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ILLUMINATING THE FALL:
NEGOTIATING HUBRIS AND HOPE IN REPRESENTATIONS OF RADIATION

A THESIS SUBMITTED TO
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IN PARTIAL FULFILLMENT OF THE DEGREE OF BACHELOR OF ARTS

BY

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ABSTRACT

Illuminating the Fall: Negotiating Hubris and Hope in Representations of Radiation

by Molly Montgomery

This thesis examines depictions of nuclear technology in two contemporary novels, *Ocean Roads* by James George and *Accident: A Day's News* by Christa Wolf, investigating in particular how the authors of these texts represent the cultural ramifications of the Cold War and of man-made radiation in the environment. It shows how the texts employ radiation as a trope representing a new outlook on global systems of ecology and also on the human body that has arisen since the dawn of the Atomic Age. Entering an ecocritical discussion on how the authors' framing of ecocatastrophe as tragic or comic influences the overall message of the novels, it explores how they employ these genres to reveal humanity's current relationship to its environment as problematic and to call for changes in that relationship. This thesis asserts that both novels invoke elements of tragedy in order to critique the overly rationalistic and dominating approach of science that can lead to unintended consequences, and they depict technological tragedy not as a single event but a phenomenon that unfolds over time. However, the novels also portray technology used for the comic purposes of restoration and survival to illustrate how the progression of technological tragedy can be interrupted.

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Introduction

When scientist Marie Curie coined the term “radioactivity” in 1898, she had no idea just how much her discovery of this scientific property would transform the world. What Curie had found was the propensity of uranium atoms to emit certain rays that could be detected; later on, scientists would theorize that this was the result of structures within the atoms decaying (Pasachoff). The discovery of radioactivity was foundational for many subsequent technologies, including, the nuclear bomb, nuclear energy, and the medical field of radiology. Marie Curie went on to discover the elements of radium and polonium and was the first woman to receive a Nobel Prize in 1903, when she, her husband Pierre, and their colleague Henri Becquerel were awarded the Nobel Prize in Physics (Pasachoff). While Curie’s work led to more great scientific discoveries and the expansion of scientific knowledge, it also held unintended consequences both societally and for her personally. Unfortunately, Curie had no way of anticipating the effects of radiation on her body. She grew ill from her exposure to radiation, and in 1934, she died, a decade too early to witness the horrifying descendant of her legacy, the atom bomb.

Marie Curie’s life is an example of a real-life narrative that could be portrayed as tragic, depending on how her story is framed, showing the potential the life of scientist has for fictionalization. Science’s rising prevalence in modern society has led to many fictional depictions of scientists and technology. In particular, the subjects of radiation and nuclear technology have become fascinations in Western culture. The very phrase “nuclear radiation” conjures up images of mushroom clouds and apocalypse while also bringing to mind the horror of news broadcasts about nuclear accidents at Chernobyl, Three-Mile Island, and, most recently, Fukushima. I propose in this thesis to explore two works of fiction deeply concerned with the issues of man-made radiation and nuclear technology. These texts, written by contemporary

authors from different cultural backgrounds, respond to the reality of the anthropogenically radiated world in which they live, questioning the decisions of scientists and politicians that led to the irradiation of the environment. I will focus in particular on their engagement with the genres of tragedy and comedy because I would like to understand how their framing of environmental catastrophe determines the texts' conclusions: Do they view overcoming environmental degradation and historical trauma as possible?

By focusing on realistic, fictional depictions of nuclear technology, instead of hypothetical narratives of nuclear apocalypse or non-fictional accounts of disasters, I hope to explore the significance of radiation as a trope, examining how the texts portray its persistent presence in the environment and how they reconcile the ambivalent meanings and uses of radiation. *Ocean Roads* by James George and *Accident: A Day's News*¹ by Christa Wolf, both share a similar literary attentiveness to radiation, which is woven into the form and language of the texts, not just into their content.

Although these two novels come from radically different cultural contexts— the author of *Ocean Roads* is from New Zealand while *Accident: A Day's News* was written in the German Democratic Republic (Eastern Germany)— they both share the looming backdrop of the Cold War, which informs their treatment of technology, especially nuclear technology. By juxtaposing these texts, I am by no means suggesting that they depict radiation uniformly. Wolf's perception of nuclear energy is influenced by the fact that she lived in a Socialist state that was considered a satellite of the Soviet Union, and thus she may have felt more immediately threatened by the possibility of nuclear war (Jordine 553-554). On the other hand, George comes from a country with a long history of opposition to nuclear technology, which influences his depictions of

¹ Translated from German by Heike Swarzbarger and Richard Takvorian

political protests in his novel.² Nevertheless, the shared preoccupations of these texts with nuclear technology demonstrate how the phenomenon of radiation is perceived, interpreted, and framed as a critique of attempts to subjugate of nature through technology.

Ocean Roads, published in 2006, follows the story of one family affected by radiation and war, who lives in Auckland, New Zealand. The father, Isaac, is a nuclear physicist who worked on the Manhattan Project. The guilt he feels for contributing to the creation of the bomb mentally cripples him. Other characters include his wife, a wartime photographer, her two sons (one, a nuclear physicist and, the other, a Vietnam War veteran), and Akiko, a survivor of Nagasaki, who captures both sons' affections. The novel documents the struggle of the family to rebuild despite being torn apart by war and sickness. It spans a period beginning at the end of World War II until the 1980's.

Accident: A Day's News, published in 1987, narrates the reactions of an East German woman who hears the news of the Chernobyl disaster. On April 26, 1986 a reactor at the Chernobyl Nuclear Power Plant in the Soviet Union exploded, releasing toxic radiation into the atmosphere that spread across Europe. In the novel, which takes place on a single day, the narrator meditates on how the released radiation will affect her and her loved ones. Simultaneously, she discusses her brother who is undergoing brain surgery, linking the two events. After hearing that her brother's surgery has been successful, the narrator anxiously

² In 1987, New Zealand was the first nation to pass a law declaring its country a "Nuclear-Free Zone," which forbade nuclear armament. This legislation resulted from concern about the effects of the U.S. and other countries' nuclear testing on the health and environment of the South Pacific. (Ware 405)

contemplates the future of nuclear power and considers her own inevitable death, leaving the ending ambiguous as to whether there exists hope for the human race.

Much, but not all, of the criticism of these novels has been ecocritical in nature. In my thesis, I position myself within ecocriticism, which is the study of literature and culture through an environmental lens; it involves interpreting the meaning in different texts' and other artworks' depictions of humanity's relationship to the environment, especially in light of current ecological crises caused by humans (Culler 126). I outline some of the critical responses to the texts below.

Critics Elizabeth DeLoughrey and Anthony Carrigan both approach *Ocean Roads* from a postcolonial perspective. DeLoughrey is interested in how George uses the trope of radiation in the environment to call attention to the militaristic and imperialistic history of nuclear testing in the Pacific, while Carrigan focuses on how colonialism can be viewed as a long-term disaster producing both medical and psychological consequences amongst colonized populations and creating "disabling environments." My own analysis does not focus on the postcolonial implications of the novel in particular, but I build on DeLoughrey and Carrigan's analyses of George's depiction of radiation. In particular, I contribute to DeLoughrey's discussion on how George uses imagery of light, associating it with other forms of radiation, to show the impact of radioactive fallout on human health and modern culture.

Ursula K. Heise, in her analysis of *Accident: A Day's News* takes a similar approach to radiation as something that disrupts conventional geographical and personal boundaries, changing how we perceive the globe and our connection to it. She analyzes the novel's portrayal of nuclear technology from the perspective of risk analysis, looking at how Wolf contrasts the societal risk of nuclear power with the individual risk of medical surgery.

Other critics, such as Karin Eysel and Deborah Janson, examine *Accident: A Day's News* and Wolf's other works from an ecofeminist perspective, looking at how Wolf genders science as masculine, but at the same time resisting the pigeonholing of women and men in particular gender roles. Meanwhile critics Peter Burgess, E.L. McCallum, and Kate Rigby focus on how Wolf portrays technology and radioactive contamination as disrupting conventional narrative structures, arguing that the formal experimentation in the text derives from her themes of technology, radiation, and modernity. I am most interested in Rigby's argument that Wolf is depicting Chernobyl as a technological tragedy through her portrayal of the affected populations and ecosystems. Yet I believe Rigby's understanding of the novel as a technological tragedy must be examined critically, because, as I will show, there are also elements of the text that are arguably comic in nature.

In order to delve into the novels' representations of radiation, it is helpful to define radiation in its scientific sense. Radiation, according to the *Encyclopedia Britannica*, is the "flow of atomic and subatomic particles and of waves, such as those that characterize heat rays, light rays, and X rays" (Burton et al.). Thus, the term radiation can refer to any part of the electromagnetic spectrum including rays with smaller wavelengths, such as X-rays and Gamma rays, the type we associate with medical and nuclear use of radiation, or it can refer to rays with larger wavelengths including visible light, heat, and radio waves. The forms of radiation with shorter wavelengths contain more energy than those with longer wavelengths, and, as a result, are generally considered more dangerous to human health because they can penetrate cells and disrupt their function (Burton et al. 1). Natural forms of radiation, such as UV rays from the sun or radiation emitted by naturally-occurring radioactive elements, should also be distinguished from anthropogenic radiation, which is produced and released by human technology. This

radiation can come from a number of sources, including the detonation of nuclear bombs, the release of radiation from nuclear power plants due to an accident, or improperly stored nuclear waste that contaminates its nearby environment.

