

**IGNORANCE PRODUCTION  
AND  
CORPORATE SCIENCE**

by

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## **Abstract**

This thesis is a philosophical exploration of “agnotology”, the study of ignorance or non-knowledge, and focuses on the production of ignorance for private interests. In particular, I argue that corporate science often deliberately produces ignorance in an effort to promote corporate interests. My thesis is structured into five chapters. In Chapter 1, I introduce agnotology and outline Robert N. Proctor’s three categories thereof: ignorance as native state, ignorance as selective choice, and ignorance as active construct. In Chapter 2, I present a review of the agnotological literature on the basis of which I argue for two expanded categories of ignorance: ignorance from ideology, and ignorance from interest. In Chapter 3, I address the question of the normative assumptions underlying agnotology. As well, given agnotology’s task of unpacking the values laden in science, agnotology’s normative conception of science may stand in tension with a conception of science as objective, neutral inquiry. In the end, I argue that agnotologists need not deny science’s objectivity when they view science as value-laden. In Chapter 4, I present a case study. Through an agnotological analysis, I argue that some HPV vaccine legislation was passed via agnogenesis. I also argue that the silencing of vaccine skeptics is a form of agnogenesis. This case, interpreted in the light of the novel agnotological framework developed in Chapters 2 and 3, supports my main thesis that corporate science serves primarily corporate interests via agnogenesis. And, finally, in Chapter 5, I present concluding remarks, draw out the limitations of the thesis, and offer suggestions for directions of future research.

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## **List of Abbreviations**

FDA ..... Food and Drug Administration

HPV ..... Human Papillomavirus

WIG ..... Women in Government

# Chapter 1

## Introduction

*We are often unaware of the scope and structure of our ignorance. Ignorance is not just a blank space on a person's mental map. It has contours and coherence, and for all I know rules of operation as well. So as a corollary to writing about what we know, maybe we should add getting familiar with our ignorance.*

Thomas Pynchon (1984)

### 1.1 What is Agnotology?

Epistemology, the theoretical study of knowledge, is the third most common area of specialization and primary specialization in philosophy.<sup>1</sup> Many normative, moral, social and political questions depend on conceptual assumptions about knowledge, both within and outside philosophy, for analyses of various important normative, moral, social and political questions. Despite the significance of epistemology, *ignorance* is not widely theorized by philosophers. Perhaps this is because ignorance appears simply to be a passive, natural feature of epistemic impoverishment. Ignorance is like a non-philosophical problem with a straightforward solution – more knowledge! However, it is not clear that passivity is an inherent feature of ignorance, nor is it clear that *more knowledge* always cures ignorance.

‘Agnotology’ is a term coined by Robert N. Proctor (1995), from the Greek prefix ‘a-’ for ‘without’ and term ‘gnosis’ for ‘knowing’ or ‘knowledge’. He offers an extensive account of the concept in *Agnotology: The Making and Unmaking of Ignorance* (2008), which he co-edited with Londa Schiebinger. Juxtaposed with traditional epistemology, which focuses on what knowledge *is*, agnotology’s focus is “on knowledge that *could have been but wasn’t*, or *should*

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<sup>1</sup> “The PhilPapers Surveys: Demographic Statistics,” *PhilPapers: Philosophical Research Online*, Since 2009,

*be but isn't.*"<sup>2</sup> Agnotology analyzes descriptive and normative conditions of ignorance, highlighting how some social arrangements depend on ignorance. For Proctor, ignorance "is often not a natural consequence of imperfect knowledge but a political consequence of conflicting interests and structural apathies. Controversy can be engineered: ignorance and uncertainty can be manufactured, maintained, and disseminated."<sup>3</sup> Agnotology seeks "to question the *naturalness* of ignorance, its causes and its distributions."<sup>4</sup>

Ignorance is commonly perceived as a problem, and one to be solved by acquisition of knowledge. But it is not always a problem. As Proctor argues, "no one needs or wants to know everything all the time; and surely all of us know things we would rather others not know."<sup>5</sup> Certainly under some conditions, ignorance is justified or even desirable. For instance, the right to privacy is a sanctioned kind of ignorance. As Proctor notes, governments are typically not seen as having the right to know everything about the personal and professional lives of its citizens; acquiring certain forms of knowledge requires special conditions and warrants.<sup>6</sup> Meanwhile, it is an open question as to whether more knowledge is always the best way to combat ignorance is always combatted with more knowledge. Can the creation of knowledge always straightforwardly rectify ignorance? To be sure, some kinds of ignorance can be immediately resolved with knowledge. But there are some cases in which increased knowledge actually increases ignorance, such as when new knowledge reveals new possibilities for knowledge, possibilities that were previously impossible to articulate. For example, a defense

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<sup>2</sup> Robert N. Proctor and Londa L. Schiebinger, *Agnotology: The Making and Unmaking of Ignorance*, Book, Whole (Stanford University Press, 2008), vii.

<sup>3</sup> Robert N. Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer* (New York: BasicBooks HarperCollins Publishers, 1995), 8.

<sup>4</sup> Proctor and Schiebinger, *Agnotology: The Making and Unmaking of Ignorance*, 3.

<sup>5</sup> *Ibid.*, 2.

<sup>6</sup> *Ibid.*

lawyer for an accused client often presents knowledge to the jury that has the effect of increasing the jury's ignorance with respect to the accused's innocence or guilt.

Or, as will be shown in this thesis, some contributions to knowledge can effectively cast doubt on others. Thus, it seems that ignorance is diverse, complex, and multifold; where some ignorance is necessary, other forms of ignorance are constructed and distributed.

The rest of this introduction will map some different kinds of ignorance and agnogenesis, where agnogenesis means ignorance production. My point of departure will be Proctor's three-fold categorization of ignorance – as native state, selective choice, or active construct.<sup>7</sup> From here, I will divide the active construct category into two sub-categories: ignorance from ideology and ignorance from interest. These sub-categories, I argue, are necessary for diagnosing the sources and even the existence of some significant examples of the commercial production of ignorance.

## **1.2 Proctor's Three Categories of Ignorance**

### **1.2.1 Ignorance as Native State**

Proctor's first category of ignorance, native state or resource, refers to the common conception of ignorance. From this perspective, ignorance is an innocent state exemplified by infants, the starting point from which knowledge can be acquired. This is the "blank slate" or "tabula rasa" that many philosophers have assumed characterizes the infant mind. Proctor writes, "I have called it *native ignorance*, because the notion is of a kind of *infantile absence* by virtue of primitivity, a dearth or cavity that is rectified (filled) by growth or birth [of knowledge]."<sup>8</sup>

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<sup>7</sup> Ibid., 4–10.

<sup>8</sup> Ibid., 5.

Native ignorance is also a resource, the soil in which things can be planted. In other words, ignorance is not merely a blank slate; it is a space for potential knowledge. Ignorance is the condition from which people can ask and attempt to answer new questions. Native ignorance enables scientific inquiry, and without it we would idle “the engines of knowledge production.”<sup>9</sup> In this sense, ignorance as native state is not a form of passive ignorance, in the way that ignorance is commonly conceived. Ignorance as native state is, in a sense, a *tabula rasa*, but one that beckons to be inscribed with knowledge. This is what allows ignorance to exist as a resource; it allows for the possibility of inquiry and the possible satisfaction of the desire to know.

### 1.2.2 Ignorance as Selective Choice

Proctor’s second category of ignorance, a lost realm or selective choice, reflects inquiry’s essential selectivity.<sup>10</sup> When we pursue a particular line of inquiry, we necessarily exclude another. By narrowing our focus on one direction, we become inattentive to other possible paths. As Proctor says, “we look *here* rather than *there* [...] Ignorance is a product of inattention, and since we cannot study all things, some by necessity—almost all, in fact—must be left out.”<sup>11</sup> Proctor offers the example of a case described by Schiebinger. During the first few centuries of European transits of the Atlantic and circumnavigations of Africa, explorers and their patrons sought not only fame and fortune, but also knowledge and resources. However, “only certain *kinds* of goods were important, while others were ignored.”<sup>12</sup> Schiebinger illustrates that

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<sup>9</sup> Ibid.

<sup>10</sup> Ibid., 7.

<sup>11</sup> Ibid.

<sup>12</sup> Ibid., 8.

explorers knew of abortifacients—artefacts of abortion and birth control—but chose to ignore them. These explorers were interested in populating and colonizing new territory, and abortifacients did not seem relevant. This is an example of passive ignorance, not borne of deliberate action, but rather of passive disinterest.<sup>13</sup>

### 1.2.3 Ignorance as a Strategic Ploy or Active Construct

Proctor's third category of ignorance, strategic ploy or active construct, seems in tension with standard view of ignorance—ignorance as a native state. Ignorance as a strategic ploy is not a natural, native state, but rather something actively produced. As Proctor writes, “This is an idea insufficiently explored by philosophers, that ignorance should not be viewed as a simple omission or gap, but rather as an active production. Ignorance can be an actively engineered part of a deliberate plan.”<sup>14</sup> Ignorance can be produced and used as a strategic ploy, precisely *because* ignorance is typically viewed as a native and curable state. So, ignorance as a strategic ploy dissembles through its rhetorical dependence on the common assumption that ignorance is a native state. It might also work by exploiting the selective nature of attention, in which cases it is pragmatically dependent on the second kind of ignorance.

The history of the tobacco industry provides an example of ignorance as active construct. In the 1950s, tobacco companies used mass advertising and research forums to argue that the claim that cigarettes cause cancer and death “had not bet been ‘proven.’”<sup>15</sup> Cigarette manufacturers targeted methodological problems with the claim, like that the animal testing used

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<sup>13</sup> Ibid., 7–8.

<sup>14</sup> Ibid., 9.

<sup>15</sup> Ibid., 11.

to support it could only show that exposure to smoke was a “mouse carcinogen,”<sup>16</sup> as opposed to a carcinogen relevant to humans. The tobacco industry was using whatever strategy they could to dispute the evidence that cigarettes are carcinogenic to humans. As Proctor writes: “True proof was hard to have short of experimenting on humans,” which would have been extremely unethical according to all concerned.<sup>17</sup> Establishing scepticism about competing knowledge claims was the tobacco industry’s game. “Doubt is our product,” claimed an internal quote from Brown & Williamson officials.<sup>18</sup> From around 1958 onward, the Tobacco Institute published a newsletter called the *Tobacco and Health Reports*. It was sent to physicians, journalists, industry opinion-makers, and government to highlight every other possible cause of cancer *except* tobacco.<sup>19</sup>

Typical for 1963 and 1964 were articles with titles such as “Rare Fungus Infection Mimics Lung Cancer,” “Viral Infections Blamed in Bronchitis Outbreaks,” “English Surgeon Links Urbanization to Lung Cancer,” “Nicotine Effect Is Like Exercise,” “Lung Cancer Rare in Bald Men,” “28 Reasons for Doubting Cigarette-Cancer Link,” and “No One Yet Knows the Answers.” The magazine blamed bird keeping (feather mites), genetics, viruses, air pollution, and every other possible cause of lung cancer epidemic—except tobacco.<sup>20</sup>

This example of ignorance is also selective choice: the tobacco industry diverts from *their* products causing cancer to drawing attention to any other possible cause of cancer. The process instils doubt in readers, allowing them to continue smoking (and buying cigarettes) until

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<sup>16</sup> Ibid., 12.

<sup>17</sup> Ibid.

<sup>18</sup> Ibid., 17.

<sup>19</sup> Ibid., 15.

<sup>20</sup> Ibid.

they can be certain smoking is harmful. As exemplified here, the tobacco industry has a large incentive to prevent certainty and maintain doubt in smokers instead.

### 1.3 Social Construction of Ignorance in Commercialized Science

Industries use scientific knowledge to disseminate and distribute ignorance, by positioning knowledge claims in ways that misdirect or mislead the public. To illustrate commercialized ignorance-production, or agnogenesis, I use Proctor's research on the tobacco industry. Proctor's agnotological research on the tobacco industry might be one of the most well-researched and well-documented examples of agnogenesis.<sup>21</sup>

He argues that science serves multiple functions in the commercial sphere. Industries use scientific knowledge as a tool or resource, to negotiate political issues and to do public relations and marketing. For example, Proctor argues that industry appeals to science create a façade that represents companies' interests as unbiased scientific progress and development, as opposed to profit. This implies that companies are neutral, balanced, and level headed. However, Proctor takes seriously the idea that science itself is "value-laden," and draws attention to how industries use science *as* advertising.<sup>22</sup>

A chemical manufacturer may promote research into the hazards of a hydrocarbon, but the hoped-for effect may be to insinuate ambiguity and forestall regulation. A lead zinc association may call for greater precision in studies of how ingested metals affect intelligence, but the main goal may be to raise doubts about health risk.<sup>23</sup>

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<sup>21</sup> Manuela Fernández Pinto, "Tensions in Agnotology: Normativity in the Studies of Commercially Driven Ignorance," *Social Studies of Science* 45, no. 2 (April 1, 2015): 296, doi:10.1177/0306312714565491.

<sup>22</sup> Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*, 102.

<sup>23</sup> *Ibid.*

Notice that Proctor does not doubt the quality of scientific research supported by the tobacco industry. However, he points out ways that industry supports and uses science in value-laden ways, to filibuster public belief. When a scientific claim appears to be controversial, industry has time before regulation or policy is passed against their interests.<sup>24</sup> Companies can steer public attention selectively, away or towards something that suits the industry's interests. In industrial contexts like this, science can also play an ideological role. Proctor argues that appealing to science creates the façade that these associations are neutral, balanced, and levelheaded; it presents the picture of industries interested in scientific progress and development. "The tobacco institute can support 'good' medical research, but the hoped-for effect may be 'goodwill' towards the industry."<sup>25</sup>

What agnogenesis does best is *buy time*. Proctor notes that requests for more research can delay implementation of regulatory standards; research creates a demand for more studies to ease uncertainty; and it creates an apparent lack of expert consensus (real or not) that suggests "there must be room for disagreement."<sup>26</sup> But more importantly, industries use this kind of agnogenesis to serve their companies' interests. As Proctor writes:

The net effect is to jam the scientific airways with true but trivial work, distracting from what is going on more fundamentally. Bias in such cases lies typically not in the falsification or misrepresentation of research ... but rather in the diversion of attention from one problem to another—from causes onto mechanisms, for example, or from questions of health onto questions of free speech. ... Science usually requires some degree of precision, but a misplaced call for precision can also be wielded as a political tool. ... But since it is not just the righteous who have

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<sup>24</sup> Ibid.

<sup>25</sup> Ibid.

<sup>26</sup> Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*, 131.

recognized that scientific facts are (among other things) social constructs, the question of origins and intentions is a vital one. Bright lights may be used to cast confusing shadows, even when they cannot dazzle us to the point of blindness.<sup>27</sup>

In sum, using true but trivial facts, industries use ignorance by selective choice—diversion—and ignorance by active construct to instil doubt and confusion into their target audience. Filibustering public knowledge with trivial information is a form of ignorance production; by giving people too much knowledge on one side of the problem, they're left grossly ignorant on what lays on the other side. More importantly, powerful industry actors strategically formulate this concentration; it is not always an accident or coincidence when certain information is lost, ignored, or undermined.

### **1.3.1 Thesis Outline**

This rest of this thesis consists of three chapters. Chapter two provides, in four major parts, some philosophical background to the study of ignorance. The first part contextualizes my approach to agnotology, by outlining my approach to epistemology. This involves a discussion of Quine's naturalized approach to epistemology, its relationship with social epistemology, as well as a discussion of standpoint theory. Second, I will draw from the works of Charles Mills and Nancy Tuana, to suggest that ignorance can derive from ideology. Third, I will provide case studies drawn from Proctor, Oreskes and Conway, to suggest that ignorance can derive from interest. Fourth, I will re-examine Proctor's treatment of ignorance as active construct. In the last part, I divide Proctor's category of ignorance as active construct into two new sub-categories, ignorance from ideology and ignorance from interest. I argue that these new sub-categories will

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<sup>27</sup> Ibid., 131–2.

help us better to understand some modes of agnogenesis. In particular, ignorance from interest is relevant to agnogenesis in the pharmaceutical industry.

The third chapter addresses the question of normativity in philosophy of science and agnotology: namely, the question of what normative framework precisely it is that agnotologists are operating under. The chapter is divided into two parts. First, I will discuss Manuela Fernández Pinto's (2014, 2015) challenge to agnotology, and her proposal to establish a normative framework to support agnotology's descriptive claims. I will take issue with Fernández Pinto's concern for the objectivity of science, and provide a critique of her proposed normative approach to agnotology. Second, I will introduce Sergio Sismondo's (2015) concern that commercialized science involves a hegemony of knowledge and concentration of power in commercial interests. I will also discuss and recommend his case analysis approach.

