas. It seems, then,

that Cavendish and Bacon both realized the powerful tool that fiction can be in teaching and communicating with the public about concepts that are difficult to grasp.

In *Blazing World*, Cavendish tackles similar topics and makes analogous criticisms of experimental philosophy, but in a way that is much more accessible in its use of the familiar elements of utopia, travel narrative, and romance. Cavendish, the narrator of the fictional narrative opens the story with a storm and kidnapping at sea, in which the kidnapped Lady survives by passing into a portal in the North Pole. This portal brings her into another realm called Blazing World, of which the Emperor of said world appoints her the Empress. In her newfound authority, she establishes governing structures, one of which is a society or school devoted to experimental philosophy, a direct satire of the Royal Society. On the surface, Cavendish's representation of the Society may seem like flattering emulation, but the chaos and uncertainty that result from the pursuit of experimental philosophy is anything but complimentary. Over the course of the narrative, the Empress discourses with experimental philosophers who are half beast, half man, as well as discoursing with the spirit world and the soul of the Duchess of Newcastle. Conflict breaks out, both within the *Blazing World* and in the Duchess's native world, and each of them assist the other – the Duchess assists the Empress in restoring the *Blazing World* back to its original condition and the Empress, through soul-travel, helps bring a revolution to a close. For the purposes of my argument, I will focus mainly on the aspects within the narrative that critique experimental philosophy. Many of Cavendish's critiques in *Blazing World* sound quite similar to the critiques in

Observations, which should be expected; however, the examples found in *Blazing World* strengthen and deepen her critiques by envisioning the theories in hypothetical practice.

One such complaint or anxiety regarding the Royal Society's methods – one commonly critiqued – was the fear that experimental philosophy lacked practicality. A strong example of this lack can be found when the Empress asks the experimental philosophers to show her a vegetable under a microscope. They show her a nettle, and the microscope assists them in seeing that there are little “bladders containing a poisonous liquor” under the nettle's points (Cavendish 143). The Empress wonders if ingesting the nettle's poison might be as harmful inwardly as it is to the exterior body, but “they answered, that it belonged to physicians more than to experimental philosophers, to give reasons hereof; for they only made microscopial inspections and related the figures of the natural parts of creatures according to the presentation of their glasses” (Cavendish 143-44). In this example, the experimental philosopher's response exemplifies that just being able to identify what he discovers through the assistance of a microscope has no use value. Not only does it have no use, but it also shows how the experimental philosophers do not even consider such a question to be within their purview, as the experimental philosophers direct the Empress to question physicians on the topic. Shortly after this admission, the Empress is shown lice and fleas under the microscope, and “she desired to know whether their microscopes could hinder their biting, or at least show some means how to avoid them? To which they answered, that such arts were mechanical and below that noble study of microscopial observations” (Cavendish 144). Such examples might seem comical, but through satire, Cavendish is able to instruct her readers about the

impracticality of experimental philosophy's focus. Both of these examples force the reader to question whether experimental philosophers do any good for society. They are not really doing anything other than just observing everything. If all they actually do is observe, she implies that there is no use in seeing what lice look like without speculating how the microscope might assist the viewer in understanding the creature more. The experimental philosophers, as presented in Cavendish's speculative world, are so specialized that they "slavishly uphold" differences between theory and practice, while elevating practice to the point that they end up promoting uselessness instead of usefulness (Chico 149). The results of their methods are "self-perpetuating delusion," according to Chico, because they have devoted themselves to methods they cannot master. In so doing, they fall short due to their inability to serve society in any advantageous way (149).

Although it may not improve society, this impracticality may not itself harm society. But Cavendish makes clear that experimental philosophers do present a danger to society when their methods lead to conflict and divisiveness. In a lengthy section in which the Empress interviews the various practitioners – those who are astronomers, chemists, and experimental philosophers, for instance – their answers repeatedly expose the philosophers' inability to agree on any truth. The Empress asks the bird-men to give her a "true relation" of the sun and the moon, but concerning the sun's health, "they were not of one opinion." Some opinions were "laughed at by others, and rejected as ridiculous, other opinions would not hold," and "thus, they argued" (Cavendish 136-37). Then, the Empress inquires into what the air is made of, but they prove, once again

unable to answer, admitting “nature is so full of variety, that our weak senses cannot perceive all the various sorts of her [the air’s] creatures; neither is there any one object perceptible by all our senses” (Cavendish 138). Next, the reader gets another list, recounting what “some said,” and what “others” said, ending with the Empress once again observing that “they could not agree” (Cavendish 139). Her final round of questions for the bird-men concerns the nature of thunder and lightning, and the reader is faced, once again, with the bird-men spouting off reasons that contradict one another. So as “to avoid hereafter tedious disputes, and have the truth of the phaenomenas of celestial bodies more exactly known, [the Empress] commanded the bear-men, which were her experimental philosophers” to observe through their telescopes. However, “these telescopes caused more differences and divisions amongst them, than ever before” (Cavendish 140). In each of these examples, Cavendish demonstrates how subjective truth is, but also how speculative it is. In claiming as certain what is merely conjecture, and without acknowledging that uncertainty, the philosophers blindly profess their own truth as more valid and remain unwilling to allow for multiplicities of truth. Without the assistance of telescopes, the experimental philosophers only can guess at possible explanations, but their differing opinions create discord because they do not know how to account for inconsistent and divergent sensory observations.

The bear-men, who are the experimental philosophers, argue just as much as the astronomers, despite their reliance on technology. After looking through their telescopes at the sun, the bear-men continue to argue with each other and come to no sound conclusions at all. As was discussed in *Observations*, Cavendish disapproves of

experimental tools used as a means to ascertain truth, and in *Blazing World*, the Empress becomes increasingly angry the longer she is presented with proof that the telescope has not provided the bear-men with any better abilities to discover truth. The telescopes, she says “are false informers, and instead of discovering the truth, [they] delude your senses; wherefore I command you to break them, and let the bird-men trust only to their natural eyes, and examine celestial objects by the motions of their own sense and reason” (Cavendish 141). This well-known moment in the narrative reinforces Cavendish’s philosophy in *Observations*, but the bear-men’s reactions to this command reveals more than Cavendish’s critique does:

The bear-men being exceedingly troubled by her Majesty’s displeasure concerning their telescopes, kneeled down, and in the humblest manner petitioned that they might not be broken; for, said they, we take more delight in artificial delusions, than in natural truths. Besides, we shall want employments for our senses, and subjects for arguments; for were there nothing but truth, and no falsehood, there would be no occasion for to dispute, and by this means we should want the aim and pleasure of our endeavours in confuting and contradicting each other; neither would one man be thought wiser than another, but all would either be alike knowing and wise, or all would be fools; wherefore we most humbly beseech your Imperial Majesty to spare our glasses, which are our only delight, and as dear to us as our lives. The Empress at last consented to their request, but upon condition, that their disputes and quarrels should remain within their schools, and cause no factions or disturbances in state, or government. (Cavendish 142)

In *Observations* Cavendish describes experimental philosophers as addicts, and in this scene, their obsession with and reliance on the telescope breaks any and all claims to balance and moderation. The reasons they want to keep the telescopes prove even more how flawed these practitioners are. Unlike the claims Sprat will make for experimental philosopher’s ability to quiet conflict and disagreement, these experimental philosophers

actually desire conflict. They find “pleasure in confuting and contradicting” one another. Their rationale also hints at their own issues with pride and ego, for they want to fight over which philosopher is wisest. Although the Empress concedes and allows the experimental philosophers to keep their telescopes, her requirement that the disagreements be kept contained highlights the dangers these kinds of disputes can have for society at large. It does not seem realistic to keep conflict contained, and it seems that her request is one that cannot be met.

Cavendish is able to showcase the detrimental effects experimental philosophy can have on the nation by presenting her reader with a view of *Blazing World* before and after the institutionalization of experimental philosophy. Before the Duchess creates the institutions devoted to experimental philosophy, she describes the Blazing World as “Paradise” and says the inhabitants “live in a continued peace and happiness, not acquainted with foreign wars, or home-bred insurrections” (Cavendish 130). But after she erected these schools and societies, the Empress complains to the Duchess of the changes that have taken place in the Blazing World. A focus on experimental philosophy has caused her world to no longer be “as quiet as it was at first,” and this troubles her. She identifies the source of these troubles with the “contentions and division between the worm-, bear- and fly-men,” and she fears “they’ll break out into an open rebellion, and cause a great disorder and the ruin of the government.” She turns to the Duchess for advice on “how I may order it to the best advantage, that this world may be rendered peaceable, quiet and happy, as it was before” (Cavendish 201). The Empress’s world has literally changed from a place of harmony and contentment to a place of disorder and ruin

because of the impact the establishment of experimental philosophy has had. The Duchess's solution and warning to the Empress serves also as a solution and warning to England, as she insinuates that the Royal Society itself is a king-sanctioned disordered society with disordered individuals. The Duchess suggests:

Since your Majesty complains much of the factions of the bear-, fish-, fly-, ape- and worm-men [...] I would advise your Majesty to dissolve all their societies; for 'tis better to be without their intelligences, than to have an unquiet and disorderly government. The truth is, said she, wheresoever is learning, there is most commonly also controversy and quarrelling; for there be always some that will know more, and be wiser than others; some think their arguments come nearer to truth, and are more rational than others; some are so wedded to their own opinions, that they never yield to reason; and others, though they find their opinions not firmly grounded upon reason, yet for fear of receiving some disgrace by altering them, will nevertheless maintain them against all sense and reason, which must needs breed factions in their schools, which at last break out into open wars, and draw sometimes an utter ruin upon a state or government (Cavendish 202).

The Duchess's speculative warning and prediction is based on the idea that flawed individuals lead to flawed philosophy, which leads to flawed conclusions, which leads to a flawed society. Not only do their discoveries lack in practicality, but their knowledge also loses all use if it creates a chaotic society. The Duchess's solution focuses on the fallibility of humans and their desire for more – more discoveries, more wisdom, and more esteem than their counterparts. These kinds of practitioners, who cannot even admit fault because they are so attached to their “own opinion[s],” will eventually lead society astray. Whatever gains in knowledge experimental philosophy is able to make, in Cavendish's view those gains are not worth the losses to the state.

Conclusion

In creating fictitious worlds and societies, in which experimental philosophy holds positions of prominence, both Bacon and Cavendish are important and early contributors to the speculative mode. Many scholars have designated these works as science fiction, but doing so detracts from the intellectual work both Cavendish and Bacon were actually performing.⁴⁰ Notwithstanding that there was no such thing as science in the seventeenth century, these texts are each attempting to speculate about experimental philosophy. Speculation, therefore, becomes an important tool through which non-practitioners such as Cavendish could contemplate and, in some ways, participate in experimental philosophy and the discoveries and changes that it brought, while Bacon could attempt to reach into the future and imagine a world in which his ideas could come to fruition. Writers of the day who conjectured about experimental philosophy's usefulness and consequences penned a type of discourse that was both speculative *and* experimental because observation is at the root of both methods and because they combine conjecture with concepts of experimental philosophy. Furthermore, because they are both works of fiction, each story helps us to better understand the role of speculation in the discourse surrounding new epistemologies. The

⁴⁰ Serjeanston says of *New Atlantis*, "if any early-modern work can legitimately be called science fiction, then perhaps Bacon's *New Atlantis* can" (99), and Sessions declares that Bacon's narrative is "one more fiction in the series of science fictions the Renaissance spawned" (150). Scholars who refer to *Blazing World* as "science fiction" include: Amy Boesky who argues that it is science fiction because of its "speculations on space travel and worlds elsewhere" (132); Laura Dodds who claims Cavendish has created a narrative with links to utopia, travel, allegory, and science fiction (123); Nicole Pohl contends that "Margaret Cavendish not only creates the first science fiction text, but science fiction in its truest sense" (58). Lisa Sarasohn also classifies *Blazing World* as a work of "science fiction" (13), while Eve Keller designates it as a "utopian science fiction fantasy" (448), and Tito Chico refers to it as a "science fiction romance" (147).

imaginative aspects of fiction are explicit, and yet, it is these imaginative works that are able to create worlds and societies in which experimental methods can be hypothetically tested. It is in these imagined worlds that one can forecast consequences, a practice that experimental philosophy does not embrace since conjecture exists outside of its methods. Cavendish's text, therefore, is more speculative than Bacon's because of the way she intentionally creates her own world through the mixing of genres. In combining genres such as romance and fantasy with philosophy, Cavendish writes that she has made "a World of my own Creating, which I call the *Blazing-World*: The first part whereof is Romancical, the second *Philosophical*, and the third is merely *Fancy*, or (as I may call it) *Fantastical* (153). This imagined world has multiple suns and does not follow the laws of nature. It is a place inhabited by animal/human hybrids and alien gemstones. Combining genres, therefore, allows her to speculate, while at the same time assists her in undermining the methods of the Royal Society.

Considered together, speculative writings by Bacon and Cavendish showcase the deep connection between the speculative and the experimental, a connection that can easily be forgotten, especially in light of the Royal Society's rhetoric and even Bacon's own views. Bacon's thoughts on fancy in the *New Organon* (1620), for example, seem much more in line with how the Royal Society represented his views of the speculative. He writes:

I am building in the human understanding a true model of the world, such as it is in fact, not such as a man's own reason would have it be; a thing which cannot be done without a very diligent dissection and anatomy of the world. But I say that those foolish and apish images of the worlds which the fancies of men have created in philosophical systems, must be utterly scattered to the winds. (110).

In just a few years, Bacon acknowledges the need for the “fancies of men.”⁴¹ In the above sentiments, Bacon denigrates the speculative in order to forward a method based on observation. In order to really arrive at truth, he says, we must scatter foolish fancies created by philosophical systems “to the winds.” In *New Atlantis*, however, Bacon embraces the power of fancy and sees it as a necessary step in popularizing his methods. Similar sentiments can be found in *Blazing World* when the Empress asks the Duchess to write down the Jews’ Cabbala. The Duchess advises her to forget such a plan because it would not benefit her people (182). The Empress then decides that she wants the Duchess to write something philosophical, but the Duchess once again objects to philosophical writing because doing so would “breed confusion, especially in human understanding” (183). The Duchess turns down the proposal to compose a moral tract since moral rules are too simple to require a written document,⁴² and she also remarks that there is no need for a political tract. Instead of these options, she advises her “rather to make a poetical or romancical Caballa, wherein you can use metaphors, allegories, similitudes, etc. and interpret them as you please” (Cavendish 183). According to the Duchess, the people do not need religious, philosophical, moral, or political writings. What they really need are writings that are imaginative and that allow them to consider truth through their own reason and speculation.

Both Bacon and Cavendish present readers with an interesting alternative for understanding experimental philosophy. Their speculative texts remind us that we can

⁴¹ *New Atlantis* was written during the five years prior to Bacon’s death, probably around 1624 (Spedding, Ellis, and Heath 121).

⁴² The “simple” moral rules the Duchess refers to are the fear of God and love of one’s neighbor.

incorporate the old with the new, without having to favor or cast aside either. When the Duchess is trying to determine the kind of world to make for herself, she decides to leave behind ancient philosophy and turn to the moderns. She then considers Descartes's and Hobbes's opinions, only to leave them both behind, as well (Cavendish 188). Her dismissals imply that the ancient and modern philosophers represent worldviews that she can accept or reject because truth is subjective and infinite. Both Bacon's and Cavendish's visions, therefore, offer Restoration readers a substitute to emerging epistemologies that tended to place speculation and observation on opposite ends of the spectrum, allowing people to envision a type of knowledge about the natural world that allows for truth derived from senses *and* speculation.

