Pandora's Lab

Queering scientific practice to incorporate storytelling as method by way of comparison with Ancient Greek mythology.

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Abstract

Based on what feminist philosophy has coined the dualistic epistemology of Western culture, the sciences and the humanities have long been assumed to be an exclusive dichotomy, with attributes such as objectivity and neutrality associated with the sciences, while the humanities are connected to subjectivity and partiality. This dualism is a part of a greater dualistic worldview which assigns negative value to some categories while attributing positive value to their "opposites." Instead of accepting that the sciences and humanities are indeed inherently and incommensurably different, this thesis posits that the opposition of the "objective" sciences and the "subjective" humanities is actually incomplete and therefore not a realistic or useful construct. Instead, I present the use of storytelling as a valuable method for knowledge-making in science.

Making use of "queer defamiliarisation" as discussed by Helen Palmer, in the first part of this thesis I compare scientific practice to Ancient Greek mythology to identify and recognize the already existing but unacknowledged narrative elements in science. In the second part, using theory from queer, feminist, and Indigenous work on knowledge, method and translation, I argue that the explicit use of narrative storytelling in scientific practice can lead to greater accountability, knowledge, and accessibility in the sciences.

By allowing for the acknowledgment and further incorporation of storytelling into the sciences, this thesis shows how the concept of knowledge can be queered to be less dependent on strict boundaries between disciplines, thereby making space for creative development of new ideas and perspectives both within and beyond scientific practice.

Keywords: queer, defamiliarisation, scientific method, dualist epistemology, mythology, narrative, storytelling.

Stuttering Hands

Your clay creations keep collapsing. You've only ever known how to sculpt, but now you are the wheel, (you are) at a loss.

You have lost your hard lines, your sharp edges. Your clay keeps collapsing and the wheel just keeps on spinning.

You start again, more gently. Let the clay go where it moves you. Your hands stutter through the making of shapes they have not held before.

> Your efforts take an unfamiliar form. You have gained soft edges, round lines. And yet, it is still good. It is still yours.

Prologue

"To seize upon one's alienness: a moment of defamiliarisation. It is precisely this process of defamiliarisation that is necessary to awaken us from automatic habits in our perception, creation, destruction and infinite reimagination of the categories of identity formation." - Helen Palmer, *Queer Defamiliarisation*, 6-7.

Once upon a time, not so far away and not so long ago, I was born to my two parents, one trained in nursing and one in engineering. From a young age, I was raised in the center of a view on science as the noble search for truth. My journey through years of academia led me through periods of interest in the humanities, but I was taught that the humanities and the arts were subjective and insubstantial. Math and science, however, would always be there for me, and never lead me astray into the dark woods. I wasn't taught to dislike the arts; my parents encouraged me to spend my free time feeding my endless hunger for fictional stories, and I always took art and music classes at school. But I knew not to rely on the humanities for my future.

Despite this, reading and writing stories came naturally to me, and I especially loved reading about myths. It was so interesting to me that a story about a monster or a god had one day been such a shared experience; they were essentially relics from an ancient worldview. How could it be that so many individuals that made up ancient civilizations shared in the telling of these kinds of stories? How was it that everyone knew them, and what roles did the myths play when they were believed? The existence of myths gave me a perspective on stories that led me to believe that even fictional narratives can tell the reader something truthful about the world. Philosopher and epistemologist Catherine Elgin describes this phenomenon as such: "After reading a novel, we often claim to have learned something. To say this is to say something more than that the novel changed our minds. We take the change to be a cognitive improvement."¹ If a character's experiences were written by a real person, the author, then why couldn't the fictional experiences be understood as a real way to approach an event?² I, also, always felt like stories had things to tell me, beyond the plot. They were telling me something about what it meant to exist, to be something other or like myself.

However, I maintained that I should put my trust, my belief, in science and its certainties, rather than the personal realm of fiction and the humanities. I knew my path to my future would go through the sciences, that the humanities weren't the real truth, and they weren't going to give me any job security. They were subjective, and subject to interpretation that would make it hard to determine if I was actually ever good at them, or if people just did or didn't like me. It was much more valuable and useful to dedicate myself to something that could bring me actual knowledge, not just an entertaining experience. The subjectivity of the humanities meant they were less reliable than the objective sciences. I held on to this understanding of the different academic subjects all through my education, up until my Master's degree, where the path of objective science became suddenly difficult to navigate. With this thesis, I wander off the path of objective sciences and into the woods, in an exploration of knowledge, based on the realization that the difference between the sciences and the humanities is perhaps not as intrinsic as I have been taught, and the woods of subjectivity not as unreliable or scary as I thought.

^a Catherine Elgin, "The Laboratory of the Mind," in *A Sense of the World: Essays on Fiction, Narrative and Knowledge*, eds. Wolfgang Huemer, John Gibson, and Luca Pocci (London: Routledge, 2007), 43. ^a In Mieke Bal's *Narratology*, she discusses how the elements of a fictional story "can be said to be constructed according to the demands of human logic of events." This point of view implies that stories also speak to facts outside of literature. Mieke Bal, *Narratology, Introduction to the Theory of Narrative* (University of Toronto Press, 2017), 154.

0.1 A history of disciplines

During my Master's degree, I have learned that this particular perspective on the division between the sciences and the humanities is not one that my parents and teachers alone thought of. It is a greater thought or culture within academia as well as outside our ivory tower: the idea that the sciences and the humanities are incommensurably different.³ In his well-known and impactful essay from the late 1950s, The Two Cultures, C.P. Snow recognizes that there exist two cultures in the academic world: the "literary intellectuals" on one side, and the scientists exemplified by the theoretical physicist – on the other.⁴ Snow notes that these two groups are virtually incomprehensible to each other; the gap between them cannot be easily crossed due to preconceptions from both sides about the other.

This division finds its origin in the development of the humanities as a category in the late 19th century. In the Introduction to the Human Sciences, Wilhelm Dilthey makes explicit the divide between "natural science" and the unnamed other science, which he dubs *Geisteswissenschaften*, translated to "human sciences."⁵ The distinction between these sciences, according to Dilthey, lies in the difference in their objects of study: the human sciences, as can be assumed based on their name, are focussed on the study of the "human spirit," while the sciences study the laws of the natural world.⁶ Another author from a slightly later period and continent, W. E. B. Du Bois, further specified that while nature can predominantly be assumed to be governed by natural laws, an element of chance to the world can be found in the human will.⁷

Feminist thinkers, most notably, have shown that the self-consciousness and free will which are historically qualities of humanity differentiated the study of humans from the study of the rest of nature. The divide between (human) subject and (natural) object ascribed to the subject an intellectuality which set the human apart from nature, supposedly making it possible for us to see nature objectively.⁸ Nature, in contrast, was objectified and its possible self-consciousness and free will, if at all

Noela Davis, "Material Culture: Epigenetics and the Molecularisation of the Social," in What if Culture was Nature all Along, ed. Vicky Kirby (Edinburgh University Press, 2017), 121.

C. P. Snow, "The Two Cultures," in The Two Cultures and The Scientific Revolution (Cambridge University Press, 1961), 1-23.

⁹ Wilhelm Dilthey, "The Human Sciences Form an Independent Whole Alongside the Natural Sciences," in Introduction to the Human Sciences, eds. R. A. Makkreel & F. Rodi (Princeton University Press, 1991), 57.

[•] Dilthey, "The Human Sciences Form an Independent Whole Alongside the Natural Sciences," 57. • William Du Bois, "Sociology Hesitant, *Project Muse* 27, no. 3 (Fall 2000): 43.

^{*} Jacqueline Dalziell, "Microbiology as Sociology: The Strange Sociality of Slime," in *What if Culture was Nature all Along*, ed. Vicky Kirby (Edinburgh University Press, 2017), 172-173.

recognized, was fully ignored. Essentially, there existed a perceived division between the humanities, which is defined by its subjective study of human behaviour, and the sciences, which is defined by its objective study of natural laws. The methods for engaging with these different topics have therefore also been segregated, so that science relies purely on the assumed-to-be objective scientific method to avoid the bias of the researcher, while the methodology within the humanities is assumed to be affected by the subjectivity of the researcher.

0.2 Challenges to objectivity

Whether this is an accurate representation of knowledge-practices has been called into question.⁹ The idea of objectivity and unbiased practice of science has been challenged repeatedly in (not only) feminist and anti-racist work, though the critique is not yet unanimously accepted within the scientific community. In her essay on cognitive and non-cognitive values in science, philosopher of science Helen Longino discusses the effect of background assumptions made by all scientists on theory choice, showing that there is currently no such thing as unbiased science.¹⁰

Being supposedly immune to bias through the scientific method of objective study of regularities has been shown to include a denial of the influence of gender, race, social standing, as well as personal beliefs and experiences, as well as nature's diversity. Feminist philosopher Donna Haraway calls it "hostile science" : the type of scientific practice that believes itself to be completely immune to bias, and therefore objective. However, feminist philosopher and literary author Simone de Beauvoir has shown that in our society, only the qualities that fall outside of the "neutral" are considered to have influence. In her book *The Second Sex*, De Beauvoir showed how while "woman has ovaries and a uterus; such are the particular conditions that lock her in her subjectivity," being a man is not a particularity." The man represents the masculine *as well as* the neuter. The fact that the man represents the neuter causes an issue specifically for scientific practice. In the striving for the most objective perspective on the world, the scientist tries to be as neutral as possible. It can be seen that "objective science" is therefore a quality allowed predominantly to white men.

See the work of (among others) Val Plumwood, Donna Haraway, and Helen Longino.
 Helen Longino, "Cognitive and Non-Cognitive Values in Science: Rethinking the Dichotomy," in Feminism, Science, and the Philosophy of Science, eds. Lynn H. Nelson and Jack Nelson (Dordrecht: Kluwer Academic Publishers, 1996), 40.

[&]quot; Donna Haraway, "Situated Knowledges: The Science Question in feminism and the privilege of partial perspective," in *Simians, Cyborgs, and Women: The Reinvention of Nature,* ed. Donna Haraway (New York: Routledge, 1991), 578. Simone De Beauvoir, *The Second Sex* (London: Vintage Random House, 2009), 5.

However, feminist work has shown every level of scientific practice is in fact influenced by the fact that it is practiced by humans, even when the scientist is a man. We decide who is allowed to engage with science, we decide which questions are important to ask, we design and create the (arguably unnatural) context of any experiment, we decide what kind of language is used to convey information, we even design and create the technology used to make "objective" measurements.¹³ This thesis hereby recognizes that the idea of objective science has developed as a part of a grander European male-centric worldview and is arguably not as unbiased, objective, and reasonable as we thought it was.

There have been several different responses to this understanding within and beyond feminist philosophy of science. One response has been the social constructivist view: rather than any reflection of the truth, all knowledge and scientific practice is seen as a form of rhetoric, with the goal of enforcing social power structures.¹⁴ Haraway discusses this as the idea that all knowledge claims are formed through "power moves," rather than a movement toward truth." While this perspective acknowledges the influence of social and cultural context on scientific practice, it perhaps gives this influence too much power, thereby reducing any knowledge to a purely social concept. Rather than allowing us the space to account for and work with our inherent biases, social constructivism absolves us of any responsibility or accountability for our actions. French philosopher, anthropologist and sociologist Bruno Latour called for a revision of critical social constructivism in his paper "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern." He stated that critique has resulted in the deconstruction of any kind of reality; that instead of bringing us closer to facts, the critical social constructivist has led us away from them." When we consider the social construction of an object of knowledge to be its downfall, all knowledge becomes less valuable.

Rather than adhering to the power moves of social constructivism, with this thesis I seek to move beyond a critique of science and objectivity. Instead of difference in perspective implying the non-existence of any truth, I believe there is still truth to be found in difference. But how can different perspectives all be valuable? Haraway defines the problem plaguing scientific practice as such:

Haraway, "Situated Knowledges," 578.
 Haraway, "Situated Knowledges," 577.
 Haraway, "Situated Knowledges," 576.

Bruno Latour, "Why Has Critique Run out of Steam? From Matters of Fact to Matters of Concern,"

Critical Inquiry 30 (Winter 2004). [•] Latour, "Why Has Critique Run out of Steam?," 231.

how to have simultaneously an account of radical historical contingency for all knowledge claims and knowing subjects, a critical practice for recognizing our own "semiotic technologies" for making meanings, and a no-nonsense commitment to faithful accounts of a "Real" world, one that can be partially shared and that is friendly to earthwide projects of finite freedom, adequate material abundance, modest meaning in suffering, and limited happiness.¹⁸

In her essay 'Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective', Haraway attempts to provide a solution to this problem through her concept of situated knowledges. Instead of the objective scientist engaging with science through an unbiased "conquering gaze from nowhere," Haraway proposes that the scientist engages with science through embodied vision, from a local perspective. This would allow us to create an objectivity that is based on specific embodiment, rather than the illusion of an unbiased vision. By doing this, we become more aware of *how* we see, as well as *what* we see.

This thesis builds on her idea of situated knowledges in science, but now applied to the presumed boundary between the sciences and the humanities. To understand how these two topics connect, we must first zoom out a little, to see how objectivity, science, and the humanities interact.

0.3 The dualistic worldview

With the connection between the humanities and the flighty human on one side, and science and orderly natural laws on the other, we can become aware of a grander scheme of connecting juxtapositions, or what ecofeminist philosopher Val Plumwood describes as a dualistic worldview. She argues that Western civilization and philosophy are based on a set of interlinked dualisms including, among others, culture/nature, science/humanities, and man/woman.¹⁹ A dualism is defined by her as "an intense, established and developed cultural expression of [...] a hierarchical relationship, constructing central cultural concepts and identities so as to make equality and mutuality literally unthinkable."20 These dualisms also include

¹⁸ Haraway, "Situated Knowledges," 579.

[&]quot; Val Plumwood, "Dualism: the logic of colonisation," in Feminism and the Mastery of Nature (New

York: Routledge, 1993), 42. Plumwood, "Dualism: the logic of colonisation," 47.

descriptive ideas which can be applied to the noun-groups in the dualisms, such as the passive versus the active, the chaotic versus the orderly, the subjective versus the objective, and the emotional versus the reasonable. This is a structural and simplified representation of how there exists a view on knowledge as consisting of the emotional, inconsistent, biased, subjective humanities on one side, and the reasonable, consistent, unbiased, objective science on the other.

While there have certainly been developments in society and academia that subvert or creatively disregard these categorizations,²¹ it can be seen that this overall dualistic perspective can still be damaging through its inherent defining of some groups as negatively related to other groups. The interwovenness of different aspects of this dualistic worldview has as a consequence that the qualities and forms on either "side" are associated with one another. De Beauvoir does not name the dualistic worldview as such, but she does discuss the effects of the self-vs-other dynamic between men and women. De Beauvoir points out that besides "their concrete power they are invested with a prestige whose tradition is reinforced by the child's whole education: the present incorporates the past, and in the past all history was made by males."²² Both at home and through their education, members of society are taught to see themselves as part of an inevitable power structure that oppresses those other than the ruling class of men. The system sustains itself by keeping those that hold power in power, thereby maintaining control.

Plumwood also discusses this effect in relation to racist, queer, and religious contexts. Women, people of color, and other marginalized groups face systemic and constant obstacles either specifically designed to keep them in an inferior position, or simply products of the lack of consideration in the organization of a society by and for white and wealthy men.²² Trans philosopher Paul B. Preciado discusses this "violence generate[d] by the dualist epistemology of the West"²⁴ in his book An Apartment on Uranus, as a relevant topic as recently as 2019.

^a See interdisciplinarity in academic subjects, humanists engaging in objectifying methods, and scientists with a more subjective approach.

^{De Beauvoir,} *The Second Sex*, 10.
Plumwood, "Dualism: the logic of colonisation."

[»] Paul B. Preciado, An Apartment on Uranus (London: Fitzcarraldo Editions, 2019), 35.