The fourth chapter consists of an agnotological analysis of the HPV vaccine. I investigate the pharmaceutical company, Merck's role in legislation promoting the vaccine and in its dissemination. First, I introduce the risks associated with HPV. I then outline how the HPV vaccine is claimed to protect against these risks, and discuss the vaccine's efficacy and potential concerns regarding the evidence of its long-term efficacy. Through an examination of the HPV vaccine's mandate and the role that the pharmaceutical industry played in it, I transition from discussing the HPV vaccine specifically to discussing vaccines broadly. I outline the historical and social context of vaccine hesitancy, and I discuss the backlash this hesitancy caused, part of which consists of the silencing of vaccine skeptics and inquirers, as well as their shaming, and being deemed irrational and unscientific. I argue that this silencing itself is a form of

agnogenesis, in addition to arguing that the pharmaceutical industry explicitly used agnogenesis as a tactic in mandating the vaccine.

## Chapter 2

### Literature Review

#### 2.1 Quine and Naturalizing Epistemology

In his classic paper “Epistemology Naturalized,” W.V.O. Quine argues for a new approach to the study of knowledge that marks a major departure from traditional epistemology.<sup>28</sup> My goal in introducing Quine is to establish a canonical philosophical foundation for two non-canonical epistemic approaches, standpoint theory and the strong programme in the sociology of knowledge. Standpoint theory and the strong programme, in turn, are useful in helping us to understand the social construction of ignorance. Thus I introduce Quine in order to show that agnotology is a philosophical project, at least when approached theoretically.

Quine explains that the practice of traditional epistemology has two sides, the conceptual and the doctrinal. On the conceptual side, traditional epistemology is concerned with *meaning*; it seeks to clarify concepts by defining and redefining knowledge, and related concepts, in an effort to maximize precision. On the doctrinal side, it is concerned with truth; it aims to establish principles through proofs, in an effort to maximize the certainty of its conclusions. At the ideal end of inquiry, “definitions would generate all the concepts from clear and distinct ideas, and the proofs would generate all the theorems from self-evident truths.”<sup>29</sup> Traditional epistemology aims to provide a foundation of certainty for the natural sciences. On the conceptual side, it aims

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<sup>28</sup> W.V.O. Quine, “Epistemology Naturalized,” in *Epistemology: An Anthology*, ed. Ernest Sosa and Jaegwon Kim, vol. 1, Book, Section vols. (Malden, MA: Blackwell Publishers, 2000), 292.

<sup>29</sup> *Ibid.*, 292.

to explain “the notion of body in sensory terms,” and on the doctrinal side, it aims to justify “our knowledge of truths of nature in sensory terms.”<sup>30</sup>

Quine argues that traditional epistemology has failed. He draws a parallel with the failure of foundationalist research programs in mathematics. On the conceptual side, the programs attempt to reduce mathematical concepts to logical concepts. As he points out, in *practice*, mathematical concepts can only be reduced to set theoretical concepts, *not* purely logical concepts. Unfortunately, set theory does not offer a foundation of certainty in the way logical proofs might: the foundations of set theory are a quagmire. Worse, as Quine writes:

We know from Gödel’s work that no consistent axiom system can cover mathematics even when we renounce self-evidence. [...] Reduction in the foundations of mathematics remains mathematically and philosophically fascinating, but it does not do what the epistemologist would like of it: it does not reveal the ground of mathematical knowledge, it does not show how mathematical certainty is possible.<sup>31</sup>

Similarly, the conceptual side of epistemology fails to reduce ideas of the body to sensory terms, because “the typical statement about bodies has no fund of experimental implications it can call its own.”<sup>32</sup> We cannot possibly reduce *every* sentence to observational or logico-mathematical terms; and without this, there is no advantage of rational reconstruction in terms of sensation or mathematics.<sup>33</sup> Furthermore, there are persistent Humean objections to the doctrinal side of the foundationalist mathematical program: we cannot achieve certainty about general statements, or statements about the future, from our impressions or observations.<sup>34</sup> As Quine notes, the “mere

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<sup>30</sup> Ibid., 293.

<sup>31</sup> Ibid., 292.

<sup>32</sup> Ibid., 296.

<sup>33</sup> Ibid., 297.

<sup>34</sup> Ibid., 293.

fact that a sentence is *couched* in terms of observation, logic, and set theory does not mean that it can be *proved* from observation sentences by logic and set theory.”<sup>35</sup> In this way, Quine suggests that the foundationalist ambitions of traditional epistemology must be abandoned.

Quine argues that there is an alternative to traditional epistemology: we can instead practice epistemology from within the natural sciences, as a subfield of psychology. He concludes:

Epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science. It studies a natural phenomenon, viz., a physical human subject. This human subject is accorded a certain experimentally controlled input—certain patterns of irradiation in assorted frequencies, for instance—and in the fullness of time the subject delivers as output a description of the three-dimensional external world and its history. The relation between the meagre input and the torrential output is a relation that we are prompted to study for somewhat the same reasons that always prompted epistemology; namely, in order to see how evidence relates to theory, and in what ways one’s theory of nature transcends any available evidence.<sup>36</sup>

As many philosophers who have followed Quine have shown, there is plenty of room for philosophical work within this naturalistic framework.

Despite my agreement with Quine’s rejection of traditional epistemology, I am cautious of his positive recommendations for epistemology, because they continue to operate within an individualist epistemic framework. The individualistic focus is standard to mainstream epistemology: epistemology tends to be about the meaning and grounding of sentences of the form “S knows that P.” Quine’s naturalizing move kept that focus, attempting to place epistemology with respect to psychology, not sociology or anthropology. But many instances of

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<sup>35</sup> Ibid., 294.

<sup>36</sup> Ibid., 297.

knowledge are social phenomena, and, indeed, much of the knowledge we value most is not importantly held by individuals, but by groups. This is the case of scientific knowledge, for example: When we say that “we know that humans and chimpanzees share a more recent common ancestor than does either with gorillas,” we don’t mean that any particular person knows this, but rather are asserting that the claim has been well established and is accepted by the relevant scientific community. Similarly, most epistemologists of ignorance believe that a considerable amount of ignorance, and some its most interesting forms, are social phenomena: Agnotology begins from the perspective of social epistemology.<sup>37</sup>

Social forms of ignorance raise questions regarding how institutions and groups can be involved in systemic agnogenesis, and how this agnogenesis may affect society at large. The focus in my thesis is on social frameworks of ignorance. In particular, I want to explore two kinds of causal structures of ignorance: ideology and interests.

## **2.2 Ignorance from Ideology**

Despite Quine’s individualism, his naturalized epistemology made conceptual room for social epistemology.<sup>38</sup> Once knowledge is naturalized, it takes only a small amount of effort to see that much of it is importantly a social product and social object. As Charles Mills writes, “A naturalized epistemology had, perforce, also to be a socialized epistemology; this was a ‘straightforward extension of the naturalist approach.’”<sup>39</sup>

### **2.2.1 Standpoint Theory**

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<sup>37</sup> Charles W. Mills, “White Ignorance,” in *Race and Epistemologies of Ignorance*, ed. Shannon Sullivan and Nancy Tuana (Albany: State University of New York Press, 2007), 13.

<sup>38</sup> Ibid.

<sup>39</sup> Ibid., 14.

Standpoint theory originates in reflections by Hegel, Marx, and Lukács. Hegel inquires after what can be known from the perspective of the slave in his master/slave dialectic. Later, Marx and Lukács inquired about the standpoint of the proletariat in class relations. By the 1970s, feminists had emphasized the contribution of the perspectives of women to understanding gender relations.<sup>40</sup> This section draws insights from a strand of social epistemology, standpoint theory. Drawing from two standpoint theorists, Charles Mills and Nancy Tuana, I present a new sub-category of ignorance, ignorance from ideology. Ignorance from ideology is a framework for understanding when instances of ignorance exist in order to protect or maintain a political or social system of ideas or beliefs.

Standpoint theory is a branch of social epistemology that highlights the epistemic advantages and disadvantages of particular social locations. As Sandra Harding explains, traditional epistemology hides the epistemic significance of social location with four premises: the cultural-historical location is irrelevant because knowledge is universal; the subject does not occupy a determinate place in space and time, and can be abstracted from the spatially and temporally determinate objects of scientific knowledge; knowers are individuals, not significantly distinguished by membership in social groups (e.g., race, class, gender); knowers must be homogenous and unitary, to ensure that knowledge remains consistent and coherent.<sup>41</sup>

Harding points out that standpoint theory rejects each of these premises. First, standpoint theory insists that science “*is of an age*,” so knowledge cannot be ahistorical.<sup>42</sup> Second, subjects and objects of knowledge both exist in space and time, and thus “the same kinds of social forces

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<sup>40</sup> Sandra Harding, “Rethinking Standpoint Epistemology: What Is ‘Strong Objectivity’?,” in *Feminist Epistemologies*, ed. Linda Alcoff and Elizabeth Potter, Thinking Gender (Routledge, 2013), 49–82.

<sup>41</sup> *Ibid.*, 63.

<sup>42</sup> *Ibid.*, 63–4.

that shape objects of knowledge also shape (but do not determine) knowers and their scientific projects.” Scientific interactions with objects culturally constitute the subject, and the subject shapes the object through cultural meanings.<sup>43</sup> Third, knowledge is inherently social: standards of knowledge are identified, expressed and regulated by communities of knowers. And fourth, subjects of knowledge are distinguished by the diversity of their social positions and experiences: there is no such thing as a homogenous subject of knowledge. Epistemic norms of coherence and consistency are based on a myth “that unitary and coherent subjects of knowledge were to be preferred only by defining one socially distinctive group of people as the ideal knowers and arguing that others lacked the characteristics that made this group ideal.”<sup>44</sup>

Indeed, according to standpoint theory, the perspective of dominance in a social relation is epistemically limited, insofar as it is biased against knowledge that might disrupt the power dynamic of the relation. Marginalized perspectives are systemically ignored as an epistemic resource, because often the knowledge they make available would undermine the authority of those responsible for policy-making and shaping the lives of the marginalized.<sup>45</sup> Sandra Harding writes:

Marginalized peoples and those who listen attentively to them will point out that from the perspective of marginal lives, the dominant accounts are less than maximally objective. Knowledge claims are always socially situated, and the failure by dominant groups critically and systemically to interrogate their advantaged social situation and the effect of such advantages on their beliefs leaves their social situation a scientifically and epistemologically disadvantaged one for genuine knowledge.<sup>46</sup>

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<sup>43</sup> Ibid., 64.

<sup>44</sup> Ibid., 66.

<sup>45</sup> Ibid., 54–5.

<sup>46</sup> Ibid., 54.

As I have illustrated, standpoint theory emphasizes the social situatedness of subjects of knowledge to redefine and maximize objectivity. The marginalized subject's very position as marginalized involves potential for a critical standpoint not available to dominant groups. Situated knowledge becomes most important in the practice and understanding of science.

### **2.2.2 Ignorance from Ideology, Case 1: White Ignorance**

Mills' paper "White Ignorance" offers an example of the use of standpoint theory to illuminate the epistemic significance of ignorance (although the paper does not use the phrase "standpoint theory" explicitly). Mills argues for a social epistemology that attends to race. In particular, he is interested in what he calls "white ignorance."<sup>47</sup> White ignorance is motivated by ideological historical narratives, which can only function in relation to denial of whites' discrimination and violence against people of colour.<sup>48</sup> White ignorance is a strategic ploy to maintain white privilege: whites need not risk their privilege to rectify wrongs of which they aren't aware. Mills' account implicates race in various aspects of ignorance, including perception, memory, testimony and group interests. Mills argues that in white ignorance, people of colour are "[s]hut out from [the white] world by a vast veil."<sup>49</sup>

In what does white ignorance consist? Mills introduces ten premises. It might be possible to challenge or nuance some or many of these; I list them to provide a better picture of Mills' stance: (1) Race is not biological but rather socially constructed. (2) White ignorance, unlike more general ignorance, is an ignorance that is caused strictly by race. (3) There are degrees of white ignorance. (4) There are explicit and implicit racist white ignorance. Explicit white

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<sup>47</sup> Mills, "White Ignorance," 17.

<sup>48</sup> Ibid., 28.

<sup>49</sup> Ibid., 18.

ignorance may be outright acts of racism and hate speech. Implicit white ignorance may be the belief that blacks were granted equal opportunity in the abolition of slavery. (5) White ignorance is not literal. Anyone can have white ignorance, or, not have white ignorance (including people of colour having white ignorance, or white people not having it). (6) Black ignorance is a different category than white ignorance, presumably because black ignorance does not have privilege. (7) White ignorance is a moral non-knowing, a morally implicated concept. (8) While there are many kinds of ignorance, Mills' focus is race or racial ignorance. (9) White ignorance is not uniform across all white people; it is a tendency or disposition, but it is not the universal or absolute. (10) White ignorance is a normative concept, in that it should be reduced and eliminated.<sup>50</sup>

What are the processes of cognition and what role does race play in them? Mills focuses on five processes: perception, conception, memory, testimony, and group thinking or interests. While Mills analyses these processes individually, he acknowledges that they are often intertwined. Perceptions, Mills argues, “are in general simultaneously conceptions, if only at a very low level.”<sup>51</sup> There are no raw perceptions, unmediated by concepts.<sup>52</sup> For example, “savage” is a strategic concept, which serves white interests: savages are continuous with non-human animals, which means they are not citizens.<sup>53</sup> To perceive people of colour as savages is to justify refusal to recognize their citizenship. Along similarly strategic lines, early European

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<sup>50</sup> Ibid., 20–23.

<sup>51</sup> Ibid., 24.

<sup>52</sup> Ibid.

<sup>53</sup> Ibid., 26.

explorers perceived themselves as discoverers of empty lands, in that way denying the existence and rights of millions of inhabitants of those lands.<sup>54</sup>

Memory makes denial possible, because it is necessarily selective. Mills writes: “Memories and identities are not fixed things, but representations or constructions of reality... Memory work is embedded in complex class, gender, and power relations that determine what is remembered (or forgotten), by whom, and for what end.”<sup>55</sup> Historical narratives that commemorate the victories of whites, while forgetting wrongdoing against people of colour, preserve the innocence and privilege of whites. Mills points out that North American history typically selects against memories that highlight the severity of genocides and slavery in the Americas.<sup>56</sup> Through such examples, Mills illustrates how the selectivity of memory, and its concomitant forgetfulness, functions strategically to preserve ideology.

Testimony offers a clear example of the social nature of knowledge: we depend on the epistemic authority of others, for what we know.<sup>57</sup> However, the epistemic authority of a testimonial depends on more than justification or truth. The epistemic authority of testimony by whites depends on white ignorance. Charles Mills writes: “Nonwhite claims of knowledge that are not backed up by European epistemic authority” are often deemed irrelevant or stupid.<sup>58</sup> Historically, black slaves were plainly denied the right to testify in court. Further, “testimony about white atrocities—lynchings, police killings, race riots” are often “too explosive to be

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<sup>54</sup> Ibid., 27.

<sup>55</sup> Ibid., 28–9.

<sup>56</sup> Ibid., 29.

<sup>57</sup> Ibid., 31.

<sup>58</sup> Ibid., 32.

allowed exposure to white cognition.”<sup>59</sup> Black testimony is rejected *a priori* not because of the likelihood that it will be *false*, but because of its likelihood to be *true*: it is in the interests of whites systematically to ignore true testimony from people of colour, to preserve the belief systems that support white privilege. Mills concludes, “In whatever discipline that is affected by race, the ‘testimony’ of the black perspective and its distinctive conceptual and theoretical insights will tend to be whited out. Whites will cite other whites, in a closed circuit of epistemic authority that reproduces white delusions.”<sup>60</sup>

White group interests sustain white ignorance.<sup>61</sup> Whites stand to benefit from maintaining the status quo, which encourages epistemic distortions – biased perception, selective memory and strategic forgetfulness, and avoidance of true testimony that would undermine the cognitive underpinnings of white entitlement. Mills writes: “Whole societies may slip into collective modes of denial. ... Whole societies are based on forms of cruelty, discrimination, repression or exclusion which are ‘known’ about but never openly acknowledged.”<sup>62</sup>

Knowledge of wrongdoing against people of colour threatens white ideologies, the dominant narratives that function politically by protecting white privilege. By strategically safeguarding whites against knowledge of racism, white ignorance preserves the ideologies that ground white privilege.

### **2.2.3 Ideology-Driven Ignorance, Case 2: Ignorance of Women’s Sexuality**

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<sup>59</sup> Ibid.

<sup>60</sup> Ibid., 245–6.

<sup>61</sup> Ibid., 34.

<sup>62</sup> Ibid., 35.