Ocean Roads and *Accident: A Day's News* both demonstrate a particular interest in "heliography," which critic Elizabeth DeLoughrey defines as "the discursive practice of writing about light as well as the inscription of our bodies as they are created, visually ordered and perceived, and penetrated by radiation" (DeLoughrey 468). Through their representations of radiation, they suggest that a new awareness of humanity's place in nature must accompany the nuclear age. Along with this awareness comes the realization of how much damage humans have caused to themselves and to the environment through their use of nuclear technology. I argue that these texts respond to environmental crisis by drawing upon elements of both tragedy and comedy to point us towards possible solutions.

Radiation, in these two texts, is figured as a natural force that human technology seeks to channel into creative or destructive production. The novels use tragedy to reveal the risk of seizing nature's potential. While these texts use tragic plot lines, they ultimately reject a linear tragic trajectory. Instead, they show how technological disaster causes the Fall of humanity through a continuous process of loss. At the same time, they employ comic elements to suggest that this course can be disrupted and redirected towards a more redemptive and creative route.

The Cold War's Radioactive Legacy

In the Shadow of the Bomb

August 6, 1945 marked the beginning of a new era in humanity's relationship with its environment. The atomic bombs dropped by the United States on Hiroshima that day and on Nagasaki three days later took a deadly toll on Japan, and the legacy of radioactive fallout continues to haunt survivors and their children and grandchildren. But this public display of nuclear violence had an even larger consequence: the Cold War, which was characterized by violent, indirect struggles for power, including a legacy of nuclear testing that dumped nuclear radiation into the atmosphere, affecting not only the people who happened to live in proximity to the testing, such as the inhabitants of the Marshall Islands, but also increasing global levels of radiation, in particular, the isotope strontium 90, a known carcinogen (DeLoughrey 475, Lutts 23). This era of nuclear technology also had an enduring effect on our culture, and is foundational to both *Ocean Roads* and *Accident: A Day's News*. In the following section, I will first address how the Cold War context informs these texts' treatment of radiation as a sinister, gradual counterpart of nuclear apocalypse. Then, in the next section, I will demonstrate how George and Wolf demarcate the Cold War as a distinct era of technological awareness through their use of radiation as a trope representing modernity.

It is impossible to extract either *Accident: A Day's News* or *Ocean Roads* from the context of the Cold War, especially when considering how these texts portray radiation. *Ocean Roads* connects the active conflicts of the Cold War and its weaponry to radiation, since it appears as both a consequence of modern warfare and as a representative example of humanity's technological war on nature. In the case of *Accident: A Day's News*, we cannot examine its

understanding of the effects of Chernobyl without noting that the novel's setting in a precarious state on the frontline of the Cold War conflict, the border between the two superpowers.

Ocean Roads, in its expansive setting across the Pacific, links military conflicts in the Pacific with the advent of nuclear technology. In particular, the scenes depicting the Vietnam War portray the brutality of modern warfare, especially the technological weapons associated with the conflict. For example, George refers to the chemical explosive napalm as a weapon in the war, but he also shows Caleb paradoxically using it to commit arson in protest of New Zealand's involvement in the war. The emphasis on different types of new weapons technology that are particularly cruel points to the ultimate weapon of the Cold War: the nuclear bomb. Furthermore, the character of Akiko is a hibakusha, which literally means an "explosion-affected person." She survived the atom bomb dropped on Nagasaki and carries scars from the bomb's radiation on her body (Carrigan 266). Thus she is a living testament to the legacy of World War II and the conflict unleashed by the new technology of the atom bomb.

Similarly, the specter of the bomb looms in the background of *Accident: A Day's News*. While the Chernobyl accident preoccupies the text, there are suggestions that the narrator does not just fear the impacts of this current event, but also the possibility of nuclear war. These hints come in the form of immediate, violent images associated with the technology, which Wolf connects to the slower damage wreaked by radioactive fallout. For example, when discussing an exhibit by Swiss writers on Hiroshima the narrator inserts a tangent on the Biblical story of the Tower of Babel, asserting the tower as a metaphor for human technological accomplishment. She then expresses her fear of living in a globalized world where language is no longer a barrier to mutually assured destruction:

We, on the other hand, all understand the basic language with which we build towers, I couldn't help thinking, but that doesn't do us any good; and we all recognize that technological voice coming out of a machine, and we join in the countdown when it sends that other machine, the rocket-powered tower, into the sky, which is no longer called the sky, but the cosmos: five— four— three— two— one— ZERO! Only sometimes the towers come crashing down, with their bloody cargo... (Wolf 85)

Wolf's narrator asserts that language barriers separating humans have been replaced by a "technological voice" that everyone recognizes. The word "voice" used to describe the new shared scientific language personifies the language and gives it agency. It begins to act of its own accord when "it sends" another machine out, suggesting that the force of this technological voice is driving humans to create more technology and reach beyond their limitations. In fact, the narrator's use of diction demonstrates this expansion of humanity's reach through technology: what was formerly considered the limit of human mobility, "the sky," is replaced by "the cosmos," indicating humans aim to conquer not just the air but also space.

The image of the "rocket-powered tower" suggests either a space mission or a nuclear missile, both which are directly linked with the Cold War and the arms race. These two possibilities— that the tower could be either an attempt to reach the heavens or a weapon sent to annihilate— delineate a binary of creative, positive technology, versus negative, destructive technology. Nevertheless, it is clear that there exists only the thinnest line between these two types of inventions. The final sentence in this passage could also be interpreted in two ways: the towers could come crashing down by accident, as is the case of the Chernobyl disaster, thereby harming those dependent on this technology, who are the "bloody cargo" inside the metaphorical

rocket; or, the towers could be intentionally destructive weapons, in which case the cargo is “bloody” due to the carnage it unleashes.

The Cold War in the background of these texts, through implying threat of nuclear apocalypse, infuses a general feeling of anxiety that haunts these two novels and points towards the presence of invisible radiation. Culturally, the period of the Cold War was characterized, at least in the United States, by widespread fear of a nuclear doomsday, especially following the discovery of the carcinogenic effects of Strontium 90, which was released globally by nuclear testing (Lutts 23-24). At the height of the Cold War, building bomb shelters in backyards became commonplace in the United States (Lutts 32). Although neither of these two texts is based in the United States, they both refer to the destructiveness of nuclear weapons, indicating their heightened awareness of the consequences of nuclear war. However, neither of their plots focuses on the possibility of nuclear apocalypse; instead, they are concerned with the day-to-day presence of radiation in the characters’ environments.

In the article, “Chemical Fallout”, critic Ralph H. Lutts argues that *Silent Spring* by Rachel Carson tapped into the public unease over the risk of radioactive fallout, employing it as an analogy for understanding the risks of a different type of contamination, residues of toxic organic chemicals used in pesticides and herbicides, such as DDT (Lutts 34-35). Similarly, I believe that Wolf is suggesting the price of nuclear power, with its risk of accidents, is just as high as the threat posed by nuclear weapons. Her narrator refers to the possibility of humans completely annihilating themselves, but does not refer to the specific means by which this might occur. Viewing humanity’s history as a small part of the entire history of life, which has included many species that have gone extinct, the narrator asks whether humans are just another “dead end” (Wolf 45). She contemplates the possible fate of humanity: “Intelligent humanity creates

the means of subjugating nature and its own kind. It seeks to break the rules and norms which it has imposed upon itself by means of open or concealed aggression, even at the cost of self-annihilation” (Wolf 45). Significantly, the narrator recognizes that there is a connection between violence against other humans and against nature, and in this particular instance Wolf does not give us any reason to question the narrator’s conclusion. From the preoccupation of the rest of the text with nuclear weapons and nuclear power, we can infer that she is commenting on humanity’s use of nuclear technology. The phrase “open or concealed aggression” evokes the indirect, “concealed” conflicts of the Cold War, which actually caused a great deal of harm to countries caught in the middle of the two superpowers and also to nature, which was negatively affected by radioactive fallout and chemical weaponry. We can also understand the binary of “open” and “concealed” as analogous to the two uses of nuclear technology— as weapons or as power sources. While it is clear how “open” aggression resulting in the exchange of nuclear weapons could result in apocalypse, it is less clear how “concealed” aggression could result in human extinction. Wolf makes that connection transparent through associating the two types of nuclear technology— showing how they both threaten to induce apocalypse, one by creating immediate devastation, the other by inciting a “concealed” gradual apocalypse through the long-term harmful effects of radioactive fallout.