0.4 Queering

As can be seen, these dualisms are interwoven, and the resolution of one dualism, such as that between the sciences and the humanities, is therefore inexorably linked to others.² It is subsequently possible to deconstruct one aspect of the dualistic worldview, such as the division between the humanities and the sciences, through engagement with the other aspects. In this thesis, I apply queer theory to knowledge as a concept, questioning the idea that knowledge needs to fall within the dualism of the sciences or the humanities. Instead, I propose that we "queer" the boundaries between these categories, and, based a definition of queer by LGBT academic Annemarie Jagose, we encourage an understanding of knowledge that "refus[ses] to crystallize into any specific form," and is instead able to transition between forms.

In his book, Preciado also discusses these categories imposed by society's authorities, such as binary gender, human or animal, objective or subjective, and how these categories are maps, "not the territory of life."²⁰ He states that

to talk about sex, gender, and sexuality, we have to begin with an act of epistemological rupture, a disavowal of category, a cracking of the conceptual vertebrae to allow for the premises of cognitive emancipation.²⁷

In essence, we need to be shaken up, and for that we must first know what the maps imposed upon us look like. Knowing where the assigned boundaries of identification are, we can then "propose other maps and other first names whose collectively imagined fictional nature is evident."²⁸

Queering or redrawing these boundaries requires us to first realize the boundaries of our own scientific perception; we need to step outside of our own perspective, somehow.³⁰ One way to do this is through feminist and queer literary theorist Helen Palmer's process of "queer defamiliarisation": "To seize upon one's alienness: a moment of defamiliarisation. It is precisely this process of defamiliarisation that is necessary to awaken us from automatic habits in our perception, creation, destruction and infinite reimagination of the categories of identity formation."³⁰ In her book *Queer*

²⁵ Plumwood, "Dualism: the logic of colonisation," 66.

²⁶ Preciado, An Apartment on Uranus, 37.

²⁷ Preciado, An Apartment on Uranus, 107.

^{*} Preciado, An Apartment on Uranus, 112.

² Elgin, "The Laboratory of the Mind," 7.

^{*} Helen Palmer, *Queer Defamiliarisation: Writing, Mattering, Making Strange* (Edinburgh University Press, 2020), 6-8.

Defamiliarisation: Writing, Mattering, Making Strange, Palmer illustrates that familiar objects can be made queer, or strange, when our perspective on them changes. This making-strange allows us to re-realize the boundaries and limits imposed on our perspectives, as well as on the observed objects.

In my thesis, I engage with the practice of queer defamiliarisation to help us become aware of the limits of our traditional perspective of science, as well as discovering possible new understandings of how knowledge can take form beyond the limits of the sciences-humanities dualism. I purposefully interweave discussions of academia, the gender binary, queer bodies, and subjectivity to reflect our interwoven dualistic worldview to give us a new perspective on the perceived divide between the sciences and the humanities that will, in Preciado's words, redraw the map of academic disciplines, or ideally even erase it altogether.

0.5 Research question and methods

To bring it all together, in this thesis, I approach the problem of the sciencehumanities dualism by focusing on how the dissolving, or queering, of boundaries between the humanities and the sciences can help us better understand and improve scientific practice. By engaging in the queer defamiliaration of science, I explore the boundaries of scientific discipline as we define it, to see where the opposition between the humanities and sciences is incomplete. I want us to reassess the boundaries and limits to a traditional view on science, and dissolve them specifically by showing how storytelling permeates these established boundaries, even when we are not aware of them. The goal is then to embrace this permeable boundary, by constructing a queer understanding of what science can be.

This thesis consists of two parts. The first part has the aim of defamiliarizing science, which takes place by observing science through the lens of myth, a form of knowledge and storytelling that has existed since before the "birth of science" among the Greeks. By asking of science how it is similar to mythology, we bring to the foreground narrative elements of science, which are normally assumed to belong purely to the humanities. This comparison makes science strange to us, since it appears to have many more storytelling-qualities than the traditional understanding of science has always had us believe. Myths also bring a queer element to the discussion: myths were and are retold over and over again by different storytellers,

meaning that they assume many different forms, but maintain their identity.³¹ Throughout this thesis, we see that science can be much the same.

Based on the understanding that myths, stories which we now consider fictional, are inherently seen as not-objective accounts in our time, I argue that the existence of mythological and narrative elements in scientific practice indicates that the categories of science and the humanities are not realistically as rigid as they are claimed to be. The comparison will be made using the discussion of fiction as thought experiment by Elgin and the narrative explanation theory as discussed by professor in Cognitive Science Nancy J. Nersessian. It can even be argued that empirical experiments and fictional narrative share many traits. These arguments are based on the idea that understanding is garnered through explanation, which exists in a narrative form.

I will furthermore be making use of several schools of mythology, as well as research into the role of narrative in scientific explanation. Specifically, the structuralist school of mythology has done work to show how myths and logic are more intertwined than what was once assumed, by investigating the existence of logic, or *logos* ($\lambda o \gamma o \varsigma$) in Ancient Greek myths^{*}. However, while the structuralists have discussed the existence of a link between myth and logic, they still view myth and logic through "what [philosopher Jacques] Derrida calls phallogocentrism, or phallocentrism and logocentrism combined, or indeed the ways in which logos (reason or language) is intimately tied up with the patriarchy"^{*}. Since this thesis is an attempt to lift ourselves out of this particular ingrained perspective, I will therefore be making use of several different techniques to analyze myths that illuminate different aspects of myths.

The second part of this thesis has the aim of creatively considering how narrative and storytelling can fit into our Western idea of science, and what it can contribute to current and future knowledge-practices. For this I draw upon work by several new materialist authors, as well as a number of Indigenous and queer scholars for their perspectives on the formation and translation of knowledge. I first discuss how we can take accountability for the existence of storytelling in science, and then continue on to explore the benefits of translating knowledge into different forms,

^a Lillian E. Doherty, *Gender and the Interpretation of Classical Myth* (London: Bloomsbury Academic, 2003), 12.

^a R. G. A. Buxton, ed., *From Myth to Reason? Studies in the development of Greek thought* (Oxford University Press, 1999).

^a Palmer, *Queer Defamiliarisation*, 6.

much like retellings of myths. The goal of this second part is to demonstrate how narrative can possibly be used as a method for scientific research to support science in its limitations, thereby queering our understanding of knowledge-categorizations.

My knowledge of science comes from my experience of being trained as a natural-science researcher in my Bachelor's degree, as well my philosophical and historical education on scientific practice in my Master's degree. My knowledge of the humanities is supported by scholarship read throughout the course of studying for this thesis, as well as several courses taken throughout my Master's degree. I am limited in that I am not skilled enough to read Ancient Greek first-hand and fluently, so I am relying on the translations and discussions in secondary sources.

All in all, this thesis is an act of labor to queerly defamiliarize science, and opens our eyes to the possibilities of creative knowledge-making once we recognize and queer the limits of our traditional map of scientific knowledge practices, specifically by discussing and recognizing the value of storytelling for knowledge-making.



"To talk about sex, gender, and sexuality, we have to begin with an act of epistemological rupture, a disavowel of category, a cracking of the conceptual vertebrae to allow for the premises of cognitive emancipation." – Paul Beatrix Preciado, *An Apartment on Uranus*, 107.

Chapter 1

Cultural and societal functions of myth and science

The first part of this thesis is an act of queer defamiliarisation of science. By comparing Ancient Greek myth and science on both a large and case-study scale, I bring into the light the narrative elements that are already existent in science. We will see that there are many elements that mythology and science share, despite their assumed incommensurable difference on either side of the humanities-sciences dualism. Science will become strange to us; suddenly there will be so much more of the humanities visible in the sciences than we ever thought there was. This will allow us to "see" the boundary between the sciences and the humanities, and specifically see that it is a blurred, queer, and permeable boundary. Rather than the division between scientific and humanities knowledge being inherent and permanent, queerly defamiliarising science will allow us to purposefully acknowledge our accountability in upholding this dualism.

The following three chapters make use of examples from myths and the sciences to indicate their similarities. These examples are not meant to represent the entirety of either knowledge-form. Instead, they are meant to be instances that highlight how insubstantial the distinction between science and humanities is. Through these examples I show that you can be purely engaged with what we call

science and still, you will encounter narrative and myth while doing so, because they are not as separate from one another as is often assumed. Essentially, the examples of similarity work as a shift in perspective. Instead of seeing science as a purely objective and neutral activity, we will explore it through the lens of a social storytelling activity, AKA myth.

I will specifically be making use of Ancient Greek myths for a number of reasons. First of all, they are relatively well-known in Western academic culture, making them an accessible system of myths with which to illustrate my thesis. Furthermore, the embodiment of knowledge in myths by many existing Indigenous cultures are still a part of current knowledge practices, which I believe are important to discuss (as can be seen in Chapter 6 of this thesis), but not applicable to my use as comparison purely for narrative structure and content. The third reason is that Ancient Greek myths are essentially iconic examples of narratives that are known to have held cultural relevance in their own time.⁴⁴ This makes the comparisons between Ancient Greek myths and scientific practice more relevant than for example a comparison with modern-day literately stories, which are arguably of less societal importance than myths as individual stories.

To begin a discussion on anything, we must first agree on the terms we are discussing, and what they mean. The concepts "myth" and "science" both allow for a certain degree of interpretation, with many mythologists disagreeing on what constitutes a myth, as well as philosophers of science disagreeing on when we first witness "science" in history. For the sake of this thesis, I have procured the definitions featured in the most recent online version of the Merriam-Webster dictionary.

Science: knowledge about or study of the natural world based on facts learned through experiments and observation.³⁵

Myth: a usually traditional story of ostensibly historical events that serves to unfold part of the world view of a people or explain a practice, belief, or natural phenomenon.^{**}

^{*} Ancient myths have furthermore informed our culture's literary (as well as extra-literary) clichés and habits. As said by Mieke Bal, going back to study the Ancient texts "helps us understand how thick the historical layer is on which the present rests, as well as to assess our dependence and reliance on patterns established in a culture quite different from our own." Bal, *Narratology*, 112. * "Science," Merriam Webster, accessed December 5*, 2021. https://www.merriamwebster.com/dictionary/science

^{* &}quot;Myth," Merriam Webster, accessed December 5^a, 2021. https://www.merriam-webster.com/dictionary/myth

These definitions will be what we will broadly base our understanding of science and myth on within this thesis. There are a number of important aspects to them that we will touch upon throughout. The first is that both definitions speak of the "natural"; both science and myth seem to be able to explain or discuss natural phenomena. This is part of the topic of this first chapter. The second noteworthy aspect, and also something we will discuss in this chapter, is that both definitions indicate that the concepts say something about the world, or about our view of the world. World *view* and *observation:* both are ways of seeing. The last word of note is the use of the word "story" in the definition of myths. That, at least, seems to be something most mythologists agree on; a myth typically has a narrative structure.³⁷ But it is missing from the definition of science. Is this lack of story in science legitimate?

To elaborate our understanding of myth, I also employ a definition of myth posed by Bruce Lincoln in 1999 which is reflected in the Merriam-Webster definition: myths are ideology in narrative form¹. Myths can be seen as an expression of a collective system of ideals. Functions of myth include, but are not limited to, explanation of natural phenomena, the description of a social order or code of conduct, and an exploration of human nature.¹

Using a queer interpretation of myth which recognizes that myths take many different shapes through each retelling, I argue that both myth and science inform societal concepts such as social hierarchies, metaphysical questions such as the understanding of life and death, and language conventions. Seeing how myth is mirrored in science in these ways will give us a queerly defamiliarised view of science as a social activity, and allow us to see how our assumption of science as separate from social life, unlike the humanities, is perhaps an inaccurate one.

1.1 Hierarchy of the natural world in myth and science

We have seen in the definitions of myth and science that both can explain natural phenomena, indicating that at least on that level myths and science aren't that dissimilar. This will be elaborated on in Chapter 2, but in this chapter I will discuss how their explanations of the natural world inform social hierarchies. Both science and myths can be seen to give indications of how a person should relate to the natural the world.

^a G. S. Kirk, *Myth. Its Meanings and Functions in Ancient and Other Cultures* (Cambridge University Press, 1970), 28.

In Ancient Greek myths, there are many examples of nature being personified as a deity, indicating that the natural phenomenon is to be treated with respect or care. Five rivers in Antioch were personified in mosaic as a result of their importance to the city; the rivers were 'life-giving,' and their personification as river gods indicates that were of value to the communities and deserving of respect.^{**} There existed also examples of punishment for not behaving with respect. In Homer's *Odyssey*, a number of Odysseus's companions die as a result of them insulting Helios by slaying his sacred herd of cows.^{**} The myths have a cultural role of teaching respectful behavior towards the natural world through the possibility of offending the gods.

Besides this, the genealogies in creation myths can also be seen to reflect societal understanding of the natural world. In Hesiod's *Theogony*, one of the most well-known cosmogenic myths of Ancient Greece, the birth order and genealogies of gods are described.[®] These gods, who personify natural phenomena, are grouped together through familial relationships. I argue that these familial relationships indicate that the natural phenomena the gods represented were also seen as related to one another conceptually. Hesiod's *Theogony* hereby gave an indication of hierarchies of the natural order, showing the audience how certain concepts should be understood in relation to one another. It is possible that these personified relationships not only gave an indication of how the people of Ancient Greece thought about the world, but were also used to teach and communicate these associations.

In a similar way, science informs our relationship to the natural world. Throughout the development of the study of biology, our ideas about what constitutes a living being have changed, and consequently informed our treatment of beings other than humans. One example is the change in ethics codes regarding animal-testing, which have become increasingly strict as we learn more about the experience animals have of the world around them.⁴ Another example is the development in our understanding of our ecological impact, and how we can create a more positive effect on climate change and planet Earth as such. I argue that behaviors such as recycling, buying locally produced foods, avoiding fast fashion, and using renewable energy sources are societal effects at least in part informed and guided by scientific discovery.

^{*} Janet Huskinson, "Rivers of Roman Antioch," in *Personification in the Greek World: From Antiquity to Byzantium Publications of the Centre for Hellenic Studies*, eds. Judith Herrin and Emma Stafford (London: Routledge, 2017), 248.

^{*} Homer, *The Odyssey, t*rans. Emily Wilson (New York: W. W. Norton & Company, Inc., 2018), 311-315, lines 12.320-453.

[&]quot; Hesiod, Theogony and Works and Days, trans. M. L. West (Oxford University Press, 2008).

^a Nuno Henrique Franco, "Animal Experiments in Biomedical Research: A Historical Perspective," *Animals 3* (2013): 238-273, doi:10.3390/ani3010238

Through our research into the natural world, science ascribes value and respect to certain aspects of the world, much like the personifying of a river to indicate its respectability and importance.

Lastly, I would argue that both science and myths have as a social role to help us understand what it means to be human on Earth. Questions such as whether we have a soul, what happens when you die, and why we have a consciousness have plagued humans for as long as we can collectively remember, and we have attempted to answer them in many different ways. In his Works and Days, Hesiod attempts to explain why humans are the way we are, and why we hold this specific place in the greater scheme of thing.⁴² The myth of Pandora, for example, gives an explanation for the existence of women among humanity, who are, in the Works and Days, created as Zeus's punishment for Prometheus's gift of fire to man. Pandora's introduction to humanity also explains the existence of illness among humans, due to Pandora opening a jar bestowed upon her by Zeus, which released "grim cares" into the world.⁴³ Another myth in the Works and Days, the myth of the races, explains how humans and gods came to be as they are now. Over the span of five iterations of men, the myth shows how and why the current fate of humankind is to toil (work the land), but that they "shall have good mixed with ill," being neither inherently evil nor good." Myths such as these give humanity a place among the other creatures of the Earth, showing us where (we think) we belong.

Nowadays, many of us look to science for answers to these questions, though other bodies of knowledge such as religion, spirituality, and the humanities also have their answers. From biology research into the primordial soup, to astrophysics research into the Big Bang, to chemistry research into the properties of the protein building-blocks of our cells, scientists and others are searching to find answers to the question of what it means to exist, and why we do. The attempted answers change constantly, but myths and science both explore these questions.

1.2 Science and myth as social guide

In the previous section, we have seen that science and myth share a social role of documenting and teaching us about the relationship between humans and the natural

^a Hesiod, *Theogony and Works and Days*.

[•] Hesiod, *Theogony and Works and Days*, 39, lines 62-96.

