COSMIC POETICS: A BINARY DISCOURSE

by

JAMES MITCHELL MADDOX

(Under the Direction of Dr. Thomas Cerbu)

ABSTRACT

Poetry and astronomy seem to be very different in how they describe the world and our experience of it. But they are not in opposition. This paper explores those two discourses as aspects of a Cartesian dualism that historically dominates much of Western thinking, namely, the difference between the ―physical" and the ―metaphysical" and how theism has reinforced the distinction between the two. Over the last few centuries, advancements in astronomy changed the way we see ourselves in the world, and we can see those changes in poetry. This paper looks at how those two discourses co-evolved, and, in doing so, it reconsiders the ―canon" of English-language literature from an interdisciplinary, ―systems" approach.

INDEX WORDS: Astronomy, Comparative Studies, Modernism, Poetry, Romanticism, Systems, Victorian Literature

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DEDICATION

This paper is dedicated to my family: Mom, Dad, Mary Halsey, Marston, and Bennett.

You are the center of my cosmos.

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PROLOGUE

1. Looking Into the Past

This is a story about outer space and how humans capture it in language… If we were to look into the switchboard of neurons in your brain, we see that there are pathways, or *associations*, we have in common when we speak of outer space. Depending on your age, your educational background, and your fondness (or disdain) for space literature, the picture of space in your head—the *story* of space in your head—is the product of everything you have heard or seen about space and who presented that information to you. And our bias today, when we speak of a ~~"n~~atural" phenomenon like space, is to think of it in scientific terms, but our relationship with space, as we will see in this story, is much more dynamic than the ~~"o~~bjective" abstractions of a science textbook or the ~~"in~~different" mathematics of physics. Our neural networks, or *schemata*, are built of webs of signifiers from a variety of discourses that have attempted to capture space in Western culture (Widmayer). Some of those signifiers are words. Some are numbers. Some are pictures or films or metaphors. *My stars!* Luckily for us, the switchboard is not infinite, and we can compare those discourses side by side and see how they are interdependent, like two stars that have co-evolved in one another's gravitational fields.

If you are reading this, we live in the same linguistic neighborhood. We see the same stars overhead. The same constellations come and go each about the same time each year. And since we live in the same neighborhood, since we share those discourses, it has always been to

our mutual advantage to share our stories. Discourse exists so that we can cooperate, as we are better equipped for long-term survival as a group if we can communicate our experiences of the world, which is why we ended up with those shared schemata that give us the same experience of outer space.

But the schemata aren‘t uniform, as each culture, each language group, each discourse community, has its own set of priorities and thus its own representations of outer space that reflect the particular problems of that community, even within Western discourse. If we were to translate this paper into, say, Swahili, the reader‘s experience of outer space, because of the different ways our languages work, would give the reader quite a different understanding of the cosmos and our place within it. But there are identifiable patterns in our Western milieu that make sense to us if we combine what we (what *I*) know about how the brain works, how discourses evolve in conjunction and opposition to one another , and the cultural influences that have shaped our attempts to capture the stars.

Since you already know that outer space is the protagonist of this story, I might as well give you the setting: Earth, which may seem paradoxical. However, for those of us who have never been to outer space and never will, outer space doesn‘t exist anywhere else. As we have established, the cosmos is a mental artifact of sign combinations—words, images, and the stories we tell about space and our personal relationships to the characters and the events in those stories. What we hear or read about space is qualified by the context, our past experiences, who is giving us the information, and a cascade of other elusive psychical phenomena. Occasionally space is obviously political, as in Kennedy‘s race to the moon. Sometimes it is seemingly innocuous, as in *Goodnight Moon*. Occasionally it is metaphorical, as when my uncle says ―far out.” And often it is poetic.

In order to tell the story of outer space in any discipline, we have to look back in time. And the only tool we have to see back in time is a telescope, which makes for a convenient metaphor to frame this tale. So I will aim my telescope at the stars in order to see how they have changed over the centuries in Western scientific and poetic discourse. Normally a critic uses a microscope, because the goal of scholarship often is to examine a small, unique object. The scholar uses the same tools all the other scholars in that field in order for that discourse community to be able to easily interpret the results. But my purposes are a bit different, because in my spare time I am a high school English teacher, and I am required by my employers to teach a particular narrative of English language literature. And that narrative doesn't sit well with me. It is the narrative of the "canon" of English language literature, and since I started teaching, I have found myself skirting the narrative.

So, this story is a new look at the high school English literature "canon" (which I will cease to put in quotations for convenience's sake) retold as the story of outer space in our discourse. More than just an interest of mine, the narrative of outer space also suits my agenda, which I will make explicit: I come from the school of Darwin, Vonnegut, Sagan, Dawkins, and Dennett, all of whom have influenced how I see myself in relation to the stars. My own brand of humanism (isn't that ultimately what scholarship is for?) has been shaped by the cosmic narrative that began to unfold for me as an undergraduate when I learned the story of the universe in "Intro to Cosmology."[1]

Some writers use the filters of feminism or of race in order to focus on a problem in literature. And I think astronomy can just as easily work as a method of thinking about the story

[1] If I remember correctly, this was the first class I attended at the University of Virginia as an undergraduate, fresh out of a high school education that only reluctantly mentioned Darwinism. The first thing Dr. Hawley said to the lecture hall was this: "Evolution is a fact. If you think that it is not a fact, you are wrong. If you plan to stay in this class, you're going to have to deal with that." My personal allegiances had been split between Biblical and scientific ontologies, and this moment was a defining one for me.

of discourse. What these filters have in common is that each is a method of ~~"s~~ystems" thinking. The ~~"t~~raditional" scholarship in any given discipline (literary criticism, for example) could, in my mind, reach to infinity, its busy practitioners rewriting the narrative of the discipline to accommodate the snowballing theory of the day. But these humanist filters are better for looking at entire systems in order to discover how each piece functions within it. Since abstraction is fundamentally how we manage ourselves in the world, especially in high school education, why not aggregate those abstractions into a flexible narrative that can serve as a larger story that can grow and accommodate further scholarship, just as those other holistic methodologies do.

Astronomy may not have the inherent appeal that feminism or minority issues have, but it also may not be quite as alienating to some as those disciplines sometimes can be (especially in the South, in my experience). Astronomy might provide an objective story, a narrative we are still writing, that tells the story of a species on a planet that is unique and worth preserving. It is a story that levels the playing field for all people, and, as I have told my students, the stars can be a nightly reminder of that story, one that does not favor any group of people.

My telescope has a large field of view, and just like any telescope, the further we look back in time, the more abstract the images appear. Thus I will focus on more recent events, although the construction of our world certainly depends on what the Greeks passed down to us. Since this study will ideally make me a more informed and effective educator, I have chosen to point my telescope at the works that are most commonly taught—the canon. I hope that my astronomical conceit in this study will reveal some of those problems.

Since as far back as the written record, outer space seems to have been divvied up between the artists and the scientists to be used for different purposes. Since none of us has been

to space (I don‘t expect any astronauts will read this) we have to rely on the signs others have recorded to get a ―picture‖ of space in our heads. And we have to be aware of both the locutionary, or referential, meaning and the illocutionary force of those texts, whether poetic or scientific, since, as Betty Jean Craige says, ―we can no longer believe that truth is not socially influenced,‖ regardless whether the truth is couched in literary or scientific discourse (Wood and Kroger 5; Craige 124).

So, let‘s point the telescope as far back as we can into the West to find the beginning of the story. We are looking for astronomical phenomena of all types, and we know that the further away they are, the less we will probably be able to see (which is ok by me—my English classes only go back so far). Lo and behold, it starts with a *Bang*…

I

2. Let There Be Light!

–And there was light. God saw that the light was good, and he separated the light from the darkness." In its straight-forward simplicity, this poetic depiction in Genesis of the beginning of everything is oddly similar to our modern, scientific understanding of how everything began. According to science all the matter of the universe was once condensed to a point of infinite density and, at the moment of the Big Bang, exploded in a fraction of a second. Within that first second, in the –Radiation Era," are what scientists call –epochs," and each epoch saw the formation of different subatomic particles that make up our current —model" of the structure of all matter.

But since it took me several semesters of astronomy courses in college to conceive of that –model," having been a dismal science student in high school, I can empathize with the ancients, who were more attuned to *practical* concerns than—ahem—*particles* at *CERN*. The Babylonians were the first to record astronomical phenomena, and their purposes in doing so were mystical and economical (agricultural). I point this out because –the dismal science" seems to have a *hand* in everything, the relationship between the mystical and the economic is familiar to anyone with a television. And since the focus of this study is astronomy and poetry, it is important to note that late twentieth-century literary theorists recognized economics to be a ubiquitous force on all utterances and texts, regardless of their format. Since the Romantic era,

an *epoch* we have not fully escaped in popular literature and art, the mystical and the literary have been closely related. And indeed, the notion that the sacred exists outside the text is an artifact of Cartesian dualism, whose story also begins with the ancients.

Already we have spied the division that inspired this study in the first place: the cuneiform texts that supplied answers to the economic (agricultural) questions could also answer the mystical questions of the day. On the one hand, the constellations and the position of the sun in the sky could accurately indicate the best times of year to plant and to harvest crops. On the other hand, those same ―signs," the symbolic motions of the planets, could be read as portents of the future or messages from the gods (Wilson 13).

Reading the motions of the stars meant the formation of the zodiac, which is one of the easiest patterns to recognize in the sky. Each winter, Orion is high in the sky. In the summer, Cygnus the swan is prominent. The zodiac is particularly important for this story, because many people still use it to tell us what to expect in the future or as an explanation for why we are the way we are. It seems almost ubiquitous, though I would hope most people use it as a novelty: in the local newspaper (economic). On placemats at Chinese restaurants (economic). On infomercials for 900 numbers (economic). In fact, while most people I know find the zodiac to be absurd, I have a couple of dear friends who honestly believe in the ―power" of the horoscopes and have lengthy explanations for why they are accurate and meaningful to them. Who am I to tell them they are wrong? Apparently horoscopes *do* have power over them if their thinking or behavior is changed by it. A modern astronomer would point out, of course, that the zodiac has shifted over time with respect to the constellation under which one was born, and the ancient charts by which the mystics make their predictions are no longer accurate (Wilson 12-3). And yet, they persist. Why? Because the communities in which the zodiac provides a certain

sociological function operate according to the rules established by that community, which are governed by economics and power relationships. Outer space only exists on Earth, remember?

My own particular idea about the way space operates has been informed by contemporary scientific discourse and the narrative of the history of astronomical discovery, but I have to admit that I have chosen to participate in a particular discourse community for reasons that are not purely academic. I cannot rule out those forces which are kin to the forces acting on the ancients—the politics of my community, the economic advantage I get by trusting my scientific professors over other teachers I had when I was younger. The schemata of neural networks at work here are again too vast to trace.

This leads us, chronologically and thematically, to a text that is inseparable from its vast economic and mystical implications in Western culture: the Bible. We are certainly more attached socially and economically to the discourse community that privileges the Bible over Babylonian cuneiform (even my students would be quick to point out the literal implications of that statement). *In the beginning there was light*. And it was good. But it wasn't good for long, because if I remember anything from my ancient world history class, political stability was scarce in Mesopotamia. The Babylonians may have been rigorous with their astronomical records and had the power to accurately predict eclipses, but the zodiac probably was not as accurate at predicting conquest as it was at dividing the year. After Babylon's peak around 1600 BC, "the following thousand years [in] Mesopotamia was like a battlefield, with invasions from all sides" (Wilson 13-4). When the "minor prophet" Joel wrote the following passage in the 6th century BC, it is easy to see the reflections of the political in the mystical:

> I will show wonders in the heavens
> and on the earth,
> blood and fire and billows of smoke.
> The sun will be turned to darkness

> and the moon to blood
> before the coming of the great and dreadful day of the LORD.
> And everyone who calls
> on the name of the LORD will be saved;
> For on Mount Zion and in Jerusalem
> there will be deliverance,
> as the LORD has said,
> even among the survivors
> whom the LORD calls. (Joel 2:30-32, *NIV*)

Joel must not have taken Babylonian astronomy in high school, because he would have realized that eclipses happen regularly. One can imagine that this was valuable information to keep from anyone—the under-class?—who saw the moon as a mystical entity, unaware of its regular cycles.[2] On the other hand, even if people *could* read the tables, that information is still a mere abstraction of a natural phenomenon and subject to interpretation according to an individual's particular experience in the world.[3] How often today do people *choose* not to believe in evolution because of their own experience in the world?

Of course, there is another, more important astronomical symbol, a star in fact, that Christians re-present as a symbol of their own private discourse each year around the winter solstice. If I were to begin a footnote to describe the mystical-political-literary implications of this single astronomical "event," the footnote would quickly consume the rest of the story as a black hole consumes all the stars in its vicinity. Suffice it to say that this particular star might

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[2] If we follow this thread through to the future, we should note that Charles II appointed the first "Astronomer Royal," John Flamsteed, in 1682, a position which still exists today ("John Flamsteed," NAHSTE). And the Catholic church has employed astronomers at least since the 17th century, the reasons for which become clearer in a later chapter.