George, on the other hand, is less concerned with the possible consequences of nuclear power.³ Instead, he calls attention to the legacy of nuclear testing in the Pacific, linking the

³ George does mention nuclear power when he shows Caleb and other scientists researching how to create a safe type of cold fusion. However this promising technology ultimately fails to materialize, suggesting that “safe” nuclear power is an unattainable dream (George 371).

testing, which was considered merely a routine part of the Cold War, to the destructive impact radioactive fallout has had on the local populations. After Isaac witnesses the Able bomb test⁴, he finds out about the toll the testing takes on animal life, observing the surviving animals as they die of cancer (George 255). Isaac realizes the significance of this loss of life: if the animals are afflicted by cancer from the radiation, humans will be too. The narrator describes Isaac's change of heart: "When he came to New Zealand Isaac he let the envelopes from the British Ministry of Defence yellow and tatter and curl in bottom drawers. He didn't want to be part of the larger, lethal envelope of research and testing....They all said the same thing, though with increasing force. Another testing program, for another war that had been searched for and sighted just over the horizon, like a landfall" (George 255). Here, the narrator refers to the testing program as "the larger, lethal envelope of research and testing." Research and testing in this case are ambiguous—do they refer to the nuclear weapons testing or the testing of the effects of radiation on unsuspecting Pacific populations? In fact, the image of an envelope suggests that these programs are all enclosed together in one package: weapons testing provides a justification for experimenting on humans. In fact, Marshall Islands populations exposed to the fallout from testing did act as live test subjects for Western scientists to glean the effects of radioactive fallout on human health without putting any white Westerners at risk (DeBrum 1). There are clear colonial implications to the image of looking for a war "sighted just over the horizon, like a landfall." George suggests that like conquistadors searching for lands to claim the scientists and military are acting as colonial agents through their use of the Pacific for weapons testing.

⁴ The Able Bomb test was an above-ground atmospheric nuclear test that the U.S. military conducted in the Bikini Atoll in July 1946 (Goro).

While Wolf seeks to remind the reader of the sinister threat of nuclear accidents, which hold the potential to release levels of radiation equal to or greater than that of nuclear bombs,⁵ George evokes the Cold War context to show the reader that the Cold War does not just signify a looming threat of apocalypse on the horizon. Gradual apocalypse can also be enacted through indirect violence— nuclear testing which has an effect on local human health. Yet the risk is not limited to the populations of the Pacific islands where testing occurs. As I explain below, both texts highlight radiation’s ability to spread globally. Therefore, George is also warning the reader that the fallout from Pacific testing has consequences for the entire planet.

⁵ The Chernobyl accident released 400 times the amount of radiation as the bomb dropped on Hiroshima (“Ten Years...” 2).

The Enlightened Age of Radiation

In my thesis, I do not use the word “modernity” to connote a relation to the literary movement of modernism, which arose from the period of World War I and focused on formal experimentation, although I will discuss how the authors sometimes use modernist techniques. Instead, I am defining modernity in this thesis as a modern ecological perspective⁶ that only coalesced at the end of World War II, although its roots go back further, to the Enlightenment. Western culture since the Enlightenment understands the material world from a secular perspective and asserts that this world can be understood through rational, scientific investigation. Since the dawn of the Atomic Age, a new conceptualization of humanity’s relations with nature has arisen, building on the earlier principles of the Enlightenment. This perspective, as I will explain, derives from the unintended consequences of human’s use of technology and globalization during this period. Where previously solid lines existed between different countries, and between humans and nature, we now have a recognition of our interconnectedness and interdependence resulting, at least in part, of anthropogenic releases of radiation.

We can see how anthropogenic radiation emerges as a marker of modernity in these two texts due to its historical and symbolic role as the literal “fallout” of the Cold War, the sinister

⁶ By “ecological” I do not mean to suggest that this is the perspective of the ecological community. What I am describing here is not the emergence of the environmentalism movement, but instead the emergence of an awareness of global systems that is derived from the science of ecology and accepted and adopted into culture at large. Of course my conception of modernity is directly related to environmentalism because with the awareness of how global systems work comes the knowledge of how humans have contaminated these systems.

and unseen legacy that continues to disrupt humanity and ecosystems globally while also leaving an equally important imprint on Western culture. In her article “Radiation Ecologies and the Wars of Light,” Elizabeth DeLoughrey argues that the development of the science of ecology is closely entwined with nuclear militarization. She points out that one of the first studies attempting to understand the impact of radioactive fallout, conducted by Howard T. Odum and directed by the Atomic Energy Commission, resulted in a greater understanding of ecology. The researchers were able to study how organisms interacted with each other and their physical environment through tracing radiation released from nuclear detonations through Pacific ecosystems, especially focusing on coral reefs (DeLoughrey 472-473). Ironically, while this radiation was useful for detecting how these ecosystems worked, it itself contaminates the ecosystems being studied. Thus, it allowed scientists to not only gain a better understanding of the workings of nature, but also to see clearly the negative impact humans have on nature.

Not only does radiation result in a better scientific understanding of the world, DeLoughrey argues that it pervades our culture, too. She links radiation to Gayatri Chakravorty Spivak's concept of planetarity, which DeLoughrey explains as “the process by which the familiar is rendered uncanny and unhomely, similar to the ways that the apprehension of (invisible) radiation and its ecological properties destabilize our understanding of place and space” (DeLoughrey 471). This is a similar idea to Heise's concept of “deterritorialization,” a type of estrangement experienced by the narrator in Wolf's novel, upon realizing that local food products, even ones produced by the narrator's own garden, are now infected by radiation (Heise 186). Radiation, in its invisibility and its tendency to spread, disrupts one's experience of the familiar local environment by rendering it potentially toxic. DeLoughrey and Carrigan assert that through *Ocean Road's* expansive setting, encompassing the entirety of the Pacific, from the

jungles of Vietnam to urban New Zealand to the icy inland of Antarctica, George shows the footprints of radiation and modern warfare globally. Released radiation figures as a physical manifestation of globalization and unites humanity in that it presents a potential risk to everyone due to its global reach (DeLoughrey 486).

Furthermore, radiation serves as a trope to illustrate the modern understanding of the human body, which views the body not simply as a cohesive unit, but as synchronized organs and parts that are dependent and influenced by the body's environment. DeLoughrey asserts that in *Ocean Roads*, the text shows how invisible radiation inscribes itself onto human bodies, resulting in visible consequences (DeLoughrey 485). For example, in one scene, Akiko encounters another survivor, an elderly man. The narrator describes him: "His skin was burned smooth, like a flat stone with small flakes hidden in it; like a mosaic" (George 116). The image of a mosaic is strangely beautiful in contrast to the horrific way in which the man's scars were formed, through exposure to intense radiation from the atomic bomb dropped on Nagasaki. Nevertheless, the scars are physical evidence of radiation's harm to the man's body, similar to Akiko's own scars or Caleb's leukemia. Just through its presence in the atmosphere, radiation can penetrate one's cells, causing them to mutate and possibly changing one's DNA. The knowledge that an invisible force has the power to cause such irreversible damage to one's body is disturbing indeed.

This awareness surfaces in *Accident* through the implied connection between the risk of radiation pervading the narrator's environment and the risk to the narrator's brother undergoing brain surgery. While Heise asserts that these are two different types of risk being contrasted, the mass, invisible and unfamiliar risk of radiation to the individualized, understood medical risk of surgery, both of these images point to the vulnerability of the human body to penetration by

outside threats. Their juxtaposition suggests that the narrator views them as transforming the familiar into dangerous, unfamiliar territory. Wolf's narrator speaks to her brother, voicing her fear that the surgery could damage part of his brain: "Even personality changes result from damage to certain parts of the brain. Nice prospects, you said, and I asked bluntly if you were really that attached to your personality. I've grown accustomed to it, you said. A patient who had formerly been peaceful suddenly became aggressive and attacked the nurses" (Wolf 19). Wolf's narrator highlights the irony of the situation through the brother's dry assertion that he has "grown accustomed" to his personality. Such a statement seems ridiculous because the ability to change personality through a medical procedure seems far-fetched.⁷ What was once considered stable, the self and personality traits, can longer be assumed so because with the help of technology, we can invade and meddle with body's parts. Significantly, this ability parallels the physical effects of radiation on the body.

The narrator recognizes that the surgery runs the risk of turning the brother violent and criminal. The fact that a small mistake in such a surgery could have such dire implications reveals just how little control humans have over the technology they claim to have mastered. This, once again, connects medical technology to nuclear technology, as the backdrop of

⁷ The idea that one's personality can be changed medically did actually exist before the 20th Century in the concept of bodily humors. However, Western medicine and psychology since then has so thoroughly debunked these medical practices that our return to viewing the personality as rooted in physical, biological substances feels suspect. Yet the history of psychology and psychiatry in the 20th century reflects this new, undeniable reality: from lobotomies to antidepressants, treatment of mental illness, both successful and unsuccessful, is now rooted in the physicality of the body and the brain.

Chernobyl in the novel reminds us we, as humans, can never have a total grip on the natural forces we seek to control through technology.