[&]quot; Hesiod, Theogony and Works and Days, 42, lines 170-204.

world. In this next section, we will look at how they also share a role in informing relationships between human beings amongst ourselves.

In Ancient Greek myths, there are often plots that inform the audience about the proper way to conduct oneself, either as a guest or host, or in relation to authorities. An example of this can be found in the Hymn to Demeter, where Demeter, who is disguised as an old woman, is welcomed into a rich family's home when she asks for help.⁶ The audience learns from this that one must treat those less fortunate than yourself with respect and compassion. An opposite example can be found in Homer's *Odyssey*: the suitors of Penelope, vying for her husband's land and home, disregard the rules of hospitality.⁶ The myth illustrates that reciprocity must be the basis of these interactions; a guest can't depend on a gracious host if the host can't rely on the fact that the guest won't overstay their welcome. These examples show us how myths functioned, among other ways, as social guides, reflecting and teaching their audiences about appropriate behavior towards other people.

Scientific knowledge, like myth, also influences our social lives and relationships with other human beings. One only has to look to the development of psychology and neuroscience to show how the treatment and social standing of people with mental health disorders has changed throughout history. While human rights violations of mentally ill people are by no means non-existent today, scientific research has played an important role in the de-stigmatization of mental illnesses through developments in treatment and changes in nomenclature.⁴⁷

Scientific practice has also been employed politically, by scientists and nonscientists alike. Among the public, scientific discovery has had considerable impact on political movements, for example by queer activists.^{*} Likewise, the priorities of larger political powers can steer scientific discovery, as can be seen in the influence of the Cold War on the development of atomic physics.^{*} Scientists themselves throughout history have also attempted to influence the social and political sphere through their research. While usually done in the name of pure knowledge, science

[•] Unknown, *The Homeric Hymns*, trans. Apostolos N. Athanassakis (Baltimore: The John Hopkins University Press, 2004), 4-6, lines 2.110-204.

^{*} Homer, *The Odyssey*, 329, lines 13.374-401.

^e Hitesh Sheth, "Human Rights of Mentally Ill Clients," *International Journal of Psychosocial Rehabilitation 20*, no. 2 (2016).

[•] Certain groups among the American homophile movement would use scientific literature to argue that there was no proof to label homosexuality as a disease. Annamarie Jagose, *Queer Theory. An Introduction* (Melbourne University Press, 1996), 28.

^{*} Peter Bowler and Iwan Morus, *Making Modern Science: A Historical Survey* (The University of Chicago Press, 2005), 479-484.

has often had (if secondary) goals of social influence. One example is the neuroscience research done by Paul Pierre Broca in the nineteenth century, who studied the brains of both black and white American women and men in an effort to scientifically support racist and sexist assumptions about black and female bodies.³⁰ His research is still taught in neuroscience courses today, without the mention of what he was actually trying to achieve with it. While these examples are not representative of every scientific endeavor, they clearly indicate that science plays an influential role in social order, much like myths did. We base our respect and treatment of others in part on our scientific understanding of the human body.

1.3 Science and myth as language apparatus

The last of the shared social roles of science and myth we will be discussing is their influence on language. As discussed by Haraway, language can be seen as an apparatus for knowledge-making.³¹ The language we use to describe an object is a form of interaction with that object, and it reciprocally influences and is influenced by societal norms and assumptions. In her essay on a "grammar of animacy," Indigenous botanist Robin Wall Kimmerer discusses how the way we speak about the beings that exist in the world influences our behavior towards them.²² Most notably, she shows how the modern English language does not allow for non-human entities to have agency, or "be-ing." In the language of her native tribe Citizen Potawatomi Nation, Potawatomi language, many objects that are identified by nouns in English are spoken about in verb-form: a bay is named *wiikwegamaa*, which is a verb that translates to "to be a bay."⁵³ Potawatomi allows for the understanding of animacy in the natural world, beyond the limits of human action. In contrast, English denies plants and geographical features a soul, and therefore absolves us from a moral responsibility toward these groups. In this section, I show that both myths and science have rules or guidelines for how information should be spoken about.

Since myths were often performed and spoken aloud, we now believe there existed practices that made it easier for performers to remember the stories. Examples of these practices are parts of direct repetition and use of certain lyric verse.³⁴ In this,

[»] Niccolo Leo Caldarro, "Racism and the Colonial Project of Creating Generational Disabilities," SSRN (April 2018), http://dx.doi.org/10.2139/ssrn.3169623 Haraway, "Situated Knowledges," 595.

Robin Wall Kimmerer, Braiding Sweetgrass (London: Penguin Books, 2020).

Kimmerer, Braiding Sweetgrass, 54-55.
 Homer, Iliad, trans. Stanley Lombardo (Indiana: Hackett Publishing Company Inc., 1997), xi.

the function creates the form. Another previously discussed aspect of myths is the personification of concepts and the natural world. This narrative function will be discussed in a later chapter in its relation to knowledge, but it is also interesting to see how it can be viewed as a grammar of animacy, of sorts. The personification of the natural world as deities gave natural phenomena such as rivers and trees agency, thereby making them deserving of respect. These myths were oral stories, told in many variants by many storytellers. The myths created a shared spoken experience, with the many different versions of the stories still allowing access to the shared mythology. I argue that all of these elements of mythological language combine to form a shared language-apparatus, a specific way of talking about the world within a certain framework which values some objects of knowledge over others.

In contrast to the humanity of the world in myth, scientific language is (most of the time) much more reductive in its attempt to be objective. Also seen in *Braiding* Sweetgrass, Kimmerer shows how the complex story of the relationship between Native American sweetgrass-pickers and the sweetgrass plant is essentially reduced to a dry and impersonal list of attributes such as the oxygenation levels of the soil and the presence or absence of a disturbance.⁵⁵ There is no space in scientific language for the role of compassion, which effects how the sweetgrass is either violently ripped or carefully helped out of the soil. In an effort to be objective, scientific language attempts to strip scientific practice of the human. This separation between the human scientist and the natural world they study can be seen as another effect of the dualistic worldview that sees nature and human as inherently different. Kimmerer sees this reductive language as an inherent loss. I see it as a translation, which is something I will return to in the second part of this thesis. Either way, the use of specific language forces the speaker to make choices about which pieces information is conveyed; the language is once again an apparatus of communication, much like a shared mythology.

In this chapter, we have explored some of the social roles of science through the lens of myth, and discovered that many of myth's social roles are reflected in science. Both science and myth, two "opposites" according to the sciences-humanities dualism, share the functions of defining the relationships between human and nature, guiding human interaction with one another, and influencing language.

^{ss} Kimmerer, Braiding Sweetgrass.

We have also seen effects of the dualistic worldview that is the starting point of this thesis: while science and myth fulfill similar social roles, the modern dualistic worldview can be seen in science's strong separation between the human and nature, which is unlike Ancient Greek mythology's personification of nature. This dualism of nature and human is clearly linked to the dualism of science and the humanities, highlighting the interwovenness of the dualisms. This is further seen in the examples of the use of science in political debates, such as Broca's racist ideologies. Broca's views reflect the dualism between the Self versus the Other, in this case representing the White Man versus the Black Woman.

Overall, the queer defamiliarisation of science through comparison with myth allows us to see that even on purely a social level, instead of science being a separate and impermeable entity, it is in fact deeply enmeshed with many other categories, from culture, to politics, to ideologies. The lines between the sciences and the humanities are clearly (queerly) already blurred.

Chapter 2

Myth as scientific knowledge and science as mythological knowledge

Not only do Ancient Greek myths and modern-day science fulfil similar societal functions in their own time; mythological stories also incorporate aspects of the world that are nowadays discussed in science. Rather than seeing this as a failed, pre-science attempt to describe the natural world, I argue that certain Greek myths perform the same function as science: the exploration and explanation of the unknown. Whether those explanations were "correct" is beside the point; there have been countless "incorrect" discoveries and explanations resulting from scientific practice. Instead, I want to focus on the practice of describing the natural world in myths to show how storytelling allows us to glean knowledge of the personified or allegorical. I then proceed to discuss the use of personification in scientific work, to show how this method of attempting to understand the world around us is anything but obsolete. Once again, the examples discussed in this chapter are employed as instances that queerly defamiliarize science. The existence of literary tools like personification and metaphor in science will show us that scientific knowledge often does not fall within its own boundaries of rigid objectivity, but rather already incorporates techniques we typically consider belonging to the humanities.

In this chapter, I will be discussing three aspects of mythological stories: personification, allegory, and genealogies. Through the discussion of these elements

in both myth and science, the monsters and gods of science will be revealed to us, further allowing us to step outside of our usual perspective on the sciences. We will also see the queer aspects of both myth and science: changeability and transition are prominent in both.

2.1 Use of Personification

There are many examples of myths which explain aspects of the (natural) world, much like science does. Several different approaches to myth include the function of explaining or discussing the natural world. Some cognitive scientists see myths as an expression of human mental capacity: in order to remember important knowledge about, for example, the location of a volcano, the information is woven into a myth. The format of myths is such that it is easier for us to remember the important information due to the narrative structure, rather than if we tried to memorize bare facts.³⁶ To make memorizing easier, natural phenomena are explained in story-form, a myth, rather than as a list of facts.

As we have touched on before, these myths make use of personification of qualities of the natural world, which make up the characters of the narratives. Personifications explain natural phenomena through cultural associations that cross between societal norms and physical characteristics. One notable example is the personification of death and dying. In Hesiod's *Theogony*, he names in the genealogy of the gods three children of Night: Moros, Ker, and Thanatos.³⁷ All three of these gods represent death, but each in a different way. The god Moros personifies "a man's appointed death," or in other words, the fated death.^{ss} Ker, a goddess, represents the death that meets a man on the battlefield, an active and pain-filled state of dying.[®] The state of being dead is personified as the god Thanatos,[®] a male god who is typically presented in a passive role in myths and physical representations.

Each of the gods takes form in a different way, and their specific forms give the audience information about different aspects of death, the natural phenomenon. In

[&]quot; Hugo Koning, Mythologie (Amsterdam University Press, 2015), 93.

Hesiod, Theogony and Works and Days, 9, lines 211-212.
 Diana Burton, "The Gender of Death," in Personification in the Greek World: From Antiquity to Byzantium Publications of the Centre for Hellenic Studies, eds. Judith Herrin and Emma Stafford (London: Routledge, 2017), 46. (Based on $\mu o \iota \rho \alpha$, or "fate" in Greek.) * Burton, "The Gender of Death," 46.

[•] Often confused with Hades, who is actually the god of the dead, or the one who rules over everything under the earth, rather than the god of death. Burton, "The Gender of Death," 52.

the Iliad, Thanatos takes the form of an adult warrior, and it is considered possible to evade or defend against him, much like how one hero could avoid being hurt by another.^a In the myths where Thanatos is presented as a more active character who attempts to cause death, he is typically defeated by the hero of the story.[®] The personification of Thanatos as a passive character similar to the hero illustrates his representation of death as a state of being, much like living is a state of being. His personification explains how life and death are understood to relate to one another.

In contrast, the goddesses Keres, who personify the state of dying on the battlefield, are typically associated with the "female" qualities of chaos and the irrational.⁴⁴ Ker⁴⁵ is described in one myth as "a woman with teeth as cruel as those of a beast, and her fingernails are bent like talons." In the Iliad, Patroclus, the dear companion of Achilles, refers to her having her jaws threateningly opened around him from his moment of birth.⁶⁷ It can clearly be seen here that while Thanatos's familiar and calm appearance represents one aspect of death, Ker's aggressive and almost animalistic characteristics personify the qualities of dying that we fear: its unexpectedness and pain. The social roles and stereotypes of women and men in Ancient Greece, as well as the physical characteristics of these gods, lend the personifications explanatory power through association.

Scientific research also often makes use of personifications in one way or another, and likewise relies heavily on cultural presumptions based on a dualistic worldview. In previous work, I have discussed the rampant gendered personification of the ocean and waves that abound in ocean science.[®] While reading works of popular science as well as scientific articles, a pattern in personification became visible: the ocean was often personified, and thereby gendered, when it acted in a way that was unexplainable based on known natural laws. Similar to the personifications of death in Ancient Greek myth, the female gender is often used to indicate the unruly or unexpected aspects of nature.[®] One example is the naming of so-called 'freak waves,' as found in *The Wave* by Susan Casey. These waves are named 'freak' or 'rogue' waves

<sup>Burton, "The Gender of Death," 47-48.
Burton, "The Gender of Death," 52.</sup>

[«] See here a clear example of the interwovenness of the dualistic worldview. On the one hand, the sure, steady male character, and on the other hand the chaotic and irrational female character.

[•] Every person has their assigned Ker, or moment of death.

<sup>Burton, "The Gender of Death," 55.
Burton, "The Gender of Death," 54.</sup>

[&]quot; Femke Reniers, "Maritime Metaphors: Gendered personification of the ocean and waves," (Tutorial Gender and Science, History and Philosophy of Science MSc, Utrecht University, 2021).

⁻ Tara Rodgers, "Toward a Feminist Epistemology of Sound," in *Engaging the World: Thinking After Irigaray*, ed. Mary C. Rawlinson (Albany: SUNY Press, 2016), 201.

because they are abnormally large, and it has long been unclear to scientists how they occur since the ocean beds in which they originate are often too shallow for the waves to naturally occur based on traditional physics.⁷⁷ Gendering and personification of these waves takes place specifically when discussing freak waves that occur in groups of three. These groups of three have been dubbed the 'three sisters,' and this is a term used in popular science as well as academic papers.⁷⁷ This personification of the waves combines several socially acknowledged aspects to describe the waves. First of all, the femininity of the personification illustrates their unexpected and unruly qualities, much like the femininity of the Keres. Secondly, the "sister" relationship between the waves represents the fact that the waves tend to occur in groups of three. This personification clearly reflects certain ideas about the explanation of these waves, just like the personifications in Ancient Greek myth.

Personification is furthermore quite queer in multiple ways. Personified characters are based on aspects of an object we consider important and want to stress (the relationship between the freak waves, or their unexpectedness, for example), but this means that personifications can be very queer and versatile in their identity, much like the many personifications of death in Ancient Greek mythology. The use of personifications also queers science in that it changes the shape of our knowledge. The concept of the "three sisters" tells us some of the same things that a non-personified description of the waves would tell us, but this different form of referring to the waves also adds a new perspective on the knowledge, one which highlights certain qualities such as their unruliness and relatedness.

Overall, we can see here that science is in fact already making use of literary tools like personification, and that this is a creative way of representing knowledge that subverts the sciences-humanities divide. How this creativity can be furthered will be elaborated on in the second part of this thesis.

2.2 Use of allegory and metaphor

Another way myths explain the natural world is through allegory, or a metaphorical narrative. The allegorical interpretation of myths is one that has been in use since the time of the Ancient Greeks themselves. In an effort to explain the strong

⁷⁷ Susan Casey, *The Wave* (New York: Anchor Books, 2010), 9.

^a Casey, *The Wave*, 9; S. Rajendran, N. Fonsenca, and C. Guedes Soares, "Experiment and time domain method comparison for the responses of a containership induced by the three sisters' abnormal waves," *Maritime Engineering and Technology* (2012): 223-230.

cultural influence of poets and myths, philosophers came up with the concept of the allegory, $\dot{\alpha}\lambda\lambda\eta\gamma$ oqí α (allegoría), which meant something like the word "figurative."⁷² One of the earliest philosophers who discussed this was Theagenes of Rhegium (6th cent. B.C.E.), "who claimed that the fights between gods in the works by Homer were in fact conflicts between principles of physics."⁷³ The gods were assumed to each represent a different element of nature or concept of culture, with Hera representing the air, Hephaestus fire, and Poseidon water, Athena intelligence, and Hermes speech. It is now generally understood that not all myths can be interpreted as allegorical, but many do seem to have functioned this way.⁷⁴

An example of an allegorical myth is the myth of Demeter and Persephone, which explains the existence of the seasons by way of a story of godly conflict.³⁷ In the Hymn to Demeter, who was the goddess of grain and agriculture, the daughter of Demeter, Persephone is taken by Hades, the god of the dead, when she is picking flowers in a field. Hades desires Persephone as his eternal bride, but Demeter does not allow this. When Zeus refuses to force Hades to return Persephone to her, Demeter abandons her post as the goddess of prosperity in anger, causing the first winter for humans (AKA a time when grain does not grow). The loss of agriculture is so devastating for humanity that Zeus eventually relents, and commands Hades to return Persephone to the surface world, and to her mother. However, by this time, Persephone had eaten of the pomegranates that grow in the Underworld, binding her to Hades. In the end, a compromise is formed based on which Persephone can live with her mother for most of the time, but must return to the Underworld for a third of every year. Whenever she is gone, her mother's grief causes the death of crops, bringing winter upon humanity.