[3] A phenomenon that is relevant to how we understand information and which has recently been applied to literary studies (Cosmides and Tooby, 2000) is the concept of "metarepresentations." The idea is that our representation of the source of an utterance or text (how we feel about someone) affects how we interpret the utterance/text. The reader's percept of me as a Master's candidate will inform the "meaning" or "quality" of this text, just as much as metarepresentations informed my choice of sources for this paper. "Language [and metarepresentational abilitiy] are clearly linked… as their own meta-language… Speakers, in intending an utterance, and hearers, in interpreting an utterance, mentally represent it as a bearer of specified content, that is , they metarepresent it" (Sperber 121). The next step to this process might be considered "theory of mind," with which a speaker or hearer interprets what the other is thinking. Considering the seemingly infinite amount of "scholarship" at our disposal today, metarepresentationally-informed evaluation is essential to any sort of textual analysis.

serve as the center of gravity around which the rest of our galaxy revolves.[4] Instead of starting this story in Mesopotamia, I could have just as easily begun our discussion with that iconic symbol, the first "sign" in the Jesus story. The relationship between the stars and our narrative of "who we are" in the world is as close as we can get to "pagan" cosmology and should set the tone for the mystical poetry of the Romantic era and beyond. But I like to see the Western narrative as a system, and had I begun with the "Star of Bethlehem," I could be accused of both reifying that narrative and responding only to it. Our relationship to the stars is a bigger story.

If zodiacal charts were our earliest attempt at connecting ourselves to the motions of the night sky, our latest attempts involve space-based telescopes and particle accelerators. But our representations of the stars are ultimately not so different from our representations of any other phenomena. They are a human construction, after all, influenced by politics, economics, power, and, if we get down to it, the gossamer of neural networks built by that wizard behind the curtain: natural selection. While I personally subscribe to a scientific cosmology and eschew—especially in the classroom—a metaphysical ontology of any sort without qualifying it contextually, my own decision to privilege the scientific discourse was driven by a series of neural processes that were shaped by the same forces that influenced the Babylonians to interpret the stars economically or mystically. In other words, while I have been trained to "weigh evidence" and "think critically," my choices are not separate from my own neural biases, which are manifold. My decision to choose literature as a vocation, too, was determined initially, partly, by the very dualist thinking I am attempting to deconstruct using the astronomical metaphor, and whose fallacy was identified by the poststructuralists. This fact is perhaps ironic, but it is not

[4] The center of the galaxy is, in fact, a "super-massive" black hole, though I didn't feel it necessary to extend the metaphor quite that far.

ironic or surprising that my avocation, astronomy, would inform my interpretation of text and thus this paper, which theoretically represents all I have learned in my post-graduate work.

3. The Dark Ages

The only thing that wasn‘t dark in the West during this period was the night sky, which was ablaze with thousands of visible stars for anyone who could take a break from the sheer joy of living during such an auspicious time. Historically, we make a division between the ―dark ages" and the story I am about to relate, but I feel it apropos to include the following anecdote under that subheading, due to its dark theme.

Christopher Columbus discovered the New World in 1492, as we all learned in elementary school. Well, luckily we have altered that narrative a bit (although it is what I learned when I was young). But Columbus *does* make for a convenient segue from the thread we began to unravel in Mesopotamia. Babylonian astronomy demonstrates neatly how humans represent space and the different ways we use its representations linguistically (socially). I have skipped everything in between, including the astronomy of the Egyptians and the Greeks, because this is the story of the high school English curriculum and not the story of the venerable additions other ancient civilizations made to the field of astronomy. Suffice it to say that by the 16th century the West had forgotten them. The Greeks had already worked out that the Earth is round when they noticed that the Earth cast a shadow on the moon—simple geometry, really. But just as Joel wasn‘t convinced that eclipses were not apocalyptic, European sailors in the 15th century weren‘t

so sure the world wasn‘t flat. Or perhaps the invisible hand hadn‘t yet given anyone a helpful push far enough out to sea…

Captain Columbus, the guy who first put the flag down so that the West could bring the family over, knew how handy a book of astronomical charts and tables could be in the open ocean.[5] After all, he did make four ―successful" journeys to America. But he also discovered, on his fourth voyage, how handy the charts could be in a real bind on *land*.

In a story that makes a mockery of the notion that scientific advancement serves to advance humankind, Columbus used astronomy to swindle supplies out of locals on the island of Jamaica. The natives‘ relationship to the stars was naturally as mystical as it was agriculturally utilitarian. They, like Joel, did not have a record of the motions of the stars at their disposal, and so Columbus did as any self-preserving mammal might do—he used his resources for his survival. He and his men had been stranded on Jamaica with a rotting ship and few supplies. They had bartered with the locals for some food, and they had unceremoniously helped themselves in other ways that quickly caused them to wear out their welcome. At some point the islanders had had enough. Columbus realized he was in a tight spot, so after consulting his star charts and finding a convenient lunar eclipse around the bend, he warned the local chiefs that if they did not bring supplies on the double, he would make the moon disappear (Dugard). You can imagine the rest of the story. Columbus got what he needed and the natives left him alone after that. Fortunately for us, few people put any stock in metaphysical interpretations of eclipses today.

[5] It‘s against the spirit of this story and my personal point of view to risk further marginalizing non-Western cultures by relegating them to a footnote, but I feel it is important to mention that ―almost to the time of Columbus, Chinese science and technology had very often been far ahead of anything the Europeans knew" (Needham, Wand, and Robinson, 33-34). Let this footnote reflect how I would handle the issue in a classroom in which the curriculum called for a strict English syllabus without mention of other cultures.

4. Candle in the Dark

Around the time Columbus was making his rounds in the ―New World," a new technology was spreading in Europe that would fundamentally change the way we represent ourselves in the world, both scientifically and literarily: the printing press. If Bibles were once the property of the elite—who were thus able to control Biblical exegesis in self-preserving ways—bibles would now be available for private study and interpretation. Craige says in *Reconnection*,

> In contributing to the objectification of reality, print encouraged secular investigation of nature, helping to bring about the Scientific Revolution… [and] encouraged individual thought about the world and about God, thus helping to bring about the Protestant Reformation. (15)

Craige follows this observation with the claim that the printing press made ―vision the primary means to obtain information about reality," as text became sovereign over verbal discourse. Visualization became increasingly important for both the notion of objectivity for ―the aesthetic of realism in the arts" and for optical reinforcement of mathematical hypotheses in the sciences. In fact, the beginning of the Scientific Revolution is often credited to Galileo, whose telescope confirmed what Copernicus had depicted in figures on paper—a visual confirmation of a visual representation on paper. In a word: ―The separation of self from world effected by print literacy made for scientific empiricism," and if a reifi-able text, separate from its author, could be confirmed visually by observation (seeing thing itself), that confirmation then was intimately tied with the signifier on paper, which reinforced its authority (15).

Scientific empiricism is surely a good thing for ―illuminating" the metaphysical world of the ancients. But old ideas don't just die off, whether in a singular person or in a culture. Like the

appendix or the tonsils, ideas that once had utility for humans are still a part of our corpus, though they may not serve the same purpose. In some cases—as with the tonsils or appendix—ideas cause problems and we might be better off without them. Dualism, which we often credit to Descartes, is the product of the emerging desire in the 17th century to quantify nature and measure phenomena empirically, and it is also a reflection of the preponderance of the human "soul" over nature, a problem that continues to inform our worldview in the West.[6]

Descartes wrote that he knew "with certainty that [material things] may exist, in as far as they constitute the object of the pure mathematics, since regarding them in this aspect, [he could] conceive them clearly and distinctly. For there can be no doubt that God possesses the power of producing all the objects I am able distinctly to conceive" (*Meditation 6*). This is a philosophy to which anyone unfamiliar with modern Darwinism could easily subscribe to today. Like cosmic background radiation, we can tune in almost anywhere in the western hemisphere and find dualism humming away. In a study published in April 2011, 22% of American students reported that their high school biology class included both creationism and evolution (Moore 223). This is perhaps the most visible—and political—conflict between "metaphysical" and scientific ontologies today in the United States, and on its own it would be a reasonable stimulus for this study. But if we are to establish a true holistic ontology for this story, we must recognize Cartesian dualism as a *meme*, "a cultural element or behavioural trait whose transmission and consequent persistence in a population, although occurring by non-genetic means (esp. imitation), is considered as analogous to the inheritance of a gene" (OED). In other words, dualism as the subject of this narrative is only one channel of that background radiation. But true

[6] Consider our current environmental problems. We continue to see ourselves as "outside of nature" instead of as a part of it. In many ways this is an environmental text, as our survival on the planet will ultimately require a systems approach if we are to manage our resources in a sustainable way.

cosmic background radiation is on *all* the channels. Memes are so ubiquitous they are all but impossible to trace.

The term was coined by Richard Dawkins, former Oxford Professor for the Public Understanding of Science, in his 1976 book *The Selfish Gene*, which may have marked the beginning of yet another one of Carl Sagan‘s ―demotions” of the ―special” qualities of humans (in this case human *ideas*). Dawkins‘ ideas have themselves proven to be quite ―fit” in the scientific community, and he has become a sort of celebrity as a champion of Darwin and a proponent of ―militant atheism” (Dawkins, TED). Dawkins, and Tufts professor, Dan Dennett, author of *Darwin’s Dangerous Idea*, *Breaking the Spell: Religion as a Natural Phenomenon*, and *Science and Religion* (2010), both consider their ideas to be fundamentally humanist in their holistic Darwinian approaches. For my purposes, the study of astronomy, especially in light of the twentieth-century discoveries that redefined the size and age of the cosmos, is essential to the evolutionary narrative in which Dawkins and Dennett place humans and human consciousness. The most succinct way to describe our place in this new narrative is Carl Sagan‘s statement, ―we are star stuff” (―The Lives of the Stars”).

So now we have all the major players in this story, and it is time for the rising action. I have given you a general idea of what we are looking for and the problem we face, but you still haven‘t seen any real poetry, and scientifically we are still on ―the first day.” But we have also arrived—probably too quickly—at the point at which the English literature curriculum usually begins for high school students. 1600AD was about the mid-point of Shakespeare‘s career, and when high school students first start their Western literature curriculum, they often begin around this time. Every English literature course I have taught began here, and all others included a nod

to Shakespeare, so perhaps we‘re starting *in medias res*, though this epic won‘t cover all periods or players. And while many departments have begun to change their curricula to reflect more than just the literature of the ―old, dead white guys,” department heads—and paying parents!—wouldn‘t hear of burying Shakespeare just yet. I, too, for a variety of reasons, love Shakespeare, and since his writing corresponds chronologically to Galileo and the beginning of the Scientific Revolution, that‘s where we‘ll pick up the tale of outer space.

II

5. Trepidation of the Spheres

While Shakespeare's plays coruscate with references to the stars and spheres (*Antony and Cleopatra*, *Hamlet, Macbeth, Twelfth Night, A Midsummer Night's Dream,* etc.), our telescope is trained on poetry, and his sonnets also reflect the cosmos of his day, one that even the Catholic church has abandoned:

> "Not from the stars do I my judgment pluck;/ And yet me think I have astronomy. . . . from thine eyes my knowledge I derive,/ And constant stars in them I read such art/ As Truth and beauty shall together thrive…" (Sonnet XIV)

If there was a poetic aesthetic in Shakespeare's poems, it was the beauty of the object of affection. And in the lover's eyes are reflected the "constant stars," which was the state of the Heavens at the time.

The figurative relationship between outer space and the aesthetic beauty of the auditor in the poem might be called a "metaphysical" relationship, and a contemporary of Shakespeare's, John Donne, would come to be known—after his death—as a "metaphysical poet" for just that sort of conceit. Donne's "metaphysical conceits" are found in the canon almost as often as Shakespeare's sonnets. And because of that moniker, he serves as a neat segue into the dualist distinction that follows from this period. We might call it the *physical* versus the *metaphysical,* akin to Descartes' model of humans in the world. In his oft-cited, "Valediction: Forbidding Mourning," Donne writes,

> Moving of the earth brings harms and fears:
> Men recon what it did and meant;
> But trepidation of the spheres,
> Though greater far, is innocent. (Georgetown)

When Donne wrote that verse in the first decade of the 17th century, there was a divine order in the cosmos, the Great Chain of Being, which itself was a remnant of Aristotelian cosmology. At the time, the heavens were thought to revolve in concentric spheres around the earth, making beautiful music, more perfect than the strings of a harp. Humans lived on the imperfect earth, where we had fallen out of God's favor. The seven greater "stars," which we now know as the planets, sun, and moon, were thought to be situated in these perfect, transparent spheres, which were, finally, surrounded by the sphere of the stars. This was the entirety of the *firmament*, outer space, the cosmos. And while astronomers from antiquity through the Middle Ages had proposed alternate models of the universe, the geocentric model prevailed in the public consciousness, and thus the literature, of the day.[7]

But when Galileo turned the first telescope toward the heavens in 1609, what he saw did not line up with the accepted model. Jupiter was accompanied by several satellites, and Saturn had "ears." His observations seemed to support a heliocentric model of the cosmos, which we credit to Copernicus,[8] but when he published his defense of that model in 1632, the church forced him to recant and placed him under house arrest. It would be exactly two hundred years

[7] Though Ptolemy's geocentric modeled had prevailed until this point, Aristarchus of Samos had proposed in the third century BCE a sun-centered "Universe" based on his measurements of the size of Earth versus the sun, which he said was "more than 300 times the volume" (Wilson, 32). Like both Aristotle and Elizabethan thinkers, he imagined the stars to be fixed in a sphere.

[8] Copernicus had established the theory mathematically by simplifying Ptolemy's observations. He began by *simply* putting the sun at the center of the universe. Though we don't know why for sure, we can imagine he held off on publishing his *The Revolutions* until the end of his life because he understood the full weight of the ironic title of his book. Copernicus was lucky to live in the age of the Gutenberg Press, without which his texts may not have reached Galileo. Like any other scientific breakthrough, this one was the product of myriad factors which came together. Today we have reduced Copernicus's discoveries to that one: heliocentricity, though his contributions to science were much more extensive. (Wilson 53-7)

before the church would remove Galileo's work from their list of banned books, in 1832 (Sagan, *Pale Blue Dot,* 40).