As a globalized risk and a direct threat to the individual human body, radiation breaks down the conceptions of geographic and physical boundaries that separate nations and individuals. Of course, the presence of radiation in global environments due to nuclear technology and our newfound awareness of that presence is certainly not the only cause of Western culture adopting a modern ecological awareness. Another factor, among others, was the Space Race. Both the Soviet Union and the U.S. sent satellites and people into space, which resulted in the world seeing, for the first time, images of the Earth as an enclosed whole, floating in space (Garrard 182). Moreover, advances in medicine and psychology also have destabilized the assumed wholeness of the individual.

I contend that the result of such a destabilization of boundaries is an increased sense of risk, an anxious outlook that distinguishes the culture of the Cold War on both sides of the arms race. The threat of nuclear war, of course, forms the backdrop of the two texts I am analyzing. The texts present the risk of radiation as fundamentally linked to war, and the same fear induced by considering the possibility of nuclear apocalypse also translates to the anxiety that derives from radioactive and toxic contamination.

George not only displays the literal effects of radiation on the bodies of characters and through the geographic setting of the novel, his use of heliography throughout the novel reminds the reader of the pervasive presence of invisible anthropogenic radiation in the environment. George incorporates light imagery into *Ocean Roads*, highlighting the ubiquity of radiation in all of its forms, both natural and man-made, and further denoting the depictions of anthropogenic radiation as symbolic of modernity. For example, photography and film emerge in many places

throughout the text such as in Etta's photos and in the silent films that Isaac watches. These two forms of art are distinctively modern in that they are mechanical forms of reproduction, capturing natural radiation in a particular moment and uniformly displaying it. They can be mass-produced and also examined innumerable times while remaining identical. Benjamin, in his essay "The Work of Art in the Age of Mechanical Reproduction" compares film and painting, asserting that while painting merely requires observation, film is analogous to surgery; it is intrusive and changes what it depicts. The very presence of the camera can change a person's actions because they know they are being observed (Benjamin 233). In this way, these forms of art not only employ radiation to function but also mirror it; radiation cannot be present in the environment without changing it. Radiation, as explained above, has allowed us to trace how particles move through air and ocean currents and has revealed to modern Western scientists a better understanding of the world's ecology. Radiation illuminates, literally through X-rays and visible light, and also figuratively through its role in ecology. Nevertheless, it has done so by interfering with natural ecosystems.

Etta, as a war photographer, epitomizes the observer/intruder binary role as she photographs traumatic scenes of death and destruction in Vietnam. George's narrator depicts her as aware of the power of her presence as a photographer. In one scene, Etta explains why she became a war photographer to her granddaughter, Rai: "I never set out to," she says, "The first photograph I ever took was of a soldier, though it was the man I photographed, not the uniform or the flag or even the ideal. The human being. I've been doing that ever since; photographing human beings. In inhuman moments" (George 294-295). Later on in the passage, Etta asserts her desire to be the "one photographer, [who] would photograph the last bullet" (295). Clearly, Etta hopes to influence the very situations that she captures by bringing people's attention to their

cruelty. It is her form of protest. George uses the phrase “human beings. In inhuman moments,” suggesting that war is not a natural phenomenon and can even degrade one’s humanity. Etta clearly believes that photographs of war humanize the subjects, but from an opposing perspective, it might also desensitize the viewer to violence, another way in which the presence of photography might influence a situation. George seems to hint that both reactions are possibly, especially through his portrayal of arguably the most important photograph in the novel, a photo that Etta unintentionally takes of Troy while he is in Vietnam.

In the photo, Troy is protecting two Vietnamese children from an explosion of napalm. Etta captures the moment, without initially realizing it is her son:

Sometimes after a napalm strike they would find bodies frozen mid-gesture.

Shrunken limbs ragged, skin indistinguishable from the fabric of their clothes.

Their body fat hissing. But this time there were none. The platoon stood with raised eyebrows, the officer making a slow sweep around him with his arm.

Soldiers began firing into...anything that looked like cover.

...Etta heard a soldier shouting at someone in the river. The others raised their rifles again. She moved in, shooting images as she walked, stopping only when the figure in the river turned, looked past at the blackened faces of the two children he was holding, straight at her.

A triangle of blackened faces.

An unholy trinity.

She took one more photo.

It won her the Pulitzer Prize and lost her one of her sons. (George 95)

In the passage above, George employs pointed parallels between Etta and the soldiers that implicate Etta in the war. While Etta is a non-participant in the action, she still accompanies a platoon and is therefore somewhat complicit in its actions. George's use of language to describe the soldiers connects them to Etta's craft. The word "frozen" is used to describe the victims of the explosive napalm, linking this Cold War era weapon to photography, which also captures bodies in mid-gesture. The description of these bodies is snapshot-like and similar in style to the way Etta's photographs are described in the novel. Furthermore, the soldiers fire as a means to detect anyone hidden, mirroring the intrusive nature of light, which exposes and uncovers. Finally, one cannot ignore the use of the words "shooting images" to describe Etta taking photographs in this scene, since it strongly echoes the firing of the soldiers. In this scene, therefore, photography is also a violent act that desensitizes the photographer to the humanity of her subjects. In this case, the subject of the photograph is her son, a fact confirmed later on in the novel (George 139-140). The final line mentions the consequences of her act, implying that while Etta may have benefited the world through her photography, she has lost some of her own human connections in the process. She has jeopardized her relationship with her son.

Through his ambiguous portrayal of photography, George reveals it as another technology of the modern world that cannot be assumed to be wholly good or evil. Instead, it must be employed wisely. Film and photography further the trope of radiation as modernity in this text because they represent a new type of artwork, mechanical reproduction, that can bring awareness, making what was before invisible and unrecorded visible and reproducible.

Nevertheless, film and photography can disrupt the situation they depict and also influence viewers' perceptions, producing both positive and negative effects. They can elicit empathy or indifference, and also they can even dislocate our sense of chronology. George highlights them

to remind the reader that radiation is present not just in nuclear bombs, but in our everyday lives, also employing them as symbols of the modern era of enlightenment and its consequences.

Wolf employs heliography to a lesser extent, although she, too, refers to other forms of radiation in her narrator's environment that reinforce the ubiquity of radiation and its significance as a marker of modernity. In particular, she hones in on the radio as an emitter of information, but not necessarily a source that can be trusted. Just as radiation illuminates, providing information, so too the radio informs her of the "N E W S," which is how the narrator describes the official information released through the radio news broadcast (Wolf 5). Her capitalization ironizes the idea that the radio is a trustworthy source of news with accurate information. Her irony reveals her doubt as to whether the government will actually allow its citizens to know the truth about the situation in Chernobyl. The explosion occurred in the Soviet Union and was not announced officially in the German Democratic Republic until three days later (Eysel 284). The conflicting news on the radio further cements her distrust in the media, as more warnings against radiation in the environment are announced one after another. Experts give conflicting reports on the severity of the situation, and every few pages it seems the list of what should or should not be consumed is revised. So we almost cannot blame one character, Herr Gutjahr for his indifferent attitude: "What I don't know won't hurt me. That was what he went by and he didn't pay much attention to all the static on the radio..." (Wolf 13). The radio comes to represent another source of uncertainty. Information itself is not to be trusted, since the line between fact and fiction can be crossed so easily.

It is significant then that Wolf chooses to employ radiation to depict the narrator's own thoughts that she sends figuratively towards her brother undergoing surgery. She describes her thoughts as "message that I'm transmitting to you [her brother] as a focused beam of energy"

(Wolf 4). She goes on to reassure him, “the kinds of beams I’m talking about are certainly not dangerous, dear brother. In a manner unknown to me, they traverse the poisoned layers of air without becoming infected” (Wolf 4-5). The message she refers to is presumably the entire narrative of the novel. Thus, the narrator imagines using this telepathic method of distribution that directly parallels the distribution of information through radio waves. This conceit allows her to assert her own counternarrative responding to the official accounts of the accident.

Furthermore, George and Wolf show how radiation disrupts conventional narrative structure and even language, so that modern forms of artistic expression become distorted in the context of pervasive radioactive fallout. *Ocean Roads* follows an entirely achronological structure that leaps from one time period to another, much like perusing snapshots of different time periods in the wrong order. In fact, DeLoughrey sees a direct connection between the presence of radiation in the text, particularly in the form of photography, and the novel’s lack of a linear chronology: “The heliography of *Ocean Roads* is non-chronological, signaling [*sic*] a narrative shift away from linear historicism and highlighting how the ecologies of light trigger both continuity and discontinuity in time and memory” (DeLoughrey 482). According to DeLoughrey, light captured through photography disrupts a chronological sense of time since it allows us to continue to inhabit a past moment. She also argues that George uses properties of light in the structure of *Ocean Roads* by creating a narrative that reflects light’s complementarity. Complementarity is the term used to describe the dual nature of light as both a wave and a particle. *Ocean Roads* has complementarity embedded into its structure: its continuous narrative flow is analogous to a wave, while its plot is ruptured by traumatic events which are analogous to particles (DeLoughrey 478). This is a fascinating observation, but the importance of the narrative structure in *Ocean Roads* lies simply in its fragmentation. This

technique is familiar to any reader who has studied modernism or post-modernism:

achronological narration, which reflects the interiority of the narrator or, in this case, mirrors the overwhelming sensory experience of living in the modern world. The world depicted in *Ocean Roads* is distorted and disrupted by the traumatic effects of the Cold War. It is fitting then for George to employ the properties of light and the medium of photography to disturb the narrative structure, as these are forms of radiation that recall the legacy of the Cold War.