Demeter was worshipped by an Ancient Greek cult called the Eleusinian Mysteries.³⁶ Based on evidence of their rituals, it can be theorized that this myth was at one point taken as a truthful explanation of the change in seasonal weather throughout the year. Nowadays however, this explanatory myth can be seen as an allegory. In this story, an explanation of the seasons is reached through the understanding of different gods' personifications of the world. If there is something wrong with the crops, then Demeter must be involved. The earth turns against

² Based on $\mathring{\alpha}\lambda\lambda$ ος (allos), "another, different" and $\mathring{\alpha}\gamma$ ορεύω (agoreuo), "to harangue, to speak in the assembly." Koning, *Mythologie*, 23.

²³ Koning, *Mythologie*, 24.

⁷⁴ Koning, *Mythologie*.

⁷⁵ Unknown, *The Homeric Hymns*, 1-14, lines 2.0-495.

^w Unknown, The Homeric Hymns, 64.

humanity in the winter, and the earth/underground are the domain of both Demeter and Hades. Since Zeus is the father of the gods, he must have been the one to solve the dispute, which would bring humanity the return of spring. We know that the seasons aren't literally caused by conflict between gods, but we can see how this conflict acts as a metaphor for the changes of the seasons and the accompanying effects on human activities like farming. The events in the myth give an explanation of a natural phenomenon through allegory

And just as we have seen with personification, science is no stranger to metaphors and allegory, either. In "Toward a Feminist Epistemology of Sound," multi-instrument composer and historian Tara Rodgers discusses the metaphors that pervade sound science. She notes that gendering of acoustics takes place through both the material of sound as passive object and the researchers as acting male subject. According to Rodgers, descriptions of acoustics research often reflect maritime travel, "in which fluid disturbances transported male subjects and generated surprising or pleasurable feelings until these subjects returned "home" to a position of rest or balance."⁷⁷ This perspective of the male subject travelling across unknown oceanic territory echoes the previously discussed female personification of the ocean. Furthermore, exploration metaphors are also consistent with colonialist narratives, further highlighting the interwoven aspects of the dualistic worldview. These maritime metaphors enforce the idea of science as a conquest of the "Other," which is both gendered and racialized.

Another example of a metaphor that is prevalent in both myth in science is that of monsters. In Greek mythology, monsters can be seen as another attempt to explain the natural world. In many myths, the Mediterranean Sea was inhabited by countless monsters, whose presence was a constant threat to heroes travelling through their waters. The myths about the existence of these monsters is a product of the Ancient Greek idea that the Mediterranean Sea was where the world ended; a place of danger.⁷⁹ The unknown danger of the sea was explained through the presence of monsters who made the waters perilous. Furthermore, research by the classical folklorist Adrienne Mayor shows how certain monsters in myths such as the griffin can be seen as an explanation of the discovery of fossilized remains by the Ancient Greeks.⁷⁰ Their

⁷ Rodgers, "Toward a Feminist Epistemology of Sound," 201.

^{*} Helen M. Rozwadowski, *Vast Expanses, A History of the Oceans* (London: Reaktion Books LTD, 2018), 40-41.

⁷⁹ Koning, Mythologie, 88.

reconstruction of these fossils may have led them to the idea that monsters existed in the past." The monsters explain certain natural phenomena, as well as make that information available to each new generation, much like how science is taught nowadays.

Mythological monsters also abound in science, though they may not be as obvious as the main antagonists of mythological narratives. Examples of this kind of metaphor in science include the use of monster names for processes and parts of bodies in medicine and biology. One example of this is the use of the Chimera, which is described in Hesiod's *Theogony* as a creature "who breathed invincible fire, a terrible great creature, swift-footed and strong. She had three heads, one of a fierce lion, one of a she-goat, and one of a powerful serpent."st As can be seen in the description, the Chimera was a *composite* creature, built up of characteristics from several animals. To "be chimeric" in medical terminology is therefore often used to indicate composition of two or more different origins: "Scientific chimeras are organisms made up of cells from two or more different zygotes, of the same or different species, occurring spontaneously, or produced artificially; chimeric genes are the result of fusion of two separate genes in one transcription unit and can result in chimeric proteins, with new or modified functions."[®] Further examples of mythological metaphors in science are the use of the word *atlas* to name the first vertebrae of the neck, *hebephrenia* as a type of schizophrenia, and hymen as the vaginal membrane.^{ss}

Overall, we can see that instead of science making monsters obsolete through research and knowledge, they are instead incorporated in our scientific practice in such a way that those who use the terms are sometimes unaware that the terms are mythological. However, they remain mythological, and thereby carry associations with them; for example, perpetuating the idea of chimeric phenotypes being seen as errors, or as monstrous.⁴⁴ The use of these metaphorical terms is not inherently problematic; they can actually illuminate aspects of the medical circumstance that makes for easy recognition and communication, like the earlier discussion of the queer

And to be honest, don't we sometimes still view dinosaurs as monsters as well? One only needs to watch Jurassic Park to get an idea of this.

st Hesiod, *Theogony and Works and Days*, 12, lines 295-331.

[«] Maria Syrrou, et al., "Mythological figures in art and genetics: Current perspectives on cyclopedia and chimerism," American Journal of Medical Genetics (2021): 2, doi: 10.1002/ajmg.c.31893.

Atlas: referring to the weight of the world in his shoulders, this vertebra holds up the head. Hebephrenia: a form of schizophrenia that sets in at the end of puberty, named after the goddess Hebe, the prime of whose life occurred in her youth. Hymen: also known as the "virginal membrane," named after the god Hymenaios, the god of marriage. Naznean. * Syrrou, "Mythological figures," 2.

personification of the natural world. However, it is important that we remain accountable for the use of these metaphorical terms. Without recognition and responsibility for the characteristics associated with these terms, we unwittingly perpetuate outdated and unkind ideas about certain medical circumstances from times where the abnormal was considered dangerous, and the Other as undesirable. By not explicitly recognizing the ways in which science incorporates narrative elements, we value scientific knowledge in a completely different way from that of the humanities, while we are coming to realize that they may in fact not be so inherently different.

2.3 Use of categorization

The last way that myths describe and explain the natural world that we will be discussing, is through the use of genealogies, of which the most well-known one is Hesiod's Theogony and his Works and Days. As discussed in Chapter 1, Hesiod tells of the many deities recognized by the Ancient Greeks, and the order in which they were born. The associations between parents and children give an indication of affinity.^{ss} This goes for affinities between qualities of both the human and the natural world. An example is the relationship between the children of Night, who are "hateful Doom and dark Fate and Death," as well as Sleep and Dreams." Natural phenomena are also shown to relate to one another, for example in the relationships between Tethys, who was the Titan goddess of life-giving (or "nursing") freshwater, and Oceanus, the Titan god of a river ever encircling the earth, and their children, the Potamoi (Rivers), Oceanids (Nymphs), and Nephelai (Clouds).^s The genealogies informed the contemporary listener of the way aspects of the world relate to one another, and they tell the modern reader about how the way Ancient Greeks may have viewed the world. Essentially, the genealogy is a categorization system, where relationships between aspects of the world of represented by familial relationships.

Science categorizes and sorts the world similarly through taxonomies, and these categorizations can take different forms. While it may seem like these are far removed from Hesiod's deity family tree, I would argue that our modern taxonomies are not that different. There are many different systems of classification that we

^{ss} Hesiod, *Theogony and Works and Days*, xi.

^{*} Hesiod, Theogony and Works and Days, 9, lines 191-225

[•] Hesiod, Theogony and Works and Days, 13, lines 331-365.

employ in science, and these systems depend of which qualities or characteristics we consider the most important for identifying a certain group. With a shift in what characteristics are considered important, so do categories shift.

Older classification systems such as that of naturalist Carl Linnaeus were based on the sexual parts of plants, for example. This classification had certain advantages, because sexual organs are relatively stable within species, but very different between species, as well as them being easy to observe in plants. He claimed that classification should attempt to uncover the "natural order" of botany, but that all of our systems of classification are "artificial," or provisional so long we do not know the natural order.[®] However, we still hold on to his practice of naming organisms based on their species and their genus. This practice holds an inherent assumption of an organism as defined by the attributes that make up these two assigned groupings.

A more modern example of taxonomy is one based on genetics, but even these can vary in their representation of relationships between species. Research has shown that while often taken to be fact, the concept of a species is actually very flexible and often difficult to pin down for a single individual[®]. The definition of a biological species is often dependent on the context, with some definitions being based on morphological resemblances, while others are based on the capacity of organisms to procreate.[®] Even a classification based on genetic resemblance is therefore still subject to our interpretation of categories.

In the book New Materialisms edited and authored by Rick Dolphijn and Iris van der Tuin, the authors discuss the ignorance of epistemologies in the "[cutting up of nature] into genus and species."¹ In their discussion of sexual difference, they call for an understanding of sexual difference not as a categorization imposed upon bodies, but rather as the expression of a body's responses to what affects it. In this interpretation, categories are being created by bodies, rather than being imposed upon them. I believe that this recognition of our activity in forming categories, besides allowing us to rethink feminism, promotes accountability for classification in a way that the traditional idea of taxonomy does not. In this section I have shown how our classification of organisms is still a series of groupings based on characteristics that we have chosen to define an organism, similar to Hesiod's cosmogenic classification.

^{*} Thibault De Meyer, "Nature and Taxonomy, Systems of," in *Encyclopedia of Early Modern Philosophy and the Sciences*, eds. Dana Jalobeanu and Charles T. Wolfe (Cham: Springer, 2020), 2-3.

De Meyer, "Nature and Taxonomy," 2-3.
 De Meyer, "Nature and Taxonomy," 4.

[&]quot; Rick Dolphijn and Iris van der Tuin, eds., New Materialism: Interviews and Cartographies (Open Humanities Press, 2012), 152.

If we can become aware of our own choices in the categorization of bodies and species, we will have a more truthful and realistic understanding of the natural world.

With this chapter, several more ways that science does not remain neatly within its objective, neutral boundaries have been made visible through queer defamiliarisation, from the use of the personification, to metaphors, to systems of categorization. We have also seen more examples of how the sciences-humanities dualism is connected to larger scheme of a dualistic epistemology, for example in the relevance of the new materialist rethinking of feminism through sexual differing, or the queer personification of the natural world. The division between the sciences and the humanities is not an isolated phenomenon, but rather an interconnected part of a whole.
Chapter 3

Experimental practice as (mythological) narrative

So far, we have discussed the social and cultural roles of myth and science, as well as the similarities between the two knowledge-types in their attempts to explain the natural world. The comparisons we've made between them have shown us that science is not as dissimilar to myths as might have thought, which indicates that the boundary between the sciences and the humanities is much less rigid and straight than supposed. In fact, we have seen examples of scientific knowledge already engaging in queer behavior, refusing to consolidate into one form or another, through its expression in personifications and metaphors. In this third chapter, we will be discussing scientific experiments, the paragon of the supposedly objective scientific method. We will be comparing the structure and content of scientific experiments with those of myths, and identifying narrative elements that they both share, to see how the sciences and the humanities are further intertwined. To do so, I will first discuss the narrative structure of myths, which we will then use to identify the narrative structure of thought experiments and lab experiments. All this to show how, similar to mythological stories, scientific experiments are based on culturally agreed upon contexts, with narrative forms.

3.1 Narrative structure in myths

To begin with, it is important to discuss how narrative is found in mythology. One branch of mythology, the structuralist school, has based its interpretation of myths on their narrative structure. Instead of assuming myths played an allegorical or ritual role, structuralists such as French anthropologist Claude Levi-Strauss sought to determine the functions of myths within their form, by investigating and taking apart the structural aspects of each story.

Levi-Strauss claimed that the meaning of a myth is conveyed by its structure, and that the content is generally irrelevant, though we must rely on the content of the myths to establish their structures.[®] In this way, the relationships between narrative elements, such as the hero leaving home, or battling a monster, are what creates meaning, much like how words in a language gain meaning through their relation to other words in a sentence.[®] Levi-Strauss identified several layers of structural elements, which can be summed up in chronological connections and logical or thematic connections between elements.[®] Levi-Strauss then posited that the true function of myths relies on these connections functioning together to resolve cultural questions, specifically ones that place two extremes across from each other.[®]

Building upon Levi-Straus's work, French classicist Jean-Pierre Vernant and his school engaged with structuralism but distanced themselves from the idea that the content of a myth is not of value. Instead, Vernant posited that both content and form play an important role in conveying the story, and that a myth's cultural and sociological context matter for the understanding of the myth.* He analyzed myths on two levels: the narrative and the semantic, or symbolic, levels. Respectively these indicate the series of events that build up a story in their specific order, and the structure of the "human condition" within the myth, which is represented by the outcome of the narrative elements.[#]

In the book *The Cuisine of Sacrifice among the Greeks*, edited by Vernant and Belgian historian Marcel Detienne, Vernant structurally analyzed the myth of Prometheus and Pandora as it is portrayed by Hesiod in the *Theogony* and *Works and Days*. This work showed how the elements of the myth in their specific order produce

[•] Kirk, Myth, 43.

^a Levi-Strauss was heavily inspired by the work of linguist Ferdinand de Saussure, essentially treating a myth as a kind of language with a grammatical structure. Doherty, *Gender*, 129.

[«]Koning, Mythologie, 97.

^{*} Koning Mythologie, 111.

^{*} Koning, Mythologie, 114.

^w Doherty, Gender, 133.

a story which as a whole "says" something greater than its individual elements. In the myth, Prometheus's subterfuge of Zeus by tricking him into accepting the inedible parts of an animal as ritual offering has as a consequence that Zeus hides the "seeds of fire" from man in punishment. Prometheus then steals these seeds, which once again results in another punishment from Zeus, the gift of the beautiful but deceptive Pandora. While Prometheus knows not to accept a gift from Zeus, his brother Epimetheus does not, and Pandora marries Epimetheus, which later leads to her opening a jar of evils bestowed upon her by Zeus. Vernant showed how the elements of this myth, in their order, produce a greater core understanding of a reciprocity of deceptive gifts, which reflect how the human condition intertwines the good with the bad. His semantic analysis shows that Pandora symbolizes this mixed bag of the human condition as well, due to her embodiment of divine beauty on the outside, animalistic temperament on the inside, and her humanity through marriage.[®] The last step of Vernant's analysis is the sociocultural context of the myth. This step shows how the symbols used in the myth are based in an acknowledged cultural framework, and that they are only intelligible in the context of that framework. The relationships between ritual offering, agriculture, and marriage, for example, are all underpinned by the cultural understanding of these terms in Ancient Greece, making the myth an expression of cultural ideology."

A more modern application of the structuralist view can be found in the work of cultural theorist and artist Mieke Bal, who incorporates structuralism into her theory of narrative.¹⁰⁰ In her book *Narratology, Introduction to the Theory of Narrative,* she speaks of both myths and narratives in general, positing that a narrative consists of a text, a story, and the elements and processes, or the fabula.¹⁰¹

In this thesis, I engage with a structuralist analysis of narratives to discuss the narrative structure of both myths and science, supplemented by the work of philosophers of epistemology and science, the aforementioned Elgin and Nersessian. This chapter focuses on the narrative elements and processes of myths and scientific practice, and how they relate to one another chronologically, as well as their cultural framework as discussed by Vernant.

^{*} Doherty, *Gender*, 133-136.

[»] Koning, Mythologie, 119.

Bal, Narratology, 154.

¹⁰¹ Bal, Narratology, 8.