CHAPTER V

DISORDERED INDIVIDUALS AND DISORDERED HOUSEHOLDS:

SPECULATIONS ON THE EXPERIMENTAL PHILOSOPHER CHARACTER-TYPE

If I could fetch my materials whence I pleas'd, to fashion the *Idea* of a perfect Philosopher: he should not be all of one *clime*, but have the different excellencies of several Countries. First, he should have the *Industry, Activity, and Inquisitive humor* of the *Dutch, French, Scotch, and English*, in laying the ground Work, the heap of Experiments: And then, he should have added the cold, and *circumspect, and wary* disposition of the *Italians, and Spaniards*, in meditating upon them, before he fully brings them into speculation. All this is scarce ever to be found in one single Man: seldom in the same Countrymen: It must then be supply'd as well as it may, by a *Publick Council*; wherein the various dispositions of all these Nations, may be blended together.

Thomas Sprat, *The History of the Royal Society*¹

Thomas Sprat's *The History of the Royal Society* does more than detail the origins of the Society and its experimental aims. It also establishes the ideal qualities of the individual practitioner. In the passage quoted above Sprat imagines creating the perfect experimental philosopher and lists what his attributes would be.² Sprat acknowledges that this flawless experimental philosopher could not be an Englishman, for he would require

¹ pg. 64.

² In order to avoid confusion and for the sake of consistency, when I refer to the practitioner of experimental philosophy in this chapter, I use the term "experimental philosopher," even though the writers I reference in this chapter also use the terms "natural philosopher" or "virtuoso." The speculative writing I explore very rarely refers to natural philosophy as experimental philosophy or to the natural philosopher as an experimental philosopher. For example, Thomas Shadwell's play is entitled *The Virtuoso*, and the main character in Aphra Behn's play is described as participating in natural philosophy. These satires, however, are aimed at the Royal Society, so when the writers refer to a virtuoso or natural philosopher, they are referring to the methods of the Royal Society, also known as experimental philosophy, which I defined in the second chapter. I use the term "experimental philosopher" to distinguish them consistently throughout from natural philosophers, whose views encompassed more than experimental methods and those who only dabbled in natural philosophy outside the Royal Society.

“different excellencies” that could only be found by melding together the Dutch, French, Scotch, English, Italian, and Spanish man. This Frankenstein-esque creation – composed of internal “excellencies” instead of dead body parts – would be clever and intelligent and would bring his diligence and curiosity to the beginning stages of experimentation. However, being inquisitive and hardworking are not enough to round out the flawless Fellow. He must also exhibit a disposition that is opposed to passion and hastiness; instead, he will be cautious and careful when considering any performed experiments and before developing any theories or hypotheses. As established in chapter three, the Royal Society rhetorically positioned itself as moderate and balanced after the excesses associated with the civil wars and Interregnum, so it makes sense that the ideal experimental philosopher would exhibit moderation. Sprat realizes that his “build-a-scientist” is not possible, and he uses that impossibility to advocate for a public assemblage of experimental philosophy. This “council” would meet together to deliberate and advise one another on matters related to experimental philosophy.³ Sprat’s apology, as discussed in chapter three, often centers on the collective effort of experimental philosophers coming together, for in the many, there is less room for inaccuracy and ego.

There are many benefits, according to Sprat, in sharing experimental philosophy “amongst so great a number” (97). One of those benefits is the ability to compare one’s own conceptions with those of others through shared discourse and the repeatability of experimentation. Through collective efforts, the experimental philosopher’s thoughts will

³ “Council, noun.” *OED*. Interestingly, in addition to general meetings, the word “council” refers to either an assembly that convenes for deciding church doctrine or one that advises the king on matters of government. In using a word that designates groups of people who decide on such important matters, Sprat emphasizes the vital role he sees the Royal Society having.

be “more enlarg’d, his judgment confirm’d, his eyes open’d to discern,” and he will better be able to decide how best to attempt experimentation (98). He will learn patterns of truth and understand how to avoid the dangers of error and falsehood. These characteristics, nevertheless, are only a few benefits. Sprat supposes there are “a thousand more advantages [that] will hereby come into the minds of the most Sagacious, and acute *Inquirers*, which they would never have compass’d, if they had been onely [*sic*] left to themselves” (98). When the individual practitioner performs experimental philosophy in isolation, he is not practicing in a way that aligns with Sprat’s ideal philosopher. On his own, the practitioner is more likely to misjudge and misunderstand his own observations, perhaps leading him to arrive at false conclusions. Sprat implies that even if the individual Fellow were unable to practice moderation on his own, his colleagues would keep him objective and balanced.

Despite Sprat’s insistence on a fair and objective approach, based only on observation and experimentation, experimental philosophers and virtuosos often became objects of ridicule and their antics became cautionary tales in speculative writing about the early Royal Society and its initial practitioners.⁴ In the previous chapter, for example,

⁴ Although the term “virtuoso” can have a variety of meanings, such as a person who dabbles in something or someone who has a special skill, I rely on the *OED*’s first entry for “virtuoso”: “A learned person; a scholar; *esp. a scientist, a natural philosopher. Also, spec. a member of the Royal Society* (emphasis added). The *OED* also notes in this definition that a virtuoso could be a natural philosopher who had only a superficial knowledge. At the time, the term “virtuoso” could refer to a member of the Royal Society who had specialized or superficial knowledge, meaning that the Royal Society had members who were more akin to what we might classify as an amateur today. We should not, however, think of virtuosos as being unworthy of study because they had an important role within the Society. According to Walter E. Houghton, Jr., the virtuoso contributed to the spread of experimental philosophy and that is “sufficient in itself to rescue them from the neglect accorded the amateur by our age of specialists” (51). Furthermore, the virtuoso was often a gentleman and his wealth benefitted the Royal Society, but he served larger functions, as well, assisting in experiments and recording results. Houghton tracks the term “virtuoso” from 1598 to the 1660s. At first, the term “virtuoso” was not strongly associated with natural philosophy, but by the

I explored how Margaret Cavendish's speculations about the society run by experimental philosophers revealed the dangers of disorder to society at large. Part of that disorder comes from an approach to truth that focuses solely on experimentation, and therefore, disregards the importance of speculation to truth making. Even though Cavendish presents the experimental philosopher working as part of a collective, his approach, as seen in *Blazing World*, still leads to societal imbalance. A more inclusive approach, as seen in Francis Bacon's *New Atlantis* and Cavendish's speculative writing, would allow for an understanding of the world that is rooted in *both* speculation and observation. In this chapter, I shift the focus from the general Society to its specific members, by examining speculative writing that investigates the fictional individuals who may have composed the collective Society. I do not mean that these characters were necessarily members of the Royal Society but more so that they are representative of the imagined experimental philosopher and symbolic of the types of individuals that might have been members of the Society. Even within the collective Society, as evidenced in Samuel Butler's poem "The Elephant in the Moon," experimental philosophers cannot cast off their individual positions, and their own egos make it impossible for them to reach a consensus that represents reality. When we move outside the laboratory and into the individual practitioner's home, writers such as Thomas Shadwell and Aphra Behn remind us of how easy it is to disregard the collective approach for which Sprat advocates. Each of the plays I investigate in this chapter warns the spectator of the isolated experimental philosopher who creates havoc within the home and for the nation. In this chapter, I focus

1660s if one was said to be a virtuoso that almost exclusively referred to interests in natural philosophy (66, 71-72).

on the experimental philosopher as an individual, in both poetry and prose, but my main focus is on speculative theatre of the Restoration because of its ability to highlight the individual as a character to be viewed and judged in a public forum, which I detail later in this chapter.

No matter how many checks and balances the Royal Society purportedly took to avoid error, the practitioner always brings with him his own humanness and imperfections; these inherent flaws come into focus in the speculative works discussed in this chapter. Although Sprat insisted on the opposite, the Royal Society was composed of fallible men, and no matter how many of them came together in supposed unison, their inherent bias or individual viewpoints remain part of their approach. Speculative writers remind us that the collective cannot happen without the individual, but this reminder also serves as a source of anxiety. If the collective is composed of disordered individuals, what does that mean for the Society as a whole?⁵ Even though experiments were performed within the Royal Society at weekly meetings, Fellows were practicing individually in their own homes, as well. John Shanahan argues that in the sixteenth and seventeenth centuries the “home was the primary setting for experimental philosophy” (226). When exploring speculative writing that focuses on the individual philosopher, experimental philosophy becomes more localized within the domestic space. Thus, when readers and spectators are also reminded that these disordered individuals are husbands and fathers who are in charge of households and families, the speculative anxieties over

⁵ I use the term “disorder” to speak to a lack of moderation within the individual practitioner. As was discussed in chapter three, Sprat’s rhetoric and Cowley’s poem both speak to and promote experimental philosophy’s ability to create balance.

experimental philosophy become more personal. Speculating about the individual practitioner allows writers to predict possible consequences on the microcosmic and macrocosmic levels. What happens in the home can happen to the nation, as disorder in the private realm can affect order in the public realm. Ultimately, I argue that speculative questions about and apprehensions of the experimental philosopher respond to larger concerns about national identity. The speculative writing in this chapter directly correlates this critique with the dangers associated with the immoderate experimental philosopher's undermined masculinity and his disordered household, which underscores lingering anxiety about the stability of the nation due to political unrest.

The Experimental Philosopher: Man versus Speculations

Sprat's *History* provides us with insight as to what attributes the ideal experimental philosopher would have, but it is important to investigate just how the figure of the experimental philosopher was viewed outside of his portrayals in speculative writing. Bacon's *New Atlantis*, a work that I identify in the previous chapter as operating in the speculative mode, outlines a society based on a new form of study and new methodology on observation and experiment. At the same time, it provides readers with the speculative vision of what kind of men "could be entrusted to carry out the great plan" (Haynes 24). In *New Atlantis*, the men in Bensalem are esteemed and valued in the utopian community because they practice research for the betterment of society rather than for their own personal interests. Of course, since Bacon's ideas on the model experimental philosopher are theoretical and speculative in nature (as are Sprat's), they

do not necessarily align with reality. According to Steven Shapin, at the end of the seventeenth century there was no consistent role or kind for the “man of science” (160).⁶ The establishment of the identity of an experimental philosopher was in flux because the “science” of the Restoration was not “science” as we know it today. In other words, one could *do* experimental philosophy without necessarily being considered an experimental philosopher. One could also be an experimental philosopher while taking on other identities and having other concerns (Shapin 161). In reality, therefore, what defined someone as an experimental philosopher was not yet completely established. As my analysis of dictionary definitions demonstrated, one was marked as a naturalist because one practiced natural philosophy, but that practice might range at the time from dabbling in the activity to more sustained study.

Despite having a role that was still being defined, experimental philosophers were often rhetorically positioned as an ideal, similar to many of Plutarch’s Greek and Roman heroes, in that both portray “stoic fortitude and self-denial” (Shapin 165). Comparable to Sprat’s model philosopher, the experimental philosopher Shapin describes focuses on the supposed benefits associated with practicing experimental philosophy: it made men “humble, serious, simple, and sincere,” and studying the vastness and magnificence of

⁶ Shapin details how many kinds of people pursued experimental philosophy at this time and that there was no such job yet of a “professional scientist.” Instead, men were professors, doctors, courtiers, gentlemen, and civil servants, so Shapin argues that the identity of an experimental philosopher was colored by the characteristics people associated with his main role (from the aforementioned list). Shapin uses Benjamin Franklin as an example to illustrate this view. While Franklin may have been known for inventing the lightning rod, he was identified primarily as a “printer, a businessman, a diplomat, and a statesman” within his culture (160-161). For more on the professionalization of science see Roy Porter, “Gentleman and Geology: The Emergence of a Scientific Career,” in *The Historical Journal* (1978). The term “science” is often used anachronistically to refer to the methods in the Royal Society. Although I would prefer to avoid the term altogether, I use it mostly in conjunction with another scholar’s usage. Anytime I use the word science for my own argument, I put the term in quotation marks to indicate the difference between our understanding of science now and in the Restoration.

nature made men “modest.” The pursuit of experimental philosophy resulted in a man who was more genuine and candid, and he was instilled with “tranquility” and “contentment” as a reward (165). Despite these benefits to his character, a life lived devoted to experimental philosophy did not usually result in material gain, fame, or political esteem, but an absence of such successes only furthers the experimental philosopher’s good character because his pursuits exemplify self-sacrifice (165).

Shapin’s characterization of the ideal experimental philosopher aligns well with Sprat’s idealized philosopher; however, the experimental philosopher, as presented by speculative writers who often critique the practitioner, seems completely foreign to the morals and ethics outlined by Bacon, Sprat, and Shapin. For example, Bacon’s concept of experimental philosophers working together in cooperative teams supposes “that the scientists concerned have no need to become involved in the competitive scramble for individual success and honors” (Haynes 27). Mary Astell’s “Character of a Virtuoso” (1696) accounts for some of what Bacon may have failed to consider about the fact that experimental philosophers are merely human.⁷ She issues some scathing critiques of the practitioner: He “abandon’d the Acquaintance and Society of Men for that of *Insects, Worms, Grubbs, Maggots, Flies, Moths, Locusts, Beetles, Spiders, Grasshoppers, Snails, Lizards, and Tortoises*” (96-97). Astell focuses on a common trope of the experimental philosopher as someone who shuns the knowledge of men in favor of the knowledge of

⁷ In “An essay in defence of the female sex in which are inserted the characters of a pedant, a squire, a beau, vertuoso, a poetaster, a city-critick, &c. in a letter to a lady.” Astell is known for *A Serious Proposal to the Ladies* (1694), in which she advocated for women’s intellectual equality and right to an education. Her proposed solution was to form communities where women could gather to study, read, and enjoy one another’s fellowship. Astell was interested in science, and she studied astronomy at the Royal Observatory at Greenwich from September 1697 through February 1698 (Perry).

the trivial. Writers in the speculative mode often ridicule experimental philosophers for their devotion to what many saw as inconsequential, which is similar to Cavendish's critiques. In making "too much of too little," according to Shapin, society was concerned that the practitioner would become corrupt and coarse because of his misplaced focus (172-73). Astell also brings up the uselessness of his research and the fact that none of his work helps to "promote our Luxury, nor encrease our Trade, and neither enrich the Nation, nor himself" (97). Although Sprat attempted to promote the utilitarian benefits of experimental philosophy, Cavendish also critiques the Society for its lack of utility, as established in the last chapter. Astell continues her attack on the experimental philosopher by drawing attention to his excessive pride. According to Astell, "he is a Passionate Admirer of his own Words" and he believes himself to be infallible (100-101). A practice rooted in impracticality and immodesty calls into question the soundness of the experimental philosopher's mental faculties. Astell addresses the quality of the experimental philosopher's mind, claiming that only "*Mad Men*" would chose to employ themselves in such matters (102). Speculative writing during the Restoration is quick to investigate these flaws in experimental philosophy and its practitioners, as we will see in the speculative writing examined in the rest of this chapter.

Many stereotypes associated with the character of the experimental philosopher in the speculative mode, as showcased in Astell's portrayal, paint the practitioner in a negative light. C.S. Duncan traces the progression of the experimental philosopher character-type in his essay "The Scientist as Comic Type," in which he argues that the character of the experimental philosopher replaced the pseudo-scientists who had

formerly been associated with alchemy, astrology, and witchcraft. Before the formation of the Royal Society, these pseudo-scientists were comic figures on the stage. In Duncan's view, the new kind of scientist, represented by the Society's experimental philosophers, fills this void.⁸ "The man of the new science," according to Duncan, was a "fool, because he was engaged in the vain pursuit of knowledge, a pedant because he was a mere pretender to learning," and he was seen as a contemptible character because his interests were centered on what was considered "low" and "vulgar" (287-8). Roslynn Haynes also contends that satiric representations of experimental philosophers in the Restoration are mostly comic because the experimental philosopher is almost always presented as an idiot, who is out of touch with reality. In her view, these comic figures "pose no threat to society because, not having the sense to realize their own stupidity, they are easily outwitted or manipulated" (Haynes 40-41). While I understand the point that Haynes is making regarding the portrayal of experimental philosophers as imbeciles, she fails to consider the serious subject matters and themes these satiric attacks address while keeping us laughing.