Wolf, too, represents radiation as perturbing the very act of writing, by changing the meanings of phrases from poetry such as “Oh heaven’s radiant azure” to something entirely different from their original intention (Wolf 9). She wonders at “the problem of what to do with the libraries full of nature poems,” suggesting poetry’s original meanings are now changed due to the new connotations that have arisen since the Chernobyl disaster. Once innocent phrases describing nature such as “the radiant sky” or even the image of a cloud have been appropriated by scientists to explain the phenomenon of radioactive fallout. These words themselves have become contaminated. Radiation in both novels interferes not only with the physical environment but also with the form and language of the stories themselves.

These novels associate the modernity that radiation comes to represent in these novels with a greater awareness of the human body and of ecosystemic vulnerabilities and interdependency, and they also connect it to the use of nuclear technology that affects every aspect of our culture. As a result, we are left to cope with the anxiety induced by our new awareness and also to monitor our technology’s risk, its potential for good and for harm. One common response to Western society’s fear of its own destruction comes in a form familiar to us, the genre of tragedy, which these texts now update to fit the needs of their narratives of ecological and human catastrophe. To this genre I turn in my next section.

Technological Tragedy and Anthropocentric (Self) Destruction

Through different means, *Accident: A Day's News* and *Ocean Roads* portray the multiple uses of nuclear radiation, for energy and for war, as modern tragedies. The narrator in *Accident: A Day's News* calls attention to the decisions that scientists and politicians made when deciding to invest in nuclear technology, thereby linking their decisions to the accident at Chernobyl, which Wolf implies, could have been prevented if scientists had resisted the temptation of nuclear energy.⁸ *Ocean Roads*, on the other hand, delves into the personal tragedy that its characters experience as a result of their relationship to nuclear radiation. In *Ocean Roads* there are elements that evoke classical tragedy: A tragic hero, Isaac, follows a tragic arc as he falls from a state of scientific achievement to mental disarray. Of course, it is not necessary for a text to display aspects of Greek tragedy at all in order for it to be considered as a “modern tragedy,” nor it is necessary for a text to be in the form of a drama. Nevertheless, the novels’ engagements with classical tragic elements signals that they are attempting to update the meaning of tragedy as it exists in the modern world, where the fall of humanity is not precipitated by the actions of the gods, but by what might seem like random chance— nuclear accidents and ecological catastrophe. However, I contend that these texts depict the effects of radiation as tragic because they are attempting to dismantle the systemic factors in our society and culture that allowed the “tragic events” to occur.

⁸ Wolf’s portrayal of nuclear energy is consistently negative throughout the entire text. By invoking her negative depictions of this technology, I am not necessarily endorsing her view. Nuclear energy, despite its risk, has great potential as a source of energy that does not produce as much carbon emissions, and I am not arguing against its use.

It is important to distinguish the common definition of tragedy as an event that causes suffering, from the literary definition, which harkens back to Antiquity and includes a whole set of conventions that must be followed for a work to be considered a “tragedy.” Raymond Williams in his seminal work *Modern Tragedy*, asserts that tragic occurrences, which include ecological disasters such as oil spills, nuclear accidents, and massive wildfires, are not so different from the tragedies of Oedipus, Faust, or Macbeth. What makes something tragic, in the literary sense, is how the story is framed as representing some greater struggle. How this struggle is defined depends on the era in which the tragedy was written. He rejects the idea that there is a single “tragic tradition,” instead examining tragedies from different eras in Western civilization as the products of their historical and political contexts. What struggle then defines modern tragedy? Williams writes, “the real key, to the modern separation of tragedy from ‘mere suffering’, is the separation of ethical control and, more critically, human agency, from our understanding of social and political life” (Williams 48-49). Williams asserts that “tragedy” in modern life is the inability to recognize how suffering arises from social and political structures that we participate in or are subjected to. Instead of reflecting on the supposed universal nature of the “human condition” through the story of a particular tragic hero who ultimately is destroyed, modern tragedies instead reveal to the audience the systemic causes of the hero’s suffering. This Marxist interpretation of modern tragedy is useful for understanding how *Accident: A Day’s News* and *Ocean Roads* employ elements of tragedy in response to the traumatic events of the Cold War and to their anthropogenically irradiated environments.

Some critics have argued that literary tragedy cannot exist in the contemporary world because we have lost belief in fate. However, I will argue that in the case of invisible radiation, the properties of physics and science itself assume the role of the metaphysical worldview to

which the characters and the readers subscribe. In fact, cultural critics Theodor W. Adorno and Max Horkheimer in their essay “The Concept of Enlightenment” pointedly question whether the rational perspective that the Enlightenment assumes is entirely devoid of earlier religious elements. In fact, the Enlightenment does not interrogate the Judeo-Christian tenet that man has power over nature, instead often incorporating this non-scientific bias into the basis of scientific observations and theory (Adorno & Horkheimer, 9). Thus, science cannot be entirely objective; it is influenced by our cultural biases. Significantly Adorno and Horkheimer even go as far as comparing the scientific assumption that all matter is interchangeable to the concept of fate (Adorno & Horkheimer 10-13). Physical matter, according to science, is composed of fungible building blocks that combine to produce atoms or molecules with specific properties determined by the substance’s structure. When this attitude is applied to objects and organisms on a larger scale, the universe begins to look predictable: a clockwork of interactions that can be understood if one can pin down enough variables. From this perspective, free will ceases to exist; we are just a concoction of chemicals determining our actions, leading us to a point of view that does not differ greatly from religions that view God or other deities as pre-destining human lives.

Yet this isn’t a commonly held view by scientists, because other branches of sciences have emerged that significantly question this idea of the universe as clockwork. Quantum mechanics and chaos theory present evidence to the contrary, showing that the world, at least a very micro or macro level, is incredibly unpredictable and influenced more by probabilities than certainties. This is where free will becomes possible again. Natural systems, such as the climate, and constructed systems, such as nuclear technology, are incredibly complex, so complex that we cannot make models that give us exact predictions about the future. Instead we must rely on our

judgment to balance risks when it comes to our use of technology (F. Buell, 193).⁹ Risk intersects with tragedy not only when we miscalculate the risk of a nuclear accident, but also when the risk is beyond our capability to contain. The danger of released radiation is so enormous that even if the risk of an accident is low, the result of an accident would be catastrophic, as depicted in these novels. Tragedy does not have to result from negligence; tragic events often occur despite the best of intentions, and that is part of what makes these events tragic— while we do have free will, we are limited as individuals and as a species by the risks we take on behalf of ourselves, others, and even non-human species who could also be affected. These texts regard humanity's quest for nuclear technology as reckless since the risks associated

⁹ Frederick Buell, in his book *From Apocalypse to Way of Life* calls modern Western society a risk society and describes it thus: "Risk society thus emerges when modernity, for a host of reasons, proves structurally unable to contain the hazards it produces. This means that its hazards have become both uncontrollable and unpunishable. The reasons why risks nowadays have become unpunishable and uncontrollable are legion. More and more, hazards these days cannot be limited to time and place, but are global. Accountability for them is increasingly difficult to assign according to the rules of causality, blame, and liability; the time between the creation of hazards and the manifestation of their effects has now lengthened into not just years but several generations" (F. Buell 193). He proceeds to give the example of a proposal to use radiated copper from a nuclear plant in common household objects such as pots and pans in small quantities, and explains how such a risk would be assessed. It is clear that in these situations, free will might not be as useful to us as we would hope, since it is not always easy to make the most prudent decision, especially when there are social and economic pressures that influence these risk analyses.

with radiation are too great, painting the tragic downfall of individuals and humanity as a whole as reflecting the systemic problems that led the tragic events to occur. But is tragedy the best way to challenge these systemic problems?

Critic Joseph Meeker would answer with a resounding no. In his essay “The Comic Mode,” he criticizes the concept of tragedy, both ancient and modern, as anthropocentric and harmful to an ecological understanding of the world and of literature. Tragedy is built upon the premise that humanity is exceptional and fundamentally superior to other creatures and aspects of the environment (Meeker 157-8). It derives from a fundamentally flawed Western viewpoint that favors anthropocentrism, ethnocentrism, and androcentrism, assuming the experiences of white, male tragic heroes are universal and representative of all human experience. Meeker also asserts that tragedy is entirely an invention of Western society, proclaiming that no equivalent genre exists in non-Western cultures. While this is certainly a debatable contention, Meeker’s greater point is that our society, in attempting to create modern tragedies, clings to a genre invented thousands of years ago in a drastically different ideological space than our current secular culture.