3.2 Narrative structure in thought experiments

While it may seem unlikely, narratives structures can in fact be found in many aspects of scientific practice, with thought experiments perhaps being the most obvious example. A thought experiment can be understood as a device of the imagination, based on agreed upon assumptions and rules, which is used to prove a point about a scientific concept. ¹¹² While thought experiments aren't based on empirical proof from experiments, they are nonetheless considered valuable and impact the development of the physical sciences.¹⁰³ And yet, as Nersessian states, "thought experiments are always presented in the form of a narrative," and this narrative is fundamental to the understanding of the knowledge being communicated.14

One example of this is theoretical physicist Albert Einstein's thought experiment about simultaneity, which takes place in an imagined train and train station. In this thought experiment, we are asked to imagine one person standing in the exact middle of a moving train, and one person standing on a stationary platform of a train station, looking at the train coming by. As the person standing on the platform watches the train pass by, two light rays are emitted on the train, one from the front of the train, and one from the back. The person on the train will see the light rays simultaneously; she is standing in the middle of the train, so either end is equidistant from where the light rays were emitted. Based on the constant speed of light, the light rays will reach the observer on the train after the same amount of time. However, this will not be the case for the person standing on the platform. The person on the platform will see the light ray from the back of the train before she sees the light ray from the front of the train. She will claim that the light ray from the back of the train was emitted before the light ray from the front of the train. How can two events that are simultaneous for one person not be simultaneous for another? This problem is solved if we take into account the difference of frame of reference of the two observers. Inside the train, the front of the train, the back of the train, and the observer are all moving with the same velocity. This means that the velocity of the train is not affecting the experience of movement of the light within the train. On the platform,

Michael T. Stuart, Yiftach Fehige, and James R. Brown, "Thought Experiments: State of the art," in The Routledge Companion to Thought Experiments, eds. Michael T. Stuart, Yiftach Fehige, and James R. Brown (New York: Routledge University Press, 2018).

Thomas Kuhn, "A Function of Thought Experiments," in *The Essential Tension: Selected Studies in Scientific Tradition and Change* (Chicago: University of Chicago Press, 1977).
 Nancy J. Nersessian, "Why do thought experiments work," *Proceedings of the Cognitive Science Society*

^{13 (1991): 432.}

however, this is very different. As the train passes by, the observer on the platform is, relative to the train, getting increasingly closer to the back of the train. Due to the decreasing distance between the observer and the back of the train, the light from the back of the train will have less far to travel to reach the observer than the light travelling from the front of the train (which is getting increasingly farther away from the observer on the platform). The observer on the platform will therefore see the light from the back of the train before she sees the light from the front of the train. This thought experiment shows us that simultaneity is defined by the frame of reference in which two or more events occur.

This thought experiment is considered legitimate proof of this concept; in 1905, Einstein included this thought experiment in his arguably revolutionary paper on relativity to prove that our understanding of simultaneity and absolute time needed to be reconfigured.¹⁰⁵ This thought experiment had clear effects on the scientific community and understanding of certain principles of physics. However, we can also see that it is, in fact, a story, with a narrative structure much like a myth. The experiment has a clear internal chronological order, which is imperative to the story. It starts with an introduction that sets up the environment of the story: the observers on the train and the platform. An event occurs (the emission of light), which causes a conflict: the disagreement between the observers about whether the events are simultaneous or not. This conflict is then resolved due to the introduction of new information, not unlike the mythological introduction of assistance from a trusted advisor as discussed by Assistant Professor in Ancient Greek mythology Hugo Koning.¹⁰⁶ The story teaches us final lesson, and it is based on a shared established background. As in the myth of Prometheus and Pandora, the elements of the thought experiment create a story through their temporal and thematic relationships to one another. Obviously, light moves much to quickly in real life for us to the see the effect of the velocity of the train on the speed of light in or outside of the train. This story is completely fictional (it literally cannot happen in real life), and yet it is still valuable as a form of knowledge-communication because of the shared basis of assumptions established in the introduction of the thought experiment.

Despite its use of narrative, thought experiments are not typically considered a subjective or storytelling activity. They are still considered a useful and functional part of scientific practice, thereby indicating that science is not as rigid and lacking in

Walter Isaacson, *Einstein: His Life and Universe* (London: Simon & Schuster, 2007), 124-5. Koning, *Mythologie*, 76.

storytelling as it poses itself to be. Much like the other similarities we have seen with myths, the narrative structure of thought experiments shows us that science also engages in storytelling, much like the humanities.

3.3 Narrative structure in empirical experiment

Claiming that thought experiments have narrative elements like those of myths might seem reasonably easy to accept, but the same might seem more difficult to imagine for empirical experiments. If anything, empirical experiments should be the polar opposite of fictional stories, with on one hand the objective, precise, natural experiment, and on the other hand the completely subjective, interpreted, and artificial story. However, it has already been discussed based on the work by multiple feminist scholars how science is not as self-evidently objective as is often assumed. In this section I expand on what I believe to be the narrative aspects of empirical experiments to show how they may not be so different from mythological stories, thereby queering what we understand to be science.

Besides the clear narrative structure in thought experiments, aforementioned Elgin argues that empirical experiments have narrative structures as well.¹¹⁷ As Elgin states, "experiments are conducted; they do not just happen." She likens them to a dramatic enactment, which contain a narrative structure, are subject to interpretation and reinterpretation, and are replicable.¹¹⁸ Both she and Nersessian agree that experiments are a "dynamic process that unfolds over time:" experiments have a beginning, middle, and end.¹⁰⁹

I believe this dynamic process is exemplified by the so-called scientific method. A scientific paper often begins with an observation based on background information, which is then hypothesized about. The observation can be likened to the setting of the story/experiment, with the research question introducing the quest, or conflict, that must be resolved. The middle consists of the actual experiment, or the quest itself. Lastly, at the end, the results are recorded and analyzed; the conflict has been resolved! Even if the experiment itself does not follow this structure exactly, the end result is still typically a paper, with elements that relate to one another in a way that produces an introduction, a middle, and a conclusion, much like a mythological story.

^{Catherine Elgin, "Fiction as Thought Experiment,"} *Perspectives on Science 22*, no. 2 (2014): 230.
Elgin, "Fiction as Thought Experiment," 226.
Elgin, "Fiction as Thought Experiment," 225.

Despite realistic experiments not always occurring in such a neat structure as the paper may present it as, narrative structure is still visible in experiments. While it is nearly impossible in observation of the natural world to find a clear "beginning" to a set of events, this is a common and necessary aspect of a lab experiment. Both scientists as well as storytellers assign to the events they discuss an arbitrary beginning and an end in their work. This beginning of an event is therefore not a direct copy of the way the studied process or event would take place in nature. Instead, it is in essence an abstraction of certain elements of the process.

In a myth, not every element of a story is told; you cannot possibly begin from the true "beginning" without telling Hesiod's *Theogony* in every single myth. Instead, a myth is a relatively short piece of a much longer and complex shared mythological world of gods and monsters. A number of elements from this world are then highlighted in one shorter story, which brings certain relationships and events into the foreground. Take for example the myth of Niobe.¹¹⁰ Niobe was the proud mother of six sons and six daughters. In her hubris, she boasted that her children were superior to the mere two children of Leto, who birthed Artemis and Apollo, the twin gods of the moon and the sun, respectively. To punish her for her pride, Leto had Apollo kill all of Niobe's sons, and Artemis kill all of her daughters. Over time, Niobe's grief turns her to weeping stone. This myth is told only in part by Achilles in the *Iliad*, to illustrate a point about the futility of self-sacrificing grief to Priam, the father of Hector of Troy. This brief reference to Niobe's story implies that Homer assumes the myth will be known to the listener. Both the *Iliad* and the myth of Niobe are pieces of a greater-known context, but they are separated and focused on to convey specific knowledge. The individual stories can be seen as abstractions from the greater canon of Ancient Greek mythology, with an imposed beginning and end.

In a similar manner, Nersessian offers a view on scientific experiments as active reconstructions and abstractions, rather than the more often assumed passive observation. Instead of experiments being seen as passive acts of observation, scientists can be seen as authors of their experiments by taking the observed phenomenon out of a natural occurrence and observing it under arguably unnatural circumstances. Elgin argues that only by exemplifying specific aspects of the natural world can we understand these observations, and that this is a characteristic common

¹¹⁰ Homer, *Iliad*, 486, line 24.602.

to thought and lab experiments, as well as fiction.^{III} She does not deny that reality and natural laws exist, but she posits that the patterns we find in scientific experiment are also imposed, in that they take form in an abstraction. Like events in a myth, observed events by scientists in the field are affected by an uncountable number of variables. A laboratory experiment is an effort to isolate a singular or limited number of variables in order to understand the relations between them.¹¹² Like stories, experiments exemplify and abstract features and patterns. Such patterns may have remained hidden from view when observed only in nature. Thus, experiments consist of controlling and manipulating events to highlight patterns that are assumed to exist; a narrative is imposed upon natural processes. Only through this abstraction into a context that does not reflect realistic circumstances, but rather a context that is known to the scientific community, can we understand the exemplified features.

This abstraction has as a result that laboratory experiments cannot be easily confirmed in real-life situations, similarly to the thought experiments discussed earlier. While laboratory experiments are replicable in the same artificial situations, experiments in the natural world, such as observational research on organisms in their habitat, are often harder or impossible to replicate due to the large number of confounding variables that exist in real life. The same goes for experiments in particle physics, for example, of which the real-life effects cannot be detected unless under very specific circumstances. Elgin instead posits that only by deliberately removing the observed phenomenon from its natural situation can the scientist say something about nature.¹¹ In this way, the act of imposing a narrative, while not objective, is what makes it possible to create understanding of nature.

Further similar to scientific papers, the events in a myth might not all take place immediately after one another. Rather, certain events can take longer than others, while the portrayal of time can seem quick. This can be seen for example in the growing of a culture of bacteria, which takes a certain period of time but can be referred to in just one sentence of a paper, or the time between the birth of Achilles, the marriage of Helen to Menelaus, and the Trojan War in the Iliad.114

Beyond the internal chronology, there is also the existence of an external temporal context, which is similar among myths and scientific experiments. While the

Elgin, "Fiction as Thought Experiment," 221-2.
 Elgin, "Fiction as Thought Experiment," 222.

[&]quot; Elgin, "Fiction as Thought Experiment," 226.

¹¹⁴ Homer, Iliad.

internal chronological structure is often crucial to understanding the conclusion of experiments and myths, the temporary context is often unknown and not very important. Rather, both myths and experiments are usually communicated as if they exist outside of a particular time-frame. Ancient Greek myths typically take place in a non-historical time: a time that is unknown and unreachable to the people listening to the stories.¹¹⁵ The time-frame of experiments is similarly undetermined. I would argue that because experiments are expected to be replicable, they can't be bound to one particular time or place, since that would make the experiment impossible to replicate. Therefore, both myths and scientific experiments are communicated to take place in an unknown and non-existent time.

3.4 Acknowledged context in mythology and science

Another shared aspect between myths and scientific practice is the existence of an acknowledged context. As discussed in the previous section, the orator of Ancient Greek myths would often assume that the listener knew a certain amount of background knowledge, whether it be in references to other myths, or the inclusion of gods and other characters who are not introduced in detail. The myths rely on this cultural context to be understood to their full extent; if the listener does not know that Athena was both the patron goddess of war strategy and handicrafts, it does not make a lot of sense to see her involved in both the Trojan War as well as a competition in weaving.¹¹⁶

The understanding of a myth also depends on the cultural framework of the narrative elements of the story, as discussed earlier in this chapter. Based on Vernant's structuralist analysis of myths, it is necessary to acknowledge a myth's sociocultural context to understand how the elements relate to one another, since the narrative elements can have meant something very different in the Ancient Greek culture than they may in a modern English book, even if the element or process described is the same. This is also discussed by Bal in the context of any narrative, not just myths. When reading a text, the frame of reference, or the "communal information" of the writer and the reader impacts the way the story is received.¹¹⁷

¹¹⁵ Koning, *Mythologie*, 10.

¹¹⁶ Athena is a supporter of the Greeks and specifically Achilles in the *Iliad*. See also the myth of Arachne, who claims to be better at weaving than even the Goddess Athena, and is cursed to become the mother of spiders for her hubris.

Bal, Narratology, 109.

Interestingly, these different interpretations of myths can lend them a queer quality. As shown by Professor of Classics Lillian Doherty in her book Gender and the *Interpretation of Classical Myth,* the myth of Persephone is going to be told in a very different way in Ancient Greece, or as a play, or as a children's book.¹¹⁸ In this section, I argue that scientific practice relies on such an acknowledged context as well, and that experimental results likewise require interpretation, shifting our valuation of them in the process.

As touched on previously, thought experiments are an example of this. Since thought experiments often take place in a context that is other than our own (in an elevator in space, for example)¹⁰, the context is usually stated explicitly to introduce the thought experiment. This context is typically made up of assumptions and natural laws that give the audience a perspective from which to view and interpret the events in the thought experiment.¹²⁰ Since the events are often not physically possible, they cannot be understood based on our own natural view-point. The proof of the thought experiment requires interpretation based on a specific unrealistic acknowledged context, much like a mythological story.

Elgin states that empirical experiments are also subject to interpretation and reinterpretation within different contexts. Both scientific results as well as myths require interpretation that relies on background knowledge. In the case of science, this background knowledge includes decided upon assumptions about the function of instruments, the format of experiments, and the analysis of results.¹² Much like the situating of mythological stories in familiar contexts, scientists must formulate and explain their experiments in correspondence to communal context for the results to be valuable to the greater scientific community.

Elgin further posits that interpretation gives the audience of the experimenter a particular perspective, leading to an element of heterogeneity, or even queerness. By highlighting the narrative aspects that scientific practice shares with literature, Elgin argues that the interpretation of works of fiction and experimental results alike leads to the presence of diverse perspectives in a field.¹² This availability of multiple

¹¹⁸ Doherty, Gender, 15-17.

[&]quot;Another of Einstein's thought experiments requires the reader to imagine the effects of moving through space while in a closed box or elevator, to illustrate the understanding of gravity as a form of acceleration.

¹²⁰ Nersessian, "Why do Thought Experiments Work?," 433.

<sup>Elgin, "Fiction as Thought Experiment," 225.
Elgin, "The Laboratory of the Mind," 48.</sup>

perspectives can then lead to new and unexpected answers to common questions, which is something we'll elaborate on in the second part of this thesis.

A similar concept has emerged in the sciences through feminist epistemologists such as Longino and Harding. Sandra Harding, a standpoint theorist, discusses the value of diversity. Rather than assuming that scientists can be fully objective, standpoint theory argues that if a society is organized based on policies related to race, gender, sexuality, or similar characteristics, the activities of the people in control both "organize and set limits on what persons [...] can understand about themselves and the world around them."¹²³ Similar to the use of a mythological world-context, Harding posits that scientific practice and understanding is equally embedded within a societal framework.

To elaborate on this, we can look into theory choice. Philosopher and feminist epistemologist Helen Longino argues that theory choice is always based on more elements than purely the experimental results.¹²⁴ Rather, theory choice is based on experimental results as well as a set of cognitive values that are determined by the scientific community to be desirable. This set of values changes over time, and rather than being objectively determined, these values are contextual. This does not mean they are not valuable or useful. The accordance of scientific practice with this set of values renders the experimental results valuable and understandable to the scientific community. Much like placing mythological events in a familiar context to induce understanding, scientific experiments are understood in relation to the assumptions of the scientific community. If the results do not mesh with the assumptions, they cannot be understood until the assumptions have changed.

More directly related to the content of experiment, Longino further poses "ontological heterogeneity" as a useful epistemic value for theory choice. A theory that maintains ontological heterogeneity is defined as a theory "that grants parity to different kinds of entities." Rather than attempting to find similarities and constant laws in the natural world, Longino posits that focusing on diversity and inconsistency can also lead to valuable theories.¹ This idea of diversity also relates to the point by Elgin discussed earlier in this essay: events in nature are influenced by an uncountable number of variables. To pay attention to the diversity of nature, to allow it to be queer, is to create a more realistic picture.