Nancy Tuana's paper "Coming to Understand: Orgasm and the Epistemology of Ignorance," offers another example of the application of standpoint theory to highlight ignorance. The paper investigates the role of ignorance in scientific and commonsense understandings of women's sexuality and anatomy.<sup>63</sup> Tuana's primary objective is to argue that there is a lack of desire to acquire knowledge about women's sexuality. This lack, she argues, illuminates the connection between *whose* desires control *what* knowledge is produced. Along this line, Tuana provides an explanation of the considerable ignorance about female sexuality and anatomy.<sup>64</sup>

Tuana reports on an experiment conducted in a large lecture class, which involved asking students about their knowledge of the clitoris. Very few female students know the size of their own clitoris, and neither male nor female students knew much about the average clitoris size. However, the majority of male students knew both the size *and* diameter of their penis, both erect and flaccid.<sup>65</sup> When asked to draw female anatomy, students could draw internal diagrams of women's reproductive organs—the vagina, fallopian tubes, uterus, etc.—but most could not draw an external view. Most excluded the clitoris, and those who did include the clitoris did not produce accurate or detailed depictions.<sup>66</sup>

Tuana suggests that the results of the experiment reflect a history of sexism in practices of knowing and not knowing female sexuality and anatomy. Before the nineteenth century, the female body was analyzed in comparison with the "true" human form, the male body. According

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<sup>63</sup> Nancy Tuana, "Coming to Understand: Orgasm and the Epistemology of Ignorance," *Hypatia* 19, no. 1 (2004): 194–232.

<sup>64</sup> Nancy Tuana, "Coming to Understand: Orgasm and the Epistemology of Ignorance," in *Agnotology: The Making and Unmaking of Ignorance*, ed. Robert N. Proctor and Londa L. Schiebinger (Stanford University Press, 2008), 110–12.

<sup>65</sup> *Ibid.*, 112.

<sup>66</sup> *Ibid.*, 113.

to then-current medical science, the female body was merely an inverted and colder version of the male body.<sup>67</sup> In the nineteenth century, the “two-sex” model, according to which men and women have distinct anatomies, excluded the clitoris—it was considered a simple nub. In many cross-sectional images between the 1940s and the 1970s, it was plainly excluded. Tuana notes that “it is important to remember that this display, or lack thereof, is happening at a time when displays of the penis are becoming ever more complex.”<sup>68</sup> However, feminist activists brought new attention to women’s bodies with the inception of the women’s health movement. In 1984, Boston Women’s Health Book Collective’s, *Our Bodies, Ourselves*, included brilliant new information, including three new structural analyses of the clitoris: the shaft, the glans, and the crura. They noted that the glans is a bundle of nerves containing 8,000 nerve fibers—twice as many as in the penis.<sup>69</sup> Nonetheless, general lack of interest in investigating female pleasure remains. Scientific research on women’s bodies still emphasizes reproduction, and de-emphasizes the clitoris and its connection to pleasure.<sup>70</sup> As Tuana writes, what is “missing or only sketchily attended to in nonfeminist anatomies ... is the desire to map the geographies and functions of the clitoris and our other pleasurable bits.”<sup>71</sup>

Tuana points out that science distinguishes internal and external sex organs. Females’ internal organs are also known as the reproductive organs, while men’s sex organs are considered external, even though, as Tuana notes, a significant portion of men’s sex organs are internal. Tuana takes this distinction to show that reproduction is considered the central function

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<sup>67</sup> Ibid.

<sup>68</sup> Ibid., 115.

<sup>69</sup> Ibid., 115–17.

<sup>70</sup> Ibid., 124–5.

<sup>71</sup> Ibid., 125.

of sexuality, and we consider female sex organs themselves almost entirely in relation to reproduction. Tuana argues that motivation to know the clitoris and the female orgasm was lost for two reasons. First, the clitoris had no obvious role in reproduction. Second, knowledge about women's sexual pleasure was threatening to men. Before the 19<sup>th</sup> century, women's sexual desires were considered to be far greater than men's, and if the clitoris were better understood, it might "worsen" the already greater lusts of women.<sup>72</sup> By 1994, however, a survey of heterosexual men and women's pleasure found that, overall, contemporary women experience less sexual pleasure than men do. The survey found that "79 percent of men reported that they were certain they had an orgasm during their first sexual experience, while only 7 percent of women could so report."<sup>73</sup> Tuana argues that it is no surprise that women experience less pleasure when culture and science perpetuate the idea that men's sex drive is greater, and when there is a latent fear of women's sexual power.<sup>74</sup>

Tuana is concerned centrally with the idea that ignorance of female anatomy and pleasure was constructed or made, because such ignorance held in place a set of ideologies that benefitted men, at least psychologically. By supporting a set of beliefs and values that reduced the significance of women's sexual anatomy to reproductive function, ignorance of the clitoris and female sexual pleasure assuaged men's fear of women's sexuality. Moreover, according to empirical research, as women's pleasure has decreased, men's has increased.<sup>75</sup> Tuana's conclusion is that epistemology should include the study of ignorance, because it will help us to

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<sup>72</sup> Ibid., 121–2.

<sup>73</sup> Ibid., 125.

<sup>74</sup> Ibid., 126.

<sup>75</sup> Ibid., 125.

understand the complex relationships between knowledge and values, and the connections between power and the construction of ignorance.<sup>76</sup>

## **2.3 Ignorance from Interest**

I use “ignorance from interest” to refer to ignorance that serves to benefit an individual, group or corporation. While interests may be ideological to some degree, they are more general, and can include advantages that incentivize actions that are unrelated to or work against ideologies.

### **2.3.1 The Strong Programme**

The strong programme in the sociology of knowledge is an approach to studying scientific knowledge, which is widely associated with the philosopher David Bloor. Like Quine, Bloor proposes a naturalistic approach to knowledge, and he is interested in the causes of scientific beliefs. However, Bloor insists that scientific knowledge is largely a social product, something that is produced, sanctioned and held by communities. For this reason, Bloor’s strong programme aims to understand sociologically, as opposed to psychologically, the content of scientific knowledge claims. (Bloor accepts that psychological research could contribute to understanding individual scientists’ thoughts, but sees this as not central to understanding scientific knowledge.) The strong programme treats beliefs, truth, falsity, rationality and irrationality as objects.<sup>77</sup> Bloor argues for a “stricture of symmetry,” where true, false, rational, or irrational beliefs should all be understood using the same tools or resources. He argues that if

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<sup>76</sup> Ibid., 140.

<sup>77</sup> Sergio Sismondo, “The Strong Programme and the Sociology of Knowledge,” in *An Introduction to Science and Technology Studies*, 2nd ed. (Wiley-Blackwell, 2010), 47.

“ideology, idiosyncrasy, political pressure, etc., are routinely invoked to explain beliefs thought false, they should also be invoked to explain beliefs thought true.”<sup>78</sup>

Bloor outlines four tenets to the strong programme: (1) it would be causal, that is, concerned with the conditions which bring about belief or states of knowledge... (2) It would be impartial with respect to truth and falsity, rationality or irrationality, success or failure. Both sides of these dichotomies will require explanation.” (3) It would be symmetrical in its style of explanation. The same types of cause would explain, say, true and false beliefs. (4) It would be reflexive. In principle its patterns of explanation would have to be applicable to sociology itself.<sup>79</sup>

Many studies tend to work out the causes of scientific knowledge in terms of interests, considered broadly. Empirical research in the sociology of knowledge shows that theories or research methods are laden with “preferences or opinions of the actors involved,” such as political aims or utility goals.<sup>80</sup> The strong programme unveils interests involved in scientific discoveries, arguments and views, and these interest-based explanations highlight the choices and goals of scientific actors. Interest-based goals and rational goals are not unlike; both narrowly tailor choices. The strong programme also looks to culture, particularly culture of scientific communities, for causes of scientific knowledge. Culture guides choices about which kinds of evidence is pursued and recognized, as well as which kinds of theoretical and experimental structures are valued. For these reasons, we can understand theoretical questions as having social and cultural concerns embedded in their very nature.

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<sup>78</sup> Ibid., 48.

<sup>79</sup> Ibid., 47.

<sup>80</sup> David Bloor, “Sociology of Knowledge,” *Routledge Encyclopedia of Philosophy* (Routledge, 2002 1998).

The strong programme's interest and culture-based models of analysis are valuable epistemological resources for understanding the social construction of both true and false beliefs. By extension, the same frameworks can be used to understand how ignorance comes to be.

### 2.3.2 Interest-Driven Ignorance, Example 1: Tobacco Industry Doubt Production

In *Cancer Wars: How Politics Shapes What We Know and Don't Know about Cancer*, Proctor gives an intensive and detailed analysis of how cancer prevention information manufactured ignorance.<sup>81</sup> In 1994, 150,000 Americans died from lung cancer. Epidemiologists believe that around 80% of those deaths (120,000) were caused by tobacco. Scientific researchers had made the link between cancer and cigarettes since the 1950s. Since the same time, the tobacco industry had established what is now known as the Council for Tobacco Research (formerly the Tobacco Institute),<sup>82</sup> and spent nearly "\$240 million on research, resulting in the publication of some 5,000 scientific papers."<sup>83</sup>

Tobacco industry research was fairly successful at perpetrating public doubt about the link between tobacco and lung cancer. Positing lack of data to support a causal link between smoking and cancer, claiming that the conclusion is "premature," and that the data is "merely statistical," the industry was relentless in its skepticism:

Why, the institute asks, does lung cancer rarely occur in both lungs simultaneously, when both are exposed equally to smoke? Why does lung cancer often occur "in the parts of the lung *least* exposed to smoke"? Why is cancer of the trachea (windpipe) rare, even though this part of the body "is exposed to *all smoke* going into

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<sup>81</sup> Proctor, *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*.

<sup>82</sup> *Ibid.*, 105.

<sup>83</sup> *Ibid.*, 106.

and out of the lungs”)? Why do nonsmokers get a kind of lung cancer identical to that of smokers?<sup>84</sup>

Some might rightly think these are fair and logical questions. But it is important to note that these questions were not motivated by pursuit of knowledge (after all, the tobacco industry insulted most science). Rather, the questions were a strategy to manufacture public doubt about the health risks of smoking, so that tobacco companies had more time to keep smokers as happy customers.<sup>85</sup>

On the one hand, the tobacco industry produced severe doubt about scientific research on smoking and tobacco. On the other hand, the tobacco industry appealed to science—in combination with fiction—to promote industry interests whenever possible. Proctor writes:

The Tobacco Institute has always drawn freely—and rather creatively—on a mixture of scientific fact and fiction to bolster its case for cigarette safety. [...] The institute produced a document asserting that the “vast majority” of smokers do not get lung cancer (true); that perinatal problems—low infant birth weight, for example—are correlated not with smoking but with factors such as “nutritional and economic status” (false); [...] that lung cancer early in the century was *underdiagnosed* while recent lung cancers tend to be *overdiagnosed* (true but besides the point).<sup>86</sup>

The tobacco industry makes numerous defenses of cigarette safety – some true, some false, some may be true, or may be false. These defenses create the appearance that scientists are still divided on the issues.<sup>87</sup> The defenses are deployed through propaganda-like publications, designed to instill uncertainty in readers. The chairman of the Tobacco Institute, George Allen, once said:

“We are not on a crusade either for or against tobacco ... if we have a crusade, it is a crusade for

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<sup>84</sup> Ibid.

<sup>85</sup> Ibid.

<sup>86</sup> Ibid., 106–7.

<sup>87</sup> Ibid., 108.

research.”<sup>88</sup> However, despite the large scientific consensus that smoking is linked to cancer, the tobacco companies continue to deny the link. At the same time, insurance companies owned by tobacco companies charge smokers double the premiums charged to non-smokers.<sup>89</sup> Although industry-sponsored research may take the form of good science, it is disseminated by industry to produce doubt, and used strategically to increase profit, as opposed to knowledge.<sup>90</sup> This is how we know the industry is not a noble seeker of knowledge.

The tobacco industry’s attempt to discredit oppositional science is framed as a “need for ‘balance’ in the ‘debate.’”<sup>91</sup> Even though there is no scientific debate about the link between smoking and cancer, even though research that casts doubt on the link does not equal research in favor of it, the tobacco industry maintains that the “other side” deserves an equal voice. The important thing to note is that the tobacco industry does “not just exploit ambiguity; they manufacture it.”<sup>92</sup> A private internal document from Brown and Williamson cigarette company reads: “Doubt is our product since it is the best means of competing with the ‘body of fact’ that exists in the mind of the general public. It is also the means of establishing a controversy. If we are successful at establishing a controversy at the public level, then there is an opportunity to put across the real facts about smoking and health.”<sup>93</sup> In other words, doubt supports their profit-based interests.

### **2.3.3 Integrating Ideology and Interests: The Case of Climate Change Deniers**

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<sup>88</sup> Ibid.

<sup>89</sup> Ibid., 106.

<sup>90</sup> Ibid., 106–7.

<sup>91</sup> Ibid., 110.

<sup>92</sup> Ibid.

<sup>93</sup> Ibid.

In their paper “Challenging Knowledge: How Climate Science Became a Victim of the Cold War,” Naomi Oreskes and Erik M. Conway (Deer 2006) argue that climate change denial is produced by market fundamentalists, through their unwavering commitment to the principles of market capitalism, to the free market, and to preventing government control.<sup>94</sup> Climate change denial exists, they argue, in light of strategic production of ignorance by government institutions and even by scientific researchers.

After the Cold War, Ronald Reagan started the Strategic Defense Initiative (SDI). The goal was to create a shield against inter-continental ballistic missiles, using space-based lasers. Thousands of scientists protested, “criticizing the program as unrealistic, undesirable, and potentially destabilizing, as it could undermine the principle of Mutual Assured Destruction on which the Cold War balance of power had long hung.”<sup>95</sup> Robert Jastrow, a prominent astrophysicist who chaired NASA’s lunar exploration committee and later became founding director at the Goddard Institute for Space Studies and Adjunct Professor of Earth Sciences at Dartmouth, protested his colleagues’ response. In 1984, Jastrow founded the George C. Marshall Institute, which “set up workshops and programs, and wrote reports and press releases, to counter prevailing negative opinion of SDI.”<sup>96</sup>

The George C. Marshall Institute’s mission statement is “to encourage the use of sound science in making public policy about important issues for which science and technology are

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<sup>94</sup> Naomi Oreskes and Erik M. Conway, “Challenging Knowledge: How Climate Science Became a Victim of the Cold War,” in *Agnotology: The Making and Unmaking of Ignorance*, ed. Robert N. Proctor and Londa L. Schiebinger, Book, Section vols. (Stanford: Stanford University Press, 2008), 55–89.

<sup>95</sup> *Ibid.*, 72.

<sup>96</sup> *Ibid.*, 73.

major considerations.”<sup>97</sup> It continues: “our current program emphasizes issues in national security and the environment.”<sup>98</sup> Oreskes and Conway argue that the institute’s concerns shifted to climate change concerns in virtue of market fundamentalism. Both SDI opposition and climate change advocates threaten the free market, and have been associated with socialism or communism.<sup>99</sup> The institute moved on to climate change denial after 1990, when threats of the Cold War seemed to finally settle.<sup>100</sup>

In their efforts to deny climate change, the institute used tactics similar to tactics they used to advocate for SDI: “they claimed that the majority position was mistaken, that the science on which it was based was incomplete, inaccurate, or just plain wrong, and they demanded equal time for their views.”<sup>101</sup> In the case of SDI, 6500 scientists were against the project, and only Jastrow’s institute was in favor. In the case of climate change, there is a large consensus of expert scientific opinion that global warming in the last 50 years is due to greenhouse gas concentrations caused by humans,<sup>102</sup> while only a handful of people deny or question the significance of climate change and its anthropogenic causes.<sup>103</sup> While it’s hard to say exactly what impact the institute has had on the public, as Oreskes and Conway point out, a 2007 poll from Gallup-Yale University showed that 40% of Americans believe that there is “a lot of disagreement among scientists” about global warming.<sup>104</sup>

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<sup>97</sup> Ibid., 70.

<sup>98</sup> Ibid., 71.

<sup>99</sup> Ibid., 87.

<sup>100</sup> Ibid., 75.

<sup>101</sup> Ibid.

<sup>102</sup> Ibid., 65–8.

<sup>103</sup> Ibid., 69.

<sup>104</sup> Ibid., 84.

Oreskes and Conway argue that a central theme of climate change denial is the idea that environmentalists are socialists or communists trying to take down capitalism. Since 1991, there have been several works by climate change deniers that argue: that environmentalists have a secret political agenda against free market capitalism, and are trying to redistribute wealth to achieve a new world order; that climate change is a fiction; and at stake is “central planning versus free enterprise, regulation versus free enterprise, spontaneity versus control”.<sup>105</sup>

Anthropologist Myanna Lahsen argues that climate change denial can be traced to physicists, and physics’ loss of prestige and funding to the biological and earth sciences. Why would physicists deny climate change, as opposed to just denying intensive climate change policy or regulation? Oreskes and Conway answer this question using the “‘linear model’ of science-policy interaction—which assumes that facts do lead directly to policy.”<sup>106</sup> If scientists believe the linear model, or if they have a naïve faith in the power of science, then it would only make sense that, in order to deny a policy change or regulation, it is necessary to deny the science that supports it.<sup>107</sup>

The above examples of opposition to climate change do not target epistemic problems . Rather, proponents of these examples of climate change denial illustrate “‘the paranoid style’ in American politics: a style that sees grand conspiracies to undermine America’s free market system and constant threats to American liberty.”<sup>108</sup> This perspective is called “market fundamentalism”: “Market fundamentalists hold a dogmatic, quasi-religious belief in unfettered market capitalism, and therefore oppose *anything* that restrains the business community, be it

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<sup>105</sup> Ibid., 86–7.