The experimental philosopher is often outwitted, usually in quite humorous ways, but that does not assume a character we are meant to only ridicule. The practitioners found in the speculative writings I examine represent larger concerns than Haynes would have us believe – concerns over family, the economy, society, and anxieties related to emerging knowledge production. Al Coppola contends that the experimental philosopher

⁸ For other Restoration plays that feature the natural philosopher as a comic character see: John Wilson, *The Cheats* (1662); John Dryden, *The Wild Gallant* (1663) and *An Evening's Love* (1665); John Lacy, *The Dumb Lady* (1672); Thomas D'Urfey, *Madame Fickle* (1677); Thomas Shadwell, *Sullen Lovers* (1688); and Thomas Wright, *The Female Virtuoso* (1693).

ends up becoming a “stereotypical learned fool” by the end of the eighteenth century; however, in the Restoration, this character type “serves as a lightning rod for a host of cultural anxieties” (Coppola 13). It is not just experimental philosophy and its methods that audiences should feel apprehensive about, and experimental philosophy may not even be the main concern. Instead, it is the actions behind the methods that pose a danger to society. In fact, the practitioner’s methods were represented as threats to the social order because of the impact the experimental philosopher’s individualistic study could have on the family and, therefore, the nation (Coppola 43). Coppola’s investigation into Restoration drama about experimental philosophy focuses on the stage and the laboratory as a similar type of spectacle, each informing the other and each contributing to the establishment of modern science. Conversely, my focus is on the speculative modes of thought that occur when writers suppose that certain behaviors could lead down dangerous paths.

I argue that writers who critique the experimental philosopher do more than make a spectacle of science. Instead, these writers participate in a type of hypothesizing about experimental philosophy that was based on observing behaviors of practitioners but was not based on observation alone. Instead, beginning with such observations, these writers turn to theoretical and fanciful conjectures about the future of society, thereby attempting to forecast the future. These speculative works, which focus on the practitioner of experimental philosophy, also showcase the vital work done within the speculative mode within culture. Although Herbert Silvette focuses on the presence of doctors on the stage in the seventeenth century, his argument that we can find “the synthesis of scientific truth

and popular belief” in these types of staged characters is particularly applicable when considering the experimental philosopher in Restoration drama (1). Fictional characters as practitioners, therefore, are worthy of serious study because they represent a response to the role of experimental philosophy in society. As we turn our attention to satirical representations of the practitioner – particularly in Samuel Butler’s poem “An Elephant in the Moon,” Thomas Shadwell’s *The Virtuoso*, and Aphra Behn’s *The Emperor of the Moon* – we will see that these characters are examined against the morals and social norms of the day. The speculative writing I explore in this chapter critiques the Royal Society, some more explicitly than others. In regard to the plays in this chapter, each has been selected for their focus on experimental philosophy within the domestic space. Because I am interested in the public reaction to the Royal Society, these plays have also been included because of their popularity at the time and for the lasting impact they had in further iterations of the experimental philosopher character-type.

Samuel Butler’s Speculations on the Experimental Philosopher

In revisiting Sprat’s ideas on why the individual needs the collective for experimental philosophy, it is clear that he contradicts many of his aforementioned viewpoints regarding the unbiased and restrained methods of experimental philosophy. He relies on Francis Bacon’s ideas and says that he remembers him somewhere saying, “*That it is one of the greatest secrets of Nature, that mens Passions are more capable of being rais’d to higher degrees in company, than in solitude: and that we sooner grieve, fear, rejoyce, love, admire, when we behold many others so mov’d, than when we are*

alone” (98). He employs Bacon’s words to demonstrate that what Bacon says about the emotions can also be said of the mind, meaning that minds together will sharpen one another more than if those minds were alone. However, an observant reader might take exception to his admission that heightened emotions become even more extreme when experienced in a group. This one example undercuts his larger argument about the correcting and moderating force of experiment done collectively. It is plausible, after all, that a Fellow might get excited or rejoice over a newfound discovery or an experiment that finally works, and if these emotions are showcased within the presence of others, one could argue that the passions of all will be raised.

Samuel Butler’s 1676 poem “An Elephant in the Moon” epitomizes the experimental philosopher whose emotions are elevated *because* he is working collectively.⁹ Although Butler’s poem focuses mostly on the collective experience, I have included his poem in this chapter because it exemplifies how even within the collective, mistakes occur because individual views cloud the practitioner’s judgment. Butler’s vision implies that individual work outside the collective is much more problematic since individuals within the collective cannot be even tempered. Although Butler’s poem presents the experimental philosopher as operating within the collective, he represents the experimental philosophers more so as individuals. They are clearly drawn as separate characters, instead of being lumped together without individual identities, as we see in

⁹ According to Alexander C. Spence it is impossible to determine the exact date of the poem, although 1676 is most likely (iv). A second version of this poem was written in heroic couplets, but Spence notes that the first version is the preferred one, which is also the version I examine (iv). “The Elephant in the Moon” according to Spence, was Butler’s “most ambitious and elaborate poem next to *Hudibras*” (iii). Hugh de Quehen notes that Butler assisted Thomas Shadwell with the “scientific parts” of *The Virtuoso*, a play I discuss in this chapter.

Cavendish's representation of Royal Society members. The experimental philosophers in Butler's speculative poem highlight the dangers of excited practitioners who so desperately want to believe in their newfound discoveries that they cannot see past their own emotions. Butler's poem, therefore, satirizes the supposed truth that can be derived from observation, especially when the experimental philosophers' own emotions and pride color those observations. Within the poem, Butler recounts the theories of power-crazed astronomers in the Royal Society who discover, through a telescope, an unknown world in the moon. They report civil "inhabitants" who live underground and who are perpetually at war with the peasants who reside above. As the experimental philosophers continue to peer at the moon, they are shocked to see a huge escaped elephant on the rampage, and though it is a startling sight, it is "as by the glass" both "clear and plain" (58). The experimental philosophers, in this case, rely on observation to draw their conclusions. After several of them look through the telescope and report seeing the same thing, each is willing to record his "Narrative" of the observation as truth to be shared with the public (321). In fact, they see this one incident as making up for all their other failed or inconsequential observations. Says one of the practitioners, "This one discovery's enough / to take all former scandals off" (225-26). As the experimental philosophers record the occurrence, they commend one another for their "learned" observations (292). In this case, the philosophers seem to associate learnedness with consensus, which becomes problematic because their conclusions are drawn from erroneous observations.

Butler's verse satirizes the Royal Society's repeated focus on the importance of observation and consensus. After some time, the experimental philosophers realize, to their disappointment, that the armies are swarming flies and that the elephant was a mouse trapped in the lens. This realization does not come through their own observation, but instead is noticed by a footboy, who "viewing well, discover'd more / Than all the learn'd had done before" (335-36). Butler issues a scathing critique here when he presents the reader with an unlearned man who is able to see what the experimental philosophers are unable or unwilling to see. As Dorothy Stimson asserts in *Scientists and Amateurs: A History of the Royal Society*, "Butler typified the common sense of the ordinary individual, who, without the learning of the virtuosi, uses his head instead of his imagination, and upsets the speculations of the learned men" (91). In satire, it is often the uneducated or naïf who speaks with wisdom, a trend that will repeat itself in the satirical dramas that will be examined later in this chapter. Butler's critique, which is directed at imagined actions taking place within the Royal Society, raises doubt as to the authority of the experimental philosophers, while undermining their supposed sole focus on experimental methods.

Part of Butler's critique is centered on the disorder that flawed methods and mistruths create when experimental philosophers become consumed by their own selfish desires. The experimental philosophers in Butler's poem, despite the evidence before their eyes, argue as to whether they should retract their written narratives about their original "discovery." Even after empirical proof is presented, they seem unable to admit that there was never an elephant on the moon. Their behavior indicates an interest

“only in the hypothetical elephant, not in an actual mouse” (Haynes 44). Despite their insistence on representing truth, when that truth impedes their quest for fame, they actively suppress the truth (Haynes 44). Consequently, Butler’s speculations assume an experimental philosopher who is not able to cast aside his own ego and his own need for recognition, despite Bacon and Sprat’s belief that collective experimentation would do just that. In this case, their emotions do feed off one another, leading them into more selfish pursuits instead of refining their aims. The philosopher’s disagreements with one another allow the reader to question whether a practitioner can be moderate in the face of possible recognition, which highlights how the individual’s desires conflict with the cooperative methods promoted by the Royal Society. Once the supposed facts are written, the experimental philosophers in “The Elephant in the Moon” want to make their inaccurate narratives public. In painting experimental philosophers this way, Butler undermines the Society’s published accounts of their experiments and showcases the Society’s reliance on language and the power of rhetoric in swaying public opinion.¹⁰ Butler says these disagreements between experimental philosophers cause fierce “brawl[s]” between them, which is ironic considering that Sprat’s *History* promoted experimental philosophy for its ability to reduce divisiveness (492). Ultimately, Butler issues a final criticism to those types of practitioners:

who greedily pursue
Things wonderful, instead of true;

¹⁰ Although he recognized that rhetoric and poetics are themselves kinds of knowledge, Bacon advocated for a type of knowledge that could be scientifically demonstrated. He understood the power of language to persuade, so he wanted to posit a system of truth that could be separated from verbal structures (Altegoer 75).

That in their Speculations chuse
To make Discoveries strange News;
And Nat’ral History a Gazette
Of Tales stupendous, and far-fet; (511-14)

Butler criticizes methods that turn the phenomena of the heavens into not just news, but “strange news,” which focuses on how the Society’s discoveries are spread to the public. The report the experimental philosophers have written is centered on inspiring feelings of astonishment, wonder, and excitement in the reader – all a type of response that is immoderate. In Butler’s warning speculation is part of the problem, whereas in Cavendish it was the antidote. For Cavendish, speculation is part of the solution because it becomes a way to forecast or think through the possible problems that could arise when relying on experimental philosophy. With Butler, we see a different kind of speculation that the experimental philosophers are engaged in. Speculation becomes dangerous when it is used for selfish ends. Butler’s warning is grounded in the idea that the Society, instead of presenting the reader with facts, publishes news that is filled with fiction, a fiction disguised *as* fact. Not only might these stories create an excitement in the public, which Butler sees as problematic, but the motivation behind the origin of these reports is also impure. The experimental philosopher pursues these wonders out of greed, or out of a “strong desire.”¹¹ It is his passions that are leading him, not his commitment to moderate experimental methods.

Butler’s satire cautions the public to be wary of experimental philosophers who resort to exaggerated tales and untruths in order to seek fame and to satisfy their own

¹¹ “greedily,” *OED*.

aspirations. The poem calls attention to those practitioners who “explicate appearances / Not as they are, but as they please” (517-18). Consequently, the misidentification represented in Butler’s poem was not the fault of the telescope; it was the fault of the men peering into it. Paradoxically, these instruments were intended to advance man’s vision, but when taken into the hands of an experimental philosopher who refuses to see and who suffers from moral blindness, these technologies are of no use (Haynes 44). Instead of associating observation with truth, Butler associates the Society’s methods with falsehood and turns experimental philosophy into an absurdity. His representation of experimental philosophy in the hands of men calls into question the unbiased nature of experimental philosophy’s endeavors, and Butler reminds his readers that the public cannot necessarily trust the written accounts of experiments that the Royal Society so often printed and circulated. Because the Royal Society made experimental philosophy a public endeavor, it opened up their methods and their Fellows to public scrutiny and evaluation. Butler’s poem provides us with important critiques, but he represents the practitioners working within a community, even though his focus is more individualized. When that critique is focused instead on individual practitioners experimenting alone outside the institution of the Royal Society, some of the concerns associated with experimental philosophy shift to more personal, instead of public, concerns. Speculative drama, therefore, becomes a powerful mode through which the public can examine the individual practitioner outside the confines of the Royal Society.

Speculation on the Restoration Stage

When the Royal Society received the royal charter in 1662, Charles II gave the Society a public presence in London, while also increasing the Society's standing and significance. As established in chapter three, the Society positioned itself as politically uninvolved and forwarded the idea that the institution would operate under methods that would foster civility and stability, essentially contributing to the necessary healing needed after the civil wars and Interregnum. As the Royal Society represented what might be a useful and "gentlemanly pursuit," experimental philosophy became one way through which the king could support the kind of society he hoped to "foster upon his return to power" (Coppola 3). Coppola suggests that Charles's reopening of the theatre was a move related to his sanctioning of the Royal Society. Both, he argues, serve a similar purpose in that they are meant to represent "things" as they naturally are – the stage as representative of society and the laboratory as representative of nature. Each would serve as a source of instruction, as well. In both arenas, according to Coppola, "the Stuart monarchy patronized the performance of certain kinds of natural truths in order to reconstruct the 'natural' social order that it sought to restore in the 1660s" (3). Shanahan goes so far as to see experimental philosophy as a type of theater in itself because of the Society's public "demonstrations of wonderful natural phenomena" ("Theatrical" 550).

When considering the function of Restoration theatre in London, it is not my goal to recount its history or to speak to all the ways theatre represented issues of the day; I intend only to represent the relationship between experimental philosophy and its staged presence. It is useful, therefore, to think about Restoration theatre's public presence in the

same way we would think of the public presence of the Royal Society. Because theatre is public art available to those who can pay, it concerns itself with events that would have been in the forefront of the audience's mind. In that way, theater can respond to the controversies of the day while reflecting the concerns, anxieties, and interests of the audience (Silvette 2). Most of the plays that speculate on the role of the experimental philosopher are comedies, but even within comedy, themes of civil and national identity are present. Many comedies focus on London life, but "even in the most metropolitan of comedies [...] the definition of national as well as class-based manners is at stake" (Orr 4).¹²

The particular plays I examine in this chapter are farce (a kind of comedy), which is a noteworthy genre considering that Restoration dramatists were often averse to labeling their own work as a farce. Dramatists who resisted the label of farce worried that farce was unpopular and that it had little aesthetic significance. Characters in Restoration farces are often flat and stereotypical, and their actions and behaviors become the focus instead of their emotions. Playwrights distanced themselves from the term because they did not want to be associated with "the triviality that they too assumed to be inherent in the form" (Holland 107).¹³ Taken together, each of the above criticisms of farce assume

¹² Orr lists George Etherege's *The Man of Mode* as representative of a city comedy concerned with national identity. Topics of emigration can be found in Nahum Tate's *Cuckolds-Haven* and Edmund Goldsmid and Thomas D'Urfey's *A Commonwealth of Women*, and William Wycherley's *The Plain Dealer* also investigates city manners (4).

¹³ For more on farce see J.L. Styan who argues that while there are elements of farce in all comedies, farce is closer to fantasy than reality (212). He also argues that the main goal of farce is ridicule, a type of ridicule that avoids "moralizing" (243). According to Leo Hughes, "The chief, even the exclusive, business of farce is to stimulate the risibilities of the audience. The distinction between farce and other kinds of comic drama must then rest upon the nature of the laughter elicited by each. The laugh, the smile, the smirk with which an audience receives high comedy [...] differs appreciably from the nonreflective guffaw with

that farce does not focus on the same subjects that Restoration comedy does, so we cannot, according to Peter Holland, find or expect in farce the same kind of realistic social activity that we can find in comedy. Holland argues that farce does “not deal directly with the ambiguities of desire, the social problems of relationships, the tense difficulties of status and power which characterize Restoration comic drama” (107-108). When considering the speculative plays that focus on the experimental philosopher, those themes, I argue, are in fact present, and my investigation into these plays emphasizes aspects of these works that writers would have rejected as sheer absurdity. Speculative farce should not be dismissed as trivial or having little value, for it is through the stereotypical characters and their actions that we find investigations into the desires, relationships, and power that could affect the experimental philosopher, his family, and society in damaging ways. Because the playwrights strip away the nuance of character, the audience is better able to criticize the methods of experimental philosophy and its impacts through the exaggerated ways those methods are presented.