Sandra Harding, "Rethinking standpoint epistemology: What is "strong objectivity"?," in *Feminist epistemologies*, eds. Linda Alcoff and Elizabeth Potter (New York: Routledge, 2013), 54.
 Longino, "Cognitive and Non-Cognitive Values in Science," 39.

Instead of seeing scientific experiments as isolated pieces of evidence, it is clear that we have to acknowledge that the results of experiments are only valuable within the context of a broad swath of assumptions and context. Myths and experiments alike depend on their interpretation within a shared context, which can lead to the queerness and diversity seen in both: the endlessly shifting versions of myths, as well as the many different possible interpretations of scientific results.

In conclusion, in this chapter I have argued that the form and structure of scientific experiments depend on narrative elements, and this has been illustrated by way of the similarities between scientific experiments and mythological stories. Both practices rely on narrative in their chronology, their abstraction from greater schemas, as well as their contextualization. What this once again shows us is that the distinction between the sciences and the humanities isn't so clear at all. Rather, aspects of narrative are already present in scientific practice, bleeding through the boundaries.

The issue then is that we as scientists and philosophers of science still believe or promote the idea that science is completely free of this kind of subjectivity. The presence of narrative elements in science isn't actually a failure of science; it doesn't have to be bad thing. Instead of trying to weed out the narrative aspects of science to actually make science objective (as many have attempted before), I believe we should see them as an indication that the dualistic worldview is not functional. Instead, we need to first become accountable for our subjectivity, and then even take advantage of it as a helpful methodology. This will be discussed in the next chapter of this thesis.



"Cross out the map, erase the first name, propose other maps and other first names whose collectively imagined fictional nature is evident. Fictions that might allow us to fabricate practices of liberty." – Paul Beatrix Preciado, *An Apartment on Uranus*,

112.

Chapter 4

Narrative as method; accountability, translation and accessibility

The first part of this thesis has been an exploration of the boundaries of science on the map of knowledge, and we have come to the realization that the separation between the sciences and the humanities is not as self-evident as is often assumed. Science's claim to objectivity comes from the idea that following the scientific method would theoretically allow us to be neutral, and this neutrality is what separates and elevates science from the humanities, and man from nature. But instead of sciences being clearly distinct from the humanities based on its objective and neutral practice, queer defamiliarisation through comparison with myth has shown us that science is in fact rife with storytelling, from the social role of science, to its use of personification and metaphor in scientific papers, to the reliance on a narrative structure in scientific experiment. The "maps" of our knowledge-disciplines are in reality variable and imposed by ourselves, and the dualism of the sciences and the humanities does not need to be considered a dualism at all, and their associations with gender, race, and other dualisms are unnecessarily fabricated.

As discussed in the introduction of this thesis, some philosophical lines of thought like social constructionism would leave us stranded at this point: science isn't what we thought it was, so therefore it is equally incapable of explaining the world truthfully as the humanities are. Others have attempted to redefine science or objectivity so that sciences can still be separated from the humanities, like feminist empiricism. I believe it more beneficial to creatively override these boundaries: seeing these boundaries as fictions without assuming that that means nothing truthful can be said about the world.¹⁰ Rather than attempting to eradicate storytelling from science, I believe it is already beneficial the way it is currently, though covertly used, and could even be used overtly as a productive method for knowledge-acquisition in science. In this chapter, I discuss how it is possible and beneficial to both take responsibility for the existing use of narrative in science without denying it its truth-telling power, as well as for the explicit use of storytelling as a method for scientific-practice. I argue that the translation that is inherent to moving between different shapes of knowledge (scientific reporting, fictional story, or other formats like physical art or mathematical formulas) results in productive knowledge-making through its allowance for multiple perspectives, generation of creative questions, and impact on the world outside of academia.

4.1 Accountability for storytelling in the sciences

To be able to explore the possible further incorporation of narrative into scientific practice as a method, we must begin with the recognition of the storytelling that already exists in science. This requires us to accept accountability, both for the use of narrative specifically as well as for the subjectivity present in science in general. As I illustrate in this section, these two things can go hand in hand, and narrative is actually uniquely suited to allowing us to be explicitly accountable for our agency and influence on scientific inquiry.

Through the work of Haraway and others, it becomes clear that even scientists are influenced by social and cultural elements that inform everything from which questions we attempt to answer, to how we present knowledge, to what gets to be considered knowledge at all. We saw evidence of this in Chapter 3 of this thesis: which patterns we find in nature depend on whether or not we acknowledge the heterogeneity of the natural world, while the interpretation of results and theory choice depend heavily on the shared assumptions among scientists in a certain context and time. As discussed in the preface to this thesis, Haraway calls for a new understanding of objectivity that allows for "situated knowledge": rather than seeing

¹²⁵ Preciado, An Apartment on Uranus, 112.

scientific observation as a neutral "conquering gaze from nowhere," she introduces an embodied (organic and technological) vision that acknowledges and makes the viewer accountable for their ways of seeing.¹²⁶ Only by taking the locality of our perspective into account can we make objective statements about the world without hidden biases.

I believe this view is reflected in work by Kimmerer, who discusses the "destructive lens" of the scientific worldview, which is based on concepts such as dominance and "the separation of knowledge from responsibility."¹²⁷ It seems that scientific practice, with its focus on removing the human influence from knowledge, often does not recognize the responsibility individuals have for the shaping of knowledge.

In contrast to the assumed "neutrality" of science, the humanities are seen as subject to personal perspective. This is also associated with several other aspects of the dualistic worldview, as we have seen in the previously discussed association between the masculine, White, science and the feminine, Other, humanities. Aforementioned Beauvoir makes the point in *The Second Sex* that "we [women] grasp more immediately what the fact of being female means for a human being, and we care more about knowing it."¹⁵⁶ And Preciado, who includes more identities along with women: "We are all in metamorphosis, but only a few of us (the ones who have been marked as monsters, the ones whose own subjectivity and bodies were publicly pointed out as fields for experimentation and material progress of mutation) realize it."¹⁵⁹ Both of these authors point out how the subjugation of groups of people makes it more likely for the members of those groups to be aware of their own subjectivity, since this is a quality assumed of them by others. In contrast, people in power in our societal structures are not forcibly made aware of the influence of their gender/sexuality/race/culture on their apparatuses of knowledge-acquisition.¹⁵⁰ In

Haraway, "Situated Knowledges", 583. "Feminist objectivity is about limited location and situation knowledge, not about transcendence and splitting of subject and object. It allows to become answerable for what we learn how to see."

²² Kimmerer, *Braiding Sweetgrass*, 346.

¹²⁸ De Beavoir, *The Second Sex*, 16.

¹²⁹ Preciado, An Apartment on Uranus, 216.

^{III} It is important to note that subjugation can be and is often intersectional, with many people dealing with the effects of discrimination based on several of their attributes. The discrimination in one sphere does not guarantee that a person is aware of their privileged position in relation to another person or group in a different social context, for example the continued discrimination against people of color among white women, or the exclusion of trans individuals from queer spaces. For more on the topic of intersectionality, see: Kimberle Crenshaw, "Mapping the Margins: Intersectionality, Identity Politics, and Violence Against Women of Color," *Stanford Law Review* 42, no. 6 (July 1991): 1241-1299.

the same way that groups who are not seen by people in power to be neutral are aware of their subjectivity, so are the humanities aware of their subjectivity.

Bringing the work of these authors together, I argue that the acknowledgement and use of narrative in science is one way to achieve a local and situated knowledge which recognizes and takes responsibility for its own perspective, which may be the only way to actually be objective.

I believe the use of narrative is especially suitable for becoming accountable for our perspective because, in contrast to science, narrative is recognizably and unapologetically agential.¹¹ In Ancient Greek myths, it is typical of the poet to establish his position in the story immediately, by proclaiming the grace of the Muses who have conveyed this story to him to tell others.¹³² Most stories have either an acknowledged perspective, or an explicit omnipresent narrator.¹³³ Even the omnipresent narrator has an acknowledged perspective, since the reader knows the narrator tells the story from a place of knowing how the story will develop and end.¹³⁴ In a way, the omnipresent narrator is what a scientific paper attempts to present: someone who both observes and knows the inner workings of the plot, AKA the experiment. However, even if the omnipresent narrator has no clear agency within the book, the reader still knows that the narrator bestows a perspective onto the story: we know that if a story is being told, someone has to be doing the telling.¹⁵ As stated by the previously cited Mieke Bal, "whenever events are presented, it is from within a certain vision. A point of view is chosen, a certain way of seeing or otherwise perceiving things, a certain angle, whether real historical facts or fictitious events are concerned. Storytelling is inevitably slanted or subjective in nature, and to deny this constitutes a dubious political act, for it means denying narrative responsibility."¹³⁶ In a story, it is clear that the teller speaks from a specific perspective, thereby allowing different retellings (different narrators) represent a multitude of different perspectives.137

The subjectivity of narrative, its ability to represent specific perspectives, is a strength of the method, and one that scientific practice can benefit from being explicit

^{III} Lynn McAlpine, "Why might you use narrative methodology? A story about narrative," *Eesti Haridusteaduste Ajakiri* 4, no. 1 (2016): 46. Bal, *Narratology*, 12.

Hesiod, *Theogony and Works and Days*, 3, lines 1-30 & 37, lines 1-28.; Homer, *The Iliad*, 1 lines, 1.1-10.; Homer, *The Odyssey*, 105, lines 1.1-10.

¹³³ Bal, Narratology, 5.

¹³⁴ Bal, Narratology, 7.

¹³⁵ Bal, Narratology, 62.

¹³⁶ Bal, Narratology, 132.

¹³⁷ Bal, Narratology, 132.

about.¹³ As discussed by Oxford professor Lynn McAlpine in a paper on the use of narrative methodology in the social sciences, "Perhaps what is most important to us about narrative research is the potential it provides to value multiple ways of knowing."¹³⁹ If to be objective is to attempt to remove ourselves from the work we do, then to engage in subjective methods like the use of narrative is to bring back the recognition of ourselves in our research.¹⁴ While a nearness to the object being studied will provide a different type of knowledge of that object than a self-imposed distance from it, this does not mean it is not valuable knowledge. Rather, the knowledge gained from the act of translating or representing knowledge in a different form can add to our understanding. It is time to learn how to represent the world with ourselves in it, in all of its queer and wonderful heterogeneity.

4.2 Translating the shape of knowledge

Once we have made room within scientific practice to acknowledge the locality of our perspectives, we are free to benefit from the heterogeneity of perspectives, as discussed in Chapter 3. In this section, I will discuss how the translation and transition of knowledge between forms, for example from a scientific report to a mythical story to a piece of physical art, offers further comprehension of the world.

My use of the word translation, similar to the concept of transition, is inspired by the discussion on gender-transition by Preciado: "The transition process does not designate the passage from femininity to masculinity but rather the passage from one way of producing truth to another."¹¹ His work sees transition between genders not as a switch from feminine to masculine as two halves of a dualism, but rather as two positions (or more) from which to express oneself that do not inherently exclude one another. I argue for a queer knowledge-practice that acts in a similar way, with the recognition that knowledge produced from different perspectives, or in different forms, are equally capable of saying something valuable and truthful about the world. I believe this kind of translation between forms and perspectives can lead to valuable knowledge just like how seeing an object from multiple angles can illuminate its previous unknown qualities.

¹³⁸ Bal, Narratology, 66.

McAlpine, "Why might you use narrative methodology?," 40.
 Ashley Barnwell, "Method Matters: The Ethics of Exclusion," in What if Culture was Nature all Along, ed. Vicky Kirby (Edinburgh University Press, 2017), 37. Preciado, An Apartment on Uranus, 184.

In this chapter, I specifically discuss the representation of scientific knowledge as a fictional story, but this is only one of the infinite ways a piece of knowledge can be given shape, much like the queer identity discussed by Preciado. This translation of knowledge into multiple forms has a number of benefits, the first being that the explicit reshaping of knowledge through the imposition of narrative elements will prioritize other aspects than the presentation of knowledge in an academic paper will. The second way translation of knowledge into different forms can positively impact knowledge-making is through the generating of questions due to the creative connections that can be made when knowledge is presented in a new format.

To illustrate some of the effects of translating, in this case, biological knowledge to a story-form, I will make use of Kimmerer's recounting of "The Three Sisters," in her book *Braiding Sweetgrass*, a Native American story about the gardening of corn, beans, and pumpkin.¹⁴²

Native people speak of this gardening style as the Three Sisters. There are many stories of how they came to be, but they all share the understanding of these plants as women, sisters. Some stories tell of a long winter when the people were dropping from hunger. Three beautiful women came to their dwellings on a snowy night. One was a tall woman dressed all in yellow, with long flowing hair. The second wore green, and the third was robed in orange. The three came inside to shelter by the fire. Food was scarce but the visiting strangers were fed generously, sharing in the little that the people had left. In gratitude for their generosity, the three sisters revealed their true identities – corn, beans, and squash – and gave themselves to the people in a bundle of seeds so that they might never go hungry again.¹⁴³

The tale is further elaborated by Kimmerer discussing the qualities of the different plants and their personification in the tale. The corn, the tall women in yellow with long hair, is

firstborn and grows straight and stiff; it is a stem with a lofty goal. Laddering upward, leaf by long-ribbed leaf, it must grow tall quickly. Making a strong stem is its highest priority at first. It needs to be there for its younger sister, the

 ¹¹² Kimmerer, Braiding Sweetgrass, 128-140.
 ¹⁴³ Kimmerer, Braiding Sweetgrass, 131

bean. Beans put out a pair of heart-shaped leaves on just a stub of a stem, then another pair, and another, all low to the ground. The bean focuses on leaf growth while the corn concentrated on height. Just about the time that the corn is knee high, the bean shoot changes its mind, as middle children are wont to do. Instead of making leaves, it extends itself into a long vine, a slender green string with a mission. In this teenage phase, hormones set the shoot tip to wandering, inscribing a circle in the air, a process known as circumnutation. The tip can travel a meter a day, pirouetting in a loopy circle dance until it finds what it's looking for – a corn stem or some other vertical support. [...] For now, it holds back on making leaves, giving itself over to embracing the corn, keeping pace with its height growth. Had the corn not started early, the bean vine would strangle it, but if the timing is right, the corn easily carry the bean. Meanwhile, the squash, the late bloomer of the family, is steadily extending herself over the ground, moving away from the corn and beans, setting up broad lobed leaves like a stand of umbrellas waving at the ends of hollow petioles. [...] As the leaves grow wider, they shelter the soil at the base of the corn and beans, keeping moisture in, and other plants out.¹⁴⁴

As can be seen in the quoted section through her use of words such as "circumnutation," Kimmerer is clearly aware of the scientific and Western perspective on the growth of these plants. However, she presents knowledge about them in a story-form.

Kimmerer makes the point that this way of gardening was not understood by colonists arriving in the Americas, and that this is in part a result of what she refers to as the "scientific worldview," an impersonal uniformity imposed upon the world.¹⁴⁵ Rather than approaching nature from an appreciation for existing patterns, which echoes Longino's call for ontological heterogeneity, science often attempts to isolate in order to understand. While isolation can certainly offer knowledge, Kimmerer shows how observing the natural world in its existing complexity rather than only in isolation is a strength, not a loss. The removal of this rigid scientific worldview from knowledge through storytelling about these three plants clearly allows the relationships between them to come to light which would otherwise have been obscured.

Kimmerer, Braiding Sweetgrass, 130.
 Kimmerer, Braiding Sweetgrass, 346.

Beyond the reframing of existing knowledge, narrative can be of further use to science is in its creative ability to generate questions otherwise more easily missed from a purely "objective" perspective. In the book *The Hidden Life of Trees: What they* Feel, How they Communicate. Discoveries from a Secret World by German forester and author Peter Wohlleben, Wohlleben introduces the idea that trees speak to one another, much like we do.¹⁴⁶ The foreword of the book starts with an anecdote on enchanted forests from fairy tales, saying that Wohlleben's book will cause "forests to become magical places" for the reader.¹⁴⁷ It is implied that Wohlleben was able to understand trees in such a non-traditional way because he viewed them from a creative (fictional) perspective, rather than one of science.¹⁴⁸ I consider this an example of what Kimmerer calls "the questions that science does not ask, not because they aren't important, but because science as a way of knowing is too narrow for the task."149 Clearly, the question of how plants speak to one another is an example of that. Kimmerer discusses how Native American elders used to say that the trees talked to each other, but that this concept of plants communicating did not fit within the Western scientific worldview, which assumes a viewpoint from the human observer at the center of the world.¹⁰ Without animal mechanisms, how could plants possibly talk?