<sup>106</sup> Ibid., 89.

<sup>107</sup> Ibid.

<sup>108</sup> Ibid., 88.

restrictions on the use of tobacco or the emission of greenhouse gases.”<sup>109</sup> Climate change denial based in market fundamentalism is ignorance from ideology – ignorance of scientific knowledge motivated by the ideology of market fundamentalism.

It is important to note that ignorance from ideology and ignorance from interest are not mutually exclusive; they feed into one another. We can explain the production of ignorance by pointing to a certain dominant ideology, but we can also take that explanation one step further, asking ‘Why is that ideology dominant?’ By explaining the ideology in terms of certain interests (of certain groups) we are also in part explaining the effects of that ideology (i.e. climate change denial) in terms of those interests. Climate change denial *also* has corporate interest fueling its production.

Doubt about climate change is produced and supported by ideologically motivated think tanks, well funded by conservative organizations, such as: the Scaife and Olin Foundations, Adolph Coors, and the corporate giant, Exxon Mobil. Exxon Mobil—“the largest publicly traded international oil and gas company”<sup>110</sup>—had used \$8 million in 2005 to fund forty organizations that challenged the science behind global warming. These organizations also include semi-journalistic outlets, such as TechCentralStation.com, a *FoxNews.com* columnist, and religious and civil rights groups.<sup>111</sup> When scientists discovered that “the Arctic was warming at twice the rate of the rest of the world—as scientists had predicted as early as 1979,”—columnist Steve Milloy from *FoxNews.com* blasted the scientists’ assessment. Milloy also happened to be an

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<sup>109</sup> Ibid.

<sup>110</sup> “About Us | ExxonMobil,” *ExxonMobil*, accessed July 16, 2015, <http://corporate.exxonmobil.com/en/company/about-us>.

<sup>111</sup> Naomi Oreskes and Erik M. Conway, *Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming*, Book, Whole (Bloomsbury Publishing USA, 2010), 246–8.

adjunct scholar at the Cato Institute, “which received \$75,000 from ExxonMobil.”<sup>112</sup> Neither *Fox News* nor *The Washington Post* (which reprinted the article) reported that Milloy had been paid. Milloy received \$40,000 from ExxonMobil – paid to The Advancement of Sound Science Center – and \$50,000, paid to the Free Enterprise Action Institute. Both organizations are registered to his home address.<sup>113</sup>

ExxonMobil had obvious interests in preventing political action about climate change.<sup>114</sup> “The objective was to convince the public and policy-makers, mainly in the USA, that human-induced climate change was not an issue requiring mandatory restrictions on greenhouse gases emissions.”<sup>115</sup> Primarily, ExxonMobil was concerned with how much it would cost to implement environmental policy changes. They were even concerned that it was a threat to world economics. So long as there was uncertainty about climate change, then the costs related to policy alterations would be unjustifiable.<sup>116</sup> Job losses and higher gas prices were also economic arguments used against climate policy. These arguments were supported by data models funded by ExxonMobil, but were later criticized for containing inaccurate assumptions. Regardless of the accuracy of data models or whether the global warming science was up for discussion, ExxonMobil had seriously invested in climate change denial.

From 1990 to 2000, the oil and gas industry contributed more than \$122 million in political donations. Exxon alone is reported to have officially contributed some \$2.9 million in political donations at the federal level from 1991 to 1998. As Pomerance, from the State

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<sup>112</sup> Ibid.

<sup>113</sup> Ibid.

<sup>114</sup> Sybille Van den Hove, Marc Le Menestrel, and Henri-Claude De Bettignies, “The Oil Industry and Climate Change: Strategies and Ethical Dilemmas,” *Climate Policy* 2, no. 1 (2002): 3–18.

<sup>115</sup> Ibid., 5.

<sup>116</sup> Ibid.

Department, puts it: “this created a political climate that made things difficult [for the Administration] (. . .). The oil industry has also had a strong influence by de-legitimizing the science and by using the Congress as a voice for their own agenda”.<sup>117</sup> S. van de Hove et al. write that ExxonMobil’s efforts were successful in that they helped the corporation buy valuable time against climate policy constraints and allowed it to continue business activities.<sup>118</sup>

Van de Hove et al. go on to explain the justifications ExxonMobil and other oil companies’ use in their strategies to deny climate change. They claim that, “from a business standpoint, corporations that choose the ‘fight against emissions constraints’ strategy consider that climate change policies represent a threat to their business and, as such, should be fought against.”<sup>119</sup> Constraints are—allegedly—bad for business, which explains why oil industries have an interest in reducing them. Furthermore, these companies believe that<sup>120</sup> technology will resolve the problems of climate change, so proactive changes aren’t prudent.

Regardless, it is important to note that oil companies are realistic that climate change may—and likely will—have a huge effect on the economy and policy development. This is where another reason for denial comes into play: buying time. If oil companies lobby against policy changes for as long as possible, they increase opportunities to develop business strategies and adjust for the future. Buying time, by encouraging climate change debate and lobbying against policy change, helps businesses stay ahead of the curve.<sup>121</sup> Ultimately, “corporations adopting a ‘fight against emission constraints’ strategy strive to justify a conservative attitude

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<sup>117</sup> Ibid., 7.

<sup>118</sup> Ibid., 9.

<sup>119</sup> Ibid., 12.

<sup>120</sup> Ibid., 13.

<sup>121</sup> Ibid., 13–14.

towards climate change because they intend to maintain their level of profit and their ways of doing.”<sup>122</sup>

## 2.4 Ignorance as Active Construct Revisited

A naturalistic approach to epistemology has several advantages. First, it lays the groundwork for a departure from individualistic epistemology to social epistemology. (Although ignorance can be understood within an individualist framework, ignorance as this thesis is concerned with is exclusively social.) Socializing epistemology enables two new epistemological frameworks: standpoint theory and social epistemology. Given these frameworks, we can understand the two new categories of ignorance that I introduced: ignorance from ideology and ignorance from interest.

As Proctor describes his own categories of ignorance, ignorance as active construct is fairly wide. I argue that we should consider Proctor’s third category as *divided* into ignorance from ideology and ignorance from interest. This way, we can better conceptualize what structures of ignorance occur within specific active-construct cases. As noted in the section on climate change, however, these categories are not mutually exclusive; they may overlap and we can sometimes use one category of ignorance to connect to another. My thesis will primarily focus on ignorance from active construct and ignorance from interest.

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<sup>122</sup> Ibid., 16.

## Chapter 3

### Normativity in Commercialized Science and Agnotology

#### 3.1 Introduction

In this chapter, I will investigate a tension created by agnotological critiques of science. The tension is that the analyzes offered by agnotologists, like Proctor, are both descriptive and normative. For instance, Proctor's work reveals interesting connections between commercialized science and the social construction of ignorance; scientific knowledge created for corporate interests is often accompanied or constituted by the creation of forms of ignorance, also for the sake of corporate interests. There are scientific findings, or a lack or weakness of findings, that may be suppressed or ignored. Inquiry that critiques the commercialization of science as *bad* or *wrong*, for instance, seems to presuppose a normative framework against which these assessments make sense. In what follows, I explore the normative dimension of Proctor's, and others', descriptive claims, and its implications.

In particular, I examine how the perspective of the agnotologist engaging in the normative critique of science is one from which science is taken to be value-laden. If so, this raises questions: Is this perspective at odds with a view of science as objective? Is the agnotologist, in a sense, denying the unbiased, objective nature of science by putting forward their critique? If so, some might take this to be a strong objection to the kinds of critiques offered by agnotology, including the critique of commercialized science in this thesis. I will argue that subjecting science to normative evaluation does not require abandoning an account of science as an objective, truth-acquiring inquiry. En route to this conclusion, I discuss work by Manuela

Fernández Pinto, in which she suggests her own way to understand agnotology's descriptive claims and the normative commitments they imply, in such a way that they are compatible with the objectivity of science. Fernández Pinto's strategy is to put forward an improved philosophy of science on which value-ladenness and objectivity do not stand in tension. I will argue that Fernández Pinto's account does not fully ameliorate the tension between objectivity and value-ladenness. Ultimately, this is a tension we must live with, and it is in part the task of agnotology job to bring this conflict to the fore. I claim, however, that Fernández Pinto does offer resources for a conception of science on which objectivity and value-ladenness are not incompatible, and this is sufficient for the purposes of showing that agnotological critiques need not deny objectivity.

### **3.2 Fernández Pinto and The Challenge of Agnotology**

Agnotology is not a value-independent study. Unlike traditional epistemology, which can often appear to proceed independent of normative frameworks,<sup>123</sup> agnotology necessarily assumes a normative framework. This is because the aim of agnotological inquiry is to understand which instances of ignorance and its uses are warranted or unwarranted, good or bad, and to discover whatever it is that makes the difference. If the methodological assumptions of the study of ignorance did not include normative principles, then it would be difficult to understand or assess what agnotologists meant when they claimed that a certain body of knowledge (to use a real example) “should be but isn't”.<sup>124</sup>

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<sup>123</sup> Whether it *is* so independent is contentious.

<sup>124</sup> Proctor and Schiebinger, *Agnotology: The Making and Unmaking of Ignorance*, vii.

This is made clear in Proctor’s work, in which he offers us an indirect account of the distinction between legitimate and illegitimate science. In what follows, I want to focus on the question of the nature of the normative framework in which these normative distinctions, like that between “good” and “bad” knowledge or ignorance production, can be justified and interpreted. It seems there is much work in this area left to be done. For while Proctor and other agnotologists have provided detailed *descriptive* accounts of agnogenesis, we are left with questions about the *normative* presuppositions of agnotology, and about the normative conception of science upon which agnotology is founded.

Fernández Pinto sheds light on these issues in her paper “Tensions in Agnotology: Normativity in the Studies of Commercially Driven Ignorance.”<sup>125</sup> She argues that agnotologists studying the social construction of ignorance in commercialized science have not yet unpacked the normative framework undergirding their descriptive claims. On her assessment, agnotologists “seem to hold implicit normative commitments that are in tension with their descriptive accounts of ignorance-constructive practices.”<sup>126</sup> She also notes that while their normative commitments are not fully fleshed out, there is still a lot we can learn from their views.<sup>127</sup> I agree, but I submit that until the normative framework of agnotology is excavated, it remains unclear whether what we *can* learn from their views is justified, or, in other words, constitutes new knowledge.

Now, out of the four works by agnotologists that Fernández Pinto analyzes—Michaels (2008), Oreskes and Conway (2010), Proctor (1995, 1996, 1999, 2008, 2011) and Mirowski

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<sup>125</sup> Fernández Pinto, “Tensions in Agnotology: Normativity in the Studies of Commercially Driven Ignorance.”

<sup>126</sup> *Ibid.*, 294–5.

<sup>127</sup> Manuela Fernández Pinto, “Learning from Ignorance: Agnotology’s Challenge to Philosophy of Science” (Ph.D., University of Notre Dame, 2014), 211, ProQuest Dissertations & Theses Global (1547351163), <http://search.proquest.com/docview/1547351163?accountid=6180>.

(2013)—she argues that Proctor holds the most promising normative view of science.<sup>128</sup> Proctor maintains that science is essentially *political*. He argues that science is political in its use as a tool for constituting and representing the strength of nations. It is also political insofar as the objects of scientific investigation are typically inspired by human interest, such as “problems of health, security, and the various forms of privilege and exclusion which societies enjoy or from which they suffer”.<sup>129</sup> For Proctor, this means that because larger social interests shape scientific inquiry, a “politics of knowledge” is embedded within science itself. Moreover, he takes science to be political in that science itself is formed by social, political groups, in which people compete for status, benefits, as well as for the power to structure what their groups, or other groups, believe and do.

Thus, on Proctor’s political conception of science, we should reject the idea that science is value-free. In fact, he takes the concept of a value-free science, or the ideal of the neutrality of science, as itself problematic; the view that science is value-free is a political phenomenon. It is political in that it acts to mask or disguise “whatever interests may lie behind the origins and maintenance of research priorities.”<sup>130</sup> Agnotology is heavily invested in studying the interests behind particular instances of ignorance (and knowledge) production. Thus, if the view of science as neutral masks the role of interests behind a false conception of what makes a given form of inquiry “scientific”, then it makes sense why an agnotologist, like Proctor, would take this conception of science as problematical and thus abandon it.

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<sup>128</sup> Fernández Pinto, “Tensions in Agnotology: Normativity in the Studies of Commercially Driven Ignorance,” 302–3.

<sup>129</sup> *Ibid.*, 303.

<sup>130</sup> *Ibid.*

In this way, it seems that there are two different conflicts between agnotology and the neutrality of science, at least if we take Proctor's analysis for granted: (i) the conception of science as value-laden, as part of the normative framework presupposed by agnotology, seems in tension with a conception of science as objective; and (ii) the acceptance of a conception of science as objective creates ignorance of science's value-ladenness, and as such *counteracts* the aim of agnotology as a form of agnogenesis, and thus should be criticized by agnotologists. So, are Proctor and those sharing the normative foundation of his analysis obliged to deny that science is objective?

The problem just raised is appreciated by Fernández Pinto, who, although sympathetic to Proctor's account, herself highlights the question of science's objectivity as a problem for Proctor's view of science's political dimensions. The problem is beyond conceptual, implicating more than how agnotologists should *view science*. There are practical problems with seeing science as value-laden: if political interests underpin and guide scientific research, then how are scientists to remain impartial and not fudge their results? Proctor has what seems to be an answer to these practical problems. He argues that "advocacy need not compromise objectivity. Objectivity is a matter of method; advocacy is a matter of commitment."<sup>131</sup> The idea seems to be that we can locate the value-ladenness of science strictly in the commitments of scientists, and locate the objectivity of science in their methodology. But how does this sooth the tensions laid out above? This remains unclear.

On this point, I agree with Fernández Pinto, who argues that Proctor's solution is insufficient. As Proctor himself acknowledges, science's becoming commercially driven has

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<sup>131</sup> Ibid.

affected the scientific *method* itself. Commercial interests do not influence science only by affecting the value commitments of individual scientists. For example, as Proctor shows, commercial interests have infiltrated experimental design, data collection and analysis, and data interpretation.<sup>132</sup> So, as Fernández Pinto writes, “Proctor’s own research on agnotology shows that value commitments and scientific methodology are intertwined, creating a tension between his methodological view of objectivity and his research on ignorance-production.”<sup>133</sup> In other words, it seems as if Proctor’s placing of value-ladenness all of the side of “commitments” rather than on the side of “methodology” is shown to be a false idealization by Proctor’s own arguments.

So we stand without a solution. Where does this leave us in unpacking and evaluating the normative framework operative in agnotology? Well, it seems that if we accept a framework like Proctor’s, or other accounts of science as “political”, then we are left questioning the objectivity of science, seemingly obligated to deny it for the sake of the success of our agnotological inquiry, and forced to deny that value-ladenness only manifests in the value commitments of scientists and not in scientific methodology. Can these burdens be shouldered? Or can they be alleviated?

Fernández Pinto answers in the affirmative. In her PhD dissertation, she frames the problem of scientific objectivity for agnotology as follows:<sup>134</sup> in order to assess whether ignorance production threatens science’s “epistemic goals” (or whether the socially constructed nature of science falsifies science’s apparent self-image as neutral, impartial, objective inquiry),

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<sup>132</sup> Ibid., 305.

<sup>133</sup> Ibid., 303.

<sup>134</sup> Fernández Pinto, “Learning from Ignorance: Agnotology’s Challenge to Philosophy of Science,” 200.

we need first an account of science itself in terms of which this assessment can proceed. In other words, we need to step back and reassess the nature of science and those epistemic goals themselves. In effect, Fernández Pinto's recommends that we embrace a philosophy of science on which the socially constructed nature of scientific inquiry is compatible with the objectivity of scientific knowledge. And because agnogenesis is a *social* phenomenon, a philosophy of science that is up to the task of dealing with it must be social. As she writes, if we grant "that a better understanding of agnogenesis requires an empirically adequate account of the current social organization of science, it seems that a social and naturalized philosophy of science would be in principle better equipped for this challenge."<sup>135</sup>

Fernández Pinto's strategy is then to offer several criteria that a philosophy of science must satisfy if it is to face up to the phenomenon of agnogenesis and the conclusions of agnotological research. Her argument in favour of this strategy is based on considerations of feminist philosophy of science. She writes,

Feminists needed a conceptual account of the role of sexist and androcentric values in science and of how to manage such values. I consider that the philosopher dealing with agnotology has to address a similar problem, i.e., accounting for the role of social and political values behind cases of agnogenesis and showing how we could manage such values.<sup>136</sup>

Following in the footsteps of feminists philosophers of science, she argues that before constraints for a philosophy of science can be laid out, we need to *accept* that social and political values embed science more than some would like to believe. For instance, values operate when

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<sup>135</sup> Ibid., 210.