More importantly, farce is a significant speculative tool because, in ridiculing the practitioner as a character, the viewer/reader better understands public reaction to experimental philosophy. King discusses the purpose of farce for eighteenth-century audiences, arguing that “satirical derision [was] considered to be [a] crucial vehicle for the correction of misguided and wrong behavior” (151). Although some of the actions on the stage were satirizing actual Royal Society experiments or actual Royal Society members, theater “responds less to reality than to perceptions of reality in its audience”

which the antics of the farceur are received” (19). Hughes argues that farce was “seen as a low form of entertainment” (272).

(Kavenik 27). This is an important distinction because it is the public response that best showcases how experimental philosophy was received by greater society, and it is that public reaction that assists us in discovering how emerging epistemologies influenced knowledge formation. Theatrical responses to experimental philosophy also showcase how theatrical and dramatic public experimentation could be, in that members of the Royal Society relied on “securing mass assent” through public displays that were often performative.¹⁴ The theater, therefore, became an ideal place to capture the “spectacle” of the Society and to represent and critique the practitioner (Coppola 3). The practitioner was often represented on stage as performing experiments that had basis in real experiments in the Royal Society, but members of the Society, which includes virtuosos, were often ridiculed for these experiments. On the Restoration stage, experimental philosophy is frequently portrayed as unworthy of a gentleman’s attention, and the practitioner’s research topics become farcical because of their uselessness and irrelevance (Haynes 34).¹⁵ The importance of the theatrical experimental philosopher must not be overlooked just because he seems to be a fool. In ridiculing the practitioner, theater that speculates presents the audience with serious resistance to the place of experimental philosophy in society. The staged experimental philosopher, therefore, symbolizes various supposed problems with the practice of experimental philosophy and reinforces

¹⁴ For more about experimental philosophy as spectacle, see Al Coppola’s *The Theater of Experiment: Staging Natural Philosophy in Eighteenth-Century Britain*. Coppola focuses on the “affective spectacle” that occurred when experiments were performed by learned participants in front of a mixed audience - specialists, amateurs, gentlemen, tradesmen, etc. (4).

¹⁵ Haynes also connects the Restoration virtuoso with earlier iterations of the same type of character, lumping the virtuoso in with other alchemists, charlatans, gullible fools, and more “serious seekers” of knowledge (39). The virtuoso, therefore, could be seen as a successor to characters such as Faustus, in addition to a thematic connection to plays like Ben Jonson’s *The Alchemist* and William Shakespeare’s *The Tempest*.

the idea that both the methods and practitioners cannot exist outside of society or without their ideological biases. Comic and “satirical attitudes in literary portrayals of scientific curiosity” reflected, according to King, “the popular discomfort with the uncertain consequences of new discoveries and technological advancements” (151). Some of the most biting critiques can be found in speculative writing that makes the experimental philosopher its main focus, present in Restoration plays such as *The Virtuoso* and *The Emperor and the Moon*.

The Virtuoso

Thomas Shadwell’s farce *The Virtuoso* opened in May 1676 to great acclaim. In attendance that month was King Charles II.¹⁶ The plot of *The Virtuoso* centers on Bruce and Longvil, two lovers intent on winning the hands of Clarinda and Miranda, both nieces of the experimental philosopher Sir Nicholas Gimcrack. Gimcrack, cuckolded by his wife, Lady Gimcrack, has rejected many of his nieces’ marriage proposals so that he can benefit financially from his nieces’ dowries. In order to gain access to Gimcrack, his home, and his nieces, Bruce and Longvil feign interest in experimental philosophy and attempt to defend themselves against Lady Gimcrack’s many advances. The play ends with matches made between the suitors and nieces, but only after Gimcrack loses everything: his estates are seized to pay off debts owed on equipment he purchased for

¹⁶ See Marjorie Hope Nicolson and David Stuart Rode’s introduction to the Regents Restoration Drama edition of *The Virtuoso*. The play was occasionally performed over the next couple decades, with the last known performance in the eighteenth century taking place in March of 1705 (xii-xiii). All quotations from the play are taken from this edition.

experiments, his wife leaves him for another and takes her money with her, and the nieces transfer their guardianship to Bruce and Longvil.

The love plot that leaves Gimcrack alone and destitute is a crucial part of the Shadwell's criticism and ridicule of experimental philosophy, and much of the scholarship on Shadwell's play investigates these various critiques. Gimcrack, after all, is an experimental philosopher, whose activities were modeled on practices within the Royal Society and on actual members.¹⁷ Haynes argues that Sir Nicholas is the "first fully developed satirical portrait of the new scientist" and that he definitely was the most significant (45). As such, scholars over the past decade have shown interest in Shadwell's character of the experimental philosopher. Christa Knellwolf King sees Shadwell's play as an indictment of a type of experimental philosophy that participates in "untruths" when it does not actively seek to undermine false or erroneous conclusions. King believes that *The Virtuoso's* satire focuses mainly, therefore, on challenging the idea that knowledge can be objective. Tita Chico, on the other hand, encourages readers to consider Shadwell's play beyond "the legacy of satire," noting that many of his plays

¹⁷ Nicholson and Rode note that Gimcrack shares vocabulary with Hooke's *Micrographia*, Glanvill's *Scepsis Scientifica*, and Formal (the rhetorician in the play) has similarities with the rhetoric found in Sprat's *History* and the *Philosophical Transactions*. Furthermore, Shadwell represents real and failed experiments of the Royal Society. See Nicholson and Rode's "Introduction" for some of the passages and references. Black also notes that Gimcrack represents an exaggeration of Royal Society methods (11). Chico says this of Hooke: "Due to the nature of his publications and his roles within the organization, Hooke was in many ways the public face of experimentalism. After Hooke attended a performance of *The Virtuoso* on June 2, 1676, at Dorset Garden, he complained in his diary that the audience knew the characterization of "Sir Nicholas Gimcrack, F. R. S." was a satire of him: 'Damned dogs. Vindica me Deus. People almost pointed'" (31). Haynes disagrees with critics who see connections between Gimcrack and the Royal Society, claiming Gimcrack is not meant to be a stand in for actual practitioners within the Royal Society. Because Gimcrack was denied membership into the Society, Haynes argues that Shadwell is not "mocking the practices of the Royal Society," and instead, "Shadwell actually uses them as the yardstick with which to beat Gimcrack" (45). Haynes also does not see Gimcrack as symbolic of the Royal Society because he does not see any of his experiments through to their end results; he experiments only for the sake of curiosity (47).

focus on female sexuality and desire. Chico sees this play as no different and associates the desire for experimentalism as tied to sexual desire and wealth. John Shanahan discusses how it might be easy to see clichéd satires of sexuality in *The Virtuoso* as weaknesses within the play, but instead critics should focus more on Shadwell's most "stinging critique" of locating the laboratory within the domestic space ("Theatrical" 557). Shanahan combines this history of science with the history of theater in his essay "Theatrical Space and Scientific Space in Thomas Shadwell's *Virtuoso*" to highlight the Royal Society's anxieties about the public and theatrical nature of experimentation. Shadwell, he claims, intervenes in this anxiety by staging it and bringing the public versus private debate to the forefront because Gimcrack's home is also his laboratory. I agree with Shanahan's argument that locating the laboratory within the home focuses the audience's attention more on the domestic space, but I contend that this attention on the domestic space highlights the negative consequences the experimental philosopher can have on his family and within the order of his household. By briefly exploring the kind of experimental philosopher Gimcrack is and focusing on his isolation, we will see that Shadwell speculates on the dangers this type of experimental philosophy can bring to the individual and his family.

Many of the characters in Shadwell's play present the audience with their opinions on Gimcrack before we ever meet him, essentially telling the audience exactly how we should view Gimcrack's character. The audience is not given the opportunity to formulate their own conclusions; instead Gimcrack's persona and his experiments have already been colored for us. Sir Formal is Gimcrack's personal rhetorician, and he tells

the audience that Gimcrack is the “finest speculative gentleman in the whole world,” and that he is the most “curious and inquisitive philosopher breathing” (18). Since Sir Formal is Gimcrack’s mouthpiece, his assessment is not to be taken seriously. Everyone else who knows Gimcrack agrees on one thing – he is not a respectable character. Bruce refers to him as “dull,” “mad,” a “fanatic,” and a “fool.” (21, 113). His nieces, Miranda and Clarinda, claim he is “foolish,” a “sot,” a “jealous man,” and that he “never cares for understanding mankind” (22). His uncle Snarl calls him a “coxcomb,” while Lady Gimcrack says he concerns himself with “fruitless speculations” (31, 42), so much so that the Royal Society refused him admission (43).¹⁸ Much of the opinions presented are grounded in Gimcrack’s research and experimental methods. He has spent 2,000 pounds on microscopes and has devoted twenty years of his life to maggots, spiders, and lice, in addition to writing a geography of the world on the moon. Gimcrack admits that it is below him to “trouble himself with men and manners” (71). While the focus of Gimcrack’s research is presented on stage as trivial and unworthy of study, Gimcrack’s own admissions downplay the importance of practical application in experimental philosophy. Famously, the audience first sees Gimcrack learning how to swim while perched upon a table and watching a nearby frog. When asked if he will ever try his hand at swimming in water, he replies, “I content myself with the speculative part of swimming; I care not for the practice. I seldom bring anything to use; ‘tis not my way. Knowledge is my ultimate end” (47). Knowledge for knowledge’s sake is not in line with the Society’s purported practical uses for experimental philosophy; however, in calling

¹⁸ Lady Gimcrack claims he was denied admission because the members of the Royal Society “envied” him (43).

attention to Gimcrack's lack of utility, the play critiques experimental philosophy for its lack of practicality, while remaining careful to accuse practitioners not following the Royal Society's standards. Passages such as the one above are meant to make fun of experimental philosophy when it "fails to examine the meanings and consequences of its discoveries" (King 162). Although none of the representations of Gimcrack are positive, these attributes make him more comical than dangerous. However, Shadwell does draw our attention to some flaws in the experimental philosopher's character that may not be as laughable.

Shadwell's depiction of the experimental philosopher as isolated is a detail we should be more concerned with because isolation prohibits collective efforts designed to curtail error, but isolation also reveals Gimcrack's obsessive practice. Early on in the play his wife describes him as a "solitary, philosophical person" (42). We later learn that he does not travel and that he has isolated himself so extremely that he will not venture into the countryside. Instead, he has country air bottled and shipped to him, which he keeps stored in his laboratory. Attentive readers/viewers may also notice how little they see of Gimcrack on stage. We hear about his character and his pursuits quite often, but we rarely see or hear directly from him. In fact, over the course of the play, Gimcrack only speaks 13% of the play's lines, yet the play is named for him. His minimal presence on the stage only highlights even more how he has secluded himself from society and his family due to his practices in experimental philosophy. Shadwell, therefore, implicates isolation as an important factor in Gimcrack's deficiencies and his broken relationships. Shannahan refers to Gimcrack's antisocial life as both "ungentlemanly and intellectually

unstable,” noting that he has traded relationships with humans for relationships with “objects and vermin,” and that he has had to hire someone to have sex with him instead of having sex with his wife (561). His isolation, consequently, leads to a disordered household in which he is the least of his family’s concerns and instead only becomes a subject of their gossip and the butt of their jokes and ruses.

As we have seen Gimcrack is not the best experimental philosopher, and his neglect as the head of his household leads to his own severed familial relationships. Shadwell, therefore, offers a critique of the way that experimental philosophy disorders domestic relationships (Coppola 42). His nieces trick him into allowing their suitors into his home, and Lady Gimcrack, according to Miranda, “cuckolds him abundantly” (22). In Restoration theatre, various aspects such as their age or class often distinguished male characters, but in comedy, in particular, they were defined most explicitly through their sexuality (Rosenthal 92).¹⁹ Furthermore, their masculinity often was defined through the control of female sexuality (Foyster 55).²⁰ The married man, in theory, was meant to have command over all who resided in his home, and men were given authority over their wives, so “if a wife committed adultery, contemporaries believed that this provided a clear sign that a man had failed in his duty to maintain household control” (Foyster 65-66). Being a cuckold, therefore, came with dishonor and shame, not because it undermined the husband’s position within the household but also because it impacted his

¹⁹ Rosenthal lists Aphra Behn, *The Rover* and *The Lucky Chance*; George Farquhar, *Love and a Bottle*; William Congreve, *Way of the World*; William Wycherley, *The Country Wife*; Mr. Sandford, *The Female Fop*; and George Etherege, *The Man of Mode* as examples of comedies that define masculinity based on sexuality.

²⁰ Foyster contends that manhood was never completely secure, so it had to be “continually proved and asserted.” One of those insecurities was grounded in the fact that female sexuality was an “unstable foundation” upon which to define masculinity (55).

“standing in the wider community” (Foyster 66). Shadwell’s play, consequently, represents Gimcrack’s missteps within his own home as representative of a reputation that extends outside the walls of his home. In Act IV, Gimcrack pronounces that he is “doubly a cuckold” (89) when he discovers that Mrs. Flirt, his whore, has not been faithful. To be doubly cuckolded brings double the shame because cuckoldry was assumed to be the man’s fault for his inability to maintain sexual control (Foyster 72). Shadwell’s speculations about an experimental philosopher whose house falls into disorder send a clear message to viewers of why we should be wary of the isolation that results from obsessive devotion to experimental philosophy. Accordingly, Gimcrack is representative of the “strong link between science and morality,” determining that the “moral decay of a weak-headed society” is caused by “preoccupations” with experimental philosophy (King 158-9).

A man’s reputation was based on more than just sexual factors, and as the play closes the audience is presented with a cuckolded Gimcrack who has lost his economic standing as well. Economic misfortune damaged a man’s honor and was devastating to the family’s standing in the community (Foyster 66). Hence, all Gimcrack’s female relatives abandon him as they each scramble to attach themselves to other men with more intact economic status and a secure masculinity. Miranda remarks, for instance, that Bruce is better able to protect her fortune, and Gimcrack’s mistress remarks that women “love men but as far as their money goes” (138-39). When Gimcrack realizes how emasculated and alone he is, he announces, “I would I had studied mankind instead of spiders” (139). In the next breath, he declares he will abandon experimental philosophy

and will instead search for the philosopher's stone. Both Andrew Black and Chico present this final scene as a move in the right direction in restoring Gimcrack's denigrated reputation. Black contends, "Gimcrack's remorse is instructive to the contemporary experimental community for whom he acts as satirical stand-in" (13). Similarly, Chico marks this moment as a modest reformation for Gimcrack: "Sir Nicolas vows that now he must devote himself to practical study—that experimental philosophy must be for utility, rather than merely for speculation and its associated pleasures" (37). Although Chico raises doubts about how likely it is that Gimcrack can recover from his financial loss and abandonment, she sees his new focus on practicality as a lesson learned (37). When I read these last lines of *Gimcrack*, I do not see a reformed character since his new focus also lacks utility; a plan to locate the philosopher's stone is anything but practical. In terms of progression, it takes Gimcrack a step away from the advancements of experimental philosophy, as the methods associated with experimental philosophy were rhetorically positioned as conflicting with alchemy and magic. Gimcrack has only shifted his methods from emerging methods to more outdated ones, perhaps indicating that reform is not possible for this kind of disorder. He does not appear to have learned from his mistakes, and in the end, he is even more isolated and turns to a practice that will only bring him even more dishonor. Gimcrack's excessive behavior may have shifted away from experimental philosophy, but his home, family, and finances lay in shambles with no real prospects for recovery. The kind of disorder in the domestic, private space that Shadwell envisions with Gimcrack is also present in Aphra Behn's exploration of Baliardo, the experimental philosopher who experiments in his own home

to his family's possible detriment.²¹ In Baliardo, we see a look into a type of experimental philosopher who mixed emerging methods with speculative methods, resulting in practices that are absurd and unbalanced. Consequently, his masculinity and household are threatened by such absurdities because his actions are deemed effeminate.