Philosopher Jacqueline Dalziell echoes this in her essay "Microbiology as Sociology," stating that "specific disciplinary structures don't merely stop certain questions being answered, they actively prevent them being asked." IT These structures proceed to dictate what work can be published, thereby setting standards for which objects are afforded consciousness or agency, reiterated over and over through journals and teaching. This ties into our discussion of the greater dualistic epistemology as discussed in the Prologue of this thesis, which attempts to separate the sciences and the humanities, but also the human and nature. By allowing for the

^{we} Peter Wohlleben, *The Hidden Life of Trees. What They Feel, How They Communicate. Discoveries from a Secret World,* trans. Jane Billinghurst. (Vancouver/Berkeley: Greystone Books, 2016), 7

Wohlleben, The Hidden Life of Trees, 7.

[&]quot; Interestingly, this insistence that forests are indeed magical because they seem to exhibit aspects beyond the understanding of traditional science (unintentionally) promotes the idea that an association between nature and story immediately places a phenomenon in the realm of fiction, rather than fact. Rather than maintain this dualism, I would argue that scientific research can benefit from seeing the world from a fictional perspective every once in a while, to generate new and unexpected questions such as these.

^{**} Kimmerer, Braiding Sweetgrass, 45.

<sup>Barnwell, "Method Matters," 31.
Dalziell, "Microbiology in Sociology," 166.</sup>

use of methods traditionally belonging to the humanities in scientific practice, we in turn support the asking of questions that subvert the disciplinary structures that also separate nature and human beings.

To summarize, in this section we have seen that beyond the mere acknowledgement of narrative in scientific practice, we can actually benefit from further mixing the sciences and the humanities, or, as I would put it, further queer our idea of knowledge to no longer be bound by the dualism of the sciences and the humanities. Rather than seeing knowledge as either scientific or humanistic, knowledge can then freely be expressed in a multitude of shapes, each of which teaches us something different about the natural world by bringing varieties of elements and questions to the foreground.

4.3 Queerness of perspective

We can create this queerness of knowledge not only through the shape of knowledge, but also in through the appreciation of the perspective of the scientistcum-storyteller. In the book *Translation and Gender: Translating in the 'Era of Feminism'*, translation studies professor at the University of Ottowa Luise von Flotow gives an example of how a translation of the same text by two different translators highlights different existing aspects of the original text.

From the perspective of contemporary discourses on gender and its effects on translation, these translations emphasize women's 'resistance', while also showing and discussing women's differences; for the African-American translator de Stael's text is reminiscent of the racist attitudes she grew up with in the USA, while the European translator is not at all sensitive to this aspect of de Stael's Mirza.¹⁵²

The background, previous experiences, and social context of a translator affect how they translate a text, and results in the object of knowledge (the original text) being presented in different ways (different translations), because every translator will "see" different things as more important in the text that they are translating.

¹⁰ Luise von Flotow, *Translation and Gender; Translating in the 'Era of Feminism'* (New York: Routledge, 2014), 33.

This is much like the queer identity of myths which we have discussed previously: every time a myth is retold, the teller's perspective will change the story to fit themselves and their audience, while retaining the essence of the myth. In general for stories, Elgin states that "a work of fiction selects and isolates, manipulating circumstances so that particular properties, patterns, connections, disparities and irregularities are brought to the fore." 55 Which of these properties and patterns are given the spotlight in a story is in part dependent on the position and identity of the author; even if two authors attempted to each write a story with the same fabula, the resulting stories would be different based on what each author finds the more important aspects.

Applying this to science means learning to appreciate the queer ability of knowledge to be represented by different perspectives, whether these take the same shape (academic paper, artwork, story, etc.) or not. The benefit of this would be an increase in the diversity of knowledge, much like discussed in the previous section of this chapter, which I would argue is a more realistic representation of the world than a homogenous, singular, perspective which does not actually succeed at remaining neutral.

Another important benefit of the recognition of different perspectives in knowledge is that it will increase the accessibility of both the knowledge as well as the academic institution. The use of narrative in scientific practice makes it possible for knowledge to be shared with people who are not as specialized as the researcher. We can take as an example the work of Oliver Sacks, neurologist and writer, who wrote and published case studies on his patients throughout his career. These case studies, or stories, as he called them, were meant to communicate knowledge to both the scientific community as well as the general public.¹⁵⁴ While Sacks was shunned in the neurological research community for his qualitative work for a big part of his career, the books were incredibly popular among casual readers. And in fact, later in his life Sacks became well-known and appreciated for his neurological research within academia, making his case studies very valuable for researchers as well.

In an interview with theoretical particle physicist and feminist and queer theorist Karen Barad in the book *New Materialisms: Interviews and Cartographies*, Barad

¹⁵⁵ Elgin, "The Laboratory of the Mind," 4. ¹⁵⁴ Oliver Sacks, *The Man Who Mistook His Wife for a Hat* (London: Picador, 2015), xxi.

speaks of the concept of scientific literacy in the United States of America, 15 and how the percentage of scientific literacy is essentially the same percentage of the population as the number of scientists and engineers.¹⁵⁶ This means that science as a creative knowledge-making practice is not accessible to anyone except for those who have dedicated years of their lives to its study. I think the use of narrative to convey scientific knowledge could increase the access non-specialists could have to science, and that this is beneficial for both science and society in general.

Beyond making science more accessible for those not engaged in knowledgemaking activities, the incorporation and appreciation of storytelling as a method can also make science more accessible to practitioners of other knowledge-practices, and vice versa. As has been touched upon throughout this thesis, there are many different methods of knowledge-making, though some are considered better or more accurate than others depending on who holds power.17 In my academic sphere, while appreciation for other forms of knowledge and for EDI (equality, diversity and inclusion) initiatives are slowly increasing, Western science is still seen as the most lofty and realistic understanding of nature as well as being an "exclusive" domain in terms of its demographics. However, science is by far not the only knowledgepractice, nor is our academic dualism of the sciences versus the humanities a universal phenomenon.

In the book *Braiding Sweetgrass*, from which I have presented excerpts earlier in this chapter, Kimmerer discusses the inaccessibility and lack of appreciation of the Western Euromerican university as an institution for Indigenous knowledge through several anecdotes. As a young student, she is chastised for wanting to study biology

[&]quot;Within the framework of the OECD Programme for International Student Assessment (PISA), scientific literacy is defined as an individual's scientific knowledge and use of that knowledge to identify questions, to acquire new knowledge, to explain scientific phenomena, and to draw evidence-based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and enquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen." "Scientific Literacy," International Bureau of Education, accessed January 25^a, 2022. http://www.ibe.unesco.org/en/glossary-curriculum-terminology/s/scientific-literacy.

Rick Dolphijn and Iris van der Tuin (Open Humanities Press, 2012), 53.

For an example of Indigenous knowledge-making not based in scientific practice, I would like to refer the reader to the work of Liisa-Rávná Finbog, a Sámi scholar and duojár from Oslo/Vaapste/Skánit. She works with the relationship between the museums, Sámi identities and duodji, a Sámi aesthetic practice. Her presentation on "The Silencing of Sámi Women and their Objects of Knowledge" at the "Fast Forward! Women in European Art, 1970-Present" conference in Copenhagen, Denmark made a lasting impression on me, and guided me in my exploration of storytelling as a method. For further information, see Liisa-Rávná Finbog, "Grow your roots deep," accessed September 28^a, 2022, https://liisaravna.blog/.

because of her curiosity about the beauty of the asters and goldenrods. She is told that the investigation of beauty is "not science."¹⁵⁸ Furthermore, in a description of the project of one of her PhD students, it is seen that the research done by the PhD student results in information that the Indigenous elders have passed down for generations. However, as Kimmerer notes, "there is a barrier of language and meaning between science and traditional knowledge, different ways of knowing, different ways of communicating."¹⁵⁹ The Western university professors who are accessing the PhD project do not consider the knowledge that the Indigenous people gained through experience to be "scientific," and therefore it is not seen as valuable as an object of knowledge.

Much work is being done on the practice of "decolonizing methodologies," which responds to this exclusive and imperialist narrative of Western science as the only valid research method. While this thesis is focused on queering science and knowledge, it is impossible to truly dissolve the dualism between the sciences and the humanities without changing our view on other dualisms as well, one of which being the dualism of the colonizer as superior to Indigenous peoples. Such an opposition cannot exist if we are to value a diversity of perspectives, and it is therefore required that academia is reshaped to be accessible and inclusive of other knowledge-making practices, de-centered from the traditional Western scientific practice.⁴⁰⁰ The incorporation of storytelling into our idea of science may be one small step that could lead us in the right direction. There is so much to be learned from perspectives other than our own, and they are all deserving of respect.

¹⁵⁸ Kimmerer, Braiding Sweetgrass, 40.

¹⁹⁹ Kimmerer, Braiding Sweetgrass, 158

Jo-ann Archibald Q'um Q'um Xiiem, Jun Lee-Morgan, Jenny Bol, and Jason De Santolo, eds., Decolonizing Research, Indigenous Storywork as Methodology (London: Zed Books, 2019).

Epilogue

"This is our work, to discover what we can give. Isn't this the purpose of education, to learn the nature of our own gifts and how to use them for good in the world?" – Robin Wall Kimmerer, *Braiding Sweetgrass*, 239.

A long journey has lead us through the perilous woods of questioning objectivity, crossing dangerously fast-flowing rivers of assumptions of binaries, slogging through tricky bogs of power dynamics, all the way here, to the epilogue of this thesis. The clear-cut difference between the sciences and the humanities is no longer as trustworthy a basis for my career choices as my parents had assumed, and the path of science has revealed itself to be much more queer and strange than I was ever told. We have traversed the map of knowledge and erased the boundaries of territories along the way, realizing that the dualisms that keep the sciences and the humanities separate are in fact fictional. With the recognition of storytelling as a part of scientific practice, we have redrawn these fictional lines on the map to be queer, and to allow knowledge to exist in many transitioning forms.

In this final chapter, I will recap the work that brought us to this point, and discuss how these conclusions relate to the greater dualistic worldview that is the context of the sciences-humanities dualism. I will furthermore suggest questions for further research, and finally, my hopes for the future of academic research.

5.1 Review of chapter conclusions

In the first part of this thesis, we engaged with the act of queer defamiliarisation, and compared the sciences to Ancient Greek mythology in their social roles, explanation of the natural world, and narrative structure.

The first chapter showed us that science, like myth, plays an important role in our understanding of how human beings relate to one another other, as well as to the natural world. Both science and myth inform us of how we should treat non-human entities as well as other human beings, and teach us about what it means to be human. Both also influence our social and political culture through their function as language apparatuses, guiding the way we communicate with one another and what aspects of the world are considered valuable. The shared qualities between science and myth made it clear to us that science is in its social function strangely similar to myth.

In the second chapter, we dove into the content of science and explored how science and myth share many ways of explaining the natural world. The personified and allegorical elements of mythological stories may have seemed like a magical and unreasonable way to explain natural phenomena, but we discovered many examples of personification and metaphor in the modern sciences. Personified ocean waves, monster biology, and ever-shifting categorizations abound, bringing to light the queerness of science as we know it.

Besides the content of scientific research being mirrored in mythology, in Chapter 3 we saw how the form and structure of scientific practice does the same. The narrative form of myths was clearly recognizable in the structure of scientific experiments, from story-like thought experiments to the abstraction of lab experiments from nature. An experiment was reframed as an imposition of narrative upon the natural world, queerly defamiliarising the act of the lab experiment to show how this quintessential act of science already exists beyond the binary limits of the sciences and the humanities. Lastly, this chapter explored the shared contexts that are required for the understanding of myths in Ancient Greece as well as modern-day experiments. We saw that experimental results require interpretation based on a greater set of assumptions, much like a singular myth required connection to the Ancient Greek mythological world. This interpretation led us to another element of queerness, where we recognized that the inherent diversity of natural phenomena may be acknowledged in science to help us reach a more realistic understanding of the natural world. Overall, the first part of this thesis brought to light the queerness of science as we know it, illustrating how science already does not conform to the boundaries imposed on it by the dualistic worldview. In the second part of this thesis we pushed the boundaries even further to say that this queerness of science is actually a good thing, and should be embraced.

In Chapter 4, I proposed the use of storytelling as a research method. Instead of attempting to eradicate any trace of the humanities from the sciences and thereby sticking to our fabricated map of knowledge, we discovered how the acknowledgment of narrative elements in science allows us to become more accountable for the influence of our perspective on our research, leading us to a "situated" form of knowledge-making. Further embracing storytelling as a research method also allows for a queer understanding of knowledge, where the translation of knowledge between different forms results in creative knowledge-making. We would benefit from this due to a queer knowledge's allowance for multiple perspectives, the generation of new, unexpected questions, and greater accessibility for and of different knowledge-practices.

In conclusion, with this thesis I have attempted to convey to my reader an exploration of the perceived dualism between the sciences and the humanities, and have offered a move beyond only the recognition of this constructed dualism. Moving beyond social constructivism, this thesis proposes a framework for tackling dualism: having realized that narrative permeates the boundaries of science, rather than considering scientific knowledge purely a social construct and therefore not a valuable description of reality, I have argued that taking accountability for and embracing narrative in research as a method actually benefits research while simultaneously tackling the dualisms that still haunt our academic subjects and society.

5.2 Effects on the dualistic worldview

As discussed in the Prologue of this thesis, the science/humanities dualism does not stand independently. Instead, it is a component of a dualistic worldview, consisting of many interwoven dualisms. This means that beyond only impacting scientific research, the dissolving of the boundary between the sciences and the humanities also impacts our social understanding of other components of this worldview. The subverting of the humanities/science opposition can support the dismantling of the dualistic worldview. Furthermore, the understanding of a neutral and objective science is inexorably linked with a male-dominated scientific field and perspective. Men are assumed to be inherently neutral and unbiased, while women and others must first overcome the state of their being to be objective (they are considered to be impacted by their gender, while men are not). Even empirically speaking this dynamic is at play: while the highest levels of most fields tend to be dominated by men, women are generally relegated to the humanities instead of the sciences, and many female scientists experience sexism in the workplace.¹⁶¹

Understanding that science does not hold a moral high-ground in relation to the humanities plays a role in undoing the negative or lesser associations with the humanities. This can have as an effect that the work in the humanities by women is seen as just as valuable as that by men, as well as no longer allowing such a strong association between the sciences, objectivity, and maleness. Instead of the objective male sciences and the subjective female humanities, we have queer knowledge: neither male nor female, and recognizing and accounting for the locality of our own perspectives and apparatuses.

Besides the role this thesis can play in tackling a sexist dualism, there are many other dualisms that can be affected. One dualism that is clearly linked to the science/humanities distinction is that between Western (colonized) knowledge versus Indigenous knowledge, where Western knowledge is seen to be more advanced and truthful than Indigenous methods of knowledge-making. As discussed in chapter 4, the explicit incorporation of narrative as a method in research can make science more accessible, to Western Euro-American audiences as well as Indigenous scholars, or anyone else who engages differently with knowledge than through the Western Euro-American academic standard. If we can't recognize that narrative plays a role in and is beneficial to our own understanding of scientific knowledge, "Western science" is inherently in opposition to other knowledge-making system and therefore entirely inaccessible to anyone outside of its own immediate community, unless others are compelled to follow the same methods (which would be an act of colonization). Instead of seeing science as an impervious and objective field, in which inherently no one who recognizes and embraces their background and locality can participate,

[&]quot; LNCH, "Rapport Harassment in Dutch academia. Exploring manifestations, facilitating factors, effects and solutions," accessed September 27^a, 2022, https://www.lnvh.nl/a-3078/harassment-in-dutch-academia.-exploring-manifestations-facilitating-factors-effects-and-solutions.

recognizing narrative in science shows us that science is queer, a little strange and changeable, and that that can be a strength. Methods of knowledge-making that are other than Western science are just as valuable, because a local perspective is all anyone ever has. Combining more different local perspectives may be just the thing that teaches us about the world.