Galileo's optical affirmation of a mathematical discovery is a fitting, if symbolic, beginning of the Scientific Revolution, which gave us a new vocabulary for describing our world. It may be obvious why the church had an interest in maintaining the divine order of cosmos. It gave them a privileged position, a connection to the "heavens," which, as Donne wrote, were high above us in the perfect order of the firmament—God's realm. As we see in his verse, that cosmic order was an integral part of the poet's existence—a way to describe the world physically and figuratively. We use the word "metaphysical" to describe Donne's poetry because of his skill at drawing long comparisons, or conceits, between our lives and the world around us. It was a way of understanding who we are in the cosmos, not so distant from the cosmos in which the ancients placed themselves. Though the cosmos at this point was essentially Catholic real estate, our position within it gave us meaning, just as our position in our current model of the universe gives us meaning today. The poetry of Donne's day, as Francis Bacon believed, "[expresses] the spiritual condition of humanity, for presenting a 'more perfect order' than one could find in nature 'since the fall.'" (Craige 17).

Today no academic would aver such a claim, though that physical-metaphysical duality persists. The belief that there is a soul that is somehow separate from the world, a "spirit/matter dualism that itself can be traced back to Plato," is intimately tied to our representations of the cosmos and where we fit into the cosmic order (Craig 15). Christian cosmology, especially in the hands of authority figures, has reinforced that duality and continues to reinforce it.[9] In this story, that duality is the conflict between the discourses and how we handle outer space and we fit in it.

[9] Aside from the legendary rift between the Catholic church and Galileo, which is a turning point in this story, the Catholic church has necessarily had to amend its own cosmology to accommodate the public's perception

Today we now know that every atom in our bodies was manufactured in a star at some point during the history of the universe. We learn in school about the ―origin of species," the origins of stars, and the role of DNA in shaping our physical and psychological characteristics. Only a fanatic would argue that Earth is the center of the universe. But we still find that occasionally the scientific narrative falls short. Many of us feel we must be more than ―star stuff," as Carl Sagan once said (*Cosmos*, episode 9). And indeed, alongside all the great astronomical discoveries, from Galileo, Kepler, and Newton, to William Herschel, to Einstein and Hubble, poets have attempted to satisfy our desire to fill in the gaps that science has left us in our cosmological model. The vestige of dualist metaphysics still exists in our popular understanding, even if it was parceled out from the church's holdings long ago, and even if the academic and artistic discourse communities have completely disassembled it. Ideas don't change overnight. The pervasiveness of that duality in our thinking is the backbone of this comparison between scientific and poetic ontologies, which have evolved together as two stars in a binary system.

One of Galileo's attackers, Jesuit mathematics professor Orazio Grassi, wrote, ―Even with his telescope, the lynx-eyed astrologer [Galileo] cannot look into the inner thoughts of the mind" (Reston 181). His use of the word ―astrologer" is a slight that implies that astronomy, a *science*, is the domain of the church and that Galileo's business is not serious work. We know who we side with today. Even the *Church* would disagree with Grassi today. But did Grassi have a point? The lexical and ontological distance between astronomical discourse and the language of poetry seems at first to support his snub against Galileo, at least objectively, but Catholic

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of the cosmos, which is a *testament* not to text itself, but perhaps to technology, which has made printing presses far faster and more efficient since the 19th century.

doctrine is not the answer. Nor is poetry. These are ontological salves which work similarly in that they construct a discourse community and a sense of meaning.

Science provides, for me at any rate, a more agreeable, secular vocabulary for describing the world, but we cannot explain all our experiences with science. Science even has a word for the experiences that are neurologically elusive: qualia. But even when science creates new vocabulary to signify ever more obscure phenomena, its ontology, as constructed by its discourse, is infinite (like that of any given academic discipline). Science uses the word ―qualia" to describe phenomena that are not otherwise quantifiable or otherwise communicable as phenomena in the conscious experience of humans, just as medicine uses the term ―idiopathic" to describe medical phenomena that have not yet been worked out by researchers, and just as astronomy uses the term ―dark matter" to describe material in the universe whose presence is known but whose physical makeup is unknown. We find all the time that we got something wrong and have to revise. One might think that art, like poetry, is an attempt to fill in those gaps, but it turns out that art too cannot be seen as value-free.

So Grassi was right in one thing: no single discourse can satisfy all our questions about who and what we are. This paper is even a testament to the fact that we're still *working it out*. But the goal for me, like the holistic thinkers whose work has inspired my research, is to work out a narrative that reduces the power relationships between global citizens, and not simply within discourse communities whose discourses might be used to take advantage of those who are not in the know.

6. Two Types of Light

Almost everything we know about stars comes from light. The study of light, or spectroscopy, began incidentally when, in 1665, Isaac Newton first trained a beam of sunlight through a crystal, separating its wavelengths into colors on a surface which could then be measured. Newton called the array of colors a *spectrum*, a term we still use to describe the different wavelengths of light found in stellar objects.[10] In that same decade there was a shift in the poetry in a critical canonical work, *Paradise Lost*, which is important for its politics (only faintly hidden), its depiction of the cosmos (geocentric), and its lasting effect on English-language poetry (interminable). [11] John Milton—who visited Galileo in his late days of house arrest—combines the epic form—which places him in and reinforces the Cartesian ontology of a particular, ―learned" discourse community—with a political, religious narrative, while simultaneously offering a subtle nod to changes in seventeenth-century science that were shifting our model of the cosmos.

Here is the economics of the poetic discourse at work. Though Milton thought highly enough of Galileo to include him in the poem several times, his cosmos was still a cosmos of ―fixt Starrs, fixt in thir Orb that flies,/ And yee five other wandring Fires [planets] that move/ In mystic Dance not without Song, resound/ His praise…" (V.176-9). The ―Tuscan artist," appears several times in the poem, once even by name: ―As when by night the glass/ Of Galileo, less assured, observes/ Imagined lands and regions in the Moon (I.289, V.261-3). But Milton's

[10] Spectroscopy was first used to measure the chemical properties of terrestrial objects, then, later, extraterrestrial ones. Spectrometers are the most important instrument in an astronomer's arsenal next to the telescope itself, as everything we know about stars and galaxies we have gleaned by measuring their light.

[11] Though he would later qualify the statement to a degree, T.S. Eliot wrote in 1936 that Milton's influence was one ―against which we still have to struggle" (Eliot 171).

private interest in astronomy would not overthrow his religious, political—oh, and poetic—universe. In light of the Restoration of Charles II earlier in the decade, Milton, having once spoken out for a government of the people,[12] reinforces that hierarchical universe so convenient to political and religious power: "Again… God made/ The Firmament… Of this great Round: partition *firm and sure*" (VII.261-7, emphasis mine).[13]

It was not so much the light of the stars Milton was interested in, but "celestial light," that problematic light of the *soul* (I.245). While Newton had stumbled upon the *physical* characteristics of light, the prevailing wisdom was that the light of God was something altogether different, and contemporaneous philosophy was heavily influenced by Biblical language. After all, the Bible was ubiquitous as an object of study for the educated class. We see in Samuel that "he shall be as the light of the morning, when the sun riseth, even a morning without clouds as the tender grass springing out of the earth by clear shining after rain" (KJV Bible, 2 Sam 22:1). The poetic simile, "as the light of the morning," indicates that the light and God were separate, implying a figurative relationship and honoring the unique character of the Christian mode of Cartesian dualism: God is *above* natural entities, not the entity itself.

Francis Bacon, who is known titularly as the first empiricist (Klein) and the "father of modern science" (Mathews), and who had a centuries-long impact on scientific method and philosophy in England, seemed to *light* upon the distinction in his *The Advancement of Learning* (1605): "To descend from spirits and intellectual forms to sensible and material forms, we read the first form that was created was light, which hath a relation and correspondence in nature and

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[12] "For men within themselves would be govern'd by reason, and not generally give up thir understanding to a double tyranny, of Custom from without, and blind affections within, they would descerne better, what it is to favour and uphold the Tyrant of a Nation" (*The Tenure of Kings and Magistrates*, 1650).

[13] For a much more comprehensive look at seventeenth-entury politics and philosophy in Milton, see Stephen M. Fallon's *Milton Among the Philosophers: Poetry and Materialism in 17th Seventeenth-Century England,* 1991.

corporal things to knowledge in spirits and incorporal things" (Bacon). If light is associated with both corporal and incorporal things—so sayeth the father of modern science!—then light is playing for both teams in the figurative, semantic foundation of dualist ontology.[14] A big problem for such a small signifier!

It is also helpful to note that Bacon dedicated his book "To the King," and early on in the work he makes it clear where his loyalties lie: "if any man shall think by view and inquiry into these sensible and material things to attain that light, whereby he may reveal unto himself the nature or will of God, then, indeed, is he spoiled by vain philosophy" (Gutenberg). The metaphysical is beyond knowing. Which is how, as the sciences seeped into the public consciousness, the metaphysical would find a new home in the literary.

A little more than 100 years after Newton had separated sunlight into its spectrum, German optician, Josef Fraunhofer, recognized characteristic patterns in the spectrum of sunlight, which were the first "spectral lines" ever recorded (MIT). As it became evident that light was a measurable, physical phenomenon that could be broken into its constituent parts, it was becoming more difficult for an educated person, whether a scientist or poet, not to feel the celestial winds of change. And the poets were keeping astride. Just as Milton had paid homage to Galileo in *Paradise Lost*, poet James Thomson was ahead of Fraunhofer by a generation when he wrote the following verse in the 1720s:

> …Even Light itself, which every thing displays,
> Shone undiscovered, till his brighter mind
> Untwisted all the shining robe of day;
> And, from the whitening undistinguished blaze,

[14] I can't resist mentioning the controversy over Ray Charles's 1956 B-Side recording, "This Little Girl of Mine," which he sang to the tune of the Harry Dixon Loes's gospel song, "This Little Light of Mine." As if to raise the rock-n-roll finger at that sacred *light*, the song was released just two years after Eisenhower prompted the addition of "Under God" to the pledge of allegiance. Surely a coincidence.

> Collecting every ray into his kind,
> To the charmed eye educed the gorgeous train
> Of parent colours. First the flaming red
> Sprung vivid forth; the tawny orange next;
> And next delicious yellow; by whose side
> Fell the kind beams of all-refreshing green.
> Then the pure blue…
> . . . .
> Myriads of mingling dyes from these result,
> And myriads still remain—infinite source
> Of beauty, ever flushing, ever new.
> Did the poet image aught so fair,
> Dreaming in whispering groves by the hoarse brook?
> Or prophet, to whose rapture heaven descends?
> Even now the setting sun and shifting clouds,
> Seen, Greenwich, from thy lovely heights, declare
> How just, how beauteous the refractive law. (Thomson 235)

The dualism as seen in the conceit of ―light" is still evident: ―His *brighter* mind." But so is a kind of proto-Romantic apostasy, a changing of cosmic order that presaged the relocation of the spiritual to the natural world, which is what academics typically claim to be the defining characteristic of Romantic philosophy and poetry: ―Did ever poet image aught so fair… Or prophet, to whose rapture heaven descends?"[15]

Of course, one did not have to split light through a prism to see a new universe emerging in the firmament. William Herschel, Fraunhofer's younger contemporary, redefined the heavens when he discovered a 7th planet (including Earth), Uranus, floating across the lens of his homemade, seven-foot reflector telescope. If the Enlightenment had elevated rational, empiricist thinking, à la Bacon, Newton, Hooke, Locke, Descartes, et al., discoveries like Fraunhofer's and Herschel's offered definitive, concrete evidence that fundamentally altered our perception of the

[15] Thomson's poem also alludes to another important astronomical discovery by Edmond Halley, that a comet's period could be mathematically predetermined in order to predict its appearance in its next orbital revolution. The comet he spotted is the eponymously named, Haley's Comet, which last made its appearance in 1986.

physical makeup of the natural world. We might even say that the combination of those technologies—the study of light and Herschel's advanced homemade telescopes—made for the birth of modern astronomy. When we combine these discoveries with advancements in chemistry and the natural sciences, the Romantic era appears to have ushered in what Richard Holmes calls ~~t~~he second Scientific Revolution," a term Coleridge may have used first in 1819.

If the literal and figurative qualities of ~~l~~ight" had once mirrored Descartes's *res extensa* and *res cogitans* in its appeal to a higher order, ~~l~~ight" in the hands of the Romantics would come to be refracted through the prism of ontological change that came out of that second revolution.

III

7. Romanticism[16]

If this is the story of outer space, our protagonist is like Beckett's Godot. We are still waiting. So far, space has been little more than the backdrop, an excuse for the telling. And up till now space has played servant to politics and theology and, let's be honest, my own purposes in reviewing what I have to teach to my high school students. But the Romantic era is when outer space comes into its own. When it starts to drive. When it strikes out on its own. Despite the problems with the language we have used in the past to depict outer space, if we are to uphold that holistic vision of the earth and humanity which is where we would like to end this narrative, we have to believe that empiricism is possible and that outer space can serve as the setting for a holistic narrative for us to follow when this one reaches its end. In other words, this is *my* story, because I want to use the current scientific narrative of space to support my own humanist vision of outer space in my classroom, just as Voltaire with *Micromegas*, Wells with *First Men on the Moon*, Vonnegut with *The Sirens of Titan*, and Sagan with *Pale Blue Dot*. So, back to the text, class…

[16] Because literary taxonomy also appeals to the literary-Cartesian hierarchy, I hope the reader will forgive me if I use the terms "Romantic," "Victorian," and "Modern" predominanty for purposes of chronology—as we use the terms "Classical," "Elizabethan," or "Enlightenment"—in order to demonstrate general transitions in thought rather than as fixed, unproblematic classifications. Furthermore, I certainly would not presume to apply the specific observations I make here to every poet who has been called Romantic, Victorian, or Modern. My topic is admittedly broad, and I have already admitted to the fallacy of sketching the narrative I identified in the beginning of this study.