The Emperor of the Moon

Aphra Behn began working on the farce *The Emperor of the Moon* in 1685 before the death of Charles II.²² She returned to the play during the “troubled reign” of James II, adding a prologue and epilogue (Todd 154). The play was most likely first performed in March of 1687, and it was printed in the same year. As with Shadwell's play, Behn's farce on experimental philosophy was quite popular; the only other play she wrote that received more acclaim was *The Rover*.²³ Behn's script centers on Doctor Baliardo, an experimental philosopher, who believes that he has spotted an entire nation living in the moon. He is so convinced by what he believes he sees in the telescope, that he becomes obsessed with peering through it constantly and spying on the world he sees there. While

²¹ Behn's play is more implicit in its criticism of the Royal Society. Other scholars, however, have marked her play as an explicit critique of the Society. Coppola, for instance, argues that Behn enters into discourse with the Royal Society (66). Barbara Benedict also sees Behn's play as a satire of and reaction against the Royal Society (60). Within the play, Behn uses the term “natural philosophy,” but one of the texts that the main character, Baliardo, reads is by John Wilkins, who was one of the founders of the Royal Society. Baliardo speaks many lines that correspond with Sprat's rhetoric about moderation and a lack of sin being key to experimental philosophy pursuits. It also seems that Behn had connections to the Royal Society, specifically being acquainted with Sprat, who may have allowed her burial in Westminster Abbey (Todd 435).

²² According to the introductory matter by Janet Todd in *The Works of Aphra Behn: Volume 7, The Plays 1682-1696*, Charles the II enjoyed Italian farce, and *commedia dell'arte* became associated with Charles's court (154). All references to Behn's play are taken from this edition.

²³ Todd notes that *The Emperor of the Moon* remained well known throughout the beginning of the eighteenth century and refers to an actor's notes on having performed in the play in 1711. Derek Hughes marks this play as Behn's most successful and notes that it was frequently performed until 1750.

Baliardo is consumed with the moon, the Vice-Roy's nephews Don Cinthio and Don Charmante court his daughter Elaria and his niece Bellemonte. With the help of Scaramouch (Baliardo's man), Cinthio and Charmante stage a spectacle designed to trick the doctor into believing that the Emperor of the Moon and his brother, the Prince of Thunderland (both played by Cinthio and Charmante), want to marry his kin.

Behn's play has not received a lot of scholarly attention, perhaps because the play is labeled as a farce, and farces are meant to only entertain. Derek Hughes in *The Theatre of Aphra Behn* actually cautions readers to not over interpret the play (171); however, Behn herself makes it clear that she is using farce with a didactic purpose in her dedication to the Lord Marquess of Worcester.²⁴ Critics who have examined *The Emperor of the Moon* have focused on Baliardo's obsession with the moon, the fiction of the theater, and the political dangers of an experimental philosopher who observes too much. Judy Hayden argues that Behn purposely uses farce as a way to ridicule the belief in a plurality of worlds. It is not, therefore, meant to be a disapproval of the Royal Society but instead a disapproval of the absurd belief that there is life on the moon. Katherine Mannheimer reads Behn's play as an examination of "theatrical and print-based fictions," arguing that Behn regenders these two modes of representation (39). Coppola explores the spectacle of *The Emperor of the Moon* through Behn's Tory political beliefs and presents Baliardo's spying on the Moon's king as symbolic of the

²⁴ Behn writes, "I am sensible, my Lord, how far the Word Farce might have offended some [...] and who, without considering the Intent, Character, or Nature of the thing, wou'd have cry'd out upon the Language, and have damn'd it [...] as too debas'd and vulgar to entertain a Man of Quality; but I am secure from this Censure, when your Lordship shall be its Judge, whose refin'd Sence, and Delicacy of Judgment, will, thro' all the humble Actions and trivialness of Business, find Nature there, and that Diversion which was not meant for the Numbers, who comprehend nothing beyond the Show and Buffoonry" (156-57).

political instability under James's reign.²⁵ Coppola goes so far as to say that Baliardo's interest in the moon is political and not at all "scientific" (493). Even if that were the case, Baliardo uses his skills in experimental philosophy, as well as an object of observation (the telescope), to gain political information about what would be (if it existed) a foreign entity, and that is partly what makes Behn's play speculative. Behn attempts to forecast the political dangers associated with men who use experimental philosophy as a means to make political gains. I, however, would like to turn my focus, as I did with *Sir Gimcrack*, to the character himself. In this case, Baliardo participates in a kind of philosophy that is partly influenced by experimental philosophy because he relies on technologies, such as the telescope; however, his practice is also immoderate and heavily tied to his reading and, therefore, to speculative, not experimental, philosophy. One could argue that Baliardo's crimes, because they are more speculative, do not suggest a critique of the Royal Society, for it rhetorically positioned itself as opposed to the speculative. However, no matter how much the Royal Society claimed to reject speculative methods, those outside of the Society did not see the Society's methods as distinct from speculation. For these reasons, Baliardo's methods can be seen as representative of the mixed and emerging methods associated with the Royal Society at the time, and his actions represent a speculative danger to his family and, therefore, the nation as well.

Baliardo's pursuit of experimental philosophy seems destined to fail because of deficiencies in his character. Throughout the play he is prone to excitability, and over the

²⁵ Coppola argues that Baliardo is a "caricature of a Whig conspiracy-monger," and that his actions of spying are treasonous (493).

course of the drama, he is reminded by several characters to be moderate. He is also easily tricked by most of the characters in the play, failing to show any careful judgment and instead jumping to irrational conclusions. When Charmante puts images in front on the telescope's glass, the doctor has no qualms in assuming that what he sees actually exists, and he exclaims, "I am all Rapture, Sir, at this rare Vision" (167). His daughter and niece quite easily trick him into believing that they are sleeping while standing up, by "sleep-talking" about the Emperor in the Moon: He says, "The Moon, the Moon she means. I am Transported, Over-joy'd, and Ecstasy'd" (183). Baliardo is easily distracted and easily convinced of everyone's deceptions as long as they begin talking about the subject that he is obsessed with. When he is told the Emperor will be descending that very night he remarks, "I am – undone with Joy! ruin'd with Transport" (187); and in the last scene of the play, when he thinks the Emperor is before him, he says, "the Splendor of his Majesty confounds me" (203). The doctor repeatedly has trouble being moderate in his responses, letting his desires for discovery and power obscure his vision and heighten his emotions; yet, he seems to have enough clarity to understand that such over-the-top reactions are not acceptable. In the final act and scene of the play, he is captivated by the elaborately staged spectacle and reminds himself in an aside, "I am amaz'd, but must conceal my Wonder ---that Joy of Fools ---and appear wise in Gravity" (200). His statement shows an awareness that his immoderate emotions make him appear foolish; however, he does not speak of those emotions as something he needs to tame or remedy, but instead as something to hide from everyone else, lest they assume he is unwise.

Behn's conjectures on the human qualities within the practitioner highlight how easily one's own emotions and flaws can color conclusions. In the case of Baliardo, Behn draws our attention not just to the moral inadequacies of the experimental philosopher, but also to how his research interests, when paired with intemperance become even more flawed and even more ridiculous.

One of the lowest "scientific" pursuits or interests, as seen in Butler's aforementioned poem, is looking for life on the moon, a subject matter that Behn uses as a way to mock Baliardo's methods as disordered. Stimson argues that the telescope was widely used and a well-known form of observation. However, "the enthusiasm of some of the amateurs and their excited imaginations had carried them into some surprising flights of fancy about possible voyages to the moon" (90). Herein lie Baliardo's methods – he relies on a technological tool to observe the sky, something that would have been part of experimental philosophy's methods; however, he does not moderate and weigh his conclusions. He jumps to speculative conjectures about what he thinks he sees, similar to the experimental philosophers in Butler's poem. To satirists, what came across as the most bizarre was the use of "elaborate, complex, and expensive apparatus – telescopes, microscopes, airpumps – to demonstrate" the obvious, the implausible, or the insignificant (Hall 162). These kinds of practices are a combination of experimental and speculative methods gone wrong, which makes both methods seem absurd. Henry Stubbe pointed out how men of "true learning" laughed at the "proposals some made of flying to the world in the moon," claiming that these men of real intellect viewed such ideas as

“superlatively ridiculous.”²⁶ Looking for life on the moon underscores the debate about the proper focus of experimental philosophy and what conclusions one can arrive at when speculating.

While Baliardo’s methods are clearly mocked in the play, his disordered mind is really what is being satirized. In the opening of the play, one of the first things the audience finds out about Baliardo is that his man and his daughter question his mental stability. In Act I, scene i, Scaramouch speaks to Elaria about her father:

Scaramouch: You must know, Madam, your Father, (my Master, the Doctor) is a little Whimsical, Romantick, or Don Quick-sottish, or so. –

Elaria: Or rather mad. (163)

With Elaria’s support, Scaramouch then believes he can disregard his own civility and pronounces that the doctor is a “lunatic” because “he is always traveling to the Moon” (163). This madness is referred to as an infection, a sickness he has “caught” from reading too many narratives about moon travel, one of which is Francis Godwin’s *The Man in the Moone*.²⁷ Though Godwin’s narrative is clearly fictional, the Doctor seems to view the story as factual. This kind of reading, according to Mannheimer, is a type of infection because Baliardo subscribes “to a mode of reading in which the reader’s sense of reality is invaded and replaced by a new, alternative reality and the reader’s sense of self is overrun and occupied by other, vicarious selves” (Mannheimer 41-2). Sprat and Cowley both refer to this type of reading as a hindrance to experimental philosophy,

²⁶ From *A Specimen of Some Animadversions upon a book entitled, Plus ultra, or, Modern improvements of useful knowledge* printed in 1670 (42). Henry Stubbe consistently attacked the Royal Society in his work.

²⁷ *The Man in the Moone* was published posthumously in 1638 (shortly after John Wilkin’s narrative *The Discovery of a World in the Moone*). In the narrative, Gonsales travels to the utopian moon world on a machine powered by birds.

which I discussed in the third chapter. None of the books the doctor reads are what would be classified as works of experimental philosophy; they are works of speculative philosophy and speculative fiction.²⁸ Even John Wilkins's narrative *The Discovery of a World in the Moone*, which Elaria lists as one of her father's "foolish books," would not be considered an empirical treatise because of Wilkins's reliance on speculation.²⁹ Wilkins's treatise opens with a clear message to readers in which he instructs them that they "shouldst not here looke to find any exact, accurate," truth and that they must "remember that I promise onely probable arguments for the prooffe of this opinion." His sixth proposition, however, states "That there is a world in the Moone," and his thirteenth proposition asserts that "'tis probably there may be inhabitants in this other World," propositions that Baliardo clearly takes literally despite Wilkins's warning that he is offering speculations, not fact.³⁰ The stories the Doctor believes about the nation in the moon are deemed "Fantoms of mad Brains to puzzle Fools withal – the wise laugh at 'em" (205).

Essentially, the Doctor is viewed in a derogatory way because his instruments have proven to be a source of illusion while his reading has led him into speculative thought, which puts him into a position of inferiority due to his lack of judgment and

²⁸ Other than *The Man in the Moon* and *A Discourse of the World in the Moon*, Elaria mentions *Lucian's Dialogue of the Lofty Traveller* as one of her father's books, in addition to "a thousand other ridiculous Volumes too hard to name" (163).

²⁹ John Wilkins was a member of the Royal Society and its first secretary. Wilkins's treatise, printed in 1638, blends natural philosophy with speculations on the moon, predicting what kind of life could be present on the moon. Marjorie Hope Nicolson marks it as an important work of popular "science" in her book *Voyages to the Moon* (1948). Quotations from Wilkins's book are taken from the facsimile found at *Early English Books Online*.

³⁰ Wilkins admits at the end of this thirteenth treatise that there is no way to test any of his "conjecture[s], since there can bee no sailing to the Moone."

practices deemed feminine. The irony, of course, is that he is presented as the fool, while the non-practitioners in the play are presented as wise. In fact, Scaramouch, who is the doctor's servant, speaks of "Deceptio visus, or the Error of the Eyes" (176). In this case, an unlearned man seems better able to speak to the dangers of experimental philosophy than the man who has devoted his life to learning. When Scaramouch comments that the doctor's "reading of Books is a pernicious thing," he is presenting a view of a certain type of reading, which can have a harmful influence on the mind (163). Mannheimer notes that Baliardo's giddy and "credulous" reading positions him as a "prototypical consumer of prose fiction: a figure already recognizable in the late seventeenth century, and already identified as female" (Mannheimer 42). Thus, the doctor's reading is not only problematic because his practice of experimental philosophy remains influenced by it, but because it undermines his masculinity. In the anonymously published conduct book *Advice of a Father, or Counsel to a Child* (1664), the author councils that men should not be "effeminate" in their recreations, and that gentlemen readers must be careful to not become "so Bookish, as to neglect thy estate" (16).³¹ Jacqueline Pearson discusses reading and gender on the Restoration stage and notes that in seventeenth-century writing, "the real man" or the "man of sense, is constructed not by books but by knowledge of the world" (46). As was established in chapter three, Sprat and Cowley both rhetorically positioned experimental philosophy as a masculine pursuit, with Cowley lamenting the way experimental philosophy had been feminized and had languished over the years.

³¹ Cent I, Section XXXII.

The doctor's reading habits, therefore, might lead audience members to question his masculinity, a query further reinforced by the disordered household that Baliardo heads. Baliardo's masculinity seems continually ridiculed throughout the play, as his household and estate are in a state of neglect. The internal operations of households were of genuine public concern because the patriarchal family was believed to be the "bedrock of social order" (Flather 42). The patriarchal household did not just consist of keeping family members under control, but also keeping other live-in subordinates in line, and restricting access to the household by outsiders. Baliardo, however, becomes so absorbed in his studies that he is oblivious to the insubordination of others in the house, particularly with Scaramouch, whom Baliardo refers to as a "false Steward of thy Masters Treasure" (140-41). Servants were supposed to have very limited power within the household, so when Scaramouch seems to be in charge of who has access to the house, there is unquestionably a problem with the household's order. After Baliardo tells Scaramouch to go back to bed and exits the stage, Scaramouch is left alone on stage and says:

No, Sir, 'tis Morning now – and I'm up for all day.
This Madness is a pretty sort of a pleasant Disease, when it tickles but in
one Vein – Why here's my Master now, as great a Scholar, as grave and
wise a Man, in all Argument and Discourse, as can be met with, yet name
but the Moon, and he runs to Ridicule, and grows as mad as the Wind.
Well *Doctor*, if thou can'st be madder yet,
We'll find a Medicine that shall cure your Fit.
---Better than all *Gallanicus*. (182)

Scaramouch's response reveals much about the disordered state of Baliardo's home. Not only does he defy his master's direct orders to go to bed, but he then also takes on a

powerful position by constructing the home's reality when he claims it is morning instead of night. This home is now in his control and he will be the one dictating what next happens in the doctor's home. Because the household was regarded as a microcosm of society, "the most fundamental duty for its head was that he should ensure that order was maintained," and if "relationships broke accepted or conventional bounds, then the spotlight of responsibility would fall on the male head of household" (Foyster 66). However, this male head of household has been presented as both a lunatic and effeminate, so Scaramouch is able to take advantage of the disorder. Scaramouch puts himself into a position of power, not only in the household, but also over Baliardo's mind when he claims he is going to "find a cure" for the doctor's madness (251). This madness, of course, is grounded in his obsession with life on the moon, an obsession that distracts him from caring for the life within his home. For instance, he does not attend to the courtship of his daughter and niece, and instead of arranging their matches he keeps them in captivity, not allowing his daughter to go farther than his garden (198). When his daughter and niece get married without his consent, literally right before his eyes and in his own home, the trickery highlights his inability to keep control of his household, and since "the home was a 'little Commonwealth,'" this also proves his inability to rule (Foyster 87).