Yet Westerners still find something very poignant about tragedy, particularly in the way that it depicts man in a fight for survival in which he ultimately is defeated. Tragedy approaches glorification in its treatment of the tragic hero, despite the inevitable punishment that arrives, because it shows the hero reaching a peak of achievement that is desirable, whether it is political or intellectual. Often, the tragic hero is punished for overreaching his limitations, whether those are set by the Gods or by some other metaphysical element; nevertheless, we as the audience empathize with him despite his suffering, perhaps even because of it, suggesting that tragedy is not a moral guide. In fact, Williams discusses Nietzsche’s proposition that we take aesthetic

pleasure from watching tragedy unfold: “For Nietzsche, the necessary response [to tragedy] is active: an aesthetic of tragic delight in man’s inevitable suffering, which the action of tragedy shows us in order to transcend it” (Williams 38). Taking pleasure in watching a hero’s fall from grace is a common reaction, which we can also see every day through how our culture sensationalizes disaster. Critic Frederick Buell notices this pattern of reveling in catastrophe. He points out that dystopian science fiction since the 1980’s that “accepted with enthusiasm what had been so problematic for its predecessors: the fact that people now lived utterly beyond environmental limits and in disequilibrium with nature” (F. Buell 257). Dystopias that use catastrophe as an aesthetic backdrop inherit the legacy of literary tragedy. Thus tragedy can potentially perpetuate destructive behavior through aestheticizing it, even as it warns against it.

Meeker argues that instead we should look towards comedy, which, in his opinion, presents a healthier worldview that better mirrors natural ecological processes of adaptation to our environment. However, recent research in ecology has dispelled the idea that there is a natural “balanced” state of nature to which disturbed ecosystems will always return (Buell, F. 191). The concept in ecology of succession building towards “climax communities,” in which several stages of ecological succession occur finally in order to transform the ecosystem into a habitable place for a stable “climax community” has been for the most part overturned. This problematizes Meeker’s idealization of comedy, which in the light of current ecological thinking, appears overly simplistic. In fact, his claim that comedy is better because it mimics natural processes is not only incorrect, but also anthropomorphizes nature by viewing it as having intention— a tendency towards balance. Nevertheless, later, I offer my own opinion on how comedy promotes a more sustainable and ecological perspective, not because it depicts a

restoration of the prevailing natural order, but because it extends to its characters the chance to adapt and evolve, versus tragedy, which resigns characters to their doom.

I do believe Meeker is correct in his assertion that tragedy, as it exists in most ancient tragic dramas and modern fiction, promotes an ecologically and socially irresponsible attitude by depicting humanity as irredeemably opposed to its environment (Meeker 158). Yet there is something to be said for using tragedy in depictions of ecocatastrophe since it allows for the dramatization of these disasters, showing how they are not just common tragedies, events with suffering victims, but revealing how they result from systemic problems in our society that need to be addressed. The two examples of tragedy I will be discussing both exhibit a heightened awareness of ecological issues and problems of social justice. In my analysis, I will demonstrate just how they deviate from the typical depictions of tragedy to expose technological tragedy as not a singular event, but as a problem that must be confronted continuously. This gradual version of tragedy evokes a more hopeful outlook than cathartic resignation. In fact, the texts also intertwine comic elements that leave the possibility of redemption and adaptation open for some, if not all, of the texts' characters. In the analysis of the text that follows, I will explore how each text frames the phenomenon of radiation as a technological tragedy, arguing that through each of their unique revisions of the tragic genre, they extend the trope of radiation into an allegorical warning against the pitfalls of an overly-rationalistic shortsighted approach to science that prioritizes scientific progress at all costs and ignores humanistic and ecological concerns until it is too late.

“A Before and After”: An Ecofeminist Revision of the Fall

Decades after the nuclear accident at the Chernobyl Power Plant in Ukraine on April 26, 1986, the word “Chernobyl” still resonates with the horror the world experienced from this seemingly improbable disaster. Until the recent Fukushima disaster in 2011, Chernobyl was the only accident ranked at level seven, the highest level, on the International Nuclear and Radiological Event Scale (INES) by the International Atomic Energy Agency (IAEA) (Black 1). An explosion in the power plant’s Reactor No. 4 released the equivalent of 400 times the amount of radioactive material released by the bomb dropped on Hiroshima (but surprisingly 10 to 100 times less than the total radiation released by nuclear testing in the 1950s and ‘60s) (“Ten years...” 2). While the area surrounding the plant was evacuated, thousands of nearby residents were exposed to radiation, as well as thousands more who lived in the path of the fallout’s spread across Europe. According to one estimate, radiation released from Chernobyl could cause up to 4,000 cases of cancer, as well as having other impacts on the health of exposed populations (“Ten Years...” 2). Certainly this incident qualifies as a tragedy in the common definition, but how could it fit into the classical definition of tragedy? There is no single tragic hero who suffers a fall; instead the victims of Chernobyl are in no way responsible for the accident. Yet, in *Accident: A Day’s News* Wolf adopts a tragic perspective, in particular alluding to Genesis, in order to frame this catastrophe as a reenactment of humanity’s Fall. Significantly, it portrays Chernobyl as not an isolated incident, but as a symptom of systemic hubris perpetuated by the reductionist attitude of science which Wolf genders as male. Tragedy then becomes a genre representative of this hubristic perspective towards science and technology that Wolf criticizes.

First of all, we must ask, how can Chernobyl be considered a tragic narrative when its very nature as an accident denies the hand of fate? In critic Kate Rigby’s article, “Tragedy,

Modernity, and *Terra Mater: Christa Wolf Recounts the Fall*,” she argues, “Wolf inscribes this particular Fall, the ‘case’ or ‘instance’ of the accident (Un-fall) in the Soviet nuclear reactor, into a tragic narrative about the whole course of European civilization, the mythical paradigm for which—one that has haunted the Western cultural imaginary for more than two millennia—is none other than the Fall (Sünden-fall)” (Rigby 122). Rigby makes her case by pointing out the direct translation of “Störfall,” the novel’s original German title contains the word fall and possibly alludes to “Sünden-fall,” the Fall of Man from the Judeo-Christian creation story. From this perspective, the accident is not a mere statistical probability but the result of human overreach, rendering humanity the culpable tragic hero.

In Genesis, the Fall of Adam and Eve results from plucking an apple from the Tree of Knowledge (*English Standard Version*, Gen. 3). Wolf echoes the Fall in her depiction of radiation transforming the pastoral landscape in which she lives, rendering it dangerous and ominous. The radio warns the narrator against eating fresh vegetables from her garden and advises her to wear gloves while gardening, creating a new expulsion from the Garden of Eden. However, instead of being exiled from paradise, humanity instead has tainted nature invisibly, so that things that appear harmless, like vegetables, are now threats. As a character in the novel succinctly remarks, “The glaze is off the planet, don’t you think?” (Wolf 23). The snippets of a religious sermon that the narrator overhears on the radio and her reaction to it evoke the Fall overtly:

And these signs shall follow them that believe; they shall take up serpents; and if they drink any deadly thing, it shall not hurt them...”

(And so one is already guilty, or shares in the guilt, by saying what one thinks, what one knows, and— although it may be hurtful— by feeling a certain

satisfaction in the process. Because one knows it?...What kind of a fix have we all got ourselves into, brother? (Wolf 49)

The line about serpents is from the Book of Mark, after Jesus' resurrection, describing the marks of a Christian believer.¹⁰ But the meaning of the phrase "they shall take up serpents" is unclear. "Take up," alternatively translated as "pick up," suggests that pious Christians will be able to accept the presence of serpents (whether physically or figuratively) without being tempted into sin, since serpents are usually associated with Devil in Christian symbolism. The sermon's reader's assertion that "if they [Christian believers] drink any deadly thing, it shall not hurt them" connects the prophecy to the present situation. The announcer is interpreting the Chernobyl accident as a sign that the resurrection of Jesus is nigh. This ironically contrasts with the narrator's worry that humanity will induce its own apocalypse through destruction of the environment.

The narrator doubts the sermon's declaration that believers are immune to harm from the accident, instead inserting her own commentary on the prophecy, pointing out that everyone is "guilty by saying... what one knows." She simultaneously alludes to the Original Sin which resulted from eating from the Tree of Knowledge, while at the same time seeking someone to blame for the Chernobyl disaster. That she blames knowledge is significant. As I discussed in the

¹⁰ "And he said to them, 'Go into all the world and proclaim the gospel to the whole creation. Whoever believes and is baptized will be saved, but whoever does not believe will be condemned. And these signs will accompany those who believe: in my name they will cast out demons; they will speak in new tongues; they will pick up serpents with their hands; and if they drink any deadly poison, it will not hurt them; they will lay their hands on the sick, and they will recover'" (*English Standard Version*, Mark 16:15-18).

previous section, the approach of the Enlightenment that elevates the production of scientific knowledge at any cost led to the invention of nuclear technology. At the same time, studies of released radiation from nuclear testing led to breakthroughs in the science of ecology (DeLoughrey 472-473). It is not just our invention of nuclear technology that has allowed for Chernobyl to occur, but also our own awareness of the damage caused by the accident; the radio's constant warnings increases the narrator's anxiety, putting her more on edge than if she simply did not know of the possible long-term consequences of eating contaminated food or drinking contaminated milk.