At first glance, the English Romantic poets, who were the authors of their own revolution in poetry, were not quite ready for a mechanical, mathematical universe. If we look at the astronomical language of their poems we see a world in flux, an evolving cosmos that isn‘t fixed in spheres but also is not fixed in a scientific ontology. We can see changes in cosmos reflected in the poetic discourse, see how much or how little the poetry of the day adopted or rejected that language in its literal and figurative use. But we also see an allegiance to that *meme*, that dualism that privileges man over the physical world.

The way we use scientific language, as with any discourse, underscores what we collectively believe about the subject of the discourse and, concomitantly, our social, political, economic roles within the world that discourse constructs. Just as we have seen in the poetry above, the poetic use of astronomical vocabulary, whether literal or figurative, reveals an ontology that reflects both the macro*cosmic* knowledge of the day and those micro*cosmic* concerns of the poets themselves. What is important about the story of outer space in the Romantic cosmology was that it was *evolving* along with our evolving scientific understanding of the cosmos.

Among the common themes in the poetry of the Romantics were a criticism of urban life, a focus on human consciousness, and a reverence for the mundane—a poetics that encouraged a proto-Victorian social consciousness and echoed the Aristotelian notion, à la Bacon, that poetry could present a ―more perfect order" (Bacon, as quoted in Craige 17). These ideas are far from the science of refraction of light through a prism or mathematical relationships between falling bodies. Instead of seeing humans and human consciousness merely as a phenomenon *in* nature—an idea that would not mature even in theory until Darwin—Romantics celebrated our metaphysical connection to nature. In the abstract, this was a reimagining of the ―divine order"

of pre-Enlightenment ontologies, with humans at the center of the physical world. But in the poetic ontology of the Romantics, that ―inner light" of humanity and the Cartesian dualism are reimagined secularly.

The difference between the physical and the metaphysical is explicit in the writing of Immanuel Kant, whose writing influenced the Romantics. In his *Critique of Pure Reason*, he writes that the world has an essence that exists beyond our physical descriptions of it:

> …all our intuition is nothing but the representation of phaenomena; that the things which we intuite, are not in themselves the same as our representations of them in intuition… What may be the nature of objects considered as things in themselves and without reference to the receptivity of our sensibility is quite unknown to us. (35-36)

Kant's work on epistemology influenced both the scientists (who were then called ―natural philosophers) and the poets of the time, but his idea that empirical data cannot fully explain the ―nature" of the world, constituted an important feature of poetry for some time. Perhaps still even now, considering the preponderance of nature poetry on the current bestseller lists.[17]

The distinction between the mechanistic world of science and those echoes of the Great Chain of Being is apparent in Wordsworth. In ―Maternal Grief," he distinguishes between those ―worlds":

> The child she mourned had overstepped the pale
> Of infancy, but still did breathe the air
> That sanctifies its confines, and partook
> Reflected beams of that celestial light
> To all the little-ones on sinful earth
> Not unvouchsafed—a light that warmed and cheered…
> (―Maternal Grief," *The Complete Poetical Works*)

[17] Mary Oliver, who is typically referred to as a ―nature poet," held four of the top ten spots on the Poetry Foundation's list of bestselling poetry books for the week of May 8, 2011. (―Bestselling Books…," Poetry Foundation)

The separation between celestial and earthly here is an unveiled appeal to the divine order of a cosmos, not a mechanical world but a metaphysical one that is not so different from Donne‘s or Milton‘s. (Remember that Milton used that same phrase, ―celestial light” in *Paradise Lost*.) Coleridge addresses his skepticism more explicitly still: ―the substitution of life and intelligence… for the philosophy of mechanism, which in everything that is most worthy of the human intellect, strikes *Death*” (as quoted in Norton 10).

At first glance, it seems the Romantics were unconvinced of the ―dehumanizing,” mathematical world that pure science seemed to point to, and disheartened by the problems of industrialization and urbanization—poor working conditions, disease, population density. What I learned in high school, and what the surveys still teach, is that the Romantic muse took the form of ―the essential role of instinct, intuition, and the feelings of ‗the heart’” and their importance in balancing ―the judgments of the purely logical faculty, ‗the head,‘ whether in the province of artistic beauty, philosophical and religious truth, or moral goodness,” (Norton 9). This is a clear ontological rift and a reflection of dualism. The canon reveals that they had different ideas about how the world is ordered, insisting there was an internal or aesthetic reality impossible to express in scientific terms.

If we follow this line of thinking, we can identify in the Romantic poetic ontology what Kant called the *transcendental*, a word that stuck, as we know, and if we trace this mode of thinking backward, we end up somewhere close to Father Grassi‘s invective. If there *is* a connection to Father Grassi as a mode of religious thinking, it‘s that the meme of Cartesian dualism seeded multiple modes of ontological dissent against the sciences.

Some critics, like Thomas Call, have constructed academic arguments for this rejectionist theory of the Romantics. His view, which could very well be founded in his own exposure to

canonical surveys and vestigial New Criticism in his own education, claims the Romantics' response to the science of their day was,

> that if any cultural entity were to depose the Enlightenment scientific establishment—which, by their efforts, they had succeeded in defining as a monument of rigidity, limitation, and oppression—then that entity should be Romantic poetry, not another form of science that could conceivably become just as troublesome as its predecessor. (Call 4)

Call is referring to the transition from the humanist idealism of the Enlightenment to the ironic tragedy of the French Revolution and Reign of Terror that followed. His claim reminds us of the politics of discourse and thus elucidates one of the possible sources for the fitness of the dualist meme: the socio-political climate in Western Europe at the time. Although the connection between astronomical tropes and politics is oblique at best, the possibility that revolution affected the way the Romantic poets viewed the science of space cannot be ignored.

And if the poets of the Romantic age were skeptical of scientific figurations of the universe, at least one scientist was skeptical of poetry. In 1798, Charles Burney, one of the first music historians and an acquaintance of William Herschel (Langlois), wrote that Herschel had admitted to him that ~~h~~he had almost always had an aversion to poetry, which he regarded as the arrangement of fine words, without any useful meaning or adherence to truth… accept when truth and science were united" (Holden 104). Herschel used the term ~~t~~truth" in the strictest scientific sense, and ~~t~~truth" in this sense, in the traditional view, was inimical to the ~~t~~ranscendental" sensibility of Romantic poets. With regard to astronomy, specifically, Coleridge, an otherwise ~~s~~cientifically inclined individual," described the nebular hypothesis, which was the prevailing cosmic origin theory of the day, as ~~r~~revolting' in its dissimilarity to ~~a~~all our other experiences of nature'" (as quoted in Call, 4). The emphasis here is on human

–experience," a term which Kant also used. But to a scientist like Herschel, –experience" would have been subjective and unreliable if it couldn't be measured and recorded.

But Call's argument ultimately falls short, and we see that the dualist meme cannot be applied to —theRomantics" as a whole. Like the story of any meme, abstractions fall short, and in the case of the Romantics, the story of outer space deserves a closer look, especially as the Romantic era was when scientists, and then poets, realized that the world was *evolving*.

Coleridge may have found a particular scientific theory inimical to his experience as a human, but that did not mean he wasn't interested in the stars. His poetic cosmos is constructed of astronomical vocabulary and places man figuratively at the center of the cosmos, but it also hints at a natural order he would have picked up from his personal interest in science:

> Earth! thou mother of numberless children, the nurse and the mother,
> Sister thou of the stars, and beloved by the Sun, the rejoicer!
> Guardian and friend of the moon, O Earth, whom the comets forget not,
> Yea, in the measureless distance wheel round and again they behold thee!
> Fadeless and young (and what if the latest birth of creation?)
> Bride and consort of Heaven, that looks down upon thee enamoured!
> Say, mysterious Earth! O say, great mother and goddess,
> Was it not well with thee then, when first thy lap was ungirdled,
> Thy lap to the genial Heaven, the day that he wooed thee and won thee.
> (–Hymn to the Earth," Coleridge, 1853)

This is not a universe of crystal spheres. Nor is it mechanical and impersonal. Rather, the astronomical language reveals an evolving conception of what the world is and what part we play within it. Though still situated in the dualist paradigm, Coleridge is attuned and fascinated by the empirical sciences. He reminisced,

> I remember, that at eight years old I walked with [my father] one
> evening from a farmer's house, a mile from Ottery—& he told me
> the names of the stars—and how Jupiter was a thousand times
> larger than our world—and that the other twinkling stars were Suns
> that had worlds rolling round them—& when I came home, he
> showed me how they rolled round. I heard him with profound
> delight & admiration; but without the least mixture of Wonder or

> incredulity. For from my early reading of Faery Tales, & Genii etc etc – my mind had been *habituated to the Vast*." (Coleridge, as quoted in Holmes, 111)

Coleridge's wonder would have been natural for an educated poet in the Romantic era. Holmes reminds us that in 1872, ~~"~~It was widely reported in the gazettes, journals and year books published in London, Paris and Berlin," that Herschel had discovered a seventh planet, Uranus, the first discovered since antiquity, and the poets we call the Romantics were certainly aware of that discovery, which had ~~"~~reignited the general fascination with astronomy" (Holmes 105). Did the surveys forget that the night sky is part of nature, too?

Herschel's influence on the scientific community, the world, and on Coleridge, himself, was powerful. He had worked exhaustively on the nebular problem, which Coleridge once found ~~"~~inimical," and had catalogued numerous nebulae at various stages, hypothesizing that our solar system was only one of many of these interstellar phenomena. His allegiance to the scientific method produced measurable and predictable results, garnered the attention of the international astronomy community, and ultimately changed the way we understand our universe (McPherson 256-258). And remember, the discovery of Uranus appeared in the papers in *1872*, almost three decades before Wordsworth published his *Lyrical Ballads*.

If Herschel's discovery of Uranus and his work on nebulae had not been enough to influence the metaphysical ontology of the poets of his day, his work in the field of spectroscopy should have been. Building on the work of Newton and Fraunhofer, he set up an experiment in which he measured the temperature of the wavelengths of light. Each wavelength had a different temperature. What's more, when he measured the temperature of the area just to the end of the red spectrum, he found, in a discovery that cannot be overstated in its implications for the study of the stars, the invisible band was even warmer than the red (MIT). Herschel's discovery would

provide scientists with an objective way of identifying the chemical properties of elements, both terrestrial and cosmic, which offered incontestable evidence for the physical makeup of the world. This is the type of astounding discovery that would have captured the imagination of a Romantic poet even in their most reductive guise—the invisible beyond the visible, the magic of the world, the mystical world made manifest.

In fact, the wide publication of those scientific finds, like the wide publication of *Origin of Species* later in the 19th century, *did* change people's understanding of the world. And the change was about *change* itself. As early as 1774, Herschel had recorded in his observation journal, "we may infer that there are undoubtedly changes among the fixt stars, and perhaps from a careful observation of this spot something might be concluded concerning the Nature of it" (as quoted in Holmes, 109). If astronomy had predicted an evolving universe so far ahead of Darwin's model of natural selection, it played more than a small role in shifting our ontology away from mysticism. A century later, early twentieth-century structuralism would, according to Terry Eagleton, "rudely unmask" the "disguised theology" of Romanticism with its "prejudice that the poem, like a person, harboured a vital essence, a soul which it was discourteous to tamper with" (Eagleton, as quoted in Craige, 94). If the structuralists arrived at that position in critical terms, it was thanks in part to the notion that the world is not a fixed place. If the world is not fixed, how could the soul be?

But those findings could not overturn the dualist paradigm, and still can't in our popular conception of our place in the world. To return for a moment to my earlier discussion of "light," one has to wonder how the dualist distinction would have been different if that one word, "light," had not been used to signify so many different ideas, and, especially, those ideas so fundamental to Christian ontology: *Let there be light, and there was light; give light to them that sit in*

darkness and in the shadow of death; He…was sent to bear witness of that Light (Genesis 1:1; Luke 1:1; John 1:4, *KJV Bible*). If only we had had a *different word* for optical light! The Latin *lux*, for example. Would the debate have been different? Coleridge, the ―scientifically inclined individual," writes of ―A light, a glory, a fair luminous cloud/ Enveloping the earth—/ And from the soul itself." Wordsworth praises the ―internal light," and only faintly portends the other kind. In his oft-cited ―Tintern Abbey," he writes, ―I have felt… a sense sublime/ Of something far more deeply interfused, Whose dwelling is the light of setting suns…" (194). This is a hint of a new cosmos, not the celestial spheres. But his ―Suns and their systems" are ―fashioned to endure,/ Unhurt, the assault of Time with all his hours,/ As the supreme Artificer ordained. This is still a fixed universe, not one that evolves. If only that word light weren't doing double duty!

Of course, there were others poets who, for reasons that should now be clear, continued to bow to that nonsecular light, as when James Leigh Hunt's ―angel… came again, with a great wakening light,/ And showed the names whom love of God had blest." Perhaps *they* are the poets who shunned science, rather than the Romantics of survey courses.[18] The important thing to note is a split in the spiritual corner of the Cartesian bout. The Christian ontology in the West remained true to its spiritual dimensions, while the Romantics were toying with a more nonsecular, Kantian notion of ―essence." As Wordsworth wrote, he felt ―a sense sublime… something far more deeply interfused"—not a mere ―celestial light." If dualism still exists in the artistic realm, I would aver it is in this form, probably informed by artists' exposure to nonsecular dualism when young, built into their personal ontologies only to transform when that ontology doesn't hold up to academic scrutiny and a scientific education..