<sup>136</sup> Ibid., 201–2.

scientific questions are posed, and when scientific results are used.<sup>137</sup> Agnotology has shown how commercial interests drive scientific research. For example, as Fernández Pinto notes, the tobacco industry had an exceptional strategy for agnogenesis: “the tobacco strategy has successfully shaped entire research fields (e.g., cancer research) by channeling funds to favourable research questions, recruiting scientists who endorse particular background assumptions, obstructing the development and publication of research leading to undesired results, narrowing career options for junior researchers, etc.”<sup>138</sup>

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<sup>137</sup> Ibid., 202.

<sup>138</sup> Ibid., 203–4.

<b>Normative Constraints</b>	<b>Descriptive Constrains</b>
<b>n1) Explain scientific knowledge.</b> Answer to the question what is scientific knowledge? (distinction between knowledge-productive and ignorance-constructive practices)	<b>d1) Be historically informed.</b> Recognize science as embedded in historical process. Understand path to current regime of science organization.
<b>n2) Identify agnogenesis.</b> Deal with cases of agnogenesis in current science, identifying the epistemological problems emerging from ignorance-constructive practices.	<b>d2) Be politically informed.</b> Take into account the politics of science and the power relations involved in scientific practice today.
<b>n3) Overcome tensions.</b> Overcome tensions found in implicit normative commitments of agnotologists.	<b>d3) Be empirically accurate.</b> Start from an accurate description of current scientific knowledge.
<b>n4) Acknowledge auxiliary motives.</b> Be clear about the political and social values motivating the approach.	Overcome or dissolve the limitations found in social epistemology of science.

**Table 1: Fernández Pinto’s Normative and Descriptive Constraints**

After we come to terms with this, we can then outline, as Fernández Pinto proceeds to do, the normative and descriptive constraints a philosophy of science must satisfy to adequately address the challenges facing agnotology. Her recommended criteria are reproduced in Table 1.<sup>139</sup>

Next, Fernández Pinto argues that if a philosophy of science shares its normative foundation with feminist philosophy of science, then it will meet these criteria. In doing so, she argues, it will also illuminate the normative framework of agnotology. How? As I interpret her argument, the normative framework of agnotology will be inherited from the normative

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<sup>139</sup> Ibid., 214–18.

framework of an adequate philosophy of science. In this sense, our account of scientific knowledge production and scientific ignorance production will be unified.

In more detail, philosophy of science, Fernández Pinto argues, should take insights from critical contextual empiricism. This view bridges the gap between traditional, individualist epistemology and sociological, constructivist epistemology; as she writes, it “endorses a social conception of epistemology,” and “understands science as a social practice in which the normative force of scientific knowledge is given by the social standards that maintain the scientific community.”<sup>140</sup> She argues that this “opens the door for a historically and politically informed view of scientific knowledge,” which is promising because, in principle, then, we can locate political incentives behind scientific research.<sup>141</sup>

Further insights should be drawn, she argues, from epistemological naturalism, discussed in the previous chapter. But for the purposes of this chapter, and for understanding agnotology’s normative groundwork, I note here just the fact that naturalized epistemology characteristically abandons traditional empiricism as a basis for science.<sup>142</sup> Naturalized feminist empiricism goes further and allows for “self-reconstructing and self-critical” justification of knowledge claims, as Fernández Pinto notes in citing Lynn Hankinson Nelson.<sup>143</sup> Nelson’s account aims to be empirical, value-judgment sensitive, normative, and non-foundationalist; it follows social epistemology, viewing groups as epistemic agents, and opposing individualist epistemology.<sup>144</sup> All of this and more should be incorporated into our philosophy of science, especially in light of

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<sup>140</sup> Ibid., 221.

<sup>141</sup> Ibid., 221–2.

<sup>142</sup> Ibid., 222–3.

<sup>143</sup> Ibid., 223.

<sup>144</sup> Ibid., 224–5.

agnogenesis in the commercial and public realms. (This is not to deny however cases of individual interests producing public scale ignorance.<sup>145</sup>) But Fernández Pinto argues that while Nelson’s account is empirically adequate, it is not sufficient because empirical adequacy is insufficient for establishing which interests and values *ought* to factor into scientific decision-making.<sup>146</sup> To fill this gap, she turns to Elizabeth Anderson.

For Anderson, “there is a ‘bidirectional influence of facts and values,’ according to which values play a role in finding and interpreting facts and facts provide evidence for or against particular values.”<sup>147</sup> This integrates normative constraints and descriptive ones. Fernández Pinto describes this as: “The more empirically adequate research is—which could eventually include historical and political circumstances—the more we would be able to identify sound values and reject unsound values in conducting research. In this sense, Anderson is giving us a framework to evaluate cases of agnogenesis.”<sup>148</sup> Because Anderson rejects science being value-free, we are now able, within her framework, to distinguish “legitimate from illegitimate research” and identify “cases of agnogenesis.”<sup>149</sup>

Fernández Pinto discusses at length how these feminist resources can be drawn on to develop a philosophy of science capable of satisfying the normative and descriptive constraints (n1)-(n4) and (d1)-(d3). But for my purposes, I will restrict my attention to constraint (n3), “Overcome tensions”, and specifically to only one of the five tensions she addresses: namely, the

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<sup>145</sup> Ibid., 225–7.

<sup>146</sup> Ibid., 227.

<sup>147</sup> Ibid., 228.

<sup>148</sup> Ibid., 229.

<sup>149</sup> Ibid.

tension between the value-laden nature of science and its objectivity (i.e., the problem that arose for Proctor above).<sup>150</sup>

Fernández Pinto surveys three ways to “relax” this tension. I will examine each in turn. I will argue that although none of these solutions fully relax the tension, they show that scientific objectivity and value-ladenness are compatible, and thus that the normative framework of agnotology does not undermine scientific objectivity.

(1) Based on Anderson’s account of bidirectional influence of facts and values, Fernández Pinto argues as follows:

“Understanding science as self-regulated with respect to value-commitments also allows us to view science as objective without being value-free [relaxing the tension], for it understands the scientific process as value-laden, but at the same time it provides an empirical mechanism to manage the role of values in scientific research, distinguishing sound from unsound values.”<sup>151</sup>

Here, Fernández Pinto argues that if Anderson’s thesis of bidirectionality is correct, then “the search for sound values to inform scientific inquiry is a constant process that does not undermine current science”. This is because, for Anderson, bidirectionality means that, as explained above, if scientists strive for empirical adequacy, then they will be *more and more able* to distinguish sound and unsound values.

But how does this mitigate value-ladenness’s threat to objectivity? For example, consider that *empirically inadequate* science might be passed off as legitimate, and abundantly produced, *because* of its unsound values (i.e., because it serves political interests). It seems, I argue, that bidirectionality does not rule out or make it difficult for this to happen. To put it simply, the

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<sup>150</sup> Ibid., 213.

<sup>151</sup> Ibid., 230.

tension is, in part, that unsound values could lead to empirical inadequacy. It is hard to see how this tension is “relaxed” by any thesis according to which empirical adequacy leads to identifying unsound values, which *might*—if the scientists care at all—in turn lead to sound-valued science. Moreover, in the framework of agnogenesis, ignorance, unlike knowledge, cannot be either empirically adequate or inadequate.

At best, bidirectionality offers a hope: if we strive for empirical adequacy, we might be able to identify unsound values, removing the threat they pose. But if the aim is to remove the threat of empirical inadequacy, then this hope is superfluous; if we achieve empirical *adequacy*, the threat of empirical *inadequacy* is thereby *automatically avoided*.

Fernández Pinto’s next recommendation for relaxing the tension between objectivity and value-ladenness is to adopt “strong objectivity”, a doctrine on which scientific research is extended to include investigating the background beliefs and values of scientists. Her argument is that through strong objectivity, we can make value-ladenness a scientific *virtue* of objectivity as opposed to a vice.<sup>152</sup> It’s not clear, however, that this is any better of a solution than the previous one.

I take it that value-ladenness can be virtuous only if the values are *sound*. So by adopting “strong objectivity”, we can praise the scientific merits of work based on sound values, and scientifically criticize work based on unsound values. Granted, this counteracts the notion that all value-ladenness is incompatible with objectivity, which is good news for agnotology’s normative framework of science.

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<sup>152</sup> Ibid., 247–50.

But does this really relax the tension? Again, a major risk of the value-laden nature of science is that values, *both* sound and unsound, might lead to non-objective science. Even if the whole scientific enterprise adopted “strong objectivity,” objectivity would still be threatened; the difference would be that science based on unsound values would be, for this reason, deemed scientifically unvirtuous. This just gives us a new way to criticize unsound-valued science, which is welcome. But one might worry about how helpful is this when we can already criticize this science as *not objective*.

Now, a defender of strong objectivity might reply that, in some cases, it might be difficult or impossible to directly assess whether some scientific research is objective or nonobjective on value-neutral grounds. So, strong objectivity strengthens our powers of critique by allowing us to criticize unsound science in these particular cases, or so they might argue. In response to this, I grant that this may be the case. However, it is unclear whether progress towards the adoption of strong objectivity is a better strategy for handling these cases than developing new, value-neutral techniques of criticism. When it comes to empirical refutation of scientific theories, it seems a direct, value-neutral (or at least a *less* value-laden as possible) refutation is something of a gold standard.<sup>153</sup>

Lastly, Fernández Pinto considers adopting “the ideal of socially responsible science” as a solution to the tension between objectivity and value-ladenness. This amounts to the endorsement of “epistemic standards to achieve objective scientific knowledge,” while also narrowing “the possibilities of such research according to its social and political constraints”.<sup>154</sup>

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<sup>153</sup> Karl Popper, *Conjectures and Refutations: The Growth of Scientific Knowledge* (London: Routledge and Kegan Paul, 1963).

<sup>154</sup> Fernández Pinto, “Learning from Ignorance: Agnotology’s Challenge to Philosophy of Science,” 242.

This sounds similar to her previous recommendation. It seems like a specific constraint such as adopting “strong objectivity” is just part and parcel of this more general recommendation. So for similar reasons, I argue this solution is limited. Adopting ideals for policing the values that guide science may serve as a check against unsound values. But how does this ensure objectivity is not compromised by values of any kind? This strategy would be more effective if sound values were shown to never produce bad science. But that hasn’t been shown. And even if that were true, it is an open possibility that objectivity could be threatened by the policing of values itself.

For these reasons, the tension remains between scientific objectivity and value-laden science. Although there are proposals that hope to massage this tension, I think they should not be taken as guaranteeing objectivity in the face of value-ladenness. Rather, the solutions are best understood as ways in which we can strive to successfully have both ongoing *objective* scientific inquiry and a critical examination of the values informing it as well.<sup>155</sup> We need not worry about the objectivity of science itself, as was a concern for Proctor. And this will not be a concern of mine going forward. What matters is that acknowledging and subjecting to critique the values of science does not deny objectivity.

I have not contested Fernández Pinto’s main claim that if we understand “the scientific process as value-laden” while acknowledging that the process “provides an empirical mechanism to manage the role of values in scientific research, distinguishing sound from unsound values,” then we can fruitfully make distinctions between legitimate and illegitimate science.<sup>156</sup> In this way, Fernández Pinto’s recommendations for philosophy of science are serviceable for the aim of my thesis. Her preliminary groundwork for a framework in which science can be assessed for

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<sup>155</sup> Ibid., 229.

<sup>156</sup> Ibid., 230.

legitimacy while not being denied objectivity can be leveraged for agnotology and the distinguishing of legitimate and illegitimate knowledge and ignorance.<sup>157</sup>

### **3.3 Sismondo's Hegemony of Commercialized Knowledge**

Fernández Pinto's overall strategy is to justify objections to corporate science on the basis of a philosophy of science on which it fails to meet certain scientific virtues. Her inspiration is drawn from the concern that "as scientific research moves increasingly into the private sector, the threat that the social construction of ignorance poses for the production of scientific knowledge and the development of appropriate public policy increases as well."<sup>158</sup> By making value-ladenness a scientific virtue, Fernández Pinto is able to criticize commercialized science based on unsound values as unscientific.

But another approach is to criticize commercialized science not from within an ideological framework in the philosophy of science, but rather from within a political framework. In this section, I consider an alternate approach to critiquing commercialized science through the works of Sergio Sismondo, which stands as an alternative candidate for a normative framework for agnotology. I explore this alternative not as a competitor, but as supplemental framework that offers certain advantages that would not be had by adopting a framework like Fernández Pinto's alone.

Sismondo's approach centres the focus of agnotology on the interests behind commercialized science, and on how these interests can become problematic for scientific inquiry. Sismondo argues that within the pharmaceutical industry, "the creation of intellectuals

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<sup>157</sup> Ibid.

<sup>158</sup> Fernández Pinto, "Tensions in Agnotology: Normativity in the Studies of Commercially Driven Ignorance," 296.

and domination of institutions are not at all organic, but are instead the result of deliberate and careful actions.”<sup>159</sup> On his view, there is a new two-fold mode of research emerging. This research is *scientific*, in that it constructs and produces evidence that bears on medical issues, but it is also *corporatized*, in that it is organized and used to support particular company goals. Given Sismondo’s framework’s political and interest-based character, I claim it provides key advantages for agnotological inquiry, and, in particular, for understanding and analyzing cases of the pharmaceutical industry such as those I will be analyzing in this thesis.

Now, Sismondo argues that our objections to this corporate science “should be focused on how it is designed to find certain truths and further certain interests.”<sup>160</sup> How has it been designed? Consider that one strategy in pharmaceutical knowledge production is the ghost management of research and publications. Ghost writing or ghost management is the process by which “published articles associated with industry-sponsored research are ‘authored’ by academic researchers” but “most of the work to shape, produce, analyze and write up research is done by actors who are largely invisible.”<sup>161</sup> This is possible through pharmaceutical companies utilizing the services of publication planners. Publication planning is a large enough activity to generate professional associations, such as the International Society of Medical Planning Professionals (ISMPP) and The International Publication Planning Association (TIPPA); ISMPP has more than 1000 members. In addition to publication planning, pharmaceutical companies sponsor approximately 70% of all clinical drug trials, and 70-75% of these contract research

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<sup>159</sup> Sergio Sismondo, “Hegemony of Knowledge and Pharmaceutical Industry Strategy,” in *Philosophical Issues in Pharmaceutics: Use, Dispensing, and Development*, ed. Dien Ho (Forthcoming: Springer, 2015), §1.

<sup>160</sup> Sergio Sismondo, “Pushing Knowledge in the Drug Industry: Ghost-Managed Science,” in *The Pharmaceutical Studies Reader*, ed. Sergio Sismondo and Jeremy A. Greene (John Wiley & Sons, 2015), 151.

<sup>161</sup> *Ibid.*, 150–1.

organizations are wholly owned by their sponsors.<sup>162</sup> This means pharmaceutical companies “control over roughly half of all clinical trial data,” in addition to having meticulously planned and managed publications. It is estimated that 40% of medical articles mentioning recently patented drugs are ghost written and/or at least partly publication planned.<sup>163</sup>

Sismondo draws attention to the gross *asymmetry* of knowledge production—which he later calls the ‘hegemony of knowledge’—between the pharmaceutical industry’s methods and independent scientific and academic research and publishing practices.<sup>164</sup> Note the pharmaceutical research mode previously mentioned: pharmaceutical companies *are* doing real science, but in a corporate mode.<sup>165</sup> He finds it concerning, however, because “commercially driven science is different from academic science in the narrowness of interests that drive it and the kinds of choices that produces.”<sup>166</sup> He adds that unlike “most independent researchers, pharmaceutical companies have clear and strong interests in particular kinds of research, questions and outcomes: ones that will increase markets and sales.”<sup>167</sup> Plus, it has been found that pharmaceutical companies steer research to get the results they favour.<sup>168</sup>

Sismondo’s research is especially illuminating from an agnotological perspective insofar as it reveals how even through knowledge production that is in fact scientific and evidence-based, there is still room to manipulate the research to support particular interests.

Pharmaceutical companies are publishing articles that are well recognized by the scientific

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<sup>162</sup> Ibid., 151–2.

<sup>163</sup> Ibid., 151.

<sup>164</sup> Sismondo, “Hegemony of Knowledge and Pharmaceutical Industry Strategy,” §1.

<sup>165</sup> Sismondo, “Pushing Knowledge in the Drug Industry: Ghost-Managed Science,” 161.

<sup>166</sup> Ibid.

<sup>167</sup> Ibid.

<sup>168</sup> Ibid., 162.

community. But at the same time, there is a corporate interest behind these publications, as well as behind the research conducted itself. Recall my previous discussion of agnotology and constructed ignorance: the ignorance relevant here is “a political consequence of conflicting interests and structural apathies.”<sup>169</sup> Moreover, it is also clear that pharmaceutical companies have tremendous control over clinical trials, which, as mentioned above, have been shown to be steered in the direction the corporate overseers point. In this case, this means that while new knowledge *is* being produced, there is a controlled selection of what *is not* produced, *not* marketed, or *not* researched; these areas are simply not “of interest” to corporate interests. In this way, we witness the simultaneous production of knowledge and ignorance, a point that Sismondo does not explicitly make.