5.3 Proposed further research

This thesis proposes a framework for tackling dualism within academia, and, I hope, thereby plays a role in the further dismantling of the dualistic worldview. However, there are many more boundaries to identify and divides to cross. On the scale of method, this thesis focusses predominantly on the use of narrative as a method of communication for knowledge. While narrative interviews are already recognized in some fields as legitimate information, predominantly the social sciences, more research can be done into the use of narrative as data collection outside of this field.¹⁶²

Furthermore, the use of storytelling as a method also needs more research in the form of practice, since it is not a format that everyone may feel equally comfortable with. As a demonstration, I have provided an example of storytelling as research in the Appendix of this thesis: I have included a fictional short story, which I have written as a different form of this thesis. Through writing it, different elements of my thesis came to the foreground, giving a different perspective on the topic of this thesis. I believe it would be valuable to do more research into how knowledge can practically be translated into different forms, and what affect the materiality of, for example, a written story versus an oral story may have on the conveyance of this knowledge.

Beyond the use of narrative as a method, other methods such as poetry, illustration, material craft, or other creative activities can also be explored as knowledge-making practices, for the same beneficial reasons as storytelling. To illustrate this point, I have also included a poem version of my thesis, which can be found in the inside cover page of this thesis as well as in the appendix. More research can be done into the effects of specific forms on knowledge beyond the narrative, some of which is already being done right now by intersectional feminist authors.¹⁶³

McAlpine, "Why might you use narrative methodology?"

¹⁰ Rebecca Coleman, Tara Page & Helen Palmer, "Feminist New Materialist Practice: The Mattering of Methods," *MAI: Feminism & Visual Culture 4* (Summer 2019).

Further research can also explore the use of the scientific method to answer questions that are not usually answered that way, for example questions of literary analysis. Based on Elgin's understanding of not only experiments as narratives but narratives as experiments, it would be an interesting element of literary analysis to analyze a text based on how it functions as an experiment. This would give the reader a new and unfamiliar understanding of the text; queering our knowledge of it.

Lastly, I believe it is of utmost importance to listen to and create space for Indigenous scholars to speak on narrative and storytelling. This thesis is certainly not the first to suggest the use of narrative as method, and while I consider its use as a queer method very valuable, it is also important to recognize the existence and oppression of story as knowledge in Indigenous cultures.

5.4 Hopes for the future

I am really only just beginning my academic career, but so far, I have done my best to see knowledge indiscriminately. Rather than dividing research fields based on their differences, I believe the differences between fields are valuable additions to any kind of research. I hope there will be a future in my lifetime where students can write fictional stories as a physics experiment, or make a painting to illuminate animal behavior, or engage in an experiment to demonstrate the literary structure of an Ancient Greek myth. A future where knowledge is wholeheartedly seen as queer: changeable, non-exclusionary, endlessly creative, and not defined by any boundaries imposed on it.

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The end

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Appendix 1 – Short story

Where the Moss Grows

"I wish you wouldn't do this," my parent says, frowning at me from the doorway to our kitchen, where I am sorting food to go in my pack.

"Someone has to," I reply. "I'm tired of this argument, and I have to finish packing. I'm leaving at sunrise tomorrow, and it'll only be a few days, anyway."

My parent only sighs, but they leave me be. I pause in my packing for a moment. I understand where they're coming from, I really do. But our town has been falling apart, and nothing is helping anymore. Someone has to do something.

At first, there were only minor earthquakes. The first tiny, negligible cracks in the ground were so inconsequential that no one knows when it all started, exactly. But over the years, the rips in the ground had grown, accompanied by earthquakes of various scales. Eventually, the cracks were big enough that kids had to jump over them when playing in the streets, and houses were starting to collapse due to the unstable ground.

Nobody knows the cause. Some people full-on denied the existence of a problem for as long as possible, though even the staunchest denier is struggling at this point. Most people, however, have been toiling endlessly to fill the cracks with more cement and repair the houses, making them sturdier to prevent collapse. But the earth keeps shaking, and the ground keeps cracking, and something needs to be done. Which is where I come in.

Some people suspect that the mountain near our town could be the cause of the earthquakes, though we're not sure how. But that seems like the best place to start, and it is only a one-day hike to the base of it. With my experience as a scout leader, I have the skills needed for hiking and navigating in the woods that others don't have. I can go out and search for the cause of the destruction, and hopefully help our town somehow. Maybe a search into the forest will give us some insight into what is happening. But first, I need to finish packing.

The next morning arrives bright and early, Dawn blooming across the horizon.¹⁶⁴ My parents are still asleep, so I leave a note for them and quietly leave the house. The town is quiet, especially on the outskirts where my family lives. I walk through the hushed streets and munch on a protein bar, thinking about the hike ahead. The pinnacle of the mountain can be reached, though it can be a dangerous hike. I have never been all the way to the top, but a previous multi-day backpacking trip brought me to about halfway up, so I'm confident I'll be able to traverse the terrain.

The first day is relatively uneventful. I navigate using a map and my compass, making sure to pass plenty of streams in which to refill my water bottle. The woods seem less disturbed by the natural disasters than the town does, somehow. Maybe the woods are better at repairing themselves than we are. I only feel a tremor once during

¹⁶⁴ Echoes the 20+ iterations of Dawn in *The Iliad*. Homer, *The Iliad*, 5.

the day, shortly after stopping for lunch. I hunch down on the ground, suddenly very aware of how risky it is to be beneath the tree cover during an earthquake. But the shaking passes without incident, and I press on. At the end of the day, I camp at the base of the mountain, setting up my tent out of the wind. I can't see the stars through the trees, but fireflies flicker around me bright enough to be the stars themselves. I poke my head out of the opening of the tent, into the chilled night air, and count fireflies until I fall asleep.

I pack up camp in the morning, while Dawn still graces the sky with flowers. What comes next is at least a four day hike up the mountain, and I have to admit I am not as keen on it as I might have indicated to my parents. The mountain looms high before me, a seemingly indomitable peak.

"Come on, Q," I cajole myself, only feeling a little silly talking to myself in the quiet woods. "It's just one step after another." With that thought in my mind, I pull the straps of my backpack tight against me and start my hike up the mountain.

The first two days go well, even if the hike isn't easy. Loose rocks clatter down the mountain as I pass, and one misstep could lead to a twisted ankle, stranding me on the mountain. The tremors are also getting more intense, it seems. They happen more often, and I start to worry about the possibility of an avalanche. But the terrain is still relatively familiar to me and I came prepared with rope and plenty of supplies for if I do get stuck.

As I get higher up the mountain, the landscape around me seems to become more and more strange. I think I recognize the trees that grow on the mountain-face, but they don't look like they're supposed to. Or at least, they don't look like I expect them too. The trees are shorter and broader than I'm used to, as if their growth has been stunted. The air gets thinner too, and my ears pop as the elevation increases. As I climb higher and higher, the trees become more and more sparse, until the landscape is empty, rocky and entirely unfamiliar to me.

After four long days of traversing the perilous mountain-path, a last turn around the mountain leads to me to the top, and I am awed breathless. The mountain gives me a view of the entire valley below. I use my hands to block the sun and realize I can see the buildings of my town, far in the distance below the mountain. The chilly wind buffets me but I stand steadily, looking down past the bare rocks and strange trees, to the familiar forest at the foot of the mountain. It's not actually very clear where each different type of landscape starts, I realize. They all transition into one another quite gradually. Entranced by the view, I don't immediately realize when the next tremor starts.

The earthquake rocks the mountain, stronger than I've ever experienced. I lose my balance with the unexpected movement and fall to my knees, hitting the rocky ground with a cry of pain. Gravel clatters beside me on the trembling earth. It feels like the whole world is shaking apart. I stay low to the ground and crawl away from the edge of the cliff, further toward the middle of the peak, and wait for it to end.

It feels like it takes an eternity, but eventually the shaking ends, and all is quiet again. I stay on the ground in case of aftershocks, but I sit up to look around. My body aches from the tension of trying to lay still on the ground. As I roll and massage the kinks from my shoulders, I suddenly realize that not all of the landscape is as bare as I had first thought. Rather, greenery adorns everything, though the plants are not the kind I am used to. The cracks in a large pile of boulders a few meters away are covered in mosses, lush and green. How is it possible that they adapted to this harsh environment? How could anything grow with barely any soil?

I start to get up to investigate, placing my hands on the ground below me to push myself into a standing position. As I do, it occurs to me that the ground beneath me does not feel like natural earth. My fingers don't feel the rounded edges of stones, or the gritty texture of mountain rock. It feels familiar to me, though, like sitting on the sun-warmed sidewalk in front of my home.

In shock, I stand up, staggering under the weight of the pack I'm still wearing. I drop my bag on the ground and climb up the mossy boulders, suddenly able to see what I could not see from my perspective sitting on the ground: the peak of the mountain has been changed from its natural form, as if it has been filled with cement and pavement. The man-made material is clearly very old, with many cracks running through it and pieces broken off. As I stare at it in amazement, understanding dawns on me slowly. The altered vegetation, earthquakes, a hole on top of a mountain filled with cement: it sounds almost laughable, but could this mountain be a volcano? Why would anyone attempt to fill the crater of a volcano like this? If the volcano is currently active it's no wonder we've been having so many earthquakes.

It is not very long until nightfall, so I decide to camp at the top of the mountain. I struggle to sleep knowing I am so near to what could potentially be an extremely dangerous crater, tossing and turning in my anxiety. But it is much too risky to traverse the mountain path at night. All I can do is hope that the crumbling pavement-filling will last for one more night, keeping me safe. But once I return to the town, something has to be figured out.

The next morning, Dawn's flowers blooming across the sky, I pack up as quickly as I can and head back down the mountain, eating breakfast on the go. I keep up the pace, hiking much more quickly than on the way up, and have to catch myself from skidding down the path a couple of times in my haste. Everything looks so queer to me now, from the stunted trees and lack of vegetation (I guess explained by the volcano having been active at some point), to the forest that used to be so familiar to me. Knowing that the disastrous earthquakes were caused by something we ourselves imposed upon the environment makes everything quite strange.

My rush pays off: I reach the woods at the base of the mountain halfway through my third day of hiking, half a day quicker than the hike up. I decide to keep hiking through the evening and into the night to make it back to the town as soon as possible. The forest around me hums with nighttime critters, fireflies lighting the way along with my flashlight. When I finally step into the town limits, I am met with wreckage beyond any scale we have experienced previously.

"Oh no," I whisper to myself as I pass a crumbling school building. The earthquake I experienced on the volcano must have hit very hard down here. The devastation weighs heavily on my chest, tightening my breath. I hurry past cars stuck on the cracked roads and re-built houses that are falling apart once more, until I make it to my parents' house.

My heart lifts with relief when I see that our house is still standing, lights burning warmly in the downstairs rooms. I have to pick my way carefully through shattered roof panels on the sidewalk, but the house itself seems luckily preserved.

"Hello? I'm back, is everything okay?" I call out as I open the door and walk in. The familiar feeling of home greets me, though I can't shake the feeling of strangeness that clings to me after my eye-opening trip.

My parents rush to the hallway where I stand when they hear me, and envelop me in hugs. "Oh Q, we were so worried!" one of my parents says, their face pushed into my hair from the tightness of their embrace. "We had such a big quake, and you were on that mountain all alone. I'm so glad you're alright."

I give myself a minute to absorb the comforting welcome, sinking into my parents' arms. While my parents may have been wrong about the state of our landscape, they have always cared for me. They could not have known that their teachings were a part of such a devastating negative impact. But after that minute, I shrug them off gently. It is time to discuss.

"I have something important to tell you," I say, and lead us to the living room.

My parents take the news with surprising grace; they are confused, of course, and question me about whether I'm really sure. One of my parents finds it especially difficult to believe. They have worked in and near the forest for years, how could they have never noticed? But eventually they both come around to the notion; they have no reason not to believe me since I gain nothing by lying, and we have no better explanation.

"There will be another town hall meeting tomorrow, you should present your findings then," one of my parents says.

"Some people are likely to refuse to believe you," the other adds solemnly.

I nod, having thought of this. "I don't need everyone to believe me," I respond. "Just enough people to make a change."

I barely sleep that night, instead tossing and turning restlessly. I truly believe that we have to undo what has been done to the mountain, and I am prepared to argue in defense of this belief. But what plagues me is the question of why the mountainfilling is there at all. What purpose could it serve?

The town hall meeting thankfully provides me with some answers. My story is met with mixed reactions: those who suspected the mountain to be the cause of the earthquakes are supportive, their ideas confirmed by my tale. Many are just happy to have some kind of answer for our troubles, even if it seems an outlandish one. But many are also suspicious of my explanation, or even dismissive. Debate rages for long enough that I have to tamp down my impatience.

"I can take you there if you need proof, but we have to act quickly," I implore them. But some of the citizens won't even hear of hiking up the mountain to see for themselves. "I don't need to go all the way up there to confirm that we shouldn't change anything," one of them says. "Even if you are correct, then there must be a reason why it is the way it is. Undoing it will likely be even more dangerous than it is

The disagreement seems too big to reconcile for some of the people at the meeting, but others who *do* believe something needs to be changed call their loved

now."

ones to join us at town hall. Overall, we end up with a majority vote among the townspeople for removing the man-made material from the volcano, if it can be done safely.

"Do we know why it's there?" a teacher asks eventually. "Maybe that will help us figure out how to get rid of it." With the librarian's help, we are able to get access to the old town plans, and study the map of our territory. I trace the boundaries of the town across the aged map with my finger.

"It seems like the volcano lies on a border of the town's land," the town baker says, following along with me. "Could it be that the volcano was blocked so that we could build the town here, specifically, without risk of an eruption?"

"If that's the case, we might need to change a lot about how we live," I say, the realization making my stomach sink despite my conviction. "If we let the volcano act naturally, the town will be at risk of burning."

"It is already burning," a retired construction-worker replies matter-of-factly. "Moving and building once seems much more efficient than having to rebuild the entire town every few months due to the earthquakes."

"But how will we know where we can build? We have never seen this volcano active, we have no idea how it will change the landscape."

A kid pipes up, one of the students of the broken-down elementary school I had passed the day before. "I have family to the south..?," they say, almost like they're asking a question. The teachers nods encouragingly for them to go on. The kid takes a deep breath and continues, "They live near an active volcano, but they learned how to build their town in a way that they were at the least possible risk if there was an eruption. Maybe we can ask them for help?"

Together as a town, we seek the help of those who know how to live in harmony with their surroundings, rather than imposing their will upon it. With much advice, time, and effort, the cement and pavement blocking the volcano are slowly chipped away bit by bit. There are more intense earthquakes, at first, and a lot of people in the town have to be relocated. But the citizens of the town support one another, and over time we find more stable housing. The landscape changes considerably: the sporadic eruptions of the first few years of reworking the town boundary left a lot of the forest decimated. But the woods are regrowing slowly, and the open space allows for the flourishing of many plants that had not been spotted here in many generations. And over time, the earthquakes have come less and less often, until now there are only occasional quakes. The shared experiences from other towns have also shown us how to build houses better fortified against the shaking, so those occasional earthquakes do not have such a devastating impact. The official boundary of the town is now redrawn to include the mountain. It has made clear to us how inconsequential and artificial these boundaries really are, in the face of the reality of the material world. We have undone our self-imposed rigidness, and have learned to welcome the strange, undefinable queerness of the world.

Appendix 2 – Poem

Stuttering Hands

Your clay creations keep collapsing. You have only ever known how to sculpt, but now you are the wheel, (you are) at a loss.

You have lost your hard lines, you have lost your sharp edges. Your clay creations keep collapsing, and the wheel just keeps on spinning.

You start again, more gently. Let the clay go where it moves. Your hands stutter through the making of shapes they have not held before.

> You have gained soft edges, you have gained round lines. And yet, it is still good. It is still yours.