[18] Current theorists may actually be attempting to undermine the contemporary influence of dualism by drawing a distinction between Romantic poetry and scientists as a historical phenomenon. Paradoxically, however, discussions of the canon reify the canon, which is a vessel for Cartesian duality in its appeal to the ―sacredness" of text (see Craig's chapter on ―Dualism and the Concept of Literature").

If there was a tension between science and poetry in the Romantic era, between those different *lights*, it would have prefigured the mistrust of science in the Modern era a century later, namely of social Darwinism and the idea that technology could save mankind from ourselves. After all, World War I would demonstrate the power of science to destroy. But at the time, the tension was between physics and metaphysics rather than physics and poetics, and we would be remiss to pit Romantic poets, *in toto*, against Romantic scientists. In his *Biographia Literaria*, Coleridge writes,

> The term, Philosophy, defines itself as an affectionate seeking after the truth; but Truth is the correlative of Being. This again is no way conceivable, but by assuming as a postulate, that both are *ab initio*, identical and co-inherent; that intelligence and being are reciprocally each other‘s substrate. (249)

The semantic friction between the two definitions of ~~–tr~~uth”—Coleridge‘s and Herschel‘s in this case—is an obvious artifact of dualism. This quote obviously appeals to a sort of soul. But it also seems to prefigure a hint at the confluence of science and conscience Darwinian would bring about. What a coup it would be if we were to find a connection between the language Coleridge uses and current, Darwinian neuroscience: Truth and Being are identical and co-herent. Well, if they‘re not identical, they‘re certainly co-herent.

This cursory comparison of early nineteenth-century astronomical and poetic ontologies illustrates the evolving relationship between those discourses. In the end the story of outer space *is* the story of various, interdependent discourses, each of which should be studied objectively as historical linguistic narratives. If I must teach the canon to my students, I must do it responsibly. If I don‘t illustrate the Cartesian dualism that privileges those texts and the entities which have perpetuated them *as* the canon, I am only serving to reinforce the Western hierarchies that are

built on that privileged discourse. If I say that ~~"s~~cience was right" and ~~"p~~oetry was wrong" I overlook the importance of pre-modern modes of thinking, of memes, on our current thinking. Moreover, I fall short of constructing the holistic paradigm with which I began this study.

The fact that I am writing this report in the first place reflects a sort of search for ~~"o~~bjective truth," and it will be reviewed by others in the field in order to ~~"v~~erify" that what is written here is accurate. But it, too, is a discourse, and so I must be aware (as much as my conscious brain will allow) of all the factors that go into the text, inform my argument, and could have implications for what I am to teach my students. If they see poetry as a discourse that responds to its environment, including to the various memes that still inform our understanding of the world, I must see my own scholarship in the same light.

And I am not immune to the meme. I have often found myself, especially before I studied twentieth-century literary criticism in graduate school, wandering through a museum seeking a sort of ~~"e~~xperience" that I couldn't put in words. I have sat in majestic natural places, some iconic, some private, and I have *felt* that there was something happening to me in that space that I couldn't put in words. I have felt the same in ~~"h~~oly" places. But I grew up in the Deep South, where my ~~"v~~ery good" private school was reluctant to teach Darwinism, and several of the science teachers insisted that evolution was only a theory. My experiences with the ~~"s~~ublime" are surely the product of those ideas, still circulating in how my world was constructed as a young person in the South. Or, put another way, my brain had 20 or so odd years to construct my reality with a spiritual dimension, despite the fact that I was always skeptical of my Creationist teachers. (My skepticism was the result of many personal factors, but I still followed that Romantic notion that there was some sort of essence, some sort of spiritual reality to human

existence.) And I have had three or four years to reconsider those notions according to another theory, one which I hope offers a more humanist vision of our place in the world.

In his book, *Pale Blue Dot*, Sagan devotes a full chapter to "The Great Demotions." In fact, the entire book might be viewed as a treatise on that topic, and it might capture how that meme was "demoted" in my own ontology and led me to this study. In that book, Sagan deconstructs historical and twentieth-century anthropocentric views, which he argues are couched in the remnants of religious ideas. Essentially, his goal is my goal, but my texts are different, because my vocation is different. Writing around the same time as Sagan, Richard Dawkins gave us that helpful word, memes, which I am using to represent those ontological structures that are passed along from one generation to the next, however modified, superficially, by semantic guises.

Following the literary thread above, in pre-Romantic ontology, the word "nature" did not include humans as a part of the whole. It was generally argued that we are distinguished from it on account of our conscious, reflective character, which now we can see is a vestige of that divine order. Immanuel Kant, who had propounded the nebular hypothesis Herschel later bolstered with empirical data, wrote, "our belief in a divine author of the universe rises to the power of an irresistible conviction… it would be utterly hopeless to attempt to rob this argument of the authority it has always enjoyed." (Kant 383). However, he notes, "the physico-theological argument is insufficient of itself to prove the existence of a Supreme Being, that it must entrust this to the ontological argument… the only possible ground of proof (possessed by speculative reason) for the existence of this being" (Kant, Section VI). The appeal here to the privileged

position of man in the cosmos is closer to poetic mysticism than anything resembling the scientific method, but it is a clear step away from nonsecular thinking.

Following on the work of Kant, Friedrich Schelling's ~~–N~~ature Philosophy" (*Naturphilosophie)*, was particularly important for Coleridge (Bowie; Coleridge), who found there a ~~–g~~enial coincidence with much that I had toiled out for myself" (Coleridge, ch. 9). His self-reported connection to Schelling's ideas went beyond a mere affinity:

> …many of the most striking resemblances, indeed all the main and fundamental ideas, were born and matured in my mind before I had ever seen a single page of the German Philosopher; and I might indeed affirm with truth, before the more important works of Schelling had been written, or at least made public. (Coleridge, ch. 9)

Schelling's work, ~~–a~~lthough its empirical claims are largely indefensible" according to Stanford professor of philosophy Andrew Bowie, both shaped and reflected Romantic poetic ontology (Bowie).

If we follow the traditional line of thought, Bowie is right, because Schelling's focus is the philosophical study of nature, which is what we consider the terrain of the Romantic poets, who depicted ~~–n~~atural phenomena with an accuracy of observation that had no earlier match in its ability to capture the sensuous nuance" (Norton 9). The words ~~–c~~apture" and ~~–n~~uance," from this statement published in the Norton Anthology, reflect a persistence of that dualism and consequent privileging of man outside nature even today. We ~~–c~~apture" animals. We ~~–c~~apture" rainwater. We ~~–c~~apture" our enemies. The implied power relationships in that word are unavoidable, and resonate particularly for us in an age where *captured* photographic representation is such a powerful tool due to its perceived objectivity.

But the language of the quote above tells us more: consider the background and education of a critic writing for the Norton Anthology. Even if that critic tries to describe

literature objectively, the ontological DNA of this person is constructed of a web of signifiers not so different from Coleridge's. What's more, the critic will have *chosen* the métier, "English" critic, based on his preference for the poetic discourse over the scientific. Thus an interest in "capturing" some truth about the Romantic poets is quite possibly rooted in a predisposition that poetry itself can "capture" the "sensuous nuance" of nature, which is a testament to the hermeneutical problem inherent in literary criticism.

For a contemporaneous reflection on Romantic ontology, we don't have to look further than Coleridge's own description of his poetics of nature, which were informed, as he says, by Schelling, and which distinguish the poetical worldview from the scientific in the early 19th century. The following statement, published in his *Biographia Literaria* in 1817, represents quite a different vision of the world than the increasingly anachronistic divine order in Wordsworth we saw earlier, a shift in ontology toward Enlightenment thinking:

> Now the sum of all that is merely OBJECTIVE, we will henceforth call NATURE, confining the term to its passive and material sense, as comprising all the phaenomena by which its existence is made known to us. On the other hand the sum of all that is SUBJECTIVE, we may comprehend in the name of the SELF or INTELLIGENCE. Both conceptions are in necessary antithesis.
> . . . .
> Truth is correlative to being. Knowledge without a correspondent reality is no knowledge; if we know, there must be somewhat known by us. To know is in its very essence a verb active. (ch. XII)

If Coleridge was once skeptical of any astronomical theories of his day, he was certainly intrigued by the possibility of an "objective," and thus *measurable*, representation of world: "We are to seek therefore some absolute truth capable of communicating to other positions a certainty… a somewhat which is, simply because it is" (ch. XII). He explicitly states his poetics

have diverged from Wordsworth,[19] while still privileging the self on the grounds of the nobility of consciousness, a position that presages the transcendental philosophy of later nineteenth-century thinkers:

> The transcendental philosopher does not inquire, what ultimate ground of our knowledge there may lie out of our knowing, but what is the last in our knowing itself, beyond which we cannot pass. The principle of our knowing is sought within the sphere of our knowing. It must be some thing therefore, which can itself be known. It is asserted only, that the act of self-consciousness is for us the source and principle of all our possible knowledge. Whether abstracted from us there exists any thing higher and beyond this primary self-knowing, which is for us the form of all our knowing, must be decided by the result. (ch. XII)

Such a metaphysical assertion, that ―the act of self-consciousness is for us the source and principle of all our possible knowledge," seems to support the traditional view that Romantic poets were opposed to the burgeoning empirical sciences of the early 19th century. The statement illustrates a shared metaphysical ontology between Romantic poets and social philosophers, and reveals the distance between that vision of the world and the ontology of scientists like Newton, Kepler, Fraunhofer, and their Romantic successors, including Herschel, who defined ―truth" according to measurable data he *captured* using the instruments of science. Secondly, it demonstrates quintessentially what philosophers and poets at that time identified as the center of human identity: the conscious will.

Not to belabor the point, but if we go one step further and see the statement as an act in itself, Coleridge *literally* manifests that ideology merely by asserting, lexically, the dominance of the self, which reinforces the notion that man is outside and above nature. Perhaps that is the point of poetry? In the end, he's right about at least one thing: that aporetic coda, ―Whether

[19] ―I shall now proceed to the nature and genesis of the Imagination; but I must first take leave to notice, that after a more accurate perusal of Mr. Wordsworth's remarks on the Imagination... I find that my conclusions are not so consentient with his as, I confess, I had taken for granted."(*Biographia Literaria*, ch. XII)

abstracted from us there exists any thing higher and beyond this primary self-knowing, which is for us the form of all our knowing, must be decided by the result." If we don't know it, does it exist?

So far I have focused on Coleridge because of his personal interest in the sciences and his visible presence in English elite society in his day. What's more, much of this study was informed by the book, *The Age of Wonder*, which is a much more in-depth look at the Romantic sciences and discusses the role of the Romantic poets in shaping our awareness of the natural world. Holmes is also Coleridge's biographer, and his work eclipses this as an elegantly presented, in-depth study of the science and philosophy of that era.

Lest I overlook the other Romantic poets who inevitably appear in all canonical studies, I should mention a couple of anecdotes regarding John Keats, who, like Milton, writes his era's astronomer *célébré* into his verse: "…oft I like some watcher of the skies/ When a new planet swims into his ken" (as quoted in Holmes, 227). The poet's comparison of a transcendent experience to a *visual* experience of discovery also reminds us of Galileo and the shift in knowing from intuition or reason to visual confirmation of phenomena, a fundamental feature of Cartesian dualism in that, as Craige writes,

> By separating information from its context—that is by "containing" it on the printed page—print also provided for the reader the illusion that reality, like that information, was divisible into parts and external to the reader…that reality was definable independently of any single perceiver… that language was a neutral medium for the recording of objective data. (Craige 14)

The relationship between poets and scientists in the Romantic era was not an opposition. Both were under the illusion that their data could objectively define the world. But the world was changing, and we see hints of that evolution in both the scientific and poetic discourses.

A statement from Coleridge regarding the cosmic order serves as a useful segue into the next chapter. He expresses it as part of his rejection of Unitarianism: "God becomes a mere power in darkness, even as Gravitation, and instead of a Moral Religion of practical Influence we shall have only a physical Theory… a dull and cold moonshine, or rather star-light which shews itself but shews nothing else" (as quoted in Priestman, 143). This skepticism, this *idea*, that science cannot tell us all, defines the secular mysticism that thrived in poetry in the 19th century and, as I have described, persists even today. But it should not be mistaken for some "truth" that lies in verse, but merely a reflection of a persistent meme as it thrives in poetic discourse. In the Romantic era our protagonist was finding itself. Those were the teenage years, and like all good teenagers, it was trying to balance its passionate side with its rational side.

8. The Victorians[20]

If Romantic poetry became a tenuous vehicle for describing, albeit tentatively, an evolving universal ontology, the Victorian poets who succeeded them naturally would pick up the mantle of the science of space, as we see in their verse. But vehicles were improving. If the Romantics were traveling by carriage, the Victorians were traveling by steam engine. The narrative of that cosmic-ontological transition, as it evolved in verse from the Romantics to later poets is a story of scientific literacy, the resilience of scientific technology and ideas, and advancements in technology to discover, capture, and disseminate the scientific discourse. Telescopes, astro-photography, and spectral analysis were whittling away at indefensible,

[20] Again, this subheading is more helpful as a chronological guide than as a category based on canonical criteria.

metaphysical explanations of the universe, and increasing literacy meant a parallel transition in the way poets depicted the cosmos.