An account of the concentration of power towards which this state of the scientific institution inevitably leads is given in Sismondo’s “Hegemony of Knowledge and Pharmaceutical Industry Strategy”, in which he argues that there is a “hegemony” of knowledge production by the pharmaceutical industry. Drawing on Antonio Gramsci’s view, we can understand “dominant interests” as having “*hegemony* over key institutions,” which in turn allows concentrated power to operate without coercion.<sup>170</sup> This hegemony of knowledge, within the hands of the pharmaceutical industry, supports knowledge *and* ignorance production for the sake of increasing profits and the effectiveness of marketing, and *not* for the sake of broad human benefit. As Sismondo writes, we “might ask not whether this or that piece of pharmaceutical knowledge is justified or true, but note instead that the structures of knowledge

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<sup>169</sup> Proctor, *Cancer Wars: How Politics Shapes What We Know and Don’t Know About Cancer*, 8.

<sup>170</sup> Sismondo, “Hegemony of Knowledge and Pharmaceutical Industry Strategy,” §1.

that create it concentrate power in very few actors, which in turn have very narrow interests.”<sup>171</sup>

The character of this critique differs markedly from the form of a standard epistemological critique, questioning the epistemic justification of an alleged item of knowledge. Rather than pursue that line of attack, Sismondo suggests that we should challenge the powerful concentration of the knowledge producers, a group that is few in number and who serve a narrow spectrum of interests. What is particularly striking, in the context of my thesis, about singling out this dimension of the problem for critical analysis is that the medical industry has become *especially* dependent on the pharmaceutical industry’s resources for knowledge production. Their role in disseminating and producing knowledge for physicians to utilize has become naturalized.<sup>172</sup> But given this reality, what conclusions should we draw about the knowledge base created for corporate interests?

Sismondo’s answer is as follows:

The result is still recognizably medical science, and may even be high quality science, but it is science serving particular and clear interests . . . . What is communicated will often be sound medical science, which is why KOLs [key opinion leaders] are willing to communicate it, nevertheless, it will be science chosen to help sell a product.<sup>173</sup>

In other words, if we recall Sismondo’s two-fold research mode, we can understand that, on the one hand, pharmaceutical research is medically and scientifically sound, and that, on the other hand, there are corporate interests involved in the scientific process with an ultimate goal of marketing and selling a product.

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<sup>171</sup> Ibid., §4.

<sup>172</sup> Ibid.

<sup>173</sup> Ibid.

Returning now to the tension between objectivity and value-laden science, how can we view this tension from Sismondo's perspective? I claim that we can interpret Sismondo's stance as based on a shift in focus from the normative values guiding or implicit in science to the worldly interests that actually drive science. After this shift in focus, the tension is then reframed as between the objectivity of science and its political dimensions. So reframed, Sismondo can deny that there is any tension here, or at least that there is no tension of like kind with the tension between a conception of science as objective and value-laden. In other words, we have put the fact/value dichotomy to the side, along with the philosophical issues stemming from it that have been of concern in the philosophy of science and in debates about the nature of objectivity, including in subsequent sections of this thesis. Although I do not claim that Sismondo has offered anything like a solution to this problem, he has at least offered a novel way of framing the issues concerning agnotologists. In this framework, an agnotological critique can proceed based on independently plausible political principles, as opposed to on the basis of a normative framework and an accompanying normative conception of science. Thus, while acknowledging that science is political and value-laden, Sismondo provides a lens through which we can focus instead on the interests behind the science, without the threat of denying objectivity.

In summary, the problem with commercialized science, as Sismondo sees it, is that there is hegemony of knowledge or a concentration of research power within the pharmaceutical industry. This hegemony influences medical knowledge and permeates it with implicit and explicit marketing. With more resources than any other research group, the pharmaceutical industry holds "dominant positions within the political economy of medical knowledge."<sup>174</sup> A

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<sup>174</sup> Ibid.

critique of corporate science can then take the form of a political critique of this heavy concentration of power in only a few actors with narrow interests, rather than take the form of a normative critique that presupposes a normative conception of science needing to be defended on the basis of a reformed philosophy of science. For those who did not find Fernández Pinto's framework attractive as a basis for agnotology, Sismondo's is an attractive, simpler alternative. I will proceed, however, embracing both.

## Chapter 4

### Agnogenesis and the HPV Vaccine

#### 4.1 An Introduction to Human Papillomavirus and the HPV Vaccine

The tobacco industry created ignorance around the carcinogenicity of tobacco, and the fossil fuel industry created ignorance around climate change through the same techniques. Both sponsored research that muddied the water, creating artificial controversies. In this chapter, I want to illustrate a different corporate approach to agnogenesis, in which a powerful company established a modest base of knowledge that was deemed good enough for actions in its interests, in the process creating a political network that would go on to suppress, rather than foster, controversy. I investigate the pharmaceutical company Merck's role in the implementation of the genital human papillomavirus (HPV) vaccine.

First, I introduce HPV and its associated risks. I then outline the protections the HPV vaccine is claimed to offer, and discuss the vaccine's efficacy, safety, and potential concerns regarding the evidence of its long-term efficacy. I then discuss the history of the HPV vaccine's mandate and the role the pharmaceutical industry played in it. In §4.4, I transition from discussing the HPV vaccine specifically to discussing vaccines broadly. I try to lay out the historical and social context of vaccine hesitancy, and I look at how this movement has affected scientific research and the uptake of vaccines. I also discuss the backlash this movement caused, in which vaccine skeptics and inquirers were silenced, shamed, or considered irrational and unscientific. I argue that this silencing is a form of agnogenesis. In the final section, all of this

constitutes my case that the industry explicitly used agnogenesis as a tactic in mandating the vaccine.

Genital human papillomavirus (HPV) accounts for 6.2 million new sexually transmitted infections annually. Of more than 100 identified HPV strains, at least 40 have been linked to cervical cancer and genital warts.<sup>175</sup> In the United States, there are 10 deaths per day from cervical cancer; and globally, cervical cancer is responsible for 274,000 deaths annually.<sup>176</sup> Of two HPV groupings—low-risk and high-risk—low-risk serotypes are linked with genital warts, and high-risk HPV serotypes are linked with cervical cancer. High-risk strains cause high-grade lesions and cell carcinoma near the cervix, and these lesions are part of what increases risk for developing cervical cancer.<sup>177</sup> HPV's link to cervical cancer was a large part in incentivizing vaccine research.

Vaccine research for HPV began in 1992. Since then, at least 4 strains of HPV can be vaccinated against: HPV types 6, 11, 16, and 18.”<sup>178</sup> These 4 strains of HPV have been linked with “approximately 70% of all cervical cancer cases and more than 90% of genital warts.”<sup>179</sup> In 2002, with a sample size of 2392 women, a double-blind placebo-controlled trial found that HPV infection could be prevented. From this trial, development continued to eventually produce a

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<sup>175</sup> Shelley Miksis, “A Review of the Evidence Comparing the Human Papillomavirus Vaccine versus Condoms in the Prevention of Human Papillomavirus Infections,” *Journal of Obstetric, Gynecologic, & Neonatal Nursing* 37, no. 3 (2008): 329; Nancy J Zonfrillo and Barbara Hackley, “The Quadrivalent Human Papillomavirus Vaccine: Potential Factors in Effectiveness,” *Journal of Midwifery & Women's Health* 53, no. 3 (2008): 188–9.

<sup>176</sup> Cheryl A Vamos, Robert J McDermott, and Ellen M Daley, “The HPV Vaccine: Framing the Arguments FOR and AGAINST Mandatory Vaccination of All Middle School Girls,” *Journal of School Health* 78, no. 6 (2008): 302–9; Miksis, “A Review of the Evidence Comparing the Human Papillomavirus Vaccine versus Condoms in the Prevention of Human Papillomavirus Infections,” 330; Zonfrillo and Hackley, “The Quadrivalent Human Papillomavirus Vaccine: Potential Factors in Effectiveness,” 188.

<sup>177</sup> Zonfrillo and Hackley, “The Quadrivalent Human Papillomavirus Vaccine: Potential Factors in Effectiveness,” 188–9.

<sup>178</sup> *Ibid.*, 199.

<sup>179</sup> *Ibid.*, 188.

bivalent and quadrivalent HPV vaccine, which means that the vaccine protects against two and four strains of HPV, respectively.<sup>180</sup> If the HPV vaccine proved effective, it could promise a significant reduction in cervical cancer and genital warts cases.

## **4.2 The Pharmaceutical Industry’s Involvement in Vaccine Politics and Policymaking**

In this section, I turn to policy-related and political concerns with the HPV vaccine. I narrate the historical circumstances in which the vaccine was put into legislation, and I present the problematic nature of the pharmaceutical industry’s ‘transparency’ and ‘disclosure’, or lack thereof.

Within a year of Gardasil’s approval by the FDA, 41 states would make legislation relating to the HPV vaccine, and 24 states mandated the vaccine for 6<sup>th</sup>-grade girls. The “remarkable burst” of legislation led researchers to ask what role manufacturers played in school mandates, and what level of manufacturer involvement in vaccine policy was appropriate. In their paper “Pharmaceutical Companies’ Role in State Vaccination Policymaking: The Case of Human Papillomavirus Vaccination,” Michelle M. Mello et al. argue that pharmaceutical company Merck & Co Inc. promoted school-entry legislation of their HPV vaccine Gardasil in an aggressive and nontransparent manner.<sup>181</sup> They argue that manufacturer involvement in

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<sup>180</sup> Miksis, “A Review of the Evidence Comparing the Human Papillomavirus Vaccine versus Condoms in the Prevention of Human Papillomavirus Infections,” 332.

<sup>181</sup> Michelle M. Mello, Sara Abiola, and James Colgrove, “Pharmaceutical Companies’ Role in State Vaccination Policymaking: The Case of Human Papillomavirus Vaccination,” *American Journal of Public Health* 102, no. 5 (2012): 893.

uptake legislation “risks undermining the prospects for legislation to foster uptake of new vaccines.”<sup>182</sup>

Merck served as a main source of information and knowledge dissemination to legislators and health department officials regarding Gardasil. Merck believes that having this role does not jeopardize the “independent decision-making by policymakers.”<sup>183</sup> Merck also directly and proactively contacted legislators, company employees, local political consultants, prominent physicals, or public relation firms in order to “discuss strategies to maximize the uptake of Gardasil.”<sup>184</sup> Merck’s lobbying efforts were primarily focused on school-entry mandates. In Texas, after the governor mandated the HPV vaccine for girls in 2007, it later came out that the governor’s chief of staff was a Merck lobbyist for years (excluding his time as chief), and that “Merck had contributed \$5000 to the governor’s campaign fund.”<sup>185</sup>

Similar events occurred in Canada. In 2007, Merck lobbyists were in contact with Canadian Prime Minister Stephen Harper and the then Ontario Minister of Health. *Toronto Star* reporter Tanya Talaga wrote an article at the time noting that:

Merck Frosst Canada Ltd., the maker of Gardasil, hired public relations giant Hill & Knowlton to push the immunization strategies using some well-connected lobbyists: Ken Boessenkool, a former senior policy adviser to Prime Minister Stephen Harper [<sup>186</sup>]; Bob Lopinski, formerly with Premier Dalton McGuinty's office; and Jason Grier, former chief of staff to Health Minister George Smitherman. . . . Boessenkool, who was responsible for message management for the Conservative campaign during the 2004 federal election, became a vice-president at Hill & Knowlton

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<sup>182</sup> Ibid.

<sup>183</sup> Ibid., 894.

<sup>184</sup> Ibid.

<sup>185</sup> Ibid., 895.

<sup>186</sup> Boessenkool is also part of the Conservative Party of Canada’s campaign team for the 2015 election, a point that might cement perceptions of close connections.

in October 2004. According to the federal lobbyist registry, his client is Merck with an effective date of Feb. 16, 2007. The vaccination program was announced in the March budget. He did not return calls.<sup>187</sup>

Merck had also mobilized legislators and stakeholders in introducing the school-entry mandate. For example, Women in Government (WIG), “a national, nonprofit group of female state legislators,” had “identified cervical cancer as a priority issue as early as 2003.”<sup>188</sup> Merck had contributed unrestricted “educational grants” to WIG, which then lead to conferences on cervical cancer, attended by Merck representatives.<sup>189</sup> WIG then prepared several reports on cervical cancer and distributed them across the states; they also “convened a task force to make policy recommendations, prepared a ‘legislative toolkit’ containing model school-entry mandate legislation, and conducted outreach to interest groups and the media to build support for such legislation.”<sup>190</sup> Of course, WIG was funded by Merck, a relationship known at the time; but they were not the only ones. One organization stated that Merck presented them unrestricted donations soon after Gardasil was introduced.<sup>191</sup>

Thus, through marketing campaigns, vaccine donations, direct outreach to political interest groups, and consumer-directed advertising, Merck effectively mobilized Gardasil school-entry mandates and legislation.<sup>192</sup> Thus health officials and patients alike sought out the vaccine. While conceding that some level of lobbying is appropriate, many critics argue that it was not appropriate to this degree. Some officials responded that Merck was disease- and fear-

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<sup>187</sup> Tanya Talaga, “Lobbyists Boosted Vaccine Program,” *Toronto Star*, August 16, 2007, sec. News, [http://www.thestar.com/news/2007/08/16/lobbyists\\_boosted\\_vaccine\\_program.html](http://www.thestar.com/news/2007/08/16/lobbyists_boosted_vaccine_program.html), accessed August 4, 2015.

<sup>188</sup> Mello, Abiola, and Colgrove, “Pharmaceutical Companies’ Role in State Vaccination Policymaking,” 895.

<sup>189</sup> *Ibid.*

<sup>190</sup> *Ibid.*

<sup>191</sup> *Ibid.*, 895–6.

<sup>192</sup> *Ibid.*

mongering. They argued that Merck had exaggerated the market for Gardasil and the risk and impact of HPV. “Others found it ‘disconcerting’ that ‘a company who is planning to make some money off a vaccine’ would use WIG to try to mandate it.”<sup>193</sup> Through direct advertising and promotion, Merck had created an unwarranted public demand of the vaccine. But for exactly this reason, any skepticism or concern that health experts or officials expressed was irrelevant. Merck’s campaign had largely obviated their approval and simply advertised directly to the public and legislature.

Mello et al. argue that, in principle, we can conceive of private industry influencing policy processes without ethical dilemmas arising. However, one might find concern in the case of HPV because there seemed to be “a symbiotic relationship between pharmaceutical manufacturers and state health policymakers.”<sup>194</sup> Merck needed policymakers to maximize their profits and distribution of Gardasil, but the legislators also needed Merck for vaccine science and information, including about policy. Mello et al. write,

The danger in relying on pharmaceutical companies to evaluate policy options is that they may not present information in the same fashion as a disinterested party. [...] Information gathering from a broader range of sources, including public health experts, may have led to a different policy agenda.<sup>195</sup>

There was also a lack of transparency; namely, it was not forthcoming just who was funded by Merck and why. WIG had unrestricted financial contributions from Merck that went undisclosed. “Such tactics ‘gave credence to people’s fears that they were trying to do things

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<sup>193</sup> Ibid., 896.

<sup>194</sup> Ibid.

<sup>195</sup> Ibid., 897.

behind closed doors and push things down people’s throats.”<sup>196</sup> The pharmaceutical company did not have interests in promoting the public good; some considered the Gardasil mandate tantamount to bodily invasion. Mello et al. write: “What seemed to weigh heavily on respondents’ minds is that legislators should impose such burdens only after very careful consideration of what was in the public interest—not Merck’s interest.”<sup>197</sup> Mello et al. conclude:

Although policymakers acknowledge the utility of vaccine manufacturers’ involvement industry lobbying that is overly aggressive, not fully transparent, or not divorced from financial contributions to lawmakers risks undermining the prospects for legislation to foster uptake of new vaccines. In the future, more restrained industry outreach that is focused on providing scientific and technical information about the vaccine may improve the outlook for legislation that is seen as legitimate by the public it both burdens and benefits.<sup>198</sup>

Moreover, policymakers depended on Merck for information and knowledge about Gardasil. Disseminating information was disconcerting in the HPV vaccine case because Merck has clear interests that diverge from the public interest. Through Merck’s corporate interest, they produced advertisements and publications that supported their vaccine; they hosted cervical cancer and HPV vaccine conferences and invited WIG to attend them. When Mello et al. point to concerns about the lack of transparency, I argue that this can be reconceived as in part a concern about manufactured ignorance, as I will explain in section 4.5.