The idea of the Fall is further reinforced by Wolf's depiction of not only the narrator's environment, but also of her language. The narrator makes a conscious decision to view Chernobyl as a tragedy in the literary sense and explores how its effect on language makes it tragic. She asserts that "Our age had created a Before and After for itself," implying that Chernobyl has changed the world and the course of human history so radically that now one must view past events through the lens Chernobyl has created (Wolf 36). Even poetry already written is tainted by Chernobyl, since words such as "radiant" and "cloud" are contaminated with ominous radioactive implications.¹¹

Moreover, Wolf emphasizes that Chernobyl is not an isolated event and does not constitute humanity's Fall in its entirety; instead, Wolf represents it as a symptom of a greater sickness within society, a larger tragic arc. It is no coincidence then that the novel itself oscillates between reports of Chernobyl and ruminations on the state of the narrator's brother in surgery, as Rigby points out (Rigby 121). Wolf hints at this connection through the narrator's explanation of how Chernobyl has affected her: "I realized I could describe my life as a series of just such

¹¹ See earlier discussion of this semantic transformation on p. 24.

incisions, a gradual clouding over produced by ever thickening shadows. Or, on the contrary, as a continuous acclimatization to ever harsher lighting, sharper insights, increasing matter-of-factness” (Wolf 36-37). Using the word “incisions” to describe jarring catastrophes such as Chernobyl, the narrator compares the psychological harm inflicted to surgical wounds that leave scars behind. Thus, she suggests that designating memories in relations to events—as “Before or After,”— fragments the psyche. Significantly, the narrator describes this effect as “gradual.” The narrator characterizes this psychological fragmentation as both obscuring and illuminating through juxtaposing the phrases “clouding over produced by thickening shadows” and “harsher light, sharper insights, increasing matter-of factness.” This duality recalls the paradox of Enlightenment: The more science probes nature, the more we understand about it, but at the same time this probing harms the very nature it seeks to understand. Recall how the narrator herself claims that the word “cloud” now necessitates a nuclear connotation. The “gradual clouding” over is the radiation seeping into the environment from Chernobyl and other nuclear events, but it also represents all of the unintended consequences resulting from a surgical, invasive treatment of the natural world promoted by rationalistic science. The words “harsher” and “sharper” carry violent undertones, suggesting that the science is guilty of torturing nature and in the process losing its empathy through its elevation of facts over emotion, “increasing matter-of-factness.” Thus Wolf’s version of the Fall, synonymous with the Enlightenment, is not an event but rather a continuous Fall constituted by the anthropocentric, patriarchal attitude embedded in Western culture, which unlike the narrator’s brother’s removable tumor, would be well-nigh impossible for any one person to simply eradicate from the world.

Wolf, through her allusions to the Fall, is in fact, designating humanity as a collective tragic hero since it responsible for the system that has led to this catastrophe. She critiques in

particular the occupation of scientist, which she genders as male in order to examine the patriarchal structures supporting the system of domination of the natural world that have led to Chernobyl. Critic Deborah Janson, in her article, “In Search of Common Ground: An Ecofeminist Inquiry into Christa Wolf’s Work” explains that Wolf’s approach to gender in many of her works reflects an ecofeminist perspective.¹² Janson concludes that Wolf’s main critique of science in her works is its alienation from emotion, which is conventionally considered female territory (Janson 173-174). Wolf views science as instead overemphasizing logic, conventionally gendered masculine. The valuing of conventionally masculine traits above those considered feminine is significant not only in it reflects the relegation anything feminine to a lower standing, but that it also denies the importance of empathy in decision-making. Without empathy, decisions to destroy or dominate can be made without any thought of the consequences. In *Accident: A Day’s News*, Wolf points out that our society associates this lack of empathy with masculinity and views raising men to be tough as not only acceptable but necessary. This topic emerges in a conversation between the narrator and her daughter on how to raise boys: “Little boys, I said. All they have to put them through to toughen them up. They got their revenge later, said my youngest daughter... Whoever had the ability to love beaten out of him would surely

¹² Ecofeminism, a branch of ecocriticism, views destruction of nature and oppression of women as fundamentally rooted in the same patriarchal, anthropocentric attitude adopted by Western society. It both seeks to sever the essentialist conflation of woman and nature (such as land being gendered as female and women being viewed as more emotional and less rationalistic) while at the same time cultivating a view of nature and women as valuable beyond the perspective of the male gaze. Woman and Nature both exist for more than to serve Man (Janson 173).

prevents others from loving in turn” (Wolf 18). The ambiguous pronoun “they” is repeated to show that society’s coercion of males to conform to a certain prescription of masculinity, toughness, is cyclical, imposed upon males who then perpetuate the cycle of violence to the next generation.

Wolf associates science with men, almost exclusively gendering all scientists in the novel as male, not to deny the existence or validity of female scientists, but to point out that this conventionally masculine attitude of valuing reason over emotion translates into the male-dominated realm of science; everyone, men and women alike, must adopt this perspective in order to succeed in the scientific world. Hence, Wolf exposes the implied gender oppositions embedded in science. For example, the narrator makes “a list of the activities which these men of science and technology presumably do not pursue, or which, if forced upon them, they would consider a waste of time” which includes domestic tasks such as “changing a baby’s diapers. Cooking, shopping... doing the laundry...Sweeping the floor” (Wolf 31). These tasks which fall traditionally under the woman’s sphere, also symbolize care of children and the maintenance of a clean environment. They are considered beneath “men of science” who have the more important task of producing knowledge, not life, and, in the process contaminating the environment. The narrator admits that she herself views some of these activities as a waste of time, showing Wolf’s awareness that gendering these menial jobs as female is problematic. Nevertheless, they are necessary, as is the ethic of care and sustaining underlying them that science lacks.

Male scientists become tragic heroes in Wolf’s narrative because their lack of empathy leads to destructive consequences. Although there is no direct causal link between a particular scientist’s unempathetic decision and Chernobyl, Wolf is suggesting that the hubristic perspective of science as a whole has led to it. Hubris, which the Oxford English Dictionary

defines as “presumption, originally towards the gods; pride, excessive self-confidence” is often a characteristic of the tragic hero that leads to his downfall (*OED*). We can see the modern version of hubris when the narrator hears an interview of a technocrat advocating for nuclear power:

Well, we heard him say, there was no such thing as an absolutely faultless prognosis in such a young branch of technology. As always with new technological developments, one would have to take certain risks into account until one fully mastered this technology as well. That was a law that also applied to the peaceful utilization of nuclear energy... The text for a letter went through my mind in which I— imploringly, how else— was to communicate to someone that the risk of nuclear technology was not comparable to any other risk and one absolutely had to renounce this technology if there was even the slightest element of uncertainty” (Wolf 103).

Here, Wolf contrasts the cold process that politicians and scientists use to calculate risk with the narrator’s own deeply emotionally response to their negligence. The impersonal tone and also the use of the vague, intangible word “risk,” which does not indicate the concrete human or environmental costs of an accident, allows the scientists and politicians to distance themselves from the consequences of Chernobyl and from the responsibility for it. Moreover the suggestion that one day this technology will be “mastered” represents the attitude that humanity can overcome these risks, a rather hubristic assertion. On the other hand, the narrator views risk from nuclear technology as unacceptable. Her diction reflects the passion which she feels for the subject through the use of words such as “imploringly” and “renounce.” Wolf implies through this juxtaposition of tone that the narrator’s perspective, an emotional one that might be construed as less rational, is actually the one we should listen to.

The attempt to control the forces of nature through nuclear technology relies on the social trust in the power of science and rationality. But can we ever truly master the complex systems of technology that we create? In the novel, the narrator tells us that this accident, according to scientists, had the estimated risk of happening once in ten-thousand years (Wolf 41). Wolf implicitly asks us to consider what went wrong. Did an extremely improbable event occur despite the odds? Or were we too confident in the ability of human rationality to control the forces of nature?

Wolf blames this hubris on the thrill that scientists receive from their pursuit of knowledge, one that allows them to ignore the consequences of their actions. Her narrator, wondering how the nuclear bomb could even have been conceived and invented in the first place, asserts that the scientists were “seduced,” driven by “titillation” and “desire” (Wolf 49). In the place of empathy, the scientists’ thirst for knowledge and power becomes sexual, a way of asserting dominance of nature through intellectual pleasure; meanwhile the moral or ecological consequences are forgotten. Critic E.L. McCallum views this desire described in the text as the Freudian concept “thanatos,” a death drive, seeing it as parallel to the drive towards narrative completion (McCallum 190). The presence of such a death drive in this novel follows the arc of tragedy, which moves inevitably towards annihilation of both the tragic hero and of his world. In this case, it is unclear whether the scientist tragic heroes also suffer from the consequences of their actions, if they too are exposed to radiation from the accident. Nevertheless, their hubris in pursuing nuclear energy is depicted as responsible for the ongoing Fall of humanity.

Placing the blame on scientists and politicians is not entirely fair, of course, because Wolf ignores the fact that their actions may have been well-intentioned. Nuclear energy has the potential to provide relatively clean energy, so it is a useful resource. Yet Wolf criticizes nuclear

energy and it advocates as symbols of what she sees as wrong with science in general, emphasizing scientists' lack of empathy and their will to dominate.