In the first decade of the 19th century, astronomers were assiduously scanning the skies for the solution to a mathematical problem. According to Kepler‘s laws of gravitation, there should be another planet between Mars and Jupiter, and Herschel‘s discovery of Uranus was strong evidence that there could be other planets. Uranus was the first planet to be discovered since antiquity, and astronomers raced to find more. What they found in their ever-improving telescopes instead, starting in 1801, was a series of asteroids, rocks floating in space, which further complicated our picture of the cosmos. What else would we find out there? The important thing was that astronomers had combined the predictive power of physics with the optical realm, with telescopes, and visual proof of a mathematical prediction was hard to ignore. Remember, this is the era when the Catholic church finally was compelled, 1832, to remove Galileo‘s defense of heliocentricity from its list of damnable texts. With all the empirical data that had been measured and recorded regarding our cosmos, the church was unable to defend its ~~–in~~nocent” spheres.

Luckily for astronomers, the advent of photography at mid-century meant that astronomers would soon be able to capture astronomical phenomena more ~~–o~~bjectively” for the purpose of recording and studying cosmic phenomena. This was a radical shift for ~~–c~~apturing” the ~~–tr~~uth” of the natural world, something that had vexed Romantic poets and thinkers only a few decades before. The first astronomical photograph, taken in 1839, was of the moon, the most likely subject for what was then very primitive equipment. That photograph was actually taken by Louis Daguerre himself, the inventor of the daguerreotype camera. And, if one were ever

inclined to find astronomy at the margins of objective science, it is helpful to know that the word ―photography" was coined by two astronomers that same year, which was only natural, following astronomers' general interest in lens and light (Hannavy 88). It is not surprising, considering how astronomers have altered our perception of the world with regard to its physical construction, that photographers were involved in our earliest attempts to reproduce it objectively for the purposes of scientific study.

Throughout the 1840s, astronomers went on to successfully capture images of the moon, of planets, shooting stars, and the sun. And in 1850, a Harvard astronomer took the first daguerreotype of a star: Vega, one of the three points of the summer triangle in the constellation Lyra. While these primitive images were not of significant value to astronomers at the time, due to their low image quality, they anticipated the methods of photography combined with spectroscopy that would ultimately enable Hubble to discover identify other galaxies, and, later, the big bang.

The photographs may also have been important for the public's perception of outer space. Images of the moon were featured at the Great Exhibition in London in 1851, which ―aroused a lot of interest in the scientific community," and images of the sun, taken by amateur astronomer Lewis Morris Rutherford, of New York, were displayed at multiple World's Fairs to great ―public success" (89). No longer did one need to understand Kepler's laws of planetary motion, or even have access to a telescope to ―see" that the cosmos could exist without the crutch, or the anthropocentrism, of metaphysics. In fact, images are often what draw people to astronomy today, especially in the first stages of astronomical education, as the math and physics required to understand it scientifically are not easily learned.

While advancements in astrophotography were providing a strong case for empirical representations of the cosmos, chemists in the early 19th century were building on Herschel's discovery of infrared light to analyze the chemical makeup of terrestrial materials. By examining the wavelengths that a substance absorbed or reflected, scientists were able to identify which elements were present in a given compound. I am willing to risk the perils of hyperbole to claim this as most important astronomical discovery of the 19th century. While astrophysicists had begun to draw out the spectra of stars by hand before cameras were advanced enough to capture enough light to measure directly with their primitive sensor materials, early adopters of astrophotography understood the potential for the discipline to tell us much more about the universe. By the 1880s, star charts included the chemical makeup of stars alongside their photographs (93), and our "picture" of outer space was now as multidimensional as our current model of space, consisting of optical, physical, and chemical data that were each independently verifiable and predictable. All of this is to say that the scientific discourse was evolving rapidly in the 19th century, and the popular discourse was changing as a result.

But while astronomy had its own methods and vocabulary, poets used a different vocabulary to record our experience of the world. The poet does not speak in numbers or star charts or chemical symbols. Images, yes. Physics, not typically. If photographic images had begun to alter our general sense of what's out there, we would be able to see it reflected in the poetry of the time. And we can. In a subtle epigram that sums up the tension between the religious and the scientific, Emily Dickinson writes,

> No matter where the Saints abide,
> They make their Circuit fair
> Behold how great a Firmament
> Accompanies a Star. (Dickinson 319)

By this time, a literate person would have understood the cosmos to be quite vast, much more so than at any time before, although debates about a finite universe versus an infinite one were debated by astronomers and writers alike. (Edgar Allan Poe even wrote an essay, which he called a "prose poem," entitled "Eureka," in 1848 that addresses the subject of an infinite universe in philosophical terms.)

Dickinson's self-contained epigram above illustrates the dichotomy between the two ontologies, while privileging an emerging scientific representation of the cosmos. Helen Vendler, an authority on Dickinson who recently edited a collection of her poetry, identifies a connection between the verse, published posthumously simply as "CXXX," and Daniel 12:3 as it appears in the King James Bible: "And they that be wise shall shine as the brightness of the firmament; and they that turn many to righteousness as the stars for ever and ever." But she conflates the message of the Biblical verse with Dickinson's own: "The secularized Saints, rather like planets, 'make their circuit' in the realm of the Ideal, each a Star, each accompanied by the vastness of an attendant 'Firmament' illuminated by the Star's radiating influence" (478). This is true in Daniel, but not in Dickinson. The errant "Saints" not only have no home in this world; they are caught in a lonely expanse like that of the "Firmament," or outer space. The "Star" in this case is a metaphor for a "Saint," but is couched in an ironically "great" expanse, an expanse that evokes solitude, which may have been more indicative of Dickinson's personal physical and psychical condition than Vendler's more sanguine reading. The preceding adjective "fair" is meant to indicate the extent of the "Circuit," which, in the first two lines, is positive, but it, too, is reversed in the final two lines.

Vendler also seems to think that "Firmament" implies light, but the etymology of the word, according to the Oxford English Dictionary, indicates it would have meant the opposite in

the 19th century.[21] Instead of ―attendant," and ―illuminating," which Vendler mistakenly borrows from Daniel and applies to Dickinson, Dickinson's ―firmament" means the opposite, like the photographic negative. Literally and figuratively it is darkness rather than light. Vendler argues that Dickinson's verse does not ―repudiate the ideals of the Bible," but ―recasts them anew in earthly terms" (478), but a more secular reading accounts for the contemporaneous usage of the word ―firmament." Even if we were to examine the word on its own, we would notice the change between its seventeenth- and nineteenth-century uses, the change between, say the King James Bible or Francis Bacon's discourse and William Herschel's or Charles Darwin's. If the word were still used in the Biblical sense, Dickinson seems to be aware of the semantic shift and used it to mirror the astro-ontological shift of the ―heavens" that was happening in her day. This is not the firmament of God, but of the secular world, in which saints are now fated to dwell, not *among* the stars, but far from them. The verse's proximity to the cosmos of William Herschel rather than the cosmos of the Bible leads to quite a different reading than Vendler's, who is writing within the English critical tradition. My interdisciplinary approach seems to me to offer a more comprehensive method for parsing the poetic discourse of that era, as well as a holistic narrative that does not privilege the verse of Dickinson herself.

Earlier in her book, Vendler identifies a similar theme of solitude, concomitant with another cosmic-psychical metaphor in another of Dickinson's poems. She writes, ―The Universe evades her grasp, sliding back into its interstellar spaces, leaving her alone on the geographic globe…" (275). Her reading of ―CXXX"—not to mention her own figurative argument—seems to contradict that explication, because it signifies opposing positions in Dickinson with regard to the secular universe, which I admit is not an impossibility. Poets, if we have learned anything

[21] ―1846 tr. *Schlegel's Phil. Hist.* 80 The Northern firmament possesses by far the largest and most brilliant constellations."; ―1877 W.C. Bryant *Receive thy Sight in Poems* ii, The pleasant rays That lit the glorious firmament." (―firmament," *OED*)

from this paper, are not as fixed in their views as Newton‘s laws of the universe once were. And, obviously, neither are the positions of critics. Each discourse has its own priorities, and if we are to find a holistic approach, it is imperative to find cross-disciplinary patterns that illuminate, mutually, not just those interwoven discourses of the past but our conception of criticism itself.

Compare Dickinson to other poetic depictions of the universe in the mid-nineteenth century, and it becomes clear that not all poets gave the cosmos such nuanced—if figurative—treatment. For example, Robert Browning wrote the following prosaic, albeit optimistic, verse early in his career, ―What matter to me if their star is a world?/ Mine has opened its soul to me; therefore I love it” (Browning 1). The Romantic echoes are as obvious as the poem‘s apparent disdain for science, and they may not be so antiquated as we first imagine. Take for example the first poem in Mary Oliver‘s recent bestselling poetry collection, ―What Can I Say”: ―The song you heard singing in the leaf when you were a child is singing still” (Oliver). The long-lasting impact of that Kantian, Romantic idea of ―essence” is not entirely anachronistic, whether it originated in the Romantic poets or is simply a snowballed meme in the snowfield of critical discourse in the intervening years. Like any object of a discourse community, however, we have to include social and economic forces as part of that story, especially considering the fact that I pulled Oliver‘s volume off the bestseller shelf.

Browning‘s short poem above, which he placed first in his collected works, does not represent the bulk of his work. It is rather, as he states in his preface to his collected works, the beginning of ―the natural development” of his ―experience” (Browning). But if this doesn‘t do justice to his later, more nuanced verse, his use of figurative astronomical language in this case does seem to capture a Romantic sense of nature and our privileged place within it, a discourse that was difficult to maintain in the face of Victorian science. In some of his other poems, ―By

the Fireside," "Cleon," and "Numpholeptos," a Romantic moon dots the landscape as little more than a piece of the scenery. In "Numpholeptos" there is a hint of post-Romantic thought, as Browning uses the somewhat enigmatic modifier "disimpassioned" to describe the moon. But on closer look, it appears rather to convey, through figurative contrast, the dismay of the poet rather than distinguishing the moon objectively as a natural phenomenon. If Browning was aware of advance in astronomy, he did not care to include that knowledge in his poetry.

On the other hand, Alfred Lord Tennyson, who was one of the most popular poets of the Victorian era, offers us a more helpful look at that binary discourse. Tennyson, a Cambridge man and one-time poet laureate of England, had obvious political incentives to maintain a particular mode of thought in his poetic discourse. But his verse is a mirror not just to those allegiances but to a universe in flux. The first lines of his oft-cited long poem, *In Memoriam*, are an address to Jesus, but his is not a world of celestial light or fixed spheres:

> Strong Son of God, immortal Love,
> Whom we, that have not seen thy face,
> By faith, and faith alone, embrace,
> Believing where we cannot prove (Tennyson)

Does religion merely pick up where science leaves off? While this looks oddly like Grassi's message to Galileo regarding our ability to know, it leaves room for a much more evolved and evolving cosmos than the church's "fix'd" cosmic real estate, even one that was advanced for the astronomy of its day:

> The stars…blindly run;
> A web is wov'n across the sky;
> From out waste places comes a cry,
> And murmurs from the dying sun;

The notion that the sun was dying was still a controversial topic at the time, but Tennyson was not afraid to marry his religious views with his scientific. He situates himself explicitly within this physical-metaphysical duality I have constructed for this story:

> O earth, what changes hast thou seen!
> There where the long street roars, hath been
> The stillness of the central sea.
> The hills are shadows, and they flow
> From form to form, and nothing stands;
> They melt like mist, the solid lands,
> Like clouds they shape themselves and go.
> But in my spirit will I dwell,
> And dream my dream, and hold it true:
> For tho‘ my lips may breathe adieu,
> I cannot think the thing farewell. (Tennyson, *In Memoriam*)

In this verse we do not see the forthcoming Darwinian notion that the soul, or consciousness, is part of the product of a series of ~~"n~~atural" phenomena. But we do see a world in which ~~"n~~othing stands." In his tight, meticulous verse, a product of his education and the poetic tradition of his time, Tennyson was likely not predicting the change in poetic discourse across the Atlantic, where discourse was flowing ~~"f~~rom form to form" in order to capture that essence. That dualist meme was evolving in poetry with our evolving understanding of the universe, and the metaphysical in poetry was assuming a secular guise to meet an increasingly confident outer space.

9. The Transcendentalists

The Transcendentalists in America are important for the chronology of this study and also for their lasting effect on American consciousness. If the scientific and poetic discourses

represent a dialectic between anthropocentric metaphysics and the material sciences of the era, the Transcendental school took that metaphysical road while the physical sciences altered the public perception of our physical universe[22] with increasing steam. There was clearly a trend toward the growing dominance, ontologically, of the physical sciences in the 19th century. One might speculate that this trend indicates our predilection for empirical constructions over metaphysical ones, though the persistence of religious ideas either serves as evidence to the contrary or, simply, as the evidence of the meme of Cartesian dualism. As a part of the holistic narrative I am describing, I would argue that our insistence on empiricist ontology is a collective Darwinian response to the dominance of a few. As ―objective" information about the world seeps into our collective consciousness with increasingly rapidity—by any mode of mass communication, including the internet—it becomes harder for an educated elite to maintain their dominance through ontologies based on metaphysical criteria. The transcendentalists seemed to pick up on this idea in their own poetic cosmology, and much of our thinking can be traced to their ontology. Of course, the transcendental philosophy has been used as a political tool, but when seen in a positive light, we can see that its proponents were interested in the value of man. Their motivations may have been problematic as reifications of dualism, but they were a step in the right direction away from nonsecular ontology.