### **4.3 The HPV Vaccine: Questions about Cervical Cancer, Efficacy, and Safety**

In this section, I outline studies regarding the HPV vaccine, and review questions regarding its efficacy, its safety, and its relation to cervical cancer. The onset of new vaccines

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<sup>196</sup> Ibid.

<sup>197</sup> Ibid.

<sup>198</sup> Ibid.

tends to raise questions about these issues (especially when a vaccine is mandated by the government) because, as potential vaccine recipients or vaccine administrators, we want to know exactly what virus it targets and which ailments a vaccinated individual will be protected from. More importantly, we should know if risks associated with the vaccine are worth the protection it brings. In what follows, the literature will support the claim that while the vaccine is extremely safe and effective against four strains of HPV under specific conditions, there may be budding concerns about the long-term efficacy of the vaccine and its ability—directly and indirectly—to protect against cervical cancer.

#### **4.3.1 Gardasil’s Efficacy and Safety**

In what follows, I present an overview of the literature discussing the efficacy and safety of the quadrivalent HPV vaccine. Gardasil, the first quadrivalent HPV vaccine, was approved by the Food and Drug Administration (FDA) in June 2006. According to Miksis, citing studies by Harper et al. (2004, 2006), the HPV vaccine protected 97% of women against HPV type 16 and 18 infections, and had no serious adverse effects. Over 98% of participants maintained seroconversion—the development of antibodies from immunization—for over 4.5 years. Incidentally, the vaccine also seemed to protect participants from HPV strains 45 and 31, with 94% and 55% protection demonstrated, respectively.<sup>199</sup> Further, Miksis cites studies from Villa et al. (2005), which demonstrated that the quadrivalent HPV vaccine had overall 100%, 100%, 86%, and 89% efficacy against strains 6, 11, 16, and 18, respectively.<sup>200</sup> However, in the general population, the vaccine was only 36% effective in preventing lesions caused by HPV. It is likely

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<sup>199</sup> Miksis, “A Review of the Evidence Comparing the Human Papillomavirus Vaccine versus Condoms in the Prevention of Human Papillomavirus Infections,” 333.

<sup>200</sup> Ibid.

that this is because of existing infection at the time of vaccination. So, it is crucially important to vaccinate prior to sexual intimacy in order to maximize efficacy.<sup>201</sup>

The vaccine also shows promise in reducing cases of cervical cancer. If the vaccine can prevent infection and the high-grade lesions caused by high-risk HPV infection, then risk of cervical cancer will significantly decrease, if not entirely disappear. Unfortunately, there is a glaring absence of long-term efficacy studies: up and until recently, “only two studies have evaluated the duration of protection after completion of the vaccination series.”<sup>202</sup> Of the completed studies, it was found that the vaccine protected for periods between 3.5 years for HPV type 16 and up to 5 years for quadrivalent vaccine Gardasil. With these results, it is “unclear how durable protection will be and whether booster injections will be needed.”<sup>203</sup> Despite this opaqueness, Merck & Co Inc., the manufacturers of the Gardasil quadrivalent vaccine, lobbied hard in the very first year of Gardasil’s approval to mandate the vaccine in school boards across North America.

In addition to concerns about the vaccine’s efficacy after 5 years, there is also a “competitive release” concern.<sup>204</sup> Competitive release is a process in which other serotypes of HPV—some of the more than 100 strains not being vaccinated against—begin to act competitively and proliferate. Coinfection—or infection of multiple strains—is found to increase risk for lesions, which in turn increases risk for cervical cancer. Eight percent of cervical cancer patients were found to have a coinfection. One conclusion drawn from this is that “if the vaccine

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<sup>201</sup> Zonfrillo and Hackley, “The Quadrivalent Human Papillomavirus Vaccine: Potential Factors in Effectiveness,” 189.

<sup>202</sup> *Ibid.*

<sup>203</sup> *Ibid.*

<sup>204</sup> *Ibid.*, 191.

does initiate a competitive release of other, potentially more virulent strains, protection may be incomplete and the vaccine may be less effective than anticipated.”<sup>205</sup> And so the need for further research increases, and the question marks for consumers multiply. But this doesn’t exhaust the concerns.

The vaccine also runs of the risk of obsoleting Pap smear testing and colposcopies. By reducing high-grade lesions and high-grade abnormalities, the predictive power for detecting high-grade dysplasia and cancer is reduced. Also, predictive power of colposcopies will reduce because the most identifiable lesions link to HPV type 16. Zonfrillo and Hackley suspect that if most females between 11 and 12 are vaccinated, then Pap testing before 24 years of age would be cost ineffective: “This delay would result in a 43% reduction in overall Pap volume 20 years postimplementation.”<sup>206</sup> This is problematic because Pap smears test for *all* cases of HPV, not just the few strains against which the HPV vaccine protects. So it is unclear, so far, whether this vaccine is a must-have, once-and-for-all solution for the ailments it promises to prevent. If the HPV vaccine results in less Pap testing, then it becomes more likely that lesions will go undetected in women who are unvaccinated, unprotected from other strains, unprotected after 5 years efficacy decline, or otherwise unprotected; this could feasibly result in no change to current rates of cervical cancer, or in a reduction in cervical cancer followed by an increase.<sup>207</sup>

The result that *will* reduce instances of cervical cancer is a reduction of high-grade lesions caused by HPV. However, these lesions are expected to take more than a decade to

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<sup>205</sup> Ibid.

<sup>206</sup> Ibid.

<sup>207</sup> Eduardo L Franco et al., “Issues in Planning Cervical Cancer Screening in the Era of HPV Vaccination,” *Vaccine* 24 (2006): S173.

progress—some claim it can take 20–40 years.<sup>208</sup> This means that observing a reduction in cervical cancer before a decade passes is unlikely, if not impossible, given the nature of HPV lesion progression. It is unclear, then, how pharmaceutical industries can market this product as a cervical cancer cure without long-term studies and evidence to support the claim.

It is noteworthy that the vaccine’s projected reduction of cervical cancer is based on protecting against high-risk HPV, which reduces high-grade lesions, which reduces risk for cervical cancer.<sup>209</sup> This is an intricate causal process of which we will have little to no concrete studies until a decade or more passes. This is important to note because of the other strains of HPV that may competitively release and maintain current rates of cervical cancer, despite the best intentions of vaccinators.

HPV vaccine effectiveness may also be affected by the variation in prevalence of HPV worldwide. For instance, in Nigeria, its prevalence is 25.6%, whereas in Spain it is 1.4%. This variation, and in particular the varying prevalence of different types of HPV, may influence the vaccine’s perceived effectiveness because “although HPV types 16 and 18 have been implicated in a majority of cervical cancer cases worldwide (53.5% and 17.2%, respectively), the specific prevalence of additional HPV types and their contribution to cervical cancer cases varies.”<sup>210</sup> In other words, there is not necessarily consensus as to how *other* HPV strains contribute to cervical cancer. The best prediction is that protecting from strains “16 and 18 could prevent 71% of

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<sup>208</sup> Ansgar Gerhardus and Oliver Razum, “A Long Story Made Too Short: Surrogate Variables and the Communication of HPV Vaccine Trial Results,” *Journal of Epidemiology and Community Health* 64, no. 5 (2010): 377–8.

<sup>209</sup> Franco et al., “Issues in Planning Cervical Cancer Screening in the Era of HPV Vaccination,” S173.

<sup>210</sup> Zonfrillo and Hackley, “The Quadrivalent Human Papillomavirus Vaccine: Potential Factors in Effectiveness,” 191.

cervical cancers globally.”<sup>211</sup> In principle, a vaccine protecting from additional strains will increase protection. But even with more strains covered, the original question remains: how do other types of HPV, and their varying prevalence between countries, affect the risk of cervical cancer and the accuracy of our measurements of it?

Finally, some have claimed that the vaccine is associated with rare instances of death and permanent disability, arguing strongly that the vaccine should be taken off the market immediately.<sup>212</sup> Japan made Gardasil part of its routine vaccination timetable in April of 2013, fully funded by the government, but removed the vaccine from that timetable only two months later, due to large numbers of adverse events, including paralysis and death;<sup>213</sup> it should be said that Japanese authorities have not claimed that there is a causal connection between the vaccine and the reported problems. A number of other people and organizations have raised concerns that Gardasil is associated with a particularly large number of serious adverse events. I return to these concerns below.

For all of these reasons, I hope to have explained how many of the most important questions about the safety, efficacy, and worthwhileness of a vaccine have no or at best unclear answers in the case of the HPV vaccine.

#### **4.4 From Vaccine Hesitancy to the War on Skepticism**

Next, I will overview vaccine hesitancy, and explain how this variety of skepticism about vaccine safety has given rise to suspicion and even full out war on *any* vaccine skepticism. Many

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<sup>211</sup> Ibid.

<sup>212</sup> Teresa Forcades i Vila, “Women and Capitalism: The Case of the Vaccine against the Human Papilloma Virus,” *Feminist Theology* 23, no. 3 (2015): 277; Lucija Tomljenovic and CA Shaw, “Death after Quadrivalent Human Papillomavirus (HPV) Vaccination: Causal or Coincidental,” *Pharmaceut Reg Affairs S* 12 (2012): 2–001.

<sup>213</sup> Stuart Gilmour, Mikiko Kanda et al. “HPV Vaccine in Japan,” *The Lancet* 382(9894)(2013): 768.

actors, from scientists to public health policymakers, have attempted to silence vaccine skeptics in an effort to maintain and promote vaccine programs. In this section, I argue that we can make sense of silencing skeptics if we understand the framework in which the silencers operate. Specifically, I will argue that silencers of skeptics have a direct interest in pushing vaccines, whether for economic, public health, or other incentives, and this obscures the crucial difference between informed, evidenced vaccine skepticism and skepticism based in ignorance or false knowledge.

#### **4.4.1 Vaccine Hesitancy**

At this point in the narrative, it is important to introduce more general concern about vaccination, in the form of vaccine hesitancy. Vaccine hesitancy is the collective phenomenon of individuals across the world who reject many or all forms of vaccines. Whether for health and safety reasons or due to mistrust of the public health system, vaccine hesitancy has gained significant traction in the past decade. Vaccine hesitant individuals choose not to vaccinate themselves or their children from highly preventable and safely vaccinated diseases like measles, mumps, and rubella. In this section, I explore the growth of vaccine hesitancy, and discuss the movement's social repercussions with regard to the uptake of vaccines.

We can find traces of vaccine hesitancy dating back to the early 1980s. A documentary was produced in 1982 entitled "DPT: Vaccine Roulette," which led parents to decline the pertussis vaccine for their children. Perceptions of harms led to personal injury lawsuits against the pharmaceutical companies tied to the vaccine. Because of this, the US Congress passed a law

“protecting vaccine manufacturers while compensating those allegedly harmed by vaccines.”<sup>214</sup>

Several years later, the Wakefield controversy erupted: In 1998, Dr. Andrew Wakefield published a paper purporting to find a relationship between the measles-mumps-rubella (MMR) vaccine, bowel disease, and autism. The study’s sample size was twelve children, and, allegedly, the parents of eight of the twelve reported “behavioural symptoms” within 6.3 days of the vaccine. The paper was formally retracted in February 2010 because Wakefield had behaved unethically and dishonestly.<sup>215</sup> Journalist Brian Deer uncovered that Wakefield was “paid more than £400,000 by lawyers trying to prove that the vaccine was unsafe.”<sup>216</sup>

The payments, unearthed by *The Sunday Times*, were part of £3.4m distributed from the legal aid fund to doctors and scientists who had been recruited to support a now failed lawsuit against vaccine manufacturers.<sup>217</sup> Wakefield had negotiated an unprecedented contract with [lawyer Richard] Barr, then aged 48, to conduct clinical and scientific research. The goal was to find evidence of what the two men claimed to be a "new syndrome", intended to be the centre piece of (later failed) litigation on behalf of an eventual 1,600 British families, recruited through media stories.<sup>218</sup>

In brief, the research spearheaded by Wakefield was corrupt and unsound.

In the wake of this controversy came the thimerosal controversy, which was centred on vaccines’ use of thimerosal, an antibacterial compound used in multidose vaccines (e.g. MMR

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<sup>214</sup> Anna Kata, “Anti-Vaccine Activists, Web 2.0, and the Postmodern paradigm—An Overview of Tactics and Tropes Used Online by the Anti-Vaccination Movement,” *Vaccine* 30, no. 25 (2012): 3780.

<sup>215</sup> Brian Deer, “How the Case against the MMR Vaccine Was Fixed,” *BMJ: British Medical Journal* 342, no. 7788 (2011): 77, doi:10.1136/bmj.c5347.

<sup>216</sup> Brian Deer, “MMR Doctor given Legal Aid Thousands,” *The Sunday Times*, no. Journal Article (2006).

<sup>217</sup> Ibid.

<sup>218</sup> Brian Deer, “Exposed: Andrew Wakefield and the MMR-Autism Fraud - Brian Deer’s Award-Winning Investigation,” 2011.

vaccine).<sup>219</sup> Thimerosal is 50% ethylmercury and was used for over 50 years as a vaccine preservative. In 1999, the FDA mandated reporting of mercury in all food and drugs; then, the American Academy of Pediatrics and the Public Health Service recommended the “immediate removal of mercury from all vaccines given to young infants,” as a precautionary measure.<sup>220</sup> Misinterpretation of this directive and existing public concern about autism and vaccines resulted in several antimercury advocacy groups. Studies thereafter showed that mercury in vaccines did not cause even mercury poisoning and there were at least seven separate studies failed to support an association between thimerosal and autism.<sup>221</sup> Regardless of the science establishing the safety of thimerosal in vaccines, many parents remained cautious and held to the idea that any mercury exposure was unsafe. Here we see vaccine hesitancy gaining traction: between Wakefield’s research and mercury exposure concerns, members of the public are becoming apprehensive towards vaccine uptake and skeptical regarding vaccine safety.

Following the thimerosal controversy, the Jenny McCarthy controversy emerged in the late 2000’s. In 2007, McCarthy published a book on the alleged causal relation between vaccines and autism. She advocated her views on television: Larry King Live, Good Morning America, and Oprah. She had posted her views publically on Twitter, and in 2012 had more than 1.3 million followers. She is quoted saying, “If you ask a parent of an autistic child if we want the measles or the autism, we will stand in line for the f---ing measles.”<sup>222</sup> Her celebrity status and

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<sup>219</sup> Jeffrey S. Gerber and Paul A. Offit, “Vaccines and Autism: A Tale of Shifting Hypotheses,” *Clinical Infectious Diseases* 48, no. 4 (2009): 456–61.

<sup>220</sup> *Ibid.*, 458.

<sup>221</sup> *Ibid.*

<sup>222</sup> Kata, “Anti-Vaccine Activists, Web 2.0, and the Postmodern paradigm—An Overview of Tactics and Tropes Used Online by the Anti-Vaccination Movement,” 3780–3783.

influence fortified vaccine hesitancy, scaring more parents than before, and attracting more followers to the movement's core concerns.

At this point, many people—too many to make light of—were already onboard with strong vaccine hesitancy. This has resulted in strong responses to those refusing vaccines:

In populations with high levels of immunization, unvaccinated children are often protected from VPDs [vaccine preventable diseases] by benefiting from the herd immunity provided by vaccinated individuals (i.e. 'free-riding'). Free-riding demonstrates the occasional discrepancy between self-interest and group interest, often referred to as 'the prisoner's Dilemma': a person may choose to act in opposition to the good of society if doing so benefits the individual. In the case of vaccine refusal, non-compliers reduce overall herd immunity but are protected from both VPDs and post-vaccine adverse events, assuming threshold coverage; however, if coverage falls beneath threshold, herd immunity will cease to protect non-compliers.<sup>223</sup>

As the number of people refusing certain vaccines reaches a certain threshold, collectively they become a risk. Babies and immunocompromised persons become vulnerable to diseases through transmission by unvaccinated persons. In 2000, endemic measles was declared eliminated in the United States<sup>224</sup>; but in 2008, the American measles outbreak increased to 134 cases that year, the most since 1996. Of these cases, "90% had not been vaccinated or had an unknown vaccination status."<sup>225</sup> In 2014, "The CDC [Center for Disease Control and Prevention] reported 644 cases of measles in 2014, the highest number of U.S. cases in any year since measles was

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<sup>223</sup> D. S. Saint-Victor and S. B. Omer, "Vaccine Refusal and the Endgame: Walking the Last Mile First," *Philosophical Transactions of the Royal Society of London. Series B, Biological Sciences* 368, no. 1623 (2013): 4, doi:10.1098/rstb.2012.0148;

<sup>224</sup> This does not mean that there were zero cases of measles during that time.

<sup>225</sup> The College of Physicians of Philadelphia, "Measles — Timelines," accessed March 10, 2015, <http://www.historyofvaccines.org/content/timelines/measles>.

declared eliminated in 2000.”<sup>226</sup> In all likelihood, vaccine hesitancy seems to have played a part in the return of measles cases.

#### **4.4.2 The Backlash: The War on Skepticism**

Vaccine hesitancy has generated considerable backlash. This is important because in the case of the HPV and perhaps other vaccines, we have good reason to inquire and be skeptical of its safety and efficacy. I point to the pharmaceutical industry’s method of disseminating knowledge to policymakers as part of an agnogenesis strategy. And over and above the issue of vaccine itself, this case displays the dynamics and real world impact of agnogenesis.

Given vaccine hesitancy and the public health concern it raises, many people have proposed strong responses, such as making vaccines necessary by law or disallowing children to attend public schools without being vaccinated. Especially in the U.S., the issue has become perceived as a conflict between liberty and public safety. Even though there is an increase in cases of measles, public health and safety seems to be winning the fight, given that strong anti-vaccination positions are often seen as an uninformed, anti-scientific position to maintain. It seems more than reasonably clear that skepticism about vaccines such as the MMR vaccine is unwarranted—there is more than enough scientific evidence to indicate that they are relatively safe.<sup>227</sup>

But, what happens when skepticism—even justified skepticism—becomes a public health concern? What if there *are* vaccines that might cause severe side effects, or are not as effective as is promised? Since vaccine hesitancy has become more prominent, asking these kinds of

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<sup>226</sup> Ibid.

<sup>227</sup> Gerber and Offit, “Vaccines and Autism: A Tale of Shifting Hypotheses,” 458.

questions has resulted in heavy reprimands, shaming of inquirers, or even effective silencing by authorities who believe that questions are harmful.

#### **4.5 Silencing Critics: Agnogenesis**

Alan Cassels, a drug policy researcher affiliated with the School of Health Information Sciences at the University of Victoria, argues that because of strong vaccine hesitancy, there has been silencing of skeptics of HPV vaccines' safety and efficacy.<sup>228</sup> Cassels argues that, in Gardasil's case, in which there is no long-term data about its efficacy against cervical cancer, we *should* be allowed to discuss publicly critical and skeptical attitudes towards the vaccine. Instead, we see extremism in the public discourse, where those questioning vaccines are labeled radical 'anti-vaxxers'—a colloquial label for those strongly against vaccination. Not accepting that all vaccines are safe and necessary is seen as unscientific. This leaves no room for discussion and debate.<sup>229</sup> And it also leaves inquirers ignorant of the possible facts of the matter.

To illustrate this phenomenon, Cassels discusses a retracted 2015 article published by the *Toronto Star*. Titled "HPV vaccine Gardasil has a dark side, Star investigation finds," authors David Bruser and Jesse McLean claim that over 60 Canadians had "experienced debilitating illnesses after inoculation" of the HPV vaccine.<sup>230</sup> Although the authors make no claim that there is a casual link between the vaccine and these illnesses, the *Toronto Star* had found in the regulator's database that, since 2007, there had been at least 50 "serious" incidents linked to the

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<sup>228</sup> Alan Cassels, "How Media Disappears Bad News about HPV Vaccines," *Common Ground Magazine*, July 2, 2015, <http://commonground.ca/2015/07/how-media-disappears-bad-news-about-hpv-vaccines/>.

<sup>229</sup> Ibid.

<sup>230</sup> David Bruser and Jesse McLean, "HPV Vaccine Gardasil Has a Dark Side, Star Investigation Finds," *Toronto Star Newspaper Ltd.*, February 5, 2015, <https://web.archive.org/web/20150205215614/http://www.thestar.com/news/canada/2015/02/05/hpv-vaccine-gardasil-has-a-dark-side-star-investigation-finds.html>, accessed August 19, 2015.

vaccine.<sup>231</sup> “According to the VAERS registry in the US, HPV-vaccines are responsible for 60% of all severe side-effects caused by vaccines: this includes 82% of permanent disability and 64% of deaths; in absolute numbers (2012): 464 permanent disability and 37 deaths of previously healthy girls/women between 16 and 29 years of age.”<sup>232</sup> I should be extremely clear that the Vaccine Adverse Effects Reporting System (VAERS) “cannot determine if the adverse health event was caused by the vaccination”—but the large percentage reported on the HPV vaccine should not simply be dismissed.<sup>233</sup>

As Cassels asks, why was the *Star* article retracted? Unlike most retracted articles that are still made available but labeled “retracted,” *this* article by the *Toronto Star* has now disappeared off the internet completely.<sup>234</sup> Cassels argues that when this article was printed, a “fierce counter-attack” was launched.<sup>235</sup> Approximately 60 physicians and infectious disease specialists wrote a counter-article arguing that the *Toronto Star’s* piece was “irresponsible” because “study after study has shown there is no causal link between the events the *Star* reported and the vaccine.”<sup>236</sup> But Cassels says that even if these vaccine side effects might be anecdotal, we should not ignore them altogether. This seems right. But if so, why is the media so reluctant to discuss the vaccine’s adverse effects, even if only anecdotal and perhaps not at all causally related to the vaccine?

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<sup>231</sup> Ibid.

<sup>232</sup> Forcades i Vila, “Women and Capitalism: The Case of the Vaccine against the Human Papilloma Virus,” 275; “US Centers for Disease Control and Prevention (CDC),” Request, *WONDER VAERS*, (2015), <http://wonder.cdc.gov/vaers.html>.

<sup>233</sup> “US Centers for Disease Control and Prevention (CDC).”

<sup>234</sup> Note that the citation included is an archive of the article, not the original webpage itself as the original *Toronto Star* pages for this article no longer exists.

<sup>235</sup> Cassels, “How Media Disappears Bad News about HPV Vaccines.”

<sup>236</sup> Ibid.

Two answers to this question have been offered by Freda Birell, a vaccine safety ally from Sanevax (a website reporting on the safety and efficacy of vaccines):

The media personnel I have talked to say one of two things: either the pharmaceutical companies threaten the media outlet with pulling their advertising or the health authorities contact them to ‘inform’ them that any press about vaccine risks will damage vaccine uptake and endanger the public health.<sup>237</sup>

Thus both public health officials—who are informed by pharmaceutical companies—and pharmaceutical companies threaten the media to report in such a way that promotes their interests. That the pharmaceutical companies are interested is obvious, but the point needs to be spelled out with respect to officials and agencies of public health. Vaccination (in general) has become a central part of the mandate of public health; the two are now inextricably linked. In addition, once a public health agency has implemented a vaccination campaign, it has made a public commitment to that campaign, and made that campaign part of its activities. And perhaps not least, that vaccination campaign becomes part of the agency’s budget, demanding staffing and management. Thus public health officials and agencies have clear interests in vaccinations, both in general and specifically.

Given the pharmaceutical industry’s hegemony over key aspects of medical knowledge, as described by Sismondo, we can assume that the industry has considerable influence over matters of public health. He writes about physicians, “Any education [KOLs] talks provide and any health benefits that result from it have to be understood as shaped by the sponsoring companies’ interests.”<sup>238</sup> Given the amounts of money at stake in vaccination programs, we can

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<sup>237</sup> Ibid.

<sup>238</sup> Sismondo, “Hegemony of Knowledge and Pharmaceutical Industry Strategy,” §3.3.

assume similar dynamics in the field of public health. Certainly, all early tests of new vaccines are done for their manufacturers, and much epidemiological information about the real-world effects of those vaccines only comes many years later. Thus we can suspect that even though medical experts and public health officials have knowledge—knowledge about the vaccines, efficacy, and usefulness—they are also in some ways ignorant, because their very source of knowledge (pharmaceutical companies) cater the information they provide to *their* interests; the information is not without embedded incentives, strategic wording, and ultimately keeping pharmaceutical industry's interests in mind. This means that even though medical experts and public health officials are, *as far as they know*, doing the best thing for public health, they are doing so in ways framed by vaccine manufacturers. Ignorance in this area has the potential to become a significant safety concern.

Unlike cases involving the tobacco industry, in which knowledge production is used as a resource for filibustering public opinion and confusing the masses, Merck explicitly claimed that *sufficient* knowledge was acquired about the HPV vaccine to justify its dissemination. Despite open questions and justified skepticism towards Gardasil, Merck chose a route of ignorance maintenance. Research and investigation into these open questions has been suspended and taken as unnecessary. In the public assertion that sufficient knowledge has been acquired, Merck lobbied and 'informed' mass publics about the vaccine's benefits based on what critics see as *insufficient* evidence. The vaccine was mandated in certain places by circumventing evidence-based procedures and, instead, was passed through policymakers that may not have been knowledgeable in the field.

This process is, I argue, one of agnogenesis driven by interests, though it also employs a pro-vaccine ideology. Merck (1) circumvented evidence-based procedures, (2) provided the knowledge and resources that policymakers required in order to make an educated decision on the mandate, and thereafter, (3) both public health and Merck silenced and ignored skeptical concerns behind the vaccine.

In (1), we see agnogenesis in the form of ignorance from active construct. When Merck lobbyists were not successful with an evidence-based policymaker, instead of addressing the lack-of-knowledge concerns of the policymakers, they circumvented them instead. This allowed them to pass legislation on the vaccine without satisfying skeptical and scientific concerns.

In analyzing (2), we can draw on Sismondo's account of the hegemony of knowledge. The policymakers responsible for mandating the vaccine almost exclusively approached Merck for their knowledge and information resources. On the back of Sismondo's two-tiered research argument—his argument that although pharmaceutical companies produce legitimate science, this science bears the marks of the influence of corporate interests—I argue that although the scientific research by Merck is valid and sound, it is also embedded with corporate interest.<sup>239</sup> This means that policymaking inquirers approaching Merck for knowledge only got part of what they sought. What they likely received was corporate-interest-based two-tiered scientific information that, ultimately, *benefits Merck* in its implementation, application, and standing with a status as 'scientific knowledge', as opposed to *benefitting the public*.

Finally, for (3), consider Cassel's investigation, from which we learned that skeptics in the media and news are literally silenced in the form of public shaming, public health

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<sup>239</sup> Sismondo, "Pushing Knowledge in the Drug Industry: Ghost-Managed Science."

intervention, and funding withdrawal threats. I argue this is explicit agnogenesis because knowledge—or at the least, questions prompting knowledge acquisition—is entirely denied. Those who express views against the vaccine, or raise questions about the vaccine’s efficacy, are met with strong intervention. Ignorance in the form of silencing is unlike the ignorance previously mentioned in this thesis. I claim, however, that we ought to still consider it agnogenesis: if we cannot acquire knowledge, then we all remain in ignorance—ignorance maintained by powerful actors.

## Chapter 5

### Conclusion

*Ignorance is king, many would not prosper by its abdication.*  
Walter M. Miller, *A Canticle for Leibowitz* (1959)

In this thesis, I have investigated corporate science through an agnotological lens. I have both followed and forged pathways through the field of agnotology by analyzing cases that display strong evidence of agnogenesis. In order to achieve this result, I considered a variety of perspectives on ignorance, philosophy, and science, as well as examined relevant literature that constitutes the base of evidence of systemic cases of agnogenesis. I expanded on this literature and presented two new ways to understand cases of agnogenesis from a philosophical point of view: ignorance from ideology and ignorance from interest. Against this background, I turned my attention to the question of the normative framework presupposed in agnotology. After examining candidate accounts of this normative framework, and various proposed criteria that it must satisfy, I explained how these accounts seem to stand in tension with a conception of science as objective inquiry. By examining ways this tension might be relaxed, I concluded that the normative conception of science presupposed by agnotology is not incompatible with scientific objectivity. Moreover, I argued that there are alternative ways to understand the form of the critique of corporate science offered by agnotologists such that the question of the objectivity of science does not arise. Specifically, if we understand the case against corporate science as based on a political concern with the corporate hegemony of knowledge, then these

concerns are orthogonal to concerns about the objectivity of corporate science or of science in general. Thereafter, I take the framework outlining the problem of the corporate hegemony of knowledge, as well as my developments for understanding agnogenesis and ignorance from interest, and apply them in performing a case study of the HPV vaccine. Here I argue that we can locate agnogenesis in the forging of the HPV vaccine legislation, as well as in the ongoing silencing of the inquiries of the vaccine skeptics. The end result is a novel outlining of systemic cases of agnogenesis and the conditions of their operation, as well as an improved framework for analyzing contemporary cases of agnogenesis.

In Chapter 2, I offered an expanded account of Proctor's third category of ignorance: ignorance as active construct. My expansion of this category splits it into two new sub-categories: ignorance from ideology, and ignorance from interest. To analyze cases of ignorance from ideology, I presented and employed conceptual resources developed in standpoint theory. I then looked closely at two examples of ignorance from ideology: white ignorance, and ignorance of women's sexuality. For understanding the distinctive characteristics of cases of ignorance from interest, I introduced the strong programme to act as my framework. I then took the case of agnogenesis within the tobacco industry, and argued that it can be understood as ignorance from interest. I also examined a case in which ignorance from ideology and interest are integrated, namely, the case of climate change denial.

With new conceptual frameworks in hand for understanding ignorance, I moved forward to address the normative framework underlying agnotology. I posed challenges for Fernández Pinto's proposed normative framework for agnotology in Chapter 3. She presents several arguments attempting to sooth the tension between an account of science as value-laden and

scientific objectivity. I challenged her arguments, and argued that they do not necessarily remove the tension; value-ladenness remains a potential threat to scientific objectivity. However, establishing that there's no tension between the two and showing that they are not strictly incompatible are distinct; Fernández Pinto, I argue, achieves the latter but not the former. Establishing the lack of incompatibility is important because it means that agnotology doesn't have to view science as not objective.

Using the concepts articulated throughout the thesis, in the previous chapter I presented an agnotological analysis of the HPV vaccine legislation and the dissemination of knowledge about it. I argued that three main strategies taken by the HPV vaccine proponents constitute forms of agnogenesis: (1) that Merck circumvented evidence-based procedures, (2) that Merck provided corporate-laden knowledge and resources to policymakers as evidence on the basis of which to make an educated decision on the mandate, and, thereafter, (3) that both Merck representatives and public health advisors silenced and ignored inquirers skeptical of the vaccine.

Now, one limitation of my thesis is the absence of arguments favouring a specific positive account of agnotology's normative framework. Although I identified flaws in Fernández Pinto's proposed framework, I did not present my own normative agnotological framework complete with repairs in response to my own objections. Instead, I presented Sismondo's concerns about commercialized science and the framework in which he raises them as an alternative framework, and as one on the basis of which the task of my thesis could move forward while putting the issue of scientific objectivity to the side. It remains for future research to synthesize the best aspects of Proctor's, Fernández Pinto's, and Sismondo's frameworks and output a consistent, freestanding account of agnotology's normative presuppositions.

Another limitation of my work includes an absence of attention to feminist analysis of the HPV vaccine. As a vaccine marketed to women that promises to prevent women's ailments, there is ample discussion to be had regarding the merits and demerits of the vaccine from a feminist perspective.

Potential directions for future research include addressing these limitations, as well as continuing the agnotological analysis of the various corporate sciences. Researchers continue to uncover cases of ignorance from interest, bringing into the spotlight the dynamics of the system of knowledge production which are vulnerable for exploitation by corporations for the production of ignorance. One pressing question is how institutions of knowledge production could be reconceived and reengineered to remove these vulnerabilities, and whether these changes would have a diminishing effect on the total knowledge output of the scientific enterprise. If we need to forsake knowledge to prevent the production of illegitimate ignorance, how should we tally up these losses and wins? What is the right balance? These questions, I claim, are both practical and philosophical. And we should not leave it up to corporations to answer them for us.

Additionally, having presented a modified framework for analyzing ignorance, updated with the inclusion of the distinction between ignorance from ideology and interest, I suspect that there could, in principle, be no end to the future modifications of our framework that will be needed to pose new kinds of agnotological questions. As corporate science changes and evolves, new questions will inevitably need to be asked, and we should be seeking out the limitations of our framework, for these are the places where new work can be done. The limits will need to be transcended. And even just focusing on today's agnotological perspective, the form of analysis

presented in this thesis is ready to be applied to more cases of specific drugs, different corporate sciences, and other systems based in ignorance from interest and ideology. For these reasons, ignorance from ideology and ignorance from interest will hopefully allow researchers to articulate better just how precisely agnogenesis is being used, and for what intentions and purposes.

To conclude, agnotology is significant in that it unveils systemic ignorance production that otherwise would go unnoticed. This is so precisely due to the nature of the subject matter: ignorance. From the findings of agnotology, researchers can discover and uncover new methods of agnogenesis being used by institutions and groups at large. These sorts of discoveries are invaluable in maximizing the overlap between public knowledge and the reality of our socially embedded scientific practices, which ensures that people are not only informed, but informed about the social conditions of the information of which they are being informed. Having presented new and updated frameworks for understanding structures of agnogenesis, and having provided applied them to paradigm cases of agnogenesis, I hope to have persuaded readers that the research done here not only matters theoretically, from the perspective of understanding the concept of ignorance, but also practically, in seeing how ignorance plays out in real time. Due to the nature of ignorance—as a state of not-knowing—it can be difficult to discover how and that agnogenesis exists. I hope to have cast new light on this phenomenon in this thesis, as well as on the method of unveiling agnogenesis itself.

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