

RESEARCH ARTICLE

The Subterranean Unsettling of Science, Race, and Religion: Obeah, Petroleum Geology, and Risk in Trinidad

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Abstract

When scholars have compared “African traditional religion” and “Western science,” they have often treated the terms of this comparison as racialized unitary entities, which are either radically different or somewhat similar (even as Western categories of rationality or nature remain the basis for these comparisons). This essay unsettles these assumptions by focusing on practices that are called “science” in the fields of both petroleum geology and Afro-Caribbean religion. Based on long-term ethnographic research in Trinidad, arguably the world’s oldest site of commercial oil extraction, I show how internal differences between those involved in “petroleum science” and “African religion” reveal a spectrum of meanings for the word “science” centered on relations to risk. At one end of this spectrum, science conveyed ideals of stable tradition that de-risked claims to knowledge for energy sector specialists intent on securing foreign investment or for “Yorubacentric” lineages of African religion centering initiation-based authority. At this spectrum’s other end, “science” foregrounded the risks of accessing hard-to-perceive forces in petroleum exploration or “spiritual work.” By focusing on heterogeneous practices rather than cultural essences or ideals of rationality, I show how the ethical implications of “science” depend on differing experiences of the risks of working with subterranean powers. While petroleum surveys at my field site in Trinidad required embodied risks by laborers, geologists backgrounded these contexts of power, representing the risks of their work as a problem of scientific accuracy. Afro-Trinidadian spiritual workers, in contrast, foregrounded the embodied risks of science as the ground of ethical practice.

Keywords: socio-cultural anthropology; science studies; religious studies; petroleum geology; colonialism; modernity; Africa; African diaspora; climate change; Obeah; Trinidad

Introduction

In the midst of global protests against racial injustice, it might seem misplaced for a controversy over “science” to become a flashpoint for debates on racism in the

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summer of 2020. Yet, it was the racial provenance of “science” that helped to stoke conservative white-lash to calls for a reckoning with the racist history of the United States (and the West in general) that summer. The controversy centered on the National Museum of African American History and Culture’s 2020 online exhibit “Talking About Race,” which featured a chart listing the “scientific method” as one of the key features of “White culture.” The social media controversy revolved around alt-right anxieties over the alleged “reverse racism” of the Museum’s chart as an assumed critique of “Whiteness,” “Western culture,” and “Americanness” (with alt-right pundits like Donald Trump Jr. equating these terms) (see Ankel 2020; McGlone 2020). Interim museum director Spencer Crew apologized but defended the exhibit as not racist because “we’re trying to talk about ideology, not about people” (quoted in McGlone 2020). What remains more interesting for this essay is the implicit ground that both sides of this debate seemed to share, since neither side questioned the underlying assumption of science’s white provenance or the chart’s characterization of science as “objective, rational linear thinking” (Koop 2020).

While geographically removed from the center of this debate, the word “science” also played a central role in twenty-first century contestations over race, Africanity, and rationality at my field site in southern Trinidad—hereafter known as Rio Moro. During a spate of alleged “demonic possessions” at the local secondary school, often attributed to African-identified “superstition” or “black magic” in national media, science served as one antidote to this supposed irrationality (with born-again Christianity serving as the other antidote). Although journalists, psychologists, and Pentecostal pastors touted either “modern science” or the Holy Spirit as progressive cures for African atavisms, many of my interlocutors in Rio Moro attributed the disturbances at the school to science itself. Drawing on a long-standing lexical equivalence between “science” and the anglophone Caribbean’s criminalized shorthand for African practices of spiritual work (“Obeah”), my interlocutors asserted that science could indicate potentially-dangerous experimentation with hard-to-perceive powers, including student attempts to access esoteric spiritual forces through online European grimoires (spell books) or the justice-seeking Obeah enacted as vengeance for incidents of sexual abuse against students (see Crosson 2020).¹ Unlike the U.S. controversy over the racial provenance of “science,” my interlocutors in southern Trinidad did not conflate science with “white culture” and objectivity. They asserted that science was the ethically fraught accessing of hard-to-perceive powers, associated both with the popular marker for African-identified spiritual practices in the region and with European esoteric texts.²

Scholars have often interpreted this doubling of “science” and “Obeah” as an instrumental, legitimating move for stigmatized African-identified practices. Yet rather than a thin veneer of beneficent rationality, the equation of Obeah and science during the school’s “possessions” revealed a complex theorization of these

¹For an excellent discussion of the lexical equivalence of Obeah and science in the Caribbean, see Palmié (2002: 201–10).

²While these grimoires were written or compiled by European or Euro-American authors, they often purported to reveal non-Euro-Christian knowledges, most principally ancient Egyptian, “Hebrew” Kabbalistic, or “Hindoo” esoteric powers. Popular examples include *The Sixth and Seventh Books of Moses* and *The Great Book of Magical Art, Hindoo Magic, and Indian Occultism*, both distributed by the Chicago-based DeLaurence Company, which became a popular source of anglophone mail order esoterica in Africa and the African diaspora starting in the early twentieth century.

words' shared associations with the risks of seeking to know and experiment with hidden forces. Far from a local (mis)understanding, I argue that this association with the potential dangers of hard-to-perceive forces deconstructs the very idea of science that has defined (white) rationality against (Black) magic. Alongside other ideals that the National Museum's chart identified with white culture (e.g., hard work and nuclear families), science has been defined by negative stereotypes about Black culture. Whether in popular movies or Christian invectives (e.g., Boaz 2021; Hurbon 1995), (mis)representations of African-identified religious practices have often performed the negative labor that makes ideals of Western science (and religion) possible. Rather than refuting these stereotypes by asserting that African-identified traditions actually conform to (some aspects of) Western standards of science or rationality, as a long line of scholars have done (e.g., Evans-Pritchard 1937; Horton 1967a), this essay critiques the idea that science can be defined by a singular rationality, cultural essence, or method. By ethnographically focusing on the work of specialists attempting to sense hard-to-perceive forces in Trinidad (mainly, geologists and spiritual workers), I show how practices labelled "science" involve heterogeneous orientations to certainty, risk, standards of authority, and ethics.

Shortly after the school "possessions," Rio Moro became the site for another exercise of science that sought knowledge of hidden forces. A Canadian management firm began a seismic oil and gas survey that attempted to remotely sense invisible subterranean morphology. Trinidad is arguably the world's oldest petroleum economy.³ Yet, with less than two decades of known reserves remaining, Trinidad's economic futures depend on the seismic exploration and development of unseeable reservoirs of energy beneath the earth's crust (as well as on the increasingly hard-to-access foreign capital that will make these ventures possible).⁴ These surveys use buried dynamite and underwater cannons to generate shockwaves powerful enough to penetrate the earth and echo back to geologists and geophysicists. Through highly mediated and uncertain processes of sensing and specialist interpretation, petroleum geologists make predictions that are often wrong (see Weszkalnys 2015). Nevertheless, through traditions of instrumentation or professional expertise, the seismic survey is often represented as a transparent process of measurement that "de-risks" oil and gas ventures. For my interlocutors in Rio Moro, recruited as the labor for these surveys, this practice of science was not an exercise in transparent, objective measurement; it involved highly contested relations of extralegal power and dangerous forms of work. While science was upheld as an exercise in transparency that could dispel the Obeah at the secondary school or de-risk oil and gas enterprises, in both these instances science was also a risky practice with hidden powers for my interlocutors.

In this essay, I use these two kinds of science to define the ends of a spectrum of certainty and risk that unsettles any opposition between Western science and African

³While the 1859 Drake Oil Well in Pennsylvania, amongst other early wells, is often recognized as the world's first modern oil well, the American Merrimac Oil Company had drilled an oil well two years earlier in the vicinity of Trinidad's pitch lake.

⁴Using the 3P (proven, probable, and possible) reserves of oil and condensate reported in a U.S. firm's audit, Trinidad and Tobago Minister of Energy Kevin Ramnarine stated in 2015 that there were about seventeen years of oil and condensate remaining at current production levels. While the amounts of such reserves are often couched as "scientific facts," such numbers are continually changing, contested, politicized, and highly debatable.

tradition. In comparing specialist practices labeled petroleum geology and African religion, I argue that neither “science” nor “African religion” are unitary entities; it is thus impossible to assign them to a single column, however defined.⁵ Rather, practices marked as both scientific *and* religious, African *and* Western navigate a spectrum of certainty and risk. By focusing on heterogeneous practices rather than assumed cultural or racial essences, I show how religious or scientific experts can occupy multiple positions on this spectrum, depending on the context. At one end of the spectrum lie ideals of “science” that are defined by authoritative truth and repetitive, ideally invariant material practices—what I, following conventional usage, associate with the words “tradition” and “ritual.”⁶ On this ideal-type spectrum, ritual is not an exclusive, defining feature of all religion, but can characterize practices deemed religious or scientific. Both scientific experiments and religious rituals can aim to perform ideals of replicability and consensus. At the other end of the spectrum, “science” conveys potentially dangerous or risky experimentation with hard-to-perceive forces that often signals hidden relations of power or conflicts.