When the trickery is revealed to Baliardo in the final scene of the play, the true stakes associated with his disordered household take center stage. Keplair, a philosopher who took part in the deceit, instructs Baliardo to "Be patient, Sir, and call up all your Vertue, You're only cur'd, Sir, of a Disease That long has reign'd over your Nobler

Faculties” (205). He goes on to point out that they have cured Baliardo from “an Error that unman’d” him (205). When Keplair asserts that Baliardo imbalanced faculties have caused him to become “unman’d,” these associations make the text speculative of gendered norms. Behn’s play presents conjecture and emotions as inferior because of their relation to the feminine, an association that Sprat and Cowley attempted to distance the Royal Society from. As Foyster argues, “The ideology of patriarchy thus led to the construction of a system of morality which rewarded and chastised those who succeeded or failed to live up to its requirements” (5). The ridicule, therefore, of Baliardo’s effeminate reading practices, his emotions, and his inability to lead his household, plays into this system of morality Foyster discusses. The members of Baliardo’s household are able to justify their trickery by claiming they are protecting his honor, but honor and reputation could only be earned by exemplifying the “male qualities of reason and strength in an approved way;” that approval was only granted if a man displayed control over his self and control over his inferiors (Foyster 32). Consequently, Baliarado has already been stripped of his honor, yet Charmante claims to care for the doctor’s honor when he explains that the elaborate ruse was all done to protect the doctor’s reputation: “If we’d not lov’d you, you’d been still impos’d on; We had brought a Scandal on your Learned Name, And all succeeding Ages had despis’d it” (205). Charmante, we must remember, has ulterior motives that supersede a selfless care over the doctor’s reputation. He has, after all, just married the doctor’s niece, so his own honor and reputation are now tied to Baliardo’s household. With that accounted for, Charmante’s reasoning recognizes

that a man's behavior was often closely watched by his neighbors and that his reputation did depend on what others thought about him (Foyster 55, 58).

When presented with the errors of his beliefs and the impact they could have on his reputation, Baliardo has trouble coming to terms with what the staged spectacle means for his research into life on the moon. Even after the truth comes out, the Doctor seems unwilling to let go of his fantasy when he says to Cinthio and Charmante who have taken on the personas of the moon men, "Are you not then the Emperor of the Moon? And you the Prince of *Thunderland*" (205)? It is difficult for him to reconcile the elaborate and fictional narrative he has crafted in his head and the very real and observable truth in front of him. It is a moment in which the audience almost feels pity for him as he bawls onstage while they watch his work and theories crumble before him. When Cinthio reminds him that a civilization never existed on the moon, his reply is one of shock: "No Emperor of the Moon, --- and no Moon World" (205)! However, when Charmante reminds him that his behavior is blighting his reputation, it is then that he has an awakening of sorts and decides to cleanse his home in a moment reminiscent of Faustus and Prospero: "Burn all my Books, and let my Study Blaze, Burn all to Ashes, and be sure the Wind Scatter the vile Contagious Monstrous Lies" (205).³² These books he refers to do contain fictions and speculations, but when Baliardo equates them with lies, he deflects attention away from his own mistakes. None of the titles Elaria mentioned earlier in the play lay any claim to any kind of soundness in experimental

³² In Act V, Scene ii of *Doctor Faustus*, the titular character cries out, just before being dragged to hell by demons, "I'll burn my books" (116). Prospero in *The Tempest* says at the end of the play, "I'll break my staff, / Bury it certain fathoms in the earth, / And deeper than did ever plummet sound / I'll drown my book" (V, i, 54-57).

methods or any kind of truth in their conclusions. By deflecting attention from his beliefs and blaming his books, Baliardo may reveal that his mind has not been cleansed, for he does not seem to realize the errors in his own thinking at this point. He orders that his books be destroyed, but he has said nothing of his instruments and telescopes.

Perhaps he will destroy the speculative texts and keep his experimental tools; however, we have no assurances that he will only pursue experimental procedures with them or that any of his methods have been rectified. Telescopes do assist experimental philosophers in their practice; however, a telescope can still be used for only observational purposes, leaving the door open for Baliardo to continue to concoct speculative narratives about what he supposes to have seen. One has to wonder just how sincere he is in saying that he will destroy his books, especially in light of words that are so similar to those spoken by Faustus and Prospero. Faustus only offers up the destruction of his materials in a final attempt to save his soul, and Prospero only says he will drown his books, but the audience never sees him do that. Perhaps Baliardo will actually keep all of his books, and everything he has just said was done to placate the crowd of people in his home and to uphold a semblance of his reputation. The final lines of the play also imply that Baliardo's great realizations might not be that sound. As the play comes to an end, Baliardo says the following lines "gravely" to himself:

I see there's nothing in Philosophy ---
Of all that writ, he was the wisest Bard, who spoke this mighty Truth. ---
"He that knew all that ever Learning writ,
Knew only this --- that he knew nothing yet." (206)³³

³³ According to the notes in Todd's edition of Behn's play, Socrates supposedly said these words.

Baliardo seems to have missed the point when he concludes that there is nothing to be gained from experimental philosophy. Instead, it would be more helpful for him to understand that there is there nothing to be gained from the methods he employs. One also has to wonder if Behn's play offers up a critique of the Royal Society because of the gap between its rhetoric and the methods practitioners were actually engaging in within their own homes. Baliardo's methods, like Gimcrack's, are immoderate and obsessive, while also being decidedly individual efforts bereft of the collective's purifying purpose; yet, Butler's poem implies that even a collaborative effort cannot save experimental philosophy from the flaws and ambitions of immoderate men. If Baliardo does, in fact, believe that there is nothing to be gained from experimental philosophy, then maybe he has learned something. Nevertheless, if we read the final lines ironically, perhaps there is an underlying message from Baliardo actually indicating that he is not going to abandon his ways. Maybe he is saying that all he has really discovered is that he has not discovered anything *yet*.

The Afterlives of Gimcrack and Baliardo

Speculative characters such as Baliardo and Gimcrack warn Restoration audiences about a type of experimental philosophy in conjunction with speculative methods that are self-absorbed and lead to the downfall of the family, the mind, and may have negative consequences for society. Both experimental philosophers have become so engrossed in what they suppose is experimental philosophy that they lose sight of what is really happening in the world around them and instead see only what they want to see, an

act reminiscent of Butler's experimental philosophers who look through the telescope itself but concoct their own version of reality. As writers, Shadwell and Behn participate in a type of speculation themselves, drawing conclusions based on what they believe could be happening within the Royal Society and with its practitioners. Extending their observations to predicted consequences establishes the experimental philosopher as a comic figure but also as figure we should be wary of because he mismanages his home and family. These fictional experimental philosophers are not just characters to laugh at because their ridiculous pursuits can lead to ruin on many levels. Coppola argues that we should not look at characters such as Gimcrack and attempt to trace the "morphology" of the "scientist" as a character type (42). Although I can understand why Coppola might see such attempts as reductive, it is important to trace the development of these characters when considering how other texts participate in the speculative mode. When other writers are directly influenced by the characters of Gimcrack and Baliardo and create their own versions of these characters, these character types become even more pertinent. The speculative practitioner becomes a way for writers – and their readers or audiences – to mediate and manage their anxieties associated with experimental philosophy. In laughing at these characters, audiences can think through their concerns, and in satirizing the experimental philosopher, speculative writers can influence and contribute to the discourse surrounding the role of the practitioner in society.

I turn now to two characters inspired by Behn and Shadwell's virtuosos, not with the goal of providing fully-fledged investigations of either, but only to draw attention to the development of the character type and the public's continued fascination with works

that speculate about the individual practitioner. Thomas D'Urfey also presents the experimental philosopher as someone worthy of ridicule in his play, *Wonders in the Sun* (1706),³⁴ which he based on Behn's drama. D'Urfey's satire, however, differs from Behn's in that the experimental philosopher in *Wonders in the Sun* is actually on the moon, not just observing the moon from Earth. In the play's list of characters, Domingo Gonzales, the protagonist and experimental philosopher, is described as "Over Curious in Natural Productions and Secrets in Astronomy" (13). His curiosity, in this case, is presented as an extreme. In the context of the play, Gonzales is accused of having "vain Curiosity," in that he only pretends "to Sciences and Knowledge" (13). Similar to Doctor Baliardo, Gonzales is considered ridiculous because he claims knowledge when he actually lacks it. Philosophers, according to D'Urfey's drama, eat "steams, luscious Fumes, rich edifying Smoak" (13). Figuratively, such a description associates experimental philosophers with feeding on that which is unsubstantial or imaginary, and Gonzales's focus is on that which has no real value or substance. Consequently, though Gonzales may believe he is striving for experimental knowledge, that very endeavor clouds and obscures his reason. Like Doctor Baliardo, he is merely a fool, and his role as a comic figure is further enhanced by the wisdom of his servant Diego who pronounces, "Ah Plague on your Philosophy" (10). Diego reinforces the ridiculousness of the scientist when he says, "Philosophy, Philosophy, a new Maggot, his head's full of 'em" (12).

Associating maggots with experimental philosophy emphasizes the threatening aspects of

³⁴ *Wonders in the Sun* was first performed in April of 1706, and it was performed five or six times and then withdrawn for "not having paid half the expense of its production" according to Robert Stanley Forsythe (150). In addition to drawing inspiration from Behn, it is also thought to be influenced by Godwin's *The Man in the Moone*.

the new methods. Maggots, of course, are associated with decay, and Diego views Gonzales's head as full of these dangerous and destructive influences. Furthermore, in the eighteenth-century, maggots were representative of strange or perverse notions and ideas.³⁵

Though one could conclude that audiences were more accepting of experimental philosophers by the time D'Urfey's play premiered and that is why his play was not as successful as Behn's, that does not necessarily seem the case, at least when briefly exploring the records associated with works about the Royal Society. Behn's play, for example, was performed throughout the first part of the eighteenth century. On the other hand, Sprat's initial *History* was not reprinted in the seventeenth century; its first reprint was in 1702 and then again in 1722 and 1734. Perhaps this printing history represents a larger shift in public attitudes, and that certain intellectual positions that seemed controversial in the 1660s were becoming more common and more accepted (Hunter 66). However, Butler's poem was reprinted in 1759, highlighting that the public still either found the experimental philosopher ridiculous or at least still enjoyed poking fun at him. The reprinting of both Sprat's *History* and Butler's poem, in addition to the fact that Behn's play was regularly performed, implies that there was still a public desire for works that speculated about experimental philosophers.

Further supporting this hypothesis is the fact that D'Urfey dedicated his play to the Kit-Cat Club, of which both Joseph Addison and Sir Richard Steele were members. Addison and Steele in *The Tatler* and *The Spectator* made fun of the Royal Society

³⁵ "Maggot, n." *OED*.

Fellows repetitively and continued to ridicule their undertakings.³⁶ In Addison's view, "Certainly the mind of man, that is capable of so much higher contemplations, should not be altogether fixed upon such mean and disproportioned objects. Observations of this kind are apt to alienate us too much from the knowledge of the world, and to make us serious upon trifles."³⁷ He also argues that "Whatever looks trivial or obscene in the common notions of the world, looks grave and philosophical in the eye of the virtuoso." In Addison's arguments, we see reverberations of criticisms that had been lodged at the Royal Society thirty or forty years prior in Cavendish, Butler, Shadwell, and Behn's writings: namely, that experimental philosophers concern themselves with inconsequential matters. Addison also highlights the difference between the common man and the experimental philosopher, implying that the common man concerns himself

³⁶ Addison and Steele published these periodical papers that were meant to be both educational and entertaining between 1709 and 1714. According to Erin Mackie, *The Tatler and The Spectator* "addressed a broad variety of topics of concern to their contemporaries" and sought to "reform polite society" (ix). Both publications were not just commentary on culture but were "agents" in forming culture (x). Their goal was to "enter into the daily lives of their readers and reshape them" (2). Donald F. Bond, who edited *The Tatler*, describes it as a "miscellany of news, instruction, and entertainment" (x).

³⁷ *The Tatler*, No. 216 (1710). This entry contains the will of a virtuoso. Bond's notation on the use of the name Gimcrack attributes Addison's usage to the main character in Shadwell's play. He writes that Gimcrack satirizes "experiments by members of the Royal Society" (133). There are other direct mentions of the Royal Society in No. 7, No. 119, and No. 236, in addition to No. 221, which I discuss in this chapter. No. 7, which appeared in April 1709, contains Bickerstaff's will and testament in which he says, "I bestow my Learning upon the Honourary Members of the Royal Society." Bond's note on this argues that "References in the *Tatler* to the Royal Society are generally uncomplimentary" (65). In No. 119, Addison writes of the "curious Discoveries that have been made by the Help of Microscopes," and the Royal Society is mentioned in a list of experiments (205, 208). Bond's note on No. 119 explains, "Addison and Steele generally ridiculed the work of the Royal Society and the efforts of the virtuosi as centering upon trivial and unworthy objects of investigation" (206). Bond marks entry 236 as a satire of the "ingenious virtuoso whose scheme for importing frogs from Ireland exemplifies the dull pedantry of the virtuosi of the Royal Society" (220). Within the entry, Addison says that the Royal Society seems "to be in a Confederacy against Men of polite Genius, noble Thought, and diffusive Learning; and chuse into their Assemblies such as have no Pretence to Wisdom, but Want of Wit; or to natural Knowledge, but Ignorance of every Thing else. I have made Observations in this Matter so long, that when I meet a young Fellow that is an humble Admirer of the Sciences, but more dull than the rest of the Company, I conclude him to be a Fellow of the Royal Society" (219-20).

with issues that matter, while the experimental philosopher becomes consumed with trivialities to the point of alienation from his community.

Addison's *Tatler* #221, printed in 1710 emphasizes the idea that absorption in experimental philosophy leads to domestic disorder, a theme undertaken earlier by Shadwell and Behn. In Shadwell's drama, for instance, the Virtuoso is cuckolded and has his estate removed from right under his nose, while in Behn's play, the Doctor's incessant observation of the moon leads him to neglect his daughter, establishing his home as a source of chaos. The experimental philosopher in D'Urfey's play has left his wife and children behind so he can explore the world in the moon. In Addison's "Letter from the Virtuoso's Widow," the widow Gimcrack writes a letter about her husband the experimental philosopher, who has recently passed away. Her letter is a cry for help, since her husband's obsessions with experimental philosophy have left her destitute. Addison's work adds another dimension to the public discourse surrounding the Royal Society because his criticisms, unlike those in the theatre, brought experimental philosophy into the coffeehouse and the readers' home.³⁸

In Mrs. Gimcrack's letter, she indirectly criticizes her husband's trivial studies of experimental philosophy by detailing the many consequences she has suffered under his pursuits. His decisions consisted of having her fire the gardener, for example, since Mr. Gimcrack believed there was no such thing as weeds. He also took to rambling through

³⁸ *The Tatler* would have been read in the privacy of one's own home but was also read and discussed in coffeehouses. Steele addresses this in the first printing in *The Tatler*. Although we cannot know for sure how popular it was or what kind of circulation it saw, Bond argues that "there can be no question as to the paper's success. The steadily increasing number of advertisements, the many references to Steele and the *Tatler* by contemporaries, and the host of imitators, both friendly and hostile – all indicate that the *Tatler* was widely read and discussed" (Bond xix-xx). He details the increase of advertisements from forty-two in May 1709 to a monthly average of over 150 by 1710 (xx).

the country, returning home with his pockets full of “moss and pebbles” (154). There is a kind of idleness associated with Mr. Gimcrack, and Addison’s satire is amusing. In this case, however, the experimental philosopher’s focus on the trivial is presented as something larger than a source of mockery. His attentions are portrayed as unnecessary and as damaging to his both his life and to his wife. Mr. Gimcrack, in fact, dies because he chased a “very odd-coloured butterfly” over the course of five miles and half of a day, resulting in a fever that killed him (154-55).³⁹ Despite immoderate pursuits that led him to his death bed, Gimcrack’s dying request was for his wife to “bring him a flea which he had kept for several months in a chain,” so that he could release the flea from its captivity (155). His deathbed instructions further underscore his misplaced focus, which should be on his wife and family, but are still concerned with inconsequential experiments.