But Wolf makes it clear that it is not just the scientists who are responsible for the hubristic use of technology that led to Chernobyl. Instead the responsibility rests on society, not only for allowing scientists to run amok, but also for subscribing to the same glorification of violent devastation that gives tragedy its power on the stage and reinforces violence against humans and nature off-stage. Wolf describes an audience member's reaction to a fictionalized version of such aestheticized destruction, the movie *Star Wars*, in order to point out how problematic this attitude towards technology is. The narrator recalls watching *Star Wars* in a movie theater :“At first I couldn't help but think of the young black woman sitting right behind me, fanatically participating in the space battles of the good white star warriors versus the evil black ones, along with the rest of the theater...screaming shrilly at one climactic moment: Kill him! Kill him! And then I realized: the weapons being used there were indeed nuclear weapons” (Wolf 64). The woman clearly is emotionally engaged in the narrative, since she is screaming at the screen. Thus, Wolf demonstrates that the desire for destruction and domination, which society adopts in the name of rationality is itself far from rational. Instead it evokes in us the worst of our emotions— hatred and fear. The narrator's realization that the bombs in the film are equivalent to nuclear weapons links this seemingly harmless film to one of the most harmful products of society's fascination with violence and destruction. By portraying this destructive attitude as also crucial to the creation of nuclear energy, Wolf suggests that there is no escaping the violent legacy of these weapons, which taint even the “peaceful” applications of this technology.

The ending anticipated by Wolf's tragic arc is the extinction of the human species. However, by framing Chernobyl as part of a larger tragic narrative, Wolf is not necessarily subscribing to the inevitability of humanity's destruction. Instead, she is critiquing our march towards death. Framing the deterioration of the environment as the Fall, in which Chernobyl is just one incident among many of scientific hubris leading to destruction, Wolf portrays the world as fundamentally transformed by human-generated radiation. There is no easy fix to clean up our irradiated environment. What matters then is whether humanity continues to only view its own narrative as a tragedy, or whether it adopts a different perspective and changes course. A tragic response would be to simply accept this as the inevitable fate of humanity, whilst a comedic response would be to look for means of possible restoration. While Wolf utilizes a tragic frame in order to help us understand the very problems with such a tragic perspective, her inclusion of comic elements counterbalance the tragic narrative, gesturing towards a more hopeful future.

The Scientist as Tragic Hero in *Ocean Roads*

In *Ocean Roads*, a nuclear scientist serves as the tragic hero. Isaac helps to invent a weapon, the nuclear bomb, which has far-reaching consequences beyond what he could have ever imagined. Dropping the bomb on Nagasaki accomplishes Isaac's shortsighted wartime goal of winning the war for the Allies, but it also leads to the arms race of the Cold War and the violence of the American military presence in the Pacific region, including the Vietnam War and the atomic testing in the Pacific. But the novel's primary tragic focus is on individuals. We see the psychological price of Isaac's active role in creating the bomb. Not only does he suffer a fall from mental acuity to madness, but he also loses his wife, his stepson, and his son in the process to war and to radiation. *Ocean Roads* employs classical tragic elements in its depiction of Isaac's downfall. In fact, the text compares Isaac to the mythological tragic hero Icarus through allusions that evoke Icarus' fatal encounter with the sun. However, *Ocean Roads*, instead of depicting one singular tragic moment, reveals tragedy as developing in a series of steps, producing a depiction of technological tragedy as a cyclical recurrence passed from one generation to the next. Thus, it has the potential to be disrupted.

I contend that George presents Isaac as an Icarus figure in the text, alluding to Greek mythology to provide a paradigm for technological tragedy that extends to our modern society's self-destructive relationship with technology, especially nuclear technology. The tale of Icarus embodies the idea of a tragic fall resulting from a tragic hero's hubris, aided by technology. Icarus flies too close to the sun. Consequently, the technology he employs turns against him, dropping him to his death (*Ovid*, 8.183-235). Significantly, it is not the technology itself that destroys Icarus; rather, it is his desire to reach the heavens, the realm of the gods that leads to his fall.

George alludes to Icarus in order to call attention to Isaac's own figurative climb and subsequent fall from the heavens. For example, the narrator describes Isaac's early fascination with the sun: "When he was a boy he asked his father what made the sun shine. He told his father he'd tried to look at it to perhaps find out, but it had hurt his eyes. His father scolded him. 'Yitzak,' he said, 'Promise me now. Do not look at the sun.... 'But you did, Yitzak,' he [Isaac] says to the sea wind. 'You did.'" (George 72). Here, the act of looking becomes more than just observation. It encompasses the desire of not only knowledge, but mastery. It is no coincidence that Isaac attempts to understand the sun, since scientific understanding of solar radiation derives from the same theories that allow us to understand how to split an atom and produce a nuclear bomb. The phrase "you did" refers to Isaac's involvement in the creation of the atom bomb, an attempt to control the forces of nature that also drive the sun. Like Icarus, Isaac attempts to reach the level of the sun, at least metaphorically. He hopes to harness nature's power, but ultimately suffers because of it Isaac's scientific curiosity as a child foreshadows his later attempts to understand nature through nuclear physics and also serve as a precautionary allegory for what happens when one attempts to confront nature directly- there are often unintended, negative consequences. In the case of the atom bomb, the general consequences come in the form of radiation, which causes long-lasting health effects to exposed populations. But for Isaac, the result of "look[ing] at the sun" is a figurative type of blindness, a psychological blindness which drains Isaac of his ability to empathize with other human beings.

Often in tragedies, the tragic hero's fall results from an overreach, an attempt to grasp power reserved for the gods, not for man. In the case of Icarus, his attempt to reach the height of the sun can be interpreted as a symbolic desire to achieve deification. However, in contemporary secular society, texts such as *Ocean Roads* no longer assume the presence of a higher religious

power that ultimately controls the fate of humans. Yet, modern tragedy still depicts humanity attempting to reach beyond its current limitations, pursuing greater power while often ignoring the dangerous risks that accompany their endeavors. For example, in a more modern tragedy, Mary Shelley's *Frankenstein*, the transgression that the scientist Victor Frankenstein crosses is the creation of life from death, resulting in terrible unintended consequences for Frankenstein, whose Creature determines to destroy his life (Shelley). In *Ocean Roads*, George illustrates Isaac's own desire to overcome the limited physicality of being human through his creation of technology with which he desires to merge. Isaac lusts not after deification, but for technological triumph, the control of nature and other human beings through violent war technology. Significantly, George reveals that the more Isaac succeeds at his quest to conquer nature through technology, the less human he becomes.

Isaac's strict adherence to a rational scientific perspective that excludes emotional or ethical considerations begins to change him from a human being to a technological tool. Not only does Isaac work towards creating a weapon of war without considering the ethical implications of his work, his overall scientific quest to understand the physical properties of nature exhibits an imperialistic, invasive attitude. The text hints at the direct connection between violence against people and violence against nature in Isaac's explanation of why he and his fellow scientists created the bomb: "Above the physicists towered an immense set of scales: conscience or victory. I never answered the question before Nagasaki, and I never even *asked* it until I saw the goats chewing" (George 253). The metaphor of scales implies the concept of the balance of nature, which Isaac and his fellow scientists are deliberately tipping towards the direction of

violence.¹³ The goats Isaac refers to are the ones he sees blown apart while watching the Able test. This scene describes the brutal effects the Able bomb has on the animals on the island, who are blasted to pieces or sentenced to radiation poisoning and cancer. It bridges the gap between the human fatalities of the bomb and the overall destruction of nature caused by this technology, revealing that the “victory” the scientists choose is not just over their human enemies but over nature itself (George 254).

Isaac’s desire for knowledge is also a desire to conquer, because once he presumes that once one knows how nature works, one can manipulate it. We can see his lust for power over nature through the way he conflates himself with the technology he creates. For example, in one passage, he describes the dropping of the atom bomb on Nagasaki from the first person, the perspective of the bomb: “The B-52 bomber’s doors open for me and I slip away. My head and body, encased in their metal sarcophagus, are two separate nuclear weapons....At 1,500 feet a tiny electrical pulse, perhaps just enough to burn a corner of a postage stamp, initiates the firing sequence. I have begun” (George 339). George depicts the conflation of human and technology as representing the ultimate height of human achievement to Isaac, since the personification of the bomb shows the possibility of a man grasping in his hands the key to domination of all other humans and of nature. However, this metaphor has tragic implications since the actual scene

¹³ The whole concept that there is a balance of nature, of course, is outdated, as I discussed in the previous section on p. 30. Nevertheless, it is still widely accepted metaphor in culture at large, which is why it appears here. The scales serve as a symbol of the negative consequences this technology has upon not just human society, but also nature, but we must acknowledge that they rest upon a problematic foundation, since they do not reflect an accurate scientific principle.

depicts the ignition of an atom bomb with destructive consequences for humanity and nature. As I discussed earlier, the bombs dropped on Nagasaki and Hiroshima not only caused terrible devastation for Japan, but also propelled the world into the Cold War. The societal tragedy of the unintended consequences of building the bomb— both the Cold War and