I focus on the practices of geologists and engineers engaged in sensing or extracting fossil fuels, comparing their navigation of a spectrum of certainty and risk with that of specialists in Trinidad’s field of African-identified religions. I show how energy sector specialists can utilize ideals of science associated with certainty to de-risk oil and gas exploration. I complicate this ideal-type science through ethnographic attention to the interventionist practice of seismic surveys within the lived contexts of power during the survey in Rio Moro and to the variety of specialist opinions about the epistemic risks (i.e., uncertainties) of their work.⁷ Such ethnographic attention shifts focus to the other end of the spectrum of “science,” in which uncertainties and risks abound.

For specialists in the field of African-identified religions in Trinidad, I found the notion of science-as-certainty most resonant when leaders were intent on constructing a stable source of authority rooted in a specific African tradition. This tradition was Ifá, often seen as the most prestigious lineage of the Yoruba ethno-religious formation, with Yoruba-identified practices currently being the most authoritative traditions in the contemporary field of African-identified religions (see Castor 2017; Johnson 2007: 205–26). In referring to their practices as “Yoruba sacred science,” leaders could draw on an ideal of science communicating

⁵Despite a widespread scholarly and popular tendency to still refer to science in the singular, as a domain based in “the scientific method” that produces universal truths, there is a well-established literature arguing that sciences involve heterogeneous practices and messy realities (e.g., Law 2004; Mol 2003).

⁶On one African-identified religious tradition’s performance of certainty through rituals of divination, see Holbraad (2012). It is probably no coincidence that Holbraad’s emphasis on certainty and truth emerges from the analysis of one of the most codified, initiation-centric, male-exclusive religious traditions of the Caribbean—Cuban Ifá. On a spectrum of certainty and risk, performances of truth tend toward codification and formalization of authority. Holbraad’s analysis points elsewhere, toward a rejection of relativism in favor of an insistence on the ontologically divergent grounds for truth. Whether the grounds for truth are defined in terms of ontology or culture, certainty is only one criterium for validity in religious practices. It is worth focusing on how religious practices are experimental, precisely because religion has often been defined or legitimated through notions of orthodox codification, ideals of invariance and consensus, or ritual stability.

⁷These contrasting tendencies toward certainty or risk have been characteristic of the field of petroleum geology and contested representations of oil’s relative abundance or scarcity in Trinidad and beyond (see Hughes 2017: 76–86).

replicability, stability, and authority. However, ritual specialists also honored practices of healing, justice-making, and protection associated with the anglophone Caribbean term Obeah. “Science” is a widespread synonym for Obeah across the region, but here science often communicated the potential dangers and powers of interventionist practices of “spiritual work” that aimed to heal and protect clients or enact justice for wrongs inflicted on them. While Obeah was roundly infernalized and criminalized by colonial authorities across the anglophone Caribbean, this association of Obeah/science with the dangers and promises of power in the present-day does not make it evil or inherently bad.⁸ Rather, as with any discourse about power (whether economic, political, spiritual, or scientific), Obeah communicated the capacity to accomplish beneficent acts, while also recognizing the human ability to misuse power and cause harm (even if unwittingly).

From colonial accounts to the present day, the potential dangers of Obeah/science have often been associated with the use of subterranean spiritual powers. So, like the earth scientists involved in seismic surveys, the African diasporic spiritual practitioners I have worked with over the past decade in southern Trinidad could also use the medium of sound (through songs, glossolalia, or percussion) to marshal knowledge about what lies below the earth. The allegedly infernal powers below the earth have often been associated with Obeah in popular, negative representations of these spiritual workers’ practices, and Western cosmologies of infernal realms have long undergirded racism (Fanon 1986[1952]: 146; Crosson 2020). However, as with the word “Obeah,” the science of sensing the subsoil was not inherently negative for many spiritual workers; instead, the subsoil body was inhabited by “powers” that included an exiled previous creation of beings (often associated with Christian “demons”), the dead, chthonic Orishas, or the figure of Ezekiel who descended into “the valley of dry bones” to make them live again (Ezekiel 37: 1–14).⁹

⁸It has been widely noted that popular attitudes toward Obeah in the Caribbean regard it as an ambivalent force (see Browne 2017: 132–56; or Paton 2009). There are a variety of interpretations for these popular ambivalent attitudes given by scholars, who are usually involved primarily in archival research on the subject rather than ethnographic immersion. Such explanations include the legacy of the colonial criminalization of Obeah (Paton 2009; Bilby 2012), intra-group conflicts among plantation laborers (Browne 2017: 132–56), or white fantasy and anxiety (Hucks 2022). I do not differ with any of the explanations and feel that they are all at play to varying degrees. What I have wanted to emphasize is the banality of the idea that a discourse on power (whether that power be political, economic, or spiritual) involves ambivalent attitudes. Considering this banality, I then have asked why it is that Obeah’s potential ambivalence is such a problem. People are entirely capable of respecting politics or economics, even when such discourses are intensely ambivalent, recognizing the capability of humans to misuse power. The problem, I have argued, has to do with “moral-racial” ideals of religion, which have been used to denigrate African-identified religions. Because of this, Obeah—a discourse on and practice of spiritual power—is held up to an impossible double-standard.

⁹The Trinidadian Kabbalah involves the honoring of a number of spiritual “entities” that are sometimes known by the names of Christian demons. In a different association, Ezekiel is equated to or associated with an entity known as Mr. Bones in the Trinidadian Kabbalah. In Yoruba-inspired grassroots practices in Trinidad, the chthonic power Ezekiel is often equated with Shakpana, originally a smallpox deity in West Africa that remains an important Orisha in Trinidadians shrines (see Smith 1963: 94; McNeal 2011: 126). Shakpana’s association with St. Jerome on the Catholic side may also have to do with subterranean resonances, as Jerome is supposed to have spent thirty years in a cave translating the Bible. A peculiarly Trinidadian Orisha, Mama Lata (literally meaning Mother Earth in Trinidadian French Patois) was associated with the body of the earth. In a highly contested and widely rejected association, due to its denigrating force, the Orisha of the crossroads, Eshu, has been associated with the infernal Christian power Satan (see McNeal 2011: 125).

Unlike Western Christian cosmologies of Hell, subterranean powers were not “evil,” but they were often potentially dangerous or risky to work with. Because they were often associated with affliction and/or death, they were also particularly skilled at removing afflictions and deadly forces, making them useful in problem-solving spiritual work (i.e., Obeah) to heal and protect clients.

It would be easy to see how the subterranean forces that petroleum geologists seek, hydrocarbons, can also be both useful and dangerous, given that our lives are powered by oil, coal, and gas, even as this power drives planetary crises. Nevertheless, the geologists and engineers I spoke with did not conceive of subterranean forces as possessing the power to afflict them, while spiritual workers did recognize the potential embodied dangers that subterranean powers can exert if misused. I argue that differential experiences of embodied risk, rather than differing cultural essences or rationalities, are the basis for spiritual workers and petroleum scientists’ divergent ethics of science and the subsoil. Within the context of seismic surveys in Rio Moro, I show how racialized hierarchies of class determined laborers’ proximity to or scientists’ distance from the embodied dangers of these surveys.

The ends of this spectrum are ideal-types, and practices marked as “African religion” or “Western science” involve both ostensibly stable traditions and risky or uncertain experimentation. Science experiments involve traditions, whether of theoretical paradigms (Kuhn 2012[1962]), experimental practice, or instrumentation (Galison 1997). Science experiments themselves are often closer to what I am calling rituals—demonstrations of consensus, tradition, replicability, and stable routines of action. As ritual, a science experiment is “a specific event that acts as a warrant for universal truth claims” (Dear 1995: 6) conducted in “a controlled environment where the vagaries of ordinary life may be displaced” (Smith 1980: 124–25). While this commonsense modern idea is applicable to many science fair projects or university laboratory experiments, it may not characterize the work of scientists, especially those who, like petroleum geologists, often deal with incredibly complex and hard-to-perceive systems. What we call science, therefore, must, to some extent, grapple with uncertainty (and some scientists have argued that “uncertainty” should actually become the basis for science itself [e.g., Prigogine and Stengers 1996]).

In a similar way, African religious practices in Trinidad involve both seemingly stable traditions and uncertainties of action or contestations over authority. Even what gets called Obeah involves multiple traditions, whether of Yoruba-inspired rituals, esotericism, Hinduism, or Christianities. Because spiritual workers often treat a diversity of clients in a religiously plural society, they need to be able to draw on multiple traditions and to translate between them to make a clients’ affliction meaningful to them (see Crosson 2020). While mobilizing the authority of multiple religious traditions, spiritual workers also reversed ritual orders or experimented with novel techniques and materials (see, for example, *ibid.*; Hogg 1961). Experimenting with new techniques involved uncertainty as to their efficacy, and reversing ritual orders to reverse a client’s situation of power involved ethical quandaries and potential dangers. All of this means that both “Western science” and “African tradition” involve experimentation—a fact that other anthropologists attempting to rationalize African religious practices have denied.¹⁰

¹⁰“Not being experimentally inclined,” Evans-Pritchard (1937) asserted, African spiritual workers “do not test the efficacy of their medicines” (quoted in Otto and Stausberg 2014: 155). Robin Horton (1967a) echoed Evans-Pritchard’s argument in asserting that “African traditional knowledge” was rational—internally consistent, and explanatory. Yet, as did Evans-Pritchard, Horton (1967b) argued that this knowledge was

I begin by providing more background on the lexical equivalence between “science” and “Obeah” in the Caribbean, and the relationship between Obeah/science and racialized debates about the limits of science, rationality, relativism, and inclusion. I draw on science studies to show how “science” itself is not a unitary entity, briefly sketching the ends of a spectrum of meanings that I employ as an interpretive frame for the practices of both African-identified religions and petroleum sciences. I then delve into the ethnographic comparison between energy sector specialists and spiritual workers in Trinidad to show how these interlocutors, whether labeled practitioners of “science” or “African tradition” in popular discourse, navigated a spectrum of certainty and risk by performing “science” in different ways. I close by dwelling on the ethical orientations afforded by different sensibilities of risk—as epistemic uncertainty versus embodied threat. I focus on the divergent exposures to embodied danger that geologists and spiritual workers face, arguing that this difference matters in determining different stances toward the ethics of subsoil extraction in an era of climate crisis.

Magic, Science, Religion (Remixed)

“Science” is not the sole province of the specialists who might typically be associated with that word. Despite their different positioning in terms of class and educational hierarchies, both African-identified spiritual workers and petroleum scientists often referred to their sensing of subterranean realms as science in Trinidad. Unlike the practices of geologists, however, the work of Afro-Caribbean spiritual workers was rendered as the superstition that science was supposed to dispel in colonial discourse. These healing, protective, and justice-making practices were referred to as “Obeah” and rendered illegal under colonial laws that began in the eighteenth century in the British-colonized Caribbean, initially in response to Obeah’s alleged role in organizing slave rebellions. To this day, Obeah remains illegal in much of the region, and “science” remains a common synonym for “Obeah.”¹¹ Despite the heavy stigmas of atavistic “superstition” or harmful “witchcraft” that hang over contemporary spiritual workers, they have referred to their practices as science since at least the early twentieth century.¹² Anthropologists in the mid- to late

limited by Africans’ imputed lack of experimentation and reliance on static traditions to explain phenomena. He alleged that Western culture was “open” because it experimented, whereas African cultures were “closed” because they repeated the same ritual traditions rather than engaging in experimentation (*ibid.*; see also Wiredu 1979).

¹¹Obeah has been decriminalized in Anguilla (1980), Barbados (1998), Trinidad and Tobago (2000), and St Lucia (2004), but remains illegal in much of the region. Recent calls for the decriminalization of Obeah in Jamaica or Antigua and Barbuda have met with considerable opposition, which argues that Obeah is sinful, anti-Christian, and potentially damaging to national welfare (see Crosson 2018). In 2013, when Jamaica removed flogging with a whip as a punishment for Obeah in order to sign the U.N. Convention Against Torture, it left the criminal status of Obeah untouched (see Paton 2015). In Jamaica, however, there are ongoing efforts toward decriminalization, although they have achieved no lasting juridical success (see Crosson 2018). On the criminalization of Obeah and other African-identified religious practices, see Boaz (2021).

¹²The earliest known account of an alleged Obeah practitioner describing their work as science (if one does not count the 1760 remarks of a rebel leader on “his master’s Obi” rendered in colonial Jamaican accounts) are from the 1917 trial of Charles Bartholomew, Anthony Bartholomew, Hubert Alexander, and Airic Achaitar, a group of Trinidadians arrested for Obeah (Alexander Rocklin, personal communication 19 Aug.

twentieth century have often interpreted this talk of science as mere masking, a legitimating cover for African traditions, like the Catholic saints that supposedly masked African deities (e.g., Herskovits and Herskovits 1947; Littlewood 1993). They thus risked implying that spiritual workers had nothing substantive to say about “science.” I found something different during fieldwork in southern Trinidad, where spiritual workers’ ideas and experimental practices transformed my own often unexamined preconceptions about what science was.

In contrast with interpretations that see “science” as a legitimating mask, other scholars have attempted to either include African and Indigenous practices within the category of Western science or to use cultural relativism to mark such practices as culturally distinct forms of science or rationality. Eschewing the cultural ghettoization of non-Western empirical practices in the category “ethnoscience,” philosophers of science have insisted that Indigenous of African practices can be unmarked science, provided they deal with the “objective investigation” of the “natural world” (Wiredu 1979: 137; Harding 2015: 90). While confronting the condensations and essentialisms of cultural relativism contained in the term “ethnoscience,” this project presumes Western divisions of matter and spirit, or nature and supernature, as the basis for inclusion. In the case of Obeah, this has meant that Afro-Caribbean practices of spiritual work, if shorn of overtly spiritual dimensions and contained within a Western category of nature or ethnobotany, could become an authorized form of “herbal” or “traditional” medicine in popular discourses.¹³ As Indigenous scholar Deborah McGregor (2004) has noted, such projects of reform are typical of attempts at artificially isolating certain “natural” aspects of Indigenous knowledge for inclusion in categories of science. In the end, projects of relativism and inclusion are often based on assumptions of cultural essences or Western categories that seek to establish the boundaries of an unmarked science, rather than a close attention to heterogeneous practices.

In examining the ways in which we talk about science, religion, and African tradition, this piece proposes neither a project of inclusion nor one of cultural relativism. By paying attention to practices and nuanced discourses, I suggest that both energy sector specialists and spiritual workers in Trinidad grapple with a spectrum of powers that the word “science” can evoke. In confronting this heterogeneity, I draw on the philosophy of science to generate two ideal-types of “science” that help to define the ends of a spectrum of certainty and risk, with each end corresponding to two ideal-types of “religion.” Since my interlocutors, regardless of whether they are labelled as representatives of science or Obeah, are neither completely certain nor uncertain, they occupy multiple positions along this spectrum that can only be partial and contingent on context.

The more commonsense of these ideal types, for both science and religion, asserts that repetitive material practices perform certainty (ideally in a controlled environment separated from the mundane/profane world, whether a lab or a sacred space). While often commonsense, the idea that science equals proof has been the object of countless critiques by philosophers of science who insist that proof

2021). It is likely that popular usage of the word “science” for practices known as Obeah preceded this, but, with a limited archive composed largely of newspaper reports on Obeah trials, it is hard to know.

¹³This authorizing project of purification was analogous to another popular project of reform that equated Obeah with psychology, provided Obeah was shorn of spiritual workers’ insistence on the reality of interpersonal spiritual forces and reduced to emotional therapy.

is impossible (and even undesirable) within empirical methods. Philosopher of science and Popper-protege Imre Lakatos (1978) lamented that science got mixed up with theological proof since its birth in the West, remaining tainted to this day. To separate the underdetermined practices of sciences from these quasi-theological ideals of science, scholars have coined the term “scientism” to denote an ideology of certainty, truth, and superiority. Scientism, we might say, is this theology of science foundational to the West, which Lakatos and other philosophers of science lament. Despite their tendency to critique scientism and uphold empirical underdetermination in this scholarship, it is important to note how the tendency of philosophy of science to promote a certain version of science over and against the alleged non-empirical certainty of religious belief is itself integral to scientism.

Taking a tack that avoids such derision and foregrounds colonial power, philosopher of science Isabelle Stengers (2012) links this ideology of science-as-certainty to colonial conquest and the project of Western modernity. She opposes this story of Science (with a capital “S”) to an “adventure of sciences” rooted in risk (an opposition that I will problematize in the conclusion by noting the entanglement of risky experimentation with colonization). In the following two sections, I tentatively adopt this heuristic opposition of science-as-certainty and science as risk. I show how persons marked as both “scientists” and “engineers” or “Obeah” practitioners and “spiritual workers” may avow ritualized certainty or specialist risk in different contexts. I then unpack presumptions about science and risk that underlie these differing stances, showing how the unequal distribution of the dangers of material practices (whether marked as “science” or “Obeah”) lead to a new understanding of experimentation and ritual.

Science as Certainty: “Yoruba Sacred Science” and “Hard Science”

Before detailing the senses of risk, fallibility, or danger that petroleum geologists and grassroots spiritual workers often highlighted in their practices of science, I will turn toward a more popular conception of science-as-certainty. Despite condemning (perhaps condescending) accounts from the philosophy of science, views reminiscent of scientism often characterize conceptions of science amongst practicing scientists or engineers (even as they might feel their actual practices do not measure up to this ideal of science). It should not be surprising that actors marked as “religious” might also espouse views of science that associate it with proof or absolute certainty. This does not mean that these scientists, engineers, or religious practitioners misunderstand “science,” because, as I am arguing, “it” is not one thing.

The sense of what Stengers calls Science was expressed by Oyotunji, the leader of a Yoruba-centric shrine, Egbe Olokun, in urban northern Trinidad. The shrine was part of a larger movement of African religion in Trinidad that gravitated toward Nigerian lineages of Ifá as the highest source of religious authority and that generally emerged out of the 1970 Black Power Revolution in Trinidad (see Castor 2017). After the suppression of this revolution by Prime Minister Eric Williams’ government, some Black Power activists turned toward guerilla warfare (see Meeks 1999), but an increasing number shifted from attempts at seizing state power toward practicing Yoruba-centric African religion as a way of asserting cultural, Afrocentric autonomy. In the words of one of the movement’s key leaders, “we came to the traditional African religion as an act of political and ideological self-expression” (Springer,

quoted in Henry 2003: 95). This shift contributed significantly to what has been called the “resurgence” of Yoruba-inspired religion (or Orisha) in Trinidad.¹⁴

The personal history of the shrine leader Oyotunji echoed this larger story of Yoruba-inspired resurgence in Trinidad. Oyotunji had been deeply involved in the Black Power Revolution, converting the political aspirations of the movement for the seizure of state power into spiritual-political aspirations. After the Black Power Revolution’s failed coup in 1970, he rejected the Catholicism he had grown up with and began looking for information on African religions. While “grassroots” practitioners of Yoruba-inspired religions had existed in Trinidad since at least the nineteenth century, Oyotunji turned increasingly to Nigeria itself as a source of authority on “African traditional religion.” Oyotunji was able to attend one of the transnational festivals that the Nigerian state, then flooded with windfall profits from the oil embargo of the 1970s, funded to promote pan-African culture.¹⁵ Like an increasing number of Black Power enthusiasts of African religion, Oyotunji traveled to Nigeria a number of times to be initiated into higher levels of Yoruba Ifá lineages over the next few decades. Nigerian ritual specialists from Yorubaland also began to travel in the opposite direction, performing rituals, readings, and initiations in Trinidad. These transnational connections, in part fostered by Oil Boom profits in both countries, led to an Ifá-centric and Nigeria-centric source of religious authority that sometimes contrasted with grassroots, Trinidad-centric sources of authority for African religion on the island.¹⁶

Oyotunji publicly called the work of his shrine “Yoruba sacred science.” When I asked him why he used the word “science” he responded in this way: “Science is two ‘h’s’ plus an ‘o’ gives you H₂O, and this is under a particular standard temperature and pressure. Just as we expect that if you kill fowl and draw seals [ritual ideograms] in a certain way, at a certain time, in a certain place, and at a certain point, then you will expect certain results. So in that respect we also call our work ‘science.’ And it is science.”

Oyotunji drew on a notion of science, the experiment, and ritual closely associated with expected results and certainty to describe his “Yoruba sacred science.” Given the same controlled conditions, he reasoned, a ritual or an experiment will produce the same expected results. This sense of ritual certainty strongly echoes J. Z. Smith’s (1980: 124–25) implicitly lab-like description of ritual as action aimed at certainty, performed in “a controlled environment where the vagaries of ordinary life may be displaced.” Oyotunji, on other occasions, substantiated the authority of “sacred science” through its rooting in “ancient Yoruba knowledge” and the continuous lineages of transmission into which he had been initiated. A relatively stable image of tradition and authority was thus described with the infallibility that the word “science” conjured.

¹⁴For a fuller history of this resurgence and its links to the Black Power movement, see Castor (2017). For an analysis of why the traditions of Yoruba (rather than other ethnic groups that were often more numerically represented in the slave trade) have become hegemonic in representing African religion in the Americas, see Johnson (2007).

¹⁵On these festivals, see Apter (2005).

¹⁶However, these two sources of authority often overlapped, with educated middle-class practitioners openly praising the work of Trinidadian grassroots shrine leaders who had never been to Nigeria (see Hucks 2006). The first two leaders of Trinidad’s national Orisha organization were also firmly rooted in local, grassroots practices.

Oyotunji and other Ifá-centric shrine leaders, while appealing to science as the practice of ancient procedures determined by traditional Yoruba authority, could also invoke science in contrasting ways. In a number of Oyotunji's public gatherings, for example, he spatially separated revealed ritual from secret Obeah/science. In an offering for the Orisha of deep seas named Olokun, for example, he turned the boat away from the ocean and into a narrow tunnel of mangroves. Inside the dense mangrove swamp, a small island appeared. Oyotunji announced that he was going to do "secret science to deal with a little personal problem" on the island and that only two of his closest associates could accompany him. He then referred to what he was about to do as "Obeah," with a smile. In contrast with the "sacred science" of Yoruba ritual, the "secret science" of Obeah was focused on solving a personal problem in Oyotunji's life and could not be witnessed by most of the Egbe in the boat. The next section explores this use of science as a synonym for Obeah and the resonances of pragmatism, secrecy, and (as we shall see) risk that such lexical equivalence often inspires. The focus of this section, however, is on Oyotunji's "two 'h's' plus an 'o'" version of "Yoruba sacred science," as a practice of prescribed procedures and expected facts, rooted in agreed-upon authorities.

In my interviews with petroleum geologists and engineers I found similar invocations of Science, though for geologists, this notion of Science was often a horizon or an aspiration rather than a lived reality. The Afro-Trinidadian petroleum geologist Simon Bideau, for example, spoke of a future in which advances in technologies of remote sensing would convert his seismic exploration of subterranean hydrocarbons from an "art" into a "hard science." Because seismic data was fallible, prone to multiple interpretations and often-contradictory predictions, he envisioned a horizon of "hard science" that would convert such fallibility into certainty. All of the petroleum engineers with whom I spoke, in contrast, saw the certainty of "hard science" as a present reality rather than an aspirational ideal (although they assumed this hard science was practiced by non-engineers). Meeting at the country club of a private golf course that the Afro-Trinidadian petroleum engineer Arthur Olivierre frequented, he told me in unequivocal terms that petroleum geology was "hard science": "It [petroleum geology] is a hard science because it gives us reliable facts that we [engineers] can use to drill a hole.... The technology they have has advanced so far. It used to be we could only look at what was on the surface to guess at what lay below the earth, but now we can see what is under there with computers and the seismic technology."

As an engineer, Olivierre admitted that he had never interpreted seismic data, and he did not consider engineering a "true science." His job was to make sure holes did not collapse (through the injection of hardening substances) and to ensure that drills did not overheat (through the circulation of special fluids in the hole around the drill bit). According to what he told me, he assumed that the interpretations of geologists were facts that helped to guide his production of reliable holes. He contrasted a previous era of geological investigation, which relied on field surveys of surface outcroppings to infer subterranean morphology, with a new era of transparent viewing of what lay below the earth through seismic technology. Like other engineers with whom I spoke, his view of science and seismic technologies highlighted their infallibility. As another petroleum engineer working with the state oil and gas company told me, "the [seismic] technology has reached to such a point that we can see with a good amount of certainty what is below our feet."

This notion of science as a realm of transparent facts evokes what sociologist/anthropologist of science Bruno Latour (2010) has called the “double-click” fantasy of transporting information without mediation—a fantasy that he says characterizes popular understandings of modernity and science (and, he adds, modernist ideas of religion). In this view, science is about seeing readily perceptible matters of fact. Latour, however, challenges this view by proposing that much of science is actually about what is too far away, too small, or too slow to be seen. The practice of science actually involves highly complex “chains of mediation” that move between radically different scales and senses to produce visible representations of electrons, galaxies, or viruses (e.g., 2010). As we shall see, such a characterization of science more closely approximates how petroleum geologists often characterized the process of moving from reflected sound waves to the visual images of the subsoil that they presented to companies. However, the mediations of seismic sensing were often “black boxed” (i.e., concealed) in corporate board rooms or in interactions with engineers (see Bowker 1994).

It could also be argued that the attitudes of engineers reflected the marked differences between practices of engineering and geology. Engineering is often considered something different from science proper, separated from many colleges of natural sciences and placed within its own school in contemporary universities. When it does qualify as science, the heterogeneous practices of engineering are often thought of as an applied, rather than experimental science. Like the colonial discursive opposition between allegedly pragmatic Obeah and non-instrumental religion, engineering and science thus bear a relation of ambivalence by virtue of the pragmatic nature of the former term. Because it is pragmatic, morally ambivalent “work,” Obeah is often an emblem of what proper religion is not in popular discourse around the anglophone Caribbean. Such distinctions echo Western polemics about magic and religion, in which the former is pragmatic and applied problem-solving while the latter is a lofty sphere of morality or communal transcendence (e.g., Chireau 2006: 3; Durkheim 1964[1912]; Malinowski 1948). In a somewhat resonant way (belying the equation of magic and technology in Western discourse), engineering is often (not)science.

Whatever the validity of this latter statement for a wide range of divergent practices, it does not hold true for the “industrial science” of oil. Engineers’ pragmatic experimentation with measurement techniques in the field were central to the foundational origin myths of petroleum science (see Bowker 1994). These measurement calibrations were conducted during the process of drilling a well—an incredibly dangerous “adventure,” especially in the early twentieth century when these origin myths took shape. One might say, however, that the experimental and risky nature of petroleum engineering had been largely black-boxed as drilling companies (particularly the dominant Schlumberger company) represented their work as “normal science” (Kuhn 2012[1962]) to gain legitimacy in the industry (Bowker 1994). In other words, the experimental pioneers of petroleum science were often not recognized as experimental scientists, and the normalization of petroleum exploration as “science” has strived to represent it as a stable tradition. A similar relationship of disavowal and symbiosis between the eclectic, experimental practices of Obeah and the certainties of modern African tradition paralleled this concealed relation between industrial engineering and “science.” Religious orthodoxies, one might say, depend on heterodox, problem-solving practices for innovations that become normal.

In contrast to an idea of science-as-certainty, the Trinidadian petroleum geologists and spiritual workers I spoke with often foregrounded a notion of science as a risky, pragmatic, and contingent activity. In my experience, petroleum geologists (and geologists more generally) are aware of the relatively high degree of uncertainty in their remote sensing of subterranean morphology. Spiritual workers also talked about science as potentially dangerous experiments with power to solve unique problems, different from a “Yoruba sacred science” of revealed rituals that maintained a traditional order. Obeah, as I have argued elsewhere (Crosson 2020), can reverse or alter the traditional order of material rituals to reverse the conventional relations of power that are at the root of a client’s affliction. Obeah is explicitly interventionist. Through material assemblages of commercial products (such as store-bought candles and oils), locally gathered herbs, graphic writing (drawings known as “seals”), embodied actions (such as spinning a client to set them on a new path or turning their clothes inside-out) and written or spoken words (like the writing of a client’s name on a piece of paper soaked in water), spiritual workers perform “experiments” to disrupt entrenched situations of power. Like experiments marked as scientific, Obeah involves traditions—authoritative orders of material practice. Yet Obeah also reverses these orders, draws eclectically on multiple traditions, alters practices to fit a client’s background and problem, or involves specialist innovations and intuition. As the next section shows, petroleum geology may also involve specialist intuition (described as “gut feelings”) in dealing with the contingent and uncertain complexities of a practical situation. Relying on specialist intuition rather than fixed certainties is not an unscientific aberration; it arguably characterizes scientific interpretation after a partial shift away from the “mechanical objectivity” of the nineteenth century toward specialist intuition in various disciplines (Daston and Galison 2010: 309–61).

While potentially dangerous (whether this danger was conceived of as epistemic or embodied), this notion of science-as-risk was not necessarily ethically inferior to science-as-certainty. For some practitioners of African-identified religions in Trinidad, the presentation of Yoruba sacred science (Ifá) as foolproof could also represent dangerous or overbearing attempts to impose Nigerian authorities onto local practices. One spiritual worker even went so far as to talk about a “Nigerian colonization” of Orisha in Trinidad, which accelerated with the hosting of the Sixth World Congress of Orisa Tradition and Culture in Trinidad in 1999. This Congress brought Nigerian and U.S. African American leaders in Ifá lineages to the island. The attempts of these leaders to impose their authority or to correct local traditions led to a degree of resentment among some Trinidadian Orisha practitioners (see Castor 2017). As Trinidadian Orisha practitioner and scholar Rawle Gibbons proclaimed, critiquing efforts to uphold the “Yoruba sacred science” of present-day Nigeria as final authority: “There is no pure form. No African talks about the tradition in any pure way” (quoted in Hucks 2006: 28). Claiming to possess a pure tradition or a foolproof science could also be dangerous.

In an analogous way, notions of science-as-certainty could be both appealing and authorizing or dangerous and dishonest for petroleum geologists. In the view of one Trinidadian petroleum geologist who I knew, then at work with ExxonMobil on the exploration of a massive new oil find in Guyana, attempting to present seismic interpretations as “hard science” in order to impress energy sector executives was a dangerous practice. “Those are the ones [geologists] I stay away from,” he told me. “Eventually their overselling of the data backfires on them.” He preferred to be

“honest” about the considerable uncertainty in his interpretation of seismic data, and he felt that corporate executives had eventually come to trust him more because of this “honesty” about the less-than-certain, probabilistic predictions of petroleum geology.

Turning now to notions of science as uncertain and potentially dangerous, we see how acknowledging the riskiness of science provides a different ground for the ethics and powers of scientific practices. These ethics not only raise questions of epistemic or professional risk, such as those raised by the Trinidadian petroleum geologist working on a project in Guyana (who considered his own work to be a morally authorized endeavor in the honest representation of data that was helping to bring prosperity to Guyana). A plumbing of science-as-dangerous also raises the question of who exactly bears the brunt of the lived risks associated with scientific endeavors. The next section sketches these risks that are integral to the execution of seismic petroleum exploration and the problems that spiritual workers address.

From Controlled Environments to Contested Ones

Before discussing the potential fallibility or danger associated with science for spiritual workers and petroleum geologists, it is important to note that spiritual work and seismic surveys do not happen in a vacuum. While both science and ritual are popularly conceived of as operating in “controlled environments” (see Smith 1980), this notion can elide contexts of power and the extensive labor required to craft “control.” The erasure of such contextual labor has been integral to colonizing notions of science, religion, and law. Spiritual workers, in my experience, most often dealt with clients’ problems with police and the legal system (see Crosson 2020). Rather than a realm of objective and impartial procedures, my interlocutors saw the criminal justice system as heavily stacked against lower-class Black people. Similarly, seismic surveys happened within contexts of power overdetermined by race and class. The materiality of labor or political and economic pressures were backgrounded, or “black-boxed,” in a context akin to the controlled environment of a lab or a ritual. But the lived situation was somewhat different, involving material affordances and power relations that were frequently tenuous or contested. The “controlled environment” of science or ritual took work to produce, and this work involved experimental, ethical “cuts” (Barad 2007) that selected who or what mattered (and those matters that, at least in authoritative representations, did not).

The seismic surveys conducted at my field site in rural southern Trinidad in 2011 are instructive in this regard. The onset of these surveys was marked by the arrival of a heavy-set man known as Tatu at the house of the family I lived with. He was driving a brand-new pick-up truck and wearing the orange jumpsuit of the Canadian management firm that was running the seismic operation in Rio Moro. Tatu was known as a “bad man,” meaning that he was both respected and feared for his potential to break the law and use violence to enforce his interests, and he informed the father of the family—known as Papoy—that the company would need to use some of the hillside farmland he squatted on for the survey. After Tatu left, Papoy told me it was common practice for companies to hire such “bad men” to liaise with local communities during seismic operations or drilling projects.

A few months later, a white truck that looked like an oversized ambulance parked at the foot of Papoy’s farm where the rugged paved road stopped. Orange tentacles were attached to the body of the vehicle, connecting the air-conditioned interior of

the truck with the hard-to-access forests of the Southern Range. The most time-consuming and laborious part of the work was the months-long cutting of tracks through dense forests and the manual lugging of heavy cables for miles along GPS lines, with the local laborers carefully skirting the marijuana fields often armed with pipe-gun traps. With very little other formal employment in the area, many of the seismic workers were engaged in this type of farming, and it was their knowledge of the ganja fields that made the survey possible. This knowledge of terrain was both absolutely essential and totally incommensurable with the language of scientific reports and the grid of GPS lines that the seismic cables ostensibly followed.

Such knowledge did not make it into company reports (nor would ganja farmers want it to). The backbreaking, dangerous labor that these workers engaged in was also typically backgrounded in seismic reports I have seen. Workers showed me pictures of all the venomous snakes they had encountered while laying the cables. They complained that the white foremen were paid salaries in U.S. dollars that dwarfed their minuscule wages, paid in local currency. They said that the company was bringing in labor from outside of the area, even though government contracts negotiated with the company stipulated that a certain percentage of the workforce had to be local. When the company did not pay them the overtime wages they felt they had earned, the company trucks found barricades of old telephone poles and scrap metal blocking the only access road to the site of one of the surveys.

Meanwhile, one of the local fisherfolk cooperatives was holding out for better pay for the local boats that would provide transportation and navigation knowledge for the offshore component of the surveys. Yet, using a tactic employed in other surveys in Trinidad, the company's local representative paid off the president of the other local fisherfolk cooperative. This was cheaper than bribing both presidents and had the additional effect of turning the two cooperatives against each other so that they could not present a united front against the company. The company's relatively small payment for the use of the boats was secured, but not evenly distributed. Only boat owners would be paid; those who normally worked the fishing boats for their daily wage were left entirely out of the deal. In addition, boat owners would only be compensated for the days that air cannons would be fired during the survey, when no fishing was allowed. However, fisherfolk asserted that the offshore seismic survey seriously disrupted fish stocks and breeding, leading to a massive depopulation of fish in the area for at least six months (see Fitzgibbon *et al.* 2017; Paxton *et al.* 2017; Surtees 2013). No compensation was offered for these effects, and this was a major thorn of contention. All of these contestations, of course, were never discussed by the petroleum geologists I spoke with, and their representations of seismic surveys focused on nonhuman technology or their own specialist interpretations.

Despite all of these labor conflicts, Papoy acquiesced to the company's terms and was grateful for the extra income he would receive as "watchman" for the company's equipment on his farm while the preparations for the survey were made. So, after months in which workers painstakingly bushwhacked the trails for seismic cables, holes were drilled deep in the forest and dynamite was placed in them, with orange tentacles running all the way from the holes back to the white truck that had just arrived on Papoy's farm. A group of people my interlocutors called "scientists" (presumably geophysicists) sat inside the air-conditioned truck for a few days. Though it was hard to see them surrounded as they were by armed guards, Papoy and the local spiritual workers who I knew speculated on what these scientists did. They compared the work of these scientists with their own complex notions of

science as a potentially dangerous engagement with hard-to-perceive forces. From their view of the seismic survey, it was clear that science was an ambivalent exercise involving contested relations of power.

To understand how the earth scientists themselves conceived of their own practices of subterranean sensing, however, I had to travel to the capital or to the national university. The armed guards, tense labor relations, and class differences that surrounded the seismic survey's white truck meant that Papoy or my other interlocutors would most likely never speak with the scientists inside. I could not talk to the geophysicists at my rural field site, but I could speak to petroleum geologists in their offices in the environs of Trinidad and Tobago's capital city (roughly two hours from where I lived with Papoy, or more, depending on road conditions). The next section compares these geologists' practices of sensing unseeable worlds with the practices that grassroots African religion employed to sense subterranean realms.

Sciences of the Occult

Simon Bideau is a foreign-trained geologist, former head of the national oil company, and former head of the Petroleum Studies Unit at one of the national universities in Trinidad and Tobago. He has lived almost his whole life in Trinidad and identifies primarily as a person of African descent. Like a majority of petroleum geologists in Trinidad and beyond he is a man. While Bideau has all of the credentials that we might associate with recognized scientists, he seemed unsure of whether he was practicing science much of the time. The first time I asked him if he considered petroleum geology to be a "hard science," he answered in the affirmative, but as we got to know each other better he revealed to me that he thought of himself "more as an artist than a scientist." Science, for him, stopped with the geophysicists in the white truck who recorded the sound waves bouncing off subterranean surfaces. This recording was science, he told me, but after that what he called "story telling" or "art" began. In explorations of new fields, he reminded me, petroleum geologists are wrong in their predictions about 75 percent of the time. In new deepwater fields, where most of Trinidad's remaining petroleum lay, this failure rate rose to between 85 and 90 percent (see Weszkalnys 2015).

That he was an artist, however, was probably not what oil and gas companies wanted to hear. As Bideau told me, they wanted science—meaning visual maps, convincing evidence, and ostensible facts—and this was where his work as storyteller began. Certainly, this seemed to bother him; he wanted to be a scientist—this was definitely how many others typically saw him—but he was not sure if he was one much of the time. He had to convert uncertainty into science, which for him and others meant clear and compelling evidence that supported a certain interpretation. Yet really there was often no definitive seismic evidence that forced him to choose one of the hundreds of possible interpretations over others, and different geologists often interpreted the same seismic data in divergent ways. Bideau told me that over the years he had developed a repertoire of embodied sensations—"gut feelings" he called them—that told him which interpretation he would follow and present to others. After months of computer processing, in which a variety of different filters and complex techniques of computation aimed to separate signal from noise, he was left with this sensation of conviction in his abdomen that told him which way to go.

While Bideau told me about his embodied artistry, his sense that the interpretation of seismic surveys *could* become “hard science” was a consistent counterpoint in our conversations. Indeed, his first reaction to my question about hydrocarbon exploration was the same as that of the engineers with whom I spoke; the complexities or “noise” of the process were black-boxed to make it an act of seeing with certainty. Later in our conversations, Bideau told me that in the future, technology would advance to the point where the sonic sensing of what lay below the earth would become akin to using an ultrasound to see a fetus in the womb. He told me these technological advances would make oil and gas exploration a “hard science.” As I thought about this metaphor of the ultrasound, I realized how conflated sound and vision were for me in my imagination of this technology. I reckoned that this smooth leap from reflected sound to visual image was what signaled “hard science,” in which the complex “chains of mediation” that allowed for movement between radically different media were black-boxed because they worked so well.¹⁷

Yet, in other conversations with geologists this metaphor turned into something more invasive. Andre Tanker, an Afro-Trinidadian petroleum geologist and former Minister of Energy, also compared seismic surveys to ultrasound. Yet, both of these processes remained inexact, he told me, because they were practices of remote sensing that used sonic waves to get at what could not be seen directly. He explained to me that the problem with seismic surveys was that the sonic explosions were not focused “laser beams.” They created bursts of sound that spread out after they were emitted from the dynamite charge in the earth or from the air cannons on boats. Nor did these sound waves penetrate the subsoil like a laser’s beam. They could bounce back to the special microphones on the boat or the earth’s surface without reaching the depth at which oil and gas lay. The sound waves could also bounce between the ocean’s floor and the bottom of the seismic ship multiple times, thus simulating the time delay that was used to separate such noise from signals that actually penetrated the subsoil. This was why, Tanker told me, seismic remote sensing was not “hard science.” Such hard science only began, he told me, when a deep hole was drilled, allowing for core samples of the different subterranean strata to be taken. Rather than an ultrasound, he likened this process to a biopsy. Instead of using sound to penetrate the body from a distance, the earth’s body was physically penetrated, allowing for scientists to analyze samples from its interior. This physical penetration of the body moved analysis from remote sensing techniques, which used invisible forces such as sound waves or (in the case of human bodies) X-rays, to the direct observation of perceptible matter—an unmediated act ideally figured as visual and tactile. Regardless of where geologists drew the line between their own work and “hard science,” it was clear that much of their interpretive labor fell short of their own ideals of science, as an activity devoted to the prototypically visual and direct observation of indisputable matters of fact.

For the spiritual workers I knew in rural southern Trinidad, however, it was precisely the removal of sight that allowed humans to access forces that lay below the earth. The principal way for spiritual workers to travel in a subterranean realm

¹⁷On chains of mediation, see Latour (2010). On black-boxing in science and technology networks, see Latour (1999: 304).

known as the Depths was through a period of extended blindfolding, known as “mourning.” This mourning ritual distinguished the Spiritual Baptists, a self-consciously African-inspired, autochthonous Caribbean Christian movement. Extended blindfolding allowed a mourner’s spirit to travel in the spiritual realms of the Heights, the Depths, and the Nations (see Crosson 2020), where they encountered Yoruba-inspired Orishas, Biblical figures, demons, the human dead, and/or living humans.

Diverging from Western separations of spirit and matter, these spiritual realms were not distinct from the physical world. The Spiritual Baptist maxim, “So carnal, so spiritual,” expresses this interpenetration of two worlds, intimating that whatever happens in the physical world echoes or exerts influence in the spirit (and vice versa). Such interpenetration or entanglement was the basis for the potential efficacy of spiritual work or Obeah. Through material practices variously called spiritual work, science, or experiments, spiritual workers manipulated material assemblages to produce changes in the spiritual world that in turn could alter the “carnal” situations of power in which an afflicted client was enmeshed.

The spiritual realm, however, was hard to perceive and often invisible, provoking the need for specialist knowledge and accumulated intuition. Mourning allowed Spiritual Baptists to sense the spiritual world by suppressing direct, physical sight. In some ways, the cultivation of the ability to sense the world of the spirit happened through a move from vision to sound. Spirit travel by experienced mourners during Spiritual Baptist church services, for example, involved glossolalia, bodily movements, forms of dress, and mouth drumming that communicated what location they had gone to in the spirit. When I asked mourners to physically locate a certain “valley” in the Depths, they often responded by making the sounds associated with that place. Working with Spiritual Baptists on the island of St. Vincent, anthropologist Wallace Zane had a similar experience of the primacy of sound in the Spiritual Lands. When Zane asked his interlocutors to draw a map of the Spiritual Lands to which they traveled they were at first puzzled and then agreed, “The sounds are the route” (1999: 82). As Zane observes, “The tunes (also called songs, although they are usually without words) are what carries one to specific spiritual lands” (ibid.: 81–82). Because the routes were sonic, a visual map was incommensurable with these mourners’ conception of spiritual realms such as the Depths.

In contrast, the geologists with whom I spoke longed to convert sound into visual image, even as they knew that the complexities of using sound to sense invisible subterranean realms rendered this a fraught exercise. They also lived in a world composed of both visible and invisible realms, but their work was to translate the unseen into the seeable (hopefully minimizing the mediation involved in this translation process). Spiritual Baptists, however, did not necessarily think that it was desirable or even possible to physically see subterranean forces (or spiritual forces more generally). Sound became a privileged medium, with physical sight deprioritized or literally suppressed.¹⁸ Rather than a telos of translation into visual

¹⁸Spiritual Baptists, however, did speak about the cultivation of what they often call “spirit eyes” or “spiritual sight.” This spiritual sense, however, was cultivated precisely through closing or blindfolding the carnal (i.e., physical) eyes.

representations, Spiritual Baptists used sound to reach a generally invisible realm that was ontologically distinct from, yet co-present with, the mundane physical world.¹⁹

For Spiritual Baptists, however, mourning was not necessarily science, although it provided knowledge of the spiritual realms necessary to enact such science. For my interlocutors, science was akin to what is popularly called “Obeah” or (to use a more neutral term) “spiritual work” in the anglophone Caribbean—practices of healing, protection, and justice-making that employ material practices and spiritual powers to solve specific problems. Science did not simply involve sensing spiritual forces but was also focused on recruiting those forces to intervene in afflictions, problems with police, or court cases. Science and Obeah were both ambivalent terms at my field site precisely because they plunged spiritual workers into vexing situations of power—family feuds over land, police shootings, or neighborly envy.²⁰ The spiritual forces that structured these problems were less-than-transparent to most people, and spiritual workers used various techniques of card reading, seed divination, or spirit mediumship to decipher the underlying causes of their clients’ afflictions. The ability to decipher and utilize invisible powers to solve problems was “science.” Both geologists and spiritual workers practiced sciences that attempted to decipher hidden phenomena through specialized material practices, thus making them available for human use. For geologists the problem of moving from invisible to visible—or from subsoil potentialities to surface extraction—was one of accuracy or epistemic risk. As the next section explores, however, for spiritual workers the problem with their science of hidden forces was one of existential, embodied, and ethical danger. The difference between epistemic and embodied risk meant that, in contrast with petroleum geologists, spiritual workers often prioritized embodied healing over an act of proving ideally figured as sight (see also Stengers 2003: 29).

Risk, Ethics, and Danger

Today, in contexts where “trauma” has become a default signifier for the effects of various social and economic injustices (Fassin and Rechtman 2009), the word healing assumes enormous positive ethical weight, in which healing often undoes relations of power rather than being mediated by them. In this usage, healing—like scientific claims to knowing or religious claims to moral truth—can offer a reparative ethics that transcends contexts of power. In this section, I want to suggest that Obeah/science provides a different ground for ethics, in which the work of healing involves power and potential risks.

While spiritual workers maintained strict ethical codes of conduct in which they saw themselves as working for justice, intervention in their clients’ conflicts meant that their practices of healing and protection could potentially become another person’s harm. For example, in the aftermath of the police killing of three people at my field site, efforts by spiritual workers to use the afflictions of the dead to force police confessions by inverting the norms of burial rituals were forms of justice-making harm—harm that police employed other spiritual workers to shield themselves from (Crosson 2020). Indeed, spiritual workers often saw themselves as

¹⁹On the “co-presence” of what Western epistemologies might call “spirit” and “matter,” see Beliso de Jesús (2014; 2015).

²⁰For examples of these situations, see Crosson (2020).

protecting a client from the Obeah or science that another spiritual worker had performed. The ethic of spiritual work, as I have argued elsewhere, presents a different view on ethics than that offered by many conceptions of religion (*ibid.*). Fixed taboos, the norms of a tradition, or black-and-white notions of good and bad could not help spiritual workers embroiled in exceptional situations of power. I argue that this is why spiritual workers talk about their work as “experiments” and “science.” Yet, unlike ideals of science as an anethical truth, spiritual workers foregrounded complex, pragmatic ethical questions by using the word “science.”

Like much science, spiritual workers dealt with forces that were invisible or hard-to-perceive for most humans; they used media other than visual sight to sense these nonhuman powers. Yet, unlike notions of science as objective and impartial, they saw their experiments as partial interventions in complex situations. Certainly, the seismic survey at my field site was an intervention into a complicated terrain that involved fraught ethical questions. Yet, these questions were backgrounded in geologists’ representations of their work, most particularly in relation to their ideals of science as a practice of seeing with minimal mediation (or at least the aspiration to approximate such an ideal). Rather than questions of justice, questions of accuracy preoccupied them. In contrast, spiritual workers did not see science/Obeah as fallible because it was inaccurate, but because it posed existential dangers. It was possible that, despite spiritual workers’ striving to make an ethical justice, harm might be enacted in the name of healing, or injustice in the name of justice. The starting point for ethics was the fact that situations of power were complex and human intentions imperfect—arguably a more “mature” approach to ethics than that presented by dichotomous ideas of good and evil or de-risked conceptions of scientific knowledge (*ibid.*).²¹

This sense of danger was dramatically illustrated in the aftermath of the police shooting of the three people at my field site. A spiritual worker, performing what residents referred to as “science” or “Obeah,” sought to afflict the officers and force them to confess what they had done to one of the victims (who was his “spiritual daughter”), stating: “Some people might see what I do as evil, but that child was murdered, and the police officers thought to themselves they could get off scott-free. No, that’s not justice! In these cases, there are specific things you can do, but it’s not a tradition.... It’s an experiment with power. It’s what they does call ‘high science.’”

My project at the time was revaluing the word “Obeah” to counteract the heavy stigmas still attached to the term today in the Caribbean; indeed, the spiritual worker acknowledged that stigma in saying that some people might see his work of affliction in the name of justice as “evil.” At the time, I reasoned that Obeah/science would only harm for just causes. But when I spoke with Papoy about this, he pointed out that the police officers involved in the shootings had also hired spiritual workers to protect themselves from criminal accusations and spiritual harm. “Were the activities of these spiritual workers protection or harm?” he asked me rhetorically. Papoy also asserted that it was not simply the police but Aiesha, the sister of one of the three

²¹Weber 2009[1919] employs this idea of an ethics that starts from the ambivalence of power as more “mature.” I have used such a conception to push back against duty ethics and the anthropological turn toward virtue ethics as both eliding such ethics of power, continuing a long-standing denigration and/or racialization of ethics of power in the realm of “religion” (Crosson 2020).

victims of the police shootings, who had been afflicted as a result of her family's justice-seeking "Obeah," as the vengeance of the dead could rebound on those who sought to wield its power.

Spiritual workers had performed certain counter-conventional burial preparations to keep the victim's spirit on earth to work for justice. But her slain sister's spirit was now afflicting Aiesha's daughter, recruiting her to help fight for justice in the spirit. Helping the victim's spirit meant that Aiesha's daughter would have to die to join her in the spiritual realm. Later on, through conversations with Aiesha, I learned that she had begged spiritual workers to reverse whatever "Obeah" or "science" they had done because it was harming her own family. For other family members, however, Obeah/science held out the hope of justice within the context of a policing and legal system that was unjust toward lower-class Black people. "If [state] justice does not take its course," as the cousin of one of the victims of the police shootings told me, "Obeah will." Despite (or because of) its justice-making power, Obeah was still dangerous. As another spiritual worker, Marianne Granger, told me after hearing about my early intentions to legitimize Obeah by casting it as wholly beneficent "healing": "That is all well and good, but Obeah *is* dangerous."

In laying out the heterogeneous views of scientists, engineers, and spiritual workers along a spectrum of certainty and risk, it might be tempting to use the poles of this spectrum to invert the moral hierarchy and racialized assumptions, discussed at the outset of this paper, that associate science with whiteness and Western-ness. Against a grand narrative of "Science" as "disenchanted premodern worlds," Stengers (2012) proposed an "adventure of sciences" as a more accurate (and positive) story of experimental practices that take risks with the unknown to generate novel "achievements." Against the notion of science as an exercise in rational conquest, certainty, and Western reform, we might elevate an "adventure of sciences" that takes experimental risks to generate new discoveries. But the risk posed by Obeah/science is less one of a romantic or epistemic adventure, and more of a potential danger that is ethical and existential. Obeah/science presents such danger, devoid of the project of redeeming science from its entanglements with colonial and ethical baggage.

Such ethical riskiness might seem alien to science, which is often assumed to be agnostic with regard to ethical questions. Common sense might tell us, as evolutionary biologist and science writer Stephen Jay Gould (1997) emphasized in his well-known Non-Overlapping Magisteria paradigm, that religion is the realm of moral value. Science, in contrast, is the realm of facts. Unless one wants to confuse matters, Gould argues, these two realms of "ought" and "is" should not overlap (*ibid.*). For other scientist-philosophers such an anethical conception of science is a masculinist fantasy of neutral objectivity, which assumes that scientists can take a disembodied god's eye view of Nature. This is the "god trick" that feminist philosopher of science Donna Haraway (1991) roundly critiques, calling for the recognition that sciences imply "situated knowledge." Taking into account the embodied and gendered positionality of scientists, philosopher of science Sandra Harding (2015) insists, actually strengthens objectivity by accounting for potential sources of bias that are often elided in idealized representations of science.

Certainly, petroleum geologists sometimes spoke about the interpretation of seismic data as an embodied mediumship that involved intuition, or as Bideau put

it, “gut feelings.”²² Yet, no geologist spoke to me about the ethical dangers and the power hierarchies of race, gender, and class that seismic surveys involved. In some respects, therefore, spiritual workers’ conceptions of an ethically complicated science remained closer to feminist philosopher-scientists’ conceptions of an ethically freighted science. According to feminist physicist-philosopher Karen Barad (2007), the study of matter is not a study simply of an inanimate nature, but of what matters. According to Barad’s interpretation of quantum physicist Nils Bohr’s infamous principle of complementarity, any measurement involves an ethical decision about what matters and what does not. Measurement is no small matter, for in Barad’s and Bohr’s worlds measuring is not a passive act, but a mutually transformative exchange of energy (one that becomes particularly hard to ignore at small scales). In Ian Hacking’s (1983) words, quantum physics showed us that scientists cannot simply peer at a passive universe from a distance; they must “interfere” with the phenomena they measure. For spiritual workers, “experiments” were obviously transformative interventions, thus implying ethical considerations about the consequences of one’s interference. This notion of the experiment as ethically freighted does not in itself redeem science—it means that difficult ethical questions that follow from intervening in situations of power are inseparable from both experimentation and measurement.

How far can such a comparison of sciences be taken? Are the spiritual worlds that practitioners of grassroots African religion live with similar to the subatomic world of quantum physics? Both worlds are invisible to most, even as they are co-present with and constituent of the physical world. Both operate by principles that seem very different from our assumptions about how the world of macroscopic matter works. Most importantly, both worlds contain immense, hidden powers that could potentially be used for construction or destruction. An atom contains the power to level cities or power them, with nuclear bombs or nuclear plants. The power of spirit could also be ambivalent for spiritual workers. This ambivalence did not imply an anethical world, but a demand for an ethics that was determined by immanent actions rather than transcendent, morally infallible deities or maxims.²³

Understanding science as ambivalent and dangerous also meant that spiritual workers were not simply adopting the word “science” as a redemptive, legitimating mask for morally stigmatized African practices. This is also why spiritual workers’ notions of science/Obeah cannot be dismissed as scientific invocations of this term to rationalize spiritual practices of metaphysics, spiritualism, ceremonial magic, or Eastern religion—projects of spiritual rationalization that have taken place from Iran and South Asia to the United States and Brazil.²⁴ Rather than purifying Obeah of ambivalence and rationalizing its practice, science expressed the moral ambivalence and risk that demanded another sort of ethics. Certainly, it is easy enough to see how

²²On specialist intuition in finding oil, see Foster and Beaumont (1992), or Halbouty (1972).

²³On conceptions of ethics as determined by human actions rather than a morally unequivocal deity, see Sidney Mintz and Michel-Rolph Trouillot (1995) or Brown (2001).

²⁴For a summary of global invocations of science to self-consciously rationalize spiritual practices, see Crosson (2023; 2020: 199–236). On overtly rationalizing uses of spiritual science in Iran, see Doostdar (2018: 4–5). On uses of science by Brazilian spiritists to buttress claims to rationality or class distinction, see Hess (1991). On North Atlantic spiritualists invocations of science and technology, see, for example, Jeremy Stolow (2008). These projects are all indebted to the scientific language of many spiritualist movements from the nineteenth century onward.

petroleum geology could also conjure this ethical ambivalence, especially in an era during which the extraction and consumption of hydrocarbons leads to what has come to be called “global warming” or “climate change.” Instead of continuing to uphold ideals of science as an ethical measurement, it might be worth considering ethical considerations as integral to the conduct and training of natural scientists. Spiritual workers’ uses of the word “science,” rather than a thin mask, transformed my ideas of science and helped me to arrive at this conclusion.

Other practitioners of African religions in Trinidad, however, invoked a notion of science that was certain and infallible rather than dangerous. The petroleum geologists saw this relative certainty of “hard science” as a future horizon or something that began once drilling penetrated the subsoil. Engineers saw such certainty as a present reality (although one they could fail to realize because they were not “real scientists”). In the realms of African religion in Trinidad, Yoruba traditionalists invoked “science” to indicate the certainty of their rituals and stable sources of authority. Neither scientists nor practitioners of religion presented homogenous attitudes toward science. Instead of facile oppositions between religion and science, or “African tradition” and “Western knowledge systems,” these heterogeneous attitudes revealed unexpected, contingent connections across disparate domains.

Conclusion

By sketching the unexpected resonances between the sciences of petroleum and the sciences of African religion, this article has argued for a heterogeneous notion of “sciences” that are not defined in opposition to “African tradition” or “religion.” Rather, Science and Religion, with their capitalization denoting grand narratives, are both “North Atlantic universals” (Trouillot 2002) that have defined the West as a project of reform, enacting (among other regulations) the criminalization of Obeah as not-religion. While Stengers does not discuss the term, I would argue that Religion complemented Science as another potent “North Atlantic universal” in colonial settings. With a capital “R,” Religion (like Science) denotes an authoritative category whose universality would become cemented over the course of the nineteenth century. “World Religion” would be the new vehicle through which Religion was universalized, just as the word “scientist” entered common English language usage for the first time. Yet, this universalization simultaneously exempted European Christianity and the West from this world (Masuzawa 2005). Since Religion became yoked to the fixity and moral order of tradition, the West’s ability to detach itself from tradition (and thereby become modern) was the implicit ground for Religion’s making in non-Western settings. The category of World Religion, therefore, did not denote just any kind of religious practice; it was simultaneously indebted to Euro-Christian ideas of Religion while representing the embedded traditions that Western Christendom (and Science) could allegedly transcend. In this prototypical form, Religion ideally implied text-authorized, collective practices devoted to maintaining traditional order through prescribed ritual, deriving from Asia or Europe. In these descriptions of Religion, ritual often seems to play the role that experiments do in grand narratives of Science—scripted demonstrations that reveal laws and shared certainties. In this way, modern ideals of Science and Religion are both “traditional,” in the sense that they aim for a stable consensus, clear authority, and shared certainties. As Kuhn

(2012[1962]) famously noted, sciences tend toward periods of consensus, in which authoritative paradigms (supported by powerful institutions) are fairly immune to experimental refutation. Like modernist ideals of religion, modern sciences often involve traditions (see Galison 1997).

Much religious practice, however, falls outside of this ideal notion of Religion. The same is true of sciences. The contradiction between experimental interventions and ideologies of certainty, in domains marked as both religious and scientific, drives a continual project of reform, often with racialized dimensions. This project aims to separate science from ethno- or pseudo-science, rationality from irrationality, religion from magic, or fundable science from “high-risk” epistemic claims. These purifications still haunt us, driven by the contradictions inherent in the material practices.

Yet, in organizing these domains around Stengers’ opposing categories of infallible “Science” and a risky “adventure of sciences,” I have not aimed to create a moral hierarchy. Certainly, for Stengers such hierarchy is readily evident; she openly values the risky adventure and abhors the “conquest” of Science. Within contexts of power the situation is a little different. The notion of science as a risky adventure was a colonial trope, and those that disproportionately bore the risks of such experimentation were racialized, colonized people. In contemporary settings, the image of science as dangerous can support paranoia about a global conspiracy of scientists that has contributed to reluctance to adhere to public health guidelines during the COVID-19 pandemic. The alleged uncertainty of science can also have dubious consequences. Some of the strongest conclusions of the philosophy of science have been (mis)used by conservative politicians in the United States to argue that anthropogenic climate change is simply a tentative hypothesis, and that true science is always open to the radical destabilization of its paradigms. Insisting on a notion of science-as-certainty, free from partisan interests, can become a powerful rebuttal to these conservative polemics in situations of power.

Similarly, for practitioners of African religious practices that have been stigmatized and criminalized, insisting on the certainty of their sacred science and identifying discrete ethnic origins in West Africa are important in making what they do an authoritative religion, recovering connections that were violently interrupted. In all of these contexts, however, it is clear that neither “science” nor “religion” are free from ethical concerns or questions of power. In an era of climate crisis, particularly on an island that is both economically dependent on fossil fuel production and vulnerable to the effects of global heating, sciences of powerful subterranean forces are enmeshed not simply in the uncertainties of knowledge but in embodied dangers. Whether science is Obeah or petroleum geology, it instantiates the ethical quandaries that human access to hard-to-perceive forces presents. Rather than gluing the meaning of “science” to racial imaginations of the West or modernity, it is necessary to detail its multiple lives in global contexts of power that involve not simply a politics of knowledge but also one of embodied risk.

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