The criticisms of male experimental philosophers, who are also husbands and fathers, reflect a larger issue connected to British concerns. As patriarchal figures, the families mentioned in each of the aforementioned texts could be read as microcosms of the nation and its vulnerabilities. As stated previously, the Royal Society regarded itself as an institution that might be able to heal the nation after the strife associated with the civil wars and Interregnum. Sprat, in fact, saw the Baconian method as something that could rebuild English nationhood (Lynch 32). The Restoration itself resulted in a “flurry of examination,” focused precisely on what united the English together as a nation (Lynch 159). What tended to emerge, especially in opposition to what was viewed as the

³⁹ Gimcrack’s death serves as an interesting parallel to Bacon’s death. According to Rose-Mary Sargent, it was Bacon’s interests in investigating nature that “hastened his death.” She notes that Bacon died in 1626 from a respiratory illness that was “apparently aggravated by a chill he had received while gathering snow for an experiment designed to test the ability of cold to preserve the flesh of fowl” (x).

frenzied enthusiasm prior to the Restoration, was a focus on moderation. In Sprat's *History*, he attempts to align the experimental philosopher with English moderation, and he establishes the practitioner as a model citizen. One could argue that the real problem associated with speculative writers' representations of experimental philosophers, is at least partly, a lack of moderation. The rhetoric of moderation in the Restoration had a couple of goals, according to John Montano. First, the rhetoric attempted to end the division in the "body politic," and second, it sought to emphasize moderation as one basis for "restoring national unity" (Montano 53). Montano asserts that any time ambition or selfishness overtook one's public duties, then "disorder invariably follows" (99). The behavior of any of the aforementioned experimental philosophers and virtuosos could easily be interpreted as extreme, and English audiences and readers might perceive this quality as a threat to the order of the period. The fact that Mr. Gimcrack's obsession with experimental philosophy kills him is not something to take lightly, especially if we read him as a metaphor for England as a nation.

While the death of Mr. Gimcrack is certainly problematic, the state in which he leaves his family is also of public concern. His wife recounts that when she first met him, he had a very "handsome estate"; however, after buying a set of microscopes, he was selected as a Fellow in the Royal Society (153). It is at this point that Mr. Gimcrack seems to lose all touch with reality, even speaking in a manner that his family cannot comprehend. She says that after he joined the Society he no longer spoke "as other People did," and that none of his family could understand him (153-54). In Addison's text, we are presented with the picture of a man (or nation) both before and after his

dabbling in experimental philosophy. Before, his family is comfortable, well taken care of, and respected. After becoming a member of the Royal Society, however, he sacrifices the well-being of his family in order to finance his scientific whims and experiments.⁴⁰ Her husband's behavior often gave Mrs. Gimcrack a "heavy heart," especially as he began to sell off his estate in order to purchase "strange baubles," items she later recounts as a "parcel of dried spiders," "cockle-shells," and "beetles" (154). These items are all she has left, and the purpose of her letter is to ask for assistance in how to sell them in the best, most efficient manner so as not to be destitute.

When considering the speculative writing in this chapter as a whole, the concerns and anxieties within each work often overlap with one another. As touted by the Royal Society, the methods represented a radical break in worldview, and speculative writing responds anxiously to this new epistemology. Each text reinforces the dangers of relying on experimental philosophy for valid avenues to truth, thereby setting up the experimental philosopher as an object of ridicule. Each piece forwards the idea that experimental philosophers are not just comic figures; they are figures of which to beware, for they have the potential to wreak both domestic and national havoc. As such, each of the pieces of literature examined within this chapter offer moral warnings to their readers. When the doctor in Behn's play refers to his books as "vile Contagious Lies" (205), we are presented with an interesting insight into the dangers of the experimental philosophy; it is contagious. It is morally despicable, and it has the power to spread. In light of the

⁴⁰ Though the Royal Society received a Royal sanction, it did not receive government funding. Each member of the Society was required to pay an initial fee to gain membership, in addition to monthly dues. Experimental philosophers had to finance their own experiments, as well.

criticisms employed in these texts, being an experimental philosopher seems to be one of the lowest forms of work a man can pursue. In *The Virtuoso* Bruce remarks that “one bricklayer is worth forty philosophers” (IV, iii, 219-20). In D’Urfey’s drama, Diego laments working for Gonzales and not keeping his first job at the plough. In his view even working for a “Dagling Lawyer, or a Stockjobbing Citt, or a wholesale Horridan” would be better than working for a “Philosopher, one that is climbing the Devil knows where, into the Sun; one that studies the Nature of Magots and Humble bees” (44). Diego further aligns the pursuit of experimental philosophy with the trivial, but more importantly with immoral and unworthy work. It seems that no matter which interpretation a reader or viewer was exposed to, the experimental philosopher was viewed with “every variety of Restoration anxiety” (Parkin 120). It is no wonder that Sprat and the Royal Society felt such a need to defend themselves, but it is also understandable why British citizens might be concerned about the implications the new experimental philosophy could have for their country.

Speculative writing in the Restoration and the eighteenth century, then, becomes a unique mode through which a reader can investigate these new forms of knowledge formation, in light of how they interact with and conflict with established truths of the day and how they speak back to epistemological shifts. Speculative writing directed specifically at the Royal Society does much more than merely critique the Society’s work; it also speculates about the role art and the imagination can have in knowledge formation, as I will allude to in my final chapter. Astell’s “The Character of the

Vertuoso” emphasizes another Restoration anxiety associated with experimental philosophy – its lack of utility:

To what purpose is it, that these Gentlemen ransack all Parts both of Earth and Sea to procure these Triffles? . . . I know that the desire of knowledge, and the discovery of things yet unknown is the Pretence; but what Knowledge is it? What Discoveries do we owe to their Labours? It is only the Discovery of some few unheeded Varieties of Plants, Shells, or Insects, unheeded only because useless; and the Knowledge, they boast so much of, is no more than a Register of their Names, and Marks of Distinction only. (102-103)

Astell speaks to one of the main ways people worried about experimental philosophy: what exactly is the point of it? Astell is right in considering the motives behind these discoveries, and when she asks if the point is to boast and get recognition of some kind, her question underscores a common concern associated with experimental philosophers – their hubris, an element common to this character type in many later writings that fall under the label of science fiction. Consequently, works such as those considered in this chapter contribute to the development of the genre of science fiction and to the development of scientists as characters in literature. Margaret Atwood, in her essay “Of the Madness of Mad Scientists: Jonathan Swift’s Grand Academy,” posits the following questions: “Where did the mad scientist stock figure come from? How did the scientist – the imagined kind – become so very deluded and/or demented” (39)? She offers Jonathan Swift as the missing link and associates his representation of experimental philosophers in *Gulliver’s Travels* as connected directly to the Royal Society. Atwood goes on to claim that without the Royal Society, there could never have been *Gulliver’s Travels*, and that without Swift’s text, there would be no mad scientists in books or film, thereafter.

Atwood is certainly correct to see a correlation between the Royal Society and Swift's novel, but authors like Butler, Shadwell, Behn, D'Urfey, and Addison were promoting this image of the deluded scientist years, and sometimes decades, before Swift introduced readers to experimental philosophers who attempt to extract sunbeams from cucumbers.

CHAPTER VI

CONCLUSION: “TWO WORLDS AT THE END OF THEIR POLES”:

THE NEED FOR “SCIENCE” AND ART

The man of science observes his own and the reports of other people’s more public experiences; conceptualizes them in terms of some language, verbal or mathematical, common to the members of his cultural group; correlates these concepts in a logically coherent system; then looks for “operational definitions” of his concepts in the world of nature, and tries to prove, by observation and experiment, that his logical conclusions correspond to certain aspects of events taking place “out there.” In his own way, the man of letters is also an observer, organizer and communicator of his own and other people’s more public experiences of events taking place in the world of nature, culture and language. Viewed in a certain way, such experiences constitute the raw material of many branches of science. They are also the raw material of much poetry, many dramas, novels, and essays.

Aldous Huxley, *Literature and Science*¹

Huxley is perhaps best known for his novel *Brave New World*, a work that blends science with speculation by forecasting the capabilities of reproductive technology and its possible impacts on society.² In the above excerpt, taken from his treatise entitled *Literature and Science*, Huxley argues for the similarities between scientists and writers, both of whom observe the world and communicate their findings to the public. Each of them, in Huxley’s view, look “out there” and seek to make meaning of what they see, the scientist through conception, systemization, experimentation, and observation, and the

¹ pg. 5-6.

² Huxley’s family had strong ties to science. His brothers Sir Julian Sorell Huxley and Sir Andrew Fielding Huxley were both scientists. The former was an evolutionary biologist and eugenicist, and the latter was a physiologist and biophysicist who won the Nobel Prize in 1963. Huxley was also the grandson of Thomas Henry Huxley, a zoologist often referred to as “Darwin’s Bulldog.”

man of letters through organization and communication, in addition to observation. What Huxley recognizes is the deep connection between scientific and literary pursuits, in that the source of each is the same. Both the scientist and the writer draw from their own experience and the experiences of others to make sense of the world. They both investigate nature, culture, and language – each of these serves as the “raw material” for their initial observations and eventual conclusions. In understanding the similarities of both endeavors, Huxley bridges two pursuits that are often viewed as divergent ones. In investigating the cultural products of the Restoration and early eighteenth century, I hope I have also exemplified how similar experimental philosophy and speculative writing were in terms of their influence on culture and knowledge production.

In both the study of science and the study of literature, it has become commonplace among scholars to debate and determine the point of origin for things such as empiricism or science fiction. But looking for the definitive beginning of something seems bound to fail because change never happens instantaneously. In investigating multiple cultural documents that range from dictionaries to philosophical treatises to what we today consider “literature,” we can better understand how many genres of writing assist in the production of knowledge. Epistemological shifts, therefore, are not just represented in the work of experimental philosophers such as Robert Boyle or Robert Hooke, and the formation of the Royal Society did not happen outside of culture. In looking at dictionary definitions, speculative prose, and speculative drama, we receive a new and more nuanced understanding of how knowledge forms. Through the exploration of these varied kinds of writing, we can also explore how science emerged and changed

culture. Experimental and speculative philosophy, therefore, does not just happen in specialized and localized places, such as the laboratory. Experimental philosophy also happens and becomes part of culture when people read about it in coffeehouses, enact it on the stage, and imagine other systems in other worlds through speculative prose and poetry.

In thinking about the shifts in natural philosophy or how experimental philosophy attempted to break away from speculative philosophy, I chose to focus on a narrow segment of time, in which the experimental agenda was institutionalized and sanctioned by the king. The formation of the Royal Society in 1660 represents one way in which epistemology shifted through the establishment of an institution, and it is an important moment to consider because of the public nature of its experimental program and its public defense in 1667. Likewise, in this study the public responses to the Royal Society and its activities, evaluated in examples of speculative writing, represent a narrow span of time – just a few decades after the Restoration. The limited number of speculative writings I have explored cannot represent the range of responses to the rise of experimental philosophy, including the concerns that these kinds of writings articulated. There is much that remains to be explored. I could have studied speculative writings that praise the Royal Society, or investigated how experimental philosophy shifted notions of the self and subjectivity, or examined how genre and form developed in certain directions because of this major shift in knowledge formation. There is also room to point toward some patterns regarding representations of technology in speculative writing – Bacon’s predictions of the posthuman or Cavendish’s use of technology as instruments of war, for

example. Because the scope has been limited, I was able to investigate a specific kind of response toward the early Royal Society, one filled with an anxious undertone about the best ways to produce knowledge, whether through experimental or speculative methods. In contemplating experimental philosophy, speculative writers bring to light a concern about the Royal Society that focuses on its impracticality, the dangers of immoderate obsession, its potential effects on destabilizing gender norms, and the downfall that comes with a disordered household. Just under the surface, these anxieties are connected to larger political and societal ones, for if Britain's greatest minds cannot temper their own egos and find useful ways to benefit the kingdom there lurks a threat to the nation at large.

These concerns do not vanish once the period known as the Restoration ends and the eighteenth century begins, which is evident in speculative texts that continue to speculate on experimental philosophy. A particular text of note is Book III of Jonathan Swift's 1726 satire *Gulliver's Travels*, another example of speculative writing that focuses specifically on the Royal Society. In looking at *Gulliver's Travels*, it is not my intent to perform a detailed reading of the text or to draw out larger implications related to its critique of the Royal Society, for in leaping forward in time by several decades, the cultural and political world has shifted and the Royal Society itself has changed. Instead, I look to Swift's speculative text to connect some common themes to those discussed in the preceding chapters and to make a case for how speculation continued to inform literary writing in the eighteenth century. A text such as Swift's also highlights the prominent, public position that the Royal Society still maintained within culture.

Swift's *Gulliver's Travels* was popular, and at the same time, the Royal Society also continued to capture the public's imagination. According to J. Paul Hunter, the first printing of *Gulliver's Travels* "sold out in a matter of days, and within five weeks two more printings were issued [...]; the book's fame spread quickly throughout both England and Ireland" [and], "it quickly became a conversation piece" (216). Book III focuses on the fictional island of Laputa, an island that floats above the earth using the technology of a magnetic "loadstone," and the capital city of Lagado, where the Grand Academy of projectors is located. This Grand Academy is a direct critique of the Royal Society, and its projectors stand in for the Society's Fellows.³ Scholars such as Frederik Smith have established that the Society's *Philosophical Transactions* inspired Book III. These *Transactions* contained the "latest news" on experimental philosophy, and they "were widely read, and not only by scientists [...] but by well-read laymen generally" (139). Because both the experimental and speculative texts – *Transactions* and *Gulliver's Travels*, respectively – proved so popular, we can infer that elements of each captured the public's enthusiasm and imagination. In writing a satire that enters into a discourse with the *Transactions*, Swift combines the experimental with the speculative.

³ For scholarship that claims Swift rejects natural philosophy altogether see Richard Foster Jones, "The Background of the Attack on Science" (1949); John Sutherland, "A Reconsideration of Gulliver's Third Voyage" (1957); John Hill, "Corpuscular Fundament: Swift and the Mechanical Philosophy" (1975); Richard G. Olson, "Tory-High Church Opposition to Science and Scientism in the 18c: The Works of John Arbuthnot, Jonathan Swift, and Samuel Johnson" (1983); and Dennis Todd, "Laputa, the Whore of Babylon, and the Idols of Science" (1978). S. H. Gould, "Gulliver and the Moons of Mars" (1945), and Colin Kiernan, "Swift and Science" (1971), contend that Swift was a supporter of natural philosophy. For more of a middle ground, where Swift is presented as both critical and enthusiastic of natural philosophy, see George Reuben Potter, "Swift and Natural Science" (1941); Frederick N. Smith, "Science, Imagination, and Swift's Brobdingnagians" (1990); and Douglas Lane Patey, "Swift's Satire on 'Science' and the Structure of Gulliver's Travels" (1991).

Swift's response to the Royal Society is filled with ridicule. Similar to Margaret Cavendish's critiques in *Blazing World*, one of Swift's criticisms centers on the denigration of the imagination by the Royal Society. While on Laputa, Gulliver observes his surroundings and the behaviors of mathematicians there and comes to the conclusion that "they are very bad Reasoners [...]. Imagination, Fancy, and Invention, they are wholly strangers to" (Swift 234-35).⁴ Their lack of imagination results in clothing that is "ill made" and uncomfortable and houses that are "ill built" and defective (232, 34). Not only do they construct materials in error and disregard those errors, but they also are unable to conceive of other subjects; they are utterly perplexed by anything outside their area of study (235). Gulliver's critique draws attention to the ridiculousness of a practice that exists without fancy. Without fancy, the projectors can only calculate and produce based upon their calculations, exemplifying that experimental philosophy also lacks practicality when it is bereft of fancy. Gulliver's description implies that the multiple errors result *because* there is a lack of creative foresight, or the ability to suppose and think through the possible ramifications of the formulas they employ. Without the imaginative faculty, their methods are more prone to error. They also lack the curiosity needed to look outside their disciplines for other types of solutions and other ways of knowing.

As we have seen in the speculative writing discussed in chapters four and five, excessive and obsessive behavior, especially when focused on impracticality, raises

⁴ It is important to note that Gulliver is not always the most reliable narrator. His descriptions are very exact; however, he is sometimes a naïve observer, in that he does not seem to acknowledge the limitations of his own viewpoint. In Part III, though, not much happens to Gulliver, and much of his narration details what he observes.

concerns about moderation and pragmatism within the practice of experimental philosophy. When Gulliver takes a tour of the Grand Academy, he details the absurdity of the projectors' experiments, a critique reminiscent of the behaviors seen in characters such as Gimcrack and Baliardo. Gulliver is introduced to a projector who has spent eight years "upon a Project for extracting Sun-Beams out of Cucumbers" (260). Although he has thus far been unsuccessful, the projector believes that in eight more years he will probably have a breakthrough. Another projector focuses on "reducing human Excrement to its original Food," while another tries to burn "Ice into Gun-Powder," and someone else hopes to turn cobwebs into silk (260, 61). Still another's experimentation on a dog results in the dog's death, after having bellows placed in his anus (264). These experiments represent a small sampling of the ones Gulliver observes, but each of them is connected by its lack of usefulness. Some of them, such as trying to turn marble into a pillow, seem completely unnecessary, as well. These practitioners do not just focus their energies on nonsense, however; their obsessive pursuit of knowledge also leads to weakness in their physical bodies. Gulliver comments on one projector's "meager Aspect" and his beard that has become "ragged and singed" (259). In another chamber Gulliver is "overcome with a horrible stink" (260), and he describes a different projector by observing that "His Hands and Cloths [were] dawbed over with Filth" (260). The experimental philosophers have let their work overtake them to a degree that it affects their appearance and their cleanliness.

As was established in discussions of the speculative works by Cavendish, Shadwell, and Behn, this excessive behavior wreaks havoc beyond the individual

practitioner. Gulliver mentions husbands who do not notice their wives' infidelities, despite the fact that those indiscretions are occurring right in front of their faces (237), indicating an imbalance within the domestic space. Of even more concern, however, is the great danger that the Grand Academy represents for the city of Lagado. The city, as a whole, seems to lie in ruins and at the root of their troubles is the formation of the Academy, which occurred forty years prior, after a group of citizens visited Laputa for five months. Upon their return, they "began to dislike the Management of every thing below, and fell into Schemes of putting all Arts, Sciences, Languages, and Mechanicks upon a new Foot" (255). Their desire for change results in a system that has not yet been "brought to Perfection, and in the mean time the whole Country lies miserable in wast" (256). In attempting to gain knowledge about the natural world, their own world has fallen apart. After spending time observing Lagado, Gulliver remarks, "I did not discover any good Effects they produced; on the contrary, I never knew a Soil so unhappily cultivated, Houses so ill contrived and so ruinous, or a People whose Countenances and Habit expressed so much Misery and Want" (251-52). In the span of just a few decades, the Grand Academy's pursuits and experimentations have destroyed their society. It is not just that people are poor and hungry, but Lagado's citizens are unhappy, as well. Their quality of life has suffered and their needs have increased. One might think that such drastic and negative consequences might deter the projectors from their selfish ambitions. Quite the contrary, however: instead of being discouraged, they are "fifty times more violently bent upon prosecuting their Schemes, driven equally on by Hope and Despair" (257).

Despite the popularity of *Gulliver's Travels* and the fact that Swift enters the discourse surrounding the Royal Society, critics have often disregarded and sometimes denigrated Book III. According to Hunter, even Swift's contemporaries were hesitant about parts of Book III (217). Unlike the other three books, Swift is often faulted for Book III, and it is frequently dismissed as a complete failure. As such, it is a text that has not received a lot of scholarly attention. Robert Phiddian notes that Book III is the "least popular and least studied part of *Gulliver's Travels*," and that no matter which scholars attempt to come to the book's defense, none has been able to dispel the belief that "it is a rather messy, miscellaneous, and even fragmented section" (50). Other critiques of Book III center on its incoherence, its dullness, its lack of literary value, and its focus on allusions that are too contemporary.⁵

Of Restoration and eighteenth-century examples of speculative writing, Swift's Book III is not alone in being derided or neglected by critics. Although Cavendish's

⁵ Bruce Olsen sees coherence and a "conscious arrangement of ideas" among Books I, II, and IV (11). Paul Alkon remarks that Swift's rhetorical stance is too negative, which makes Book III seem "the weakest" (13). William Eddy issues one of the most scathing critiques of Book III: "The third part of *Gulliver's Travels* is at once the longest and the worst. It is a miscellany of unrelated situations that are, with one exception, Struldbrugland, uninspired and dull. There is here no attempt to create an agreeable world of the imagination." Because of these faults, he says, "it would be the apotheosis of pedantry for me to attempt to enlist interest where Swift himself failed" (157). Bonamy Dobrée argues, "this voyage has never been popular [...] it seems at first sight too much of a rag-bag of all the left-overs in Swift's satirical armoury; both the scientific references and the political ones are at once too contemporary and too recondite" (329). Marjorie Nicolson and Nora M. Mohler's article "The Scientific Background of Swift's Voyage to Laputa" is the first to offer a sustained investigation into the connections between Swift's ideas and the *Philosophical Transactions* and the Royal Society. Even they remark, "There is a general agreement that in interest and literary merit it falls short of the first two voyages [...] it lacks philosophic intuition. Any reader sensitive to literary values must so far agree with the critics who disparage the tale" (110). For other scholarship on Book III's value see: Clive T. Probyn, "Swift and Linguistics: The Context behind Lagado and around the Fourth Voyage" (1974); Jenny Mezciems, "The Unity of Swift's 'Voyage to Laputa': Structure as Meaning in Utopian Fiction" (1977); Dennis Todd, "Laputa, the Whore of Babylon, and the Idols of Science" (1978); James A. Swearingen, "Time and Technique in Gulliver's Third Voyage" (1982); Michael DePorte, "Teaching the Third Voyage" (1988); Douglas Lane Patey, "Swift's Satire on 'Science' and the Structure of Gulliver's Travels" (1991); and Walter Freedman, "Swift's Struldbruggs, Progress, and the Analogy of History" (1995).

works have received more scholarly consideration in recent decades, her work is still often discussed in similar terms to Swift's Book III. *Blazing World* is said to have little narrative coherence and readers are advised to not expect her writing to make sense. As I discussed in the last chapter, Aphra Behn's play *The Emperor of the Moon* was the second-most (if not the most) popular of all her plays; yet, there has been very little scholarship on it.⁶ Samuel Butler's poem "The Elephant and the Moon" has not received the attention it deserves, despite it being his most ambitious work after *Hudibras*. There seems to be a difference between these texts that had cultural relevance at the time and those we now deem as worthy of study. Perhaps that difference arises due to subject matter and the fact that some of these writings have been relegated to works of science fiction.

Scholars who study science fiction tend to label texts such as *Blazing World* and Book III of *Gulliver's Travels* as science fiction or as precursors to science fiction. In some cases, Book III is seen as the very archetype of science fiction (Alkon 164).⁷ Anachronistically labeling Swift's work as science fiction marks his writing as something unique or isolated in its time. Milton Millhauser contends that Swift's views about

⁶ As I mentioned in chapter 4, Derek Hughes cautions readers to not over interpret the play in *The Theatre of Aphra Behn* (171).

⁷ Alkon makes it clear that Book I and II are only "adventure-fantasy, no matter how much they may be inspired by the microscope and telescope." Part IV, he says is a "variety of utopia," but Gulliver's third voyage is science fiction but "only while he is on the Flying Island, in Lagado, and among the Struldbruggs" (13). For other scholarship on Book III as science fiction see Samuel Holt Monk who claims that *Gulliver's Travels* "is at once science fiction and a witty parody of science fiction" (48). Robert M. Philmus analyzed Lagado and Laputa to show that "although *Gulliver's Travels* is not science fiction, strictly defined, in [...] episodes like these a technique of presenting science as fiction can be perceived which anticipates the science fiction of later writers" (12). Darko Suvin argues that "Swift created the great model for all subsequent SF [science fiction]" (113), and Neil Barron contends, "Of its seventeenth- and eighteenth-century contemporaries, *Gulliver's Travels* probably remains the most important to contemporary science fiction from Wells onward because of the bitterly critical tone it takes toward humanity" (80).

experimental philosophy are “exceptional” for the period and that his is the only work of fiction from this time period that retains “any currency and that include[s] any significant treatment of science and scientists” (290, 287). Clearly, as my study has shown, there are other authors who take on experimental philosophy and its practitioners as one of their main themes, so Swift’s critiques are not all that exceptional; however, as with trying to determine a starting point for science, it is also problematic to attempt to label a work as the originator of the science fiction genre. The writings I have studied are fictional in that they create a space of imagined realities and fictitious characters, but they are not necessarily prose fiction. More important than conventions of genre, however, is the reduction that occurs when we label early modern texts as science fiction. Doing so causes a loss in our appreciation of the cultural moment. When speculative writing is classified as science fiction, that writing is simplified because we lose sight of the cultural discourse that was happening at the time over whether the speculative or the experimental was more valuable. Disregarding that conversation inhibits us from understanding why the turn to speculative writing was so important, in that it arose at a moment in which the speculative was being denigrated.

Studying speculative writing in tandem with experimental philosophy also reminds us of the beginnings of the separation between art and what we now know as science. The Royal Society positioned their experimental method as the new and modern approach to knowledge and aligned the speculative with ancient philosophy. It is within this context of the “quarrel between Ancients and Moderns” that we see the beginnings of “science” as a distinct and progressive form and one that eventually is positioned in

opposition to art and the humanities (Patey 810). Swift represents the division between these modes of learning by having the Academy's various buildings be divided into different schools, based on that which they see as practical (or experimental philosophy) and those who are the "Advancers of speculative Learning" (265). Today we understand the division between art and science, but we do not always acknowledge or understand the interplay between the two, and this interplay is culturally important. There was a need for art and the imagination at this particular historical moment for understanding experimental philosophy better, and there remains a need for both today for the same reasons. The speculative serves as a bridge between literature and science, and yet we are not paying it the attention it deserves – either in studying literature or in studying science.

Speculative writing allows for ambiguity, and although it does not provide readers with the definitive "matters of fact" that experimental philosophy claims to provide, it leads us to a more complex understanding of knowledge formation. Speculative writing interprets cultural events and in doing so, it helps "to define a new national tradition of identity, ideas, values, and literature" (Hunter 220). Texts such as Thomas Sprat's *The History of the Royal Society* and writings such as *Blazing World* raise similar questions: how does one find truth? On what do we base that truth? What is the relationship between truth and fact? Between truth and imagination? Speculative writing, I believe, also undermines the stability of truth. As Smith notes, a text such as *Gulliver's Travels* allows for readers to "consider some important questions regarding the assumptions" of both kinds of discourse – "scientific" discourse and the discourse that is speculative writing

(157). Huxley's text on science and literature implies that these assumptions will only lead us to incomplete truth:

Thought is crude, matter unimaginably subtle. Words are few and can only be arranged in certain conventionally fixed ways; the counterpoint of unique events is infinitely wide and their succession indefinitely long. That the purified language of science, or even the richer purified language of literature should ever be adequate to the givenness of the world and of our experience is, in the very nature of things, impossible. Cheerfully accepting the fact, let us advance together, men of letters and men of science, further and further into the ever-expanding regions of the unknown. (118)

It is in the in-between, according to Huxley, that we can truly advance toward knowledge. By acknowledging the limitations of both science and art and their inability to ever completely represent the range of experience or the vastness of nature, we can look to both science *and* art to equip us to better understand that which can seem unfathomable. Speculative writing combines logic and fancy, and it is in that combination where we can find more nuanced understanding. Cavendish describes how she wants her reader to view her *Observations* and *Blazing World*, two seemingly different texts. She says that she joined these two pieces of writing together "as two Worlds at the ends of their Poles" (153). In other words, the philosophical treatise and the speculative prose are joined together along the same continuum. Cavendish's description is how I propose we view the speculative writing and experimental philosophy of this time, as part of the same structure. We must move between the two ends of the poles and find truth within the interplay.

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Fishing, Fortification, Gardening, Gauging, Geography, Geometry, Grammar, Gunnery, Handicrafts, Hawking, Heraldry, Horsemanship, Husbandry, Hydraulicks, Hydrography, Hydrostaticks, Law, Logick, Maritime and Military Affairs, Mathematicks, Mechanicks, Merchandize, Metaphysicks, Meteorology, Navigation, Opticks, Otacousticks, Painting, Perspective, Pharmacy, Philosophy, Physick, Physiognomy, Pyrotechny, Rhetorick, Sculpture, Staticks, Statuary, Surveying, Theology, and Trigonometry. Illustrated with near Five Hundred Cuts, for Giving a clearer Idea of those Figures, not so well apprehended by verbal Description. Likewise A Collection and Explanation of Words and Phrases us'd in our antient Charters, Statutes, Writs, Old Records and Processes at Law. Also The Theogony, Theology, and Mythology of the Egyptians, Greeks, Romans, &c. being an Account of their Deities, Solemnities, either Religious or Civil, their Divinations, Auguries, Oracles, Hieroglyphicks, and many other curious Matters, necessary to be understood, especially by the Readers of English Poetry. To which is added, A Collection of Proper Names of Persons and Places in Great-Britain, with their Etymologies and Explications. The Whole digested into an Alphabetical Order, not only for the Information of the Ignorant, but the Entertainment of the Curious; and also the Benefit of Artificers, Tradesmen, Young Students and Foreigners. A Work useful for such as would Understand what they Read and Hear, Speak what they Mean, and Write true English. Collected by several hands, the mathematical part by G. Gordon, the botanical by P. Miller. The whole revis'd and improv'd, with many thousand additions, by N.

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Confectionery, Cookery, Horsemanship, Hawking, Hunting, Fowling, Fishing, &c, To which is added, the interpretation of proper names of men and women, that derive their Original from the above-mention'd Ancient and Modern Tongues, with those of Writs and Processes at Law: Also the Greek and Latin Names of divers sorts of Animals, Plants, Metals, Minerals, &c. and several other remarkable Matters more particularly express'd in the Preface. Compiled by Edward Phillips, Gent. London, MDCCVI. [1706]. Eighteenth Century Collections Online,
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