Coleridge's notion of the ―transcendental philosopher" did not vanish in the face of the empirical sciences which he supported as ―objective." But, like his own transition from poetry (including his relation to Wordsworth), to the philosophical prose of *Bibliographia Literaria*, the transcendental vein became more prolix. Emerson, who is typically considered to be the father of American transcendentalism, wrote poems, but the new metaphysical mode of thinking seemed

[22] I deliberately use the phrase ―*our* physical universe" in order to demonstrate the ―ifness" of that anthropocentric meme—the idea that we are masters of our world and not merely phenomena within it.

to require complete sentences to convey its message. There is a subtle irony in the fact that prose, rather than poetry, is the preferred method of conveying that philosophy which is meant to enable one to experience something words cannot express—a portent of later exegesis, perhaps, like this study.

When we look at outer space in Emerson's writing, we see an ideology that, similar to that of the Romantics, distances itself from a Christian ontology in its previous iterations, but also distances itself from the empirical sciences of his time, though Emerson was certainly literate in the natural sciences. The social philosophy in the following statement has a faint echo of Coleridge, but is more developed, more articulate, and combines declarative statements with an unveiled assertion that the human will is supreme even above the sum of the natural world. In describing what he considers "The Wise Man," he says,

> The obedient universe bends around him, and all stars lend their ray to the hour and the man. Nature speaks *ex tempore* to him and lights up a sudden festival wherever he bends his steps. He needs no library, for he has not done thinking; no church, for he is himself a prophet; no statute book… no money… no road… for the life of the Creator shoots through him. (*Journals* 361)

This metaphysical idea, that we can somehow transcend the physical, has its roots in other ancient religions and has lasted as part of our current, popular metaphysical ontology. Compare that statement to this: "Use the Force, Luke," Obi-Wan Kenobi's admonishment to Luke Skywalker in *Star Wars* (*Episode IV: A New Hope*).[23]

[23] *Star Wars* obviously has a deeper connection to the narrative of this study as a film that is based on well-developed science of outer space. While George Lucas was not entirely faithful to scientific realism (the space ships still make sound in outer space – an impossibility), the film gave the public a visual image of outer space that has had an impact on the public perception of outer space and had a profound impact on how I personally see humans in the cosmos. Lucas's notion of "the used future" is particularly important as a visual-narrative conceit, because it gives humans practical agency in the cosmos. Although we are subject to its physical laws—like Han Solo's space ship, the Millennium Falcon, an "old hunk o' junk"—we move about it with little more difficulty than moving about on earth. This is an important revision in the popular consciousness of Earth in the cosmos. In fact, Earth is never mentioned in the films. In the hands of popular narratives such as this and those of the Star Trek series and their spinoffs, the earth isn't a mystery, just a much bigger arena for human interaction. We can even "bend it to our

It is no mystery why Emerson is a staple in high school English classes—this notion of the self as capable of anything is part of our collective American narrative and likely has social roots in our pioneering spirit, which is also a trope in canonical surveys, which, thankfully, are sensitive to the social issues in texts like James Fenimore Cooper's *Last of the Mohicans* and *The Pioneers*. Peruse the self-help aisle, watch a motivational speech by Joel Osteen, or scratch your head at the "quantum mysticism" of *What the Bleep Do We Know*, and you'll discover that persistent idea—perhaps the fittest secular idea that has survived in the American collective consciousness.

But Emerson's world was quite different from ours, and his statement would have been more shocking at the time. Does he intend for us to see the self as a "Creator"? The ambiguity of the statement, as opposed to its alternatives—that God animates man, or that the wise man is god himself—is no doubt intentional. The position that man has the potential to *be* divine, which he likely adopted from his studies of Buddhism at Harvard Divinity School, though theistic, is certainly not Christian. As Emerson wrote explicitly, "the Buddhist is a transcendentalist" (as quoted in Burgan, 25). But that idea would have been untenable—and therefore not fungible?—to a popular American audience at the time, so a figure of speech saves Emerson the trouble.

As for his poetry, the universe is there, but we are not a piece of it. Or rather, we are not a piece if we *choose* not to be: "Think me not numbed or halt with age,/ Or cares that earth to earth engage. . . . I tire of shams, I rush to be:/ I pass with yonder comet free,—/ Pass with the comet into space" (*Poems*, 218). Other depictions of the cosmos in his verse are more Wordsworthian: "to inspire/ Sweet, extravagant desire,/ Starry space and lily-bell/ Filling with thy roseate smell,

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will," as Obi-Wan Kenobi teaches Luke, which is the comet's tail of the meme of the human soul. I have to point out, in closing this footnote that, as I was typing this, it came as a surprise—though maybe it shouldn't—that the spell-check feature of Microsoft Word (the software used to produce this paper) accepts the spelling of Obi-Wan Kenobi in its entirety. I couldn't have expected a more immediate affirmation of that narrative's presence in our collective consciousness, even if it has been driven by the economics of film and software technology!

Wilt not give the lips to taste/ Of the nectar which thou hast" (83). In many ways it *is* Wordsworth's original Romantic ideal: the "Mind of Man… A thousand times more beautiful than the earth" (Norton 9), that transcends the physical world, but now the world is bigger and more complex. Emerson does not contest its empirical, "mechanical" construction, as Coleridge did when he denied Kant's nebulae hypothesis, but a pithy, Emersonian apothegm reminds us, via cosmic analogy, that we are not yet so far away from the metaphysics of Kant, or the Buddha, or the Bible: "Atom from atom yawns as far/ As moon from earth, or star from star" (280). It's almost as if he were searching for Einstein's Unified Theory a half a century early.

As for Emerson's protégé, Thoreau, his contribution is not in his poetry, for which he is not well known, but as a champion of nature and its aesthetic value. His use of astronomical vocabulary indicates he did not limit the natural world to terrestrial phenomena, though he generally uses that vocabulary to frame the "beauty of the human soul" rather than illustrate our role in the cosmic order (Thoreau, *The Writings of Henry David Thoreau,* viii). His figurative constructions of cosmic phenomena have obvious echoes of Romanticism and Schelling's *Naturphilosophie*, and similar tropes would appear again in the Modern era, but by then they would be altered by the fatalist undertones of that era. Because the focus of this study is on poetry, I don't want to spend too much time on Thoreau's writing, but his importance as a lasting figure in Western notions of consciousness warrants a quick glace at his prose.

"Observe the hours of the universe, not the cars," he writes. "The mind of the universe… which we share, has been intended upon each particular object" (Thoreau, *The Writings of Henry David Thoreau,* 45, 411). Here we are a part of the universe, albeit an unscientific part. Since the universe has since become part and parcel of the natural realm, and since Thoreau is often

credited with being one of the first —naturalists,"[24] his own —metaphysical" connection to nature is important for understanding later poets' connection to the cosmos, especially those —bestselling" poets like Oliver. His poetry, as I have hinted, was not his strong suit, but it more succinctly illustrates the point:

> Two solitary stars--
> Unmeasured systems far
> Between us roll;
> But by our conscious light we are
> Determined to one pole.
> What need confound the sphere?--
> Love can afford to wait;
> For it no hour's too late
> That witnesseth one duty's end,
> Or to another doth beginning lend. (Thoreau, *American Transcendental Web*)

If there was a poet in the 19th century who bridged the physical with the metaphysical, the astronomical with the mundane, it was Walt Whitman. His free verse, seemingly bound neither in structure nor in content, appears to be a deliberate move against the ontological bias of previous —canonical" authors and perhaps a nod to an unfixed universe. Nor was it bound by the windy explanations and esoteric spiritualism of the transcendentalist essayists. This is not to say his verse is economical. In fact it is *sprawling*. But unlike the transcendental —message" of Emerson and Thoreau, it did not require lengthy rationalizations. The poem's structure asks us to consider it as a new type of aesthetic object, as valuable in its structure and vocabulary as the worldly —profane" objects and experiences it described.

It was, as Whitman claims in —Starting from Paumanok," —a song… of the One form'd out of all." His universe, like Emerson's, was integrally related to the notion of a soul—even Whitman, with his unbuttoned shirt and —loafing" spirit wasn't immune to that meme, which

[24] The use of the term —naturalist" as it is used her should be distinguished from literary —naturalism" sometimes associated with late nineteenth-century French literature and, later, with American novelists in the early 20th century. In this context, I mean to define —naturalism" as it relates to concern for our natural surroundings, similar to the environmentalism of John Muir, Aldo Leopold, Annie Dillard, Edward Abbey, et al.

creeps in in even the most mundane expressions in the English language. But his universe was not necessarily subject *to* the soul, which implies a universe of which we are a mere part, not subject to our desires: "Clear and sweet is my soul, and clear and sweet is all that is not my soul" ("Song of Myself," *Leaves of Grass*). In his universe "all things… are perfect miracles, each as profound as any," but not because we are special: "You shall possess the good of the earth and sun, (there are many suns left)" ("Paumanok"; "Song of Myself," *Leaves*).

The casual, parenthetical addition of "there are many suns left," is one of my favorite observations in Whitman, because it is a clear acceptance of the sciences in the humanist guise of an avuncular admonishment. "Don't worry," it seems to say. "You may be little more than an afterthought in the cosmos, but isn't it a miracle you're here?!" Consider the contrast between that and Dickinson's lonely "Firmament." In this universe we may have been "demoted" from the center, but our position is not what's important. This is a universe in which all realms are valid as parts of our experience, even as Whitman privileges what is *not* in parentheses. The parentheses signify an awareness of the growing rift between the discourses that the Romantics and Victorians were only beginning to work out in their verse.

One does not have to subscribe to a formal "poetics" or "science" to get at the essence of what is human, Whitman tells us, a position that, again, is bolstered by his use of free verse. In the following passage, as in the one above, he distinguishes between those realms by placing the "scientific" in parentheses, which is the equivalent of writing it in a footnote, an acknowledgment of the multiple discourses that describe the world. Here we see the multiple dimensions of his cosmos and their implicit order in his cosmology:

> All space, all time,
> (The stars, the terrible perturbations of the sun,
> Swelling, collapsing, ending, serving their longer, short use,)
> Fill'd with eidolons only.

. . . .
Beyond thy lectures learn‘d professor,
Beyond thy telescope or spectroscope observer keen, beyond all
mathematics,
Beyond the doctor‘s surgery, anatomy, beyond the chemist with
his chemistry,
The entities of entities, eidolons.
(–Eidolons,” *Leaves*)

If we look at this verse by itself, Whitman appears at first glance to be disparaging the sciences. He uses the word –eidelons,” which would have been akin to –spectre” (–eidelon,” OED). But if he privileges poetic discourse over scientific here (a claim that is reinforced, obviously, by the fact that he conveys the idea in a poem), there is evidence elsewhere that he also distrusts poetry, or any discourse, for that matter: –a book I have made,/ The words of my book nothing, the drift of it every thing,/ A book separate, not link‘d with the rest nor felt by the intellect,/ But you ye untold latencies will thrill to every page” (–Shut Not Your Doors,” *Leaves*). That writing can lead a reader to a truth beyond the text is at once Grassian, Romantic, Transcendental, and Modern. It may even be, in very general terms, the epistemological axiom of poetic discourse: combine lexical signifiers in such a way that the reader recognizes—or better, realizes—something about the world that is impossible to convey explicitly by signifiers alone. The important thing for this story is that it is still, fundamentally, a discourse that is subject to personal, interpersonal, political, social, and economic forces, and not part of some duality between the –soul” and –the world.”

Finally, in a verse that more distinctly anticipates Modernism and perhaps poststructuralism, a passage from –Song of Myself” (whose free verse structure, again, mirrors and reinforces its ontology) admonishes its auditor:

You shall no longer take things at second or third hand, nor look
into the eyes of the dead, nor feed on the spectres in books,

> You shall not look through my eyes either, nor take things from me.[25]
> You shall listen to all sides and filter them from your self. . . . I
> have heard what the talkers were talking, the talk of the
> beginning and the end,
> But I do not talk of the beginning or the end.

What could be more individualistic, more ―American," than this appeal to our independence as self-conscious, autonomous souls in the great cosmos, capable of anything? And at the same time, what could possibly have been more revolutionary in verse in the late 19th century in America? While the Romantic undercurrent of man-outside-nature is apparent in his treatment of the conscious, willful human persona, Whitman cuts through religious and scientific speculations regarding the origins and fate of the cosmos and arrives at a philosophical position that is ahead of its time in its consideration of our ability to ―know." The fact that he couches this appeal to the self in poetic verse is evidence for the dialectic at work at that time—the distinction between a scientific, empirical representation of our world and a poetic one. As we have seen, however, Whitman, a poet, does not condemn the natural sciences but embraces them—everything, including various discourses, are all just pieces of the cosmological puzzle.

At that time, the origins and fate of the cosmos—a topic not limited to the 19th century, of course—was of particular interest in light of what we knew about the physical universe. In a reductive but helpful depiction of the scientific conversation of that time, Harold Dodgen of Washington State University writes, ―It was thought that since everything tends to thermal equilibrium (all objects reach the same temperature), the universe would use all the sources of energy and would end in ―heat death" (Dodgen). In that science we find a connection to the poetic discourse: both Tennyson's dying star and Whitman's perturbations.

[25] The irony of this statement in light of the fact that I am explicating the poem with my own reading is not lost on me. I ask that the reader please think for him or herself.

I see Whitman‘s secular metaphysics as an optimistic, reactive ―yawp‖ to the changing universe Matthew Arnold foresaw in his poem ―Dover Beach‖ of 1867, which is a lament for a God-centered universe. He opines:

> The Sea of Faith
> Was once, too, at the full, and round earth‘s shore
> Lay like the folds of a bright girdle furled.
> But now I only hear
> Its melancholy, long, withdrawing roar,
> Ah, love, let us be true
> To one another! For the world, which seems
> To lie before us life a land of dreams,
> So various, so beautiful, so new,
> Hath really neither joy, nor love, nor light,
> Nor certitude, nor peace, nor help for pain;
> And we are here as on a darkling plain
> Swept with confused alarms of struggle and flight,
> Where ignorant armies clash by night. (Arnold, *Victorian Web*)

The psychological forces that led Arnold to such a view are ultimately beyond surmise, but the poem appears to be exactly what the canonical surveys say it is, a reflection of ―the conflicts between science and religion in his age,‖ which were partly the result of astronomy (―Matthew Arnold,‖ *Litweb*). The language has astronomical undertones, too, in that ―bright girdle furled.‖

Suffice it to say, that if given the choice I would rather have a beer with Whitman than the melancholy Arnold, whose poem was inspired, of all things, by his honeymoon trip to Dover Beach (Touche). But his religious sentiment was just as important as Whitman‘s un-centered verse when it came to the modern era of poetry and science in the first couple of decades of the 20th century. And that is where space really becomes grown up.

IV

10. Modernism

Harlow Shapley looked across his office. In his hand was a letter he had just finished reading for the umpteenth time. Not sure which emotion was appropriate, he mused to his colleague: ―Here is the letter that has destroyed my universe" (―From Our Galaxies to Island Universes," AIP).

Shapley may have been speaking hyperbolically, but not metaphorically. The statement was literal, and it was about one of a handful of moments in the history of astronomy when one could say that our understanding of the known universe had fundamentally changed, like when Galileo found Saturns ―ears" or when Uranus ―swam" across Herschel's lens (Keats's word). The letter was from Edwin Hubble, who had been using the 100-inch telescope at the Mt. Wilson Observatory outside of Los Angeles—the world's most powerful telescope at the time—to take photographs of nebulae in outer space. Hubble had been training the scope on those distant, fuzzy patches of light that were an enigma to astronomers (since Kant, Herschel, and Coleridge…), and exposing the photographic plates for long periods of time in order to collect as much light from them as possible. Recent advancements in telescope technology enabled the scope to track stars long enough and accurately enough to get the type of exposures that yielded highly detailed photographs, just as a digital camera can record more information the more

megapixels it has. And these photographs were far more detailed than those from the early days of astrophotography.

The eye can record only so much information with optical observation in a given moment. In addition, we are limited by our ability to draw what we see, which is how astronomers had recorded their observations since man first began to record what was in the night sky. But if a medium—what we would call a light sensor or *negative* today—is exposed for several moments or minutes, the camera can absorb much more light—much more data—than the naked eye, recording those long-sought light signatures early astrophotographers knew would become so useful. This seemingly elementary principle of photography is fundamental to the study of the stars, and it has implications for our look at the poetry of Modernism.

In the early twentieth century, cameras used *plates* to record the light collected from a telescope, and Hubble knew that the light-gathering capacity of the photographic plates, coupled with the great magnification power of the telescope, could potentially yield enough data about those fuzzy, distant splotches to solve the riddle of the nebulae that had perplexed astronomers for so long.

The universe literally was Shapley‘s universe when he received that fateful letter. He had been the last to redefine its boundaries, successfully proving that the Milky Way galaxy was an immense 100,000 light-years across, and that our solar system, our Sun, did not hold a privileged place within it. For that he has gained considerable renown in the astronomy world, but he had not solved the riddle of the nebulas beyond his conjecture that they could possibly comprise other ~~–u~~niverses” (~~–F~~rom Our Galaxies to Island Universes.”). What Hubble found in the photographic plates, and what he had written to Shapley in the letter, would supersede Shapley‘s

Milky Way ―universe." But it wasn't just Shapley's universe that it would destroy: it was a symbolic expansion of the Copernican model, another of those ―demotions."

Hubble's photographic plates did their job. By comparing back-to-back long-exposed photographs of the Andromeda Nebula, M31,[26] Hubble noticed an unusual feature in the plates: Cepheid variables (―Edwin P. Hubble," NASA). These stars, which vary in brightness over a period of time, are reliable markers of distance within our galaxy. A little more than a decade before, in 1912, astronomer Henrietta Leavitt had published her discovery that there was a correlation between Cepheid stars' luminosity, period, and distance, which allowed astronomers to measure them. When Hubble discovered Cepheid variables in the Andromeda Nebula, he was astonished to find that, according to Leavitt's calculations, the stars were not within the 100,000 light-years that Shapley had described, but roughly a million light years away, which located them quite far from our Milky Way Galaxy (―From Our Galaxies to Island Universes," AIP).

When Hubble's findings were applied to other ―nebulae" in the night sky, it soon became evident that not only were we not the center of our galaxy, we were a lonely outpost in outer space, far from our nearest neighbors, and not at all unique. If Shapley's discovery had given scientists the impression that we are very small, Hubble's discovery rendered us infinitesimal. Writing this now, in 2011, it seems odd that less than a century ago the Milky Way galaxy was thought to comprise the entirety of outer space and that many people, astronomers included, assumed we had a privileged spot reserved within it. However, Hubble was not working in some dusky country enclave or even the ivory tower. He was working in the age of Tesla and instantaneous radio transmission. Recent improvements to the printing press, especially, had improved and hastened the time it took for discoveries to reach the reading public, and it wasn't

[26] The Andromeda galaxy was first identified—officially—by Charles Messier, a comet-hunter, who catalogued 110 night-sky phenomena in 1831. He designated them with the letter M and a number. We still use his designations today.

long before the non-scientific world was digesting and re-interpreting Hubble‘s new vision of outer space.

Furthermore, this was the age of Einstein and relativity, who had shaken up the world when he turned Newtonian physics on its head. Not only was the cosmos evolving, but it was *malleable*. Not even light was a fixed entity but was directly related to mass and energy. At this point the story of poetry, like the story of outer space, becomes nearly as limitless as space itself.

I have taken half a dozen or so graduate level courses that have addressed Modernist poetry, and no two of my professors have agreed on a common definition of it. Luckily for me, my department heads at the high school level have all thrown up their hands when we get to this part in our story. The astronomical picture really begins to come into focus, and most of what we believe about the universe comes from that reimagining that took place in Hubble‘s time. Plus, other modes of entertainment were replacing poetry as a common mode of discourse, and, as if sensing its own waning relevance as a social, political discourse, poetry starts to, ~~“~~do its own thing,” as a professor once told me, off the cuff.

While many Modernist poets continued to borrow the language and ontology of astronomy, wrestling with its implications for a diminished role for man in the world, in my eyes the two discourses grew further apart than they were at any other point in this story. The one poet of note who held on to that scientific-poetic binary discourse was Robinson Jeffers, whose brother was an astronomer at the Lick Observatory. Jeffers, who is typically considered a minor poet amongst all the Modernist big shots that show up in the anthologies (Eliot, Pound, Yeats, Stein, Williams, Stevens, et al.), continued to wrestle with the stars in their increasing multitudes and distance. And he placed us in their midst, not as the heavens, but as a cold, dark, even

hopeless setting for the tragedy of human existence. For him nature was beauty, and man was its antithesis. In "The Epic Stars" he reflects on our story:

> The heroic stars spending themselves,
> Coining their very flesh into bullets for the lost battle,
> They must burn out at length like used candles;
> And Mother Night will weep in her triumph, taking home her heroes.
> There is the stuff for an epic poem—
> This magnificent raid at the heart of darkness, this lost battle—
> We don't know enough, we'll never know.
> Oh happy Homer, taking the stars and the Gods for granted. (Jeffers 699)

Looking back, we see that Wordsworth had hinted at this sort of demotion of humans in the cosmos, but here we feel the weight of a World War and the nihilism of a cold, dying universe. But we must read this in the context of the binary discourse. It is not simply the loss of human importance in an infinite and expanding universe. It is the loss of that narrative. As the two stars grow further apart, the poet is perhaps searching for that metaphysical, divine center that once held him in place in the discourse of verse, a trope we now find anachronistic and "Romantic."

EPILOGUE

11. Infinite Universe, Endless Story

In this story we have seen snapshots of the story of outer space as we *captured* it in our various discourses. And the story is merely a sketch. When I look at a picture of myself as a child, I see a picture of myself at the beach, in a school play, in my first car. But a narrative, like snapshots, can only capture a few moments. There is much to this story I have left out. I am ending it in the modernist era, because, for one, I have run out of *space*, but I also end it because the high school English curriculum loses its own narrative in the twentieth century, and the canonical surveys become particularly problematic. On the one hand, modernist texts are studied for their political implications leading up to and in the wake of World War I. But they also, unsurprisingly, still support the notion of a canon, which is particularly ―inimical," to use Coleridge's word to our understanding of the modern era.

The transition from modernism to postmodernism is even more problematic, and I have heard professors argue, unconvincingly, for taxonomies that attempted to define those periods according to criteria that seemed at the time to be personally driven (socially, economically, etc.: tellingly, my Oxford professors had quite different ideas about these taxonomies from my Middlebury and UGA professors).

In independent schools, luckily, I am able, essentially, to teach ―whatever I like" when it comes to the 20th century, and inevitably, I stray from poetry, because the qualities of poetry as a

discourse that attempts to entertain and to capture particular linguistic, rhythmic, and figurative qualities, fell victim to its own solipsism in the early twentieth century, and we began to seek new modes of representation to answer our idiosyncratic desires (social-political-economic).

Paradoxically, but perhaps fortunately, independent schools, which are essentially un-democratic and often venerate those ―old, dead white guys" as important to the discourse of a power-holding elite, have been infiltrated by many of those of us whose ―universe" is poststructuralist and inherently de-centered. The story of outer space for me was once an anarchist's tale, not unlike Jeffers' apocalyptic, uncaring cosmos. The tale that Sagan's text tells, however, is an appeal to humanism, and when I began teaching, I realized that, if the narrative matrix is infinite, as Martin Macquillan argues, then essentially the battle for equality is a battle of discourses. When I first taught ―astronomy and literature" as a senior elective at Darlington School, in Rome, GA, I had no idea what I was doing or even what texts to teach. But I knew I had to tell a story that would resonate among my students, a story that would enable them to see literature as part of a greater narrative in which they could find themselves and which would give them meaning that transcended, not the physical world, but the power relationships that were inherently built into their linguistic community.

As the Sapir-Whorf theory tells us, our language constructs our reality, and students in independent schools are fixed, like the stars of antiquity, in a sphere around the rest of the world that is constructed of the language of elitism and reinforced by canonical studies of literature and history. My goal is to challenge that discourse with a new, interdisciplinary, holistic approach. Ultimately, the goal is for each student to arrive at ―independent" thought, or at least to understand when power is being wielded by an individual or group in non-obvious ways, which is how the guerilla warfare of economics and politics works.

When I was in high school, my English teachers wanted us to see literature as a quasi-spiritual alternative to religion. This is where I first encountered Darwinism—not in the science classroom, but in the ontologies of modern literature, especially Kurt Vonnegut, who had resonated with the anti-elite counter-culture of the 1960s. The philosophy resonated with me and was both encouraged and fixed by my astronomy classes in college. As I have mentioned, this is my story, driven by my own politics (and economics, of course). The Cartesian dualism that structured a lot of my thinking as a young student—even through some English studies in college (ultimately, it was why I left that field as an undergraduate)—has been "deconstructed" by the academic world, but it is very much alive in the world of television, internet, film, and popular literature for much of the population. And that is where most of us live today.

I have used the term "binary" discourse to represent poetic and scientific discourses as if they were a binary star system. The number of binary systems in the universe is vast, and I think if we see all discourse as a possible binary system with other discourses, we will better understand discourse. As Craige writes, "literature and the discipline of literary study obtained definition in opposition to science, and, later, in opposition to other apparently utilitarian endeavors" (1). Literature also obtains its definition in relation to other discourses, and, ideally, a study such as this would include the various images of outer space that people used to represent the cosmos from cave drawings, to Ptolemaic diagrams in the Renaissance, to Herschel's drawings, to pictures from the Hubble telescope. Perhaps in the future all Master's theses will be produced electronically in a manner that would enable the inclusion of "texts" such as Handel's "Total Eclipse," Holst's "The Planets," or Philip Glass' "The Light."

In the end, the goal is to position ourselves in a meaningful, holistic narrative, one that is not fixed but evolving, like our world. The cosmos, like other approaches, may be as good as

any. When lecturing on the earth, Eugene Odum occasionally used the photograph of Earth that astronomers took from the moon in order to demonstrate our place in a greater system. The space probe, Voyager, took another photograph that is even more awe-inspiring, as the earth appears not as a majestic orb but as a faint speck in a vast field of darkness. In prose that is far more elegant than anything I have written here, Sagan sums up the vision I would like to communicate to my students with this interdisciplinary text on our literary, scientific, evolving cosmos:

> Our planet is a lonely speck in the great enveloping cosmic dark. In our obscurity -- in all this vastness -- there is no hint that help will come from elsewhere to save us from ourselves. It is up to us. It's been said that astronomy is a humbling, and I might add, a character-building experience. To my mind, there is perhaps no better demonstration of the folly of human conceits than this distant image of our tiny world. To me, it underscores our responsibility to deal more kindly and compassionately with one another and to preserve and cherish that pale blue dot, the only home we've ever known (*Pale Blue Dot*).

The next time I teach astronomy and literature, or any other high school English course, for that matter, I hope my students will envision the world of discourse as something akin to a pale blue dot, a place in the cosmos we all share and must mind as global citizens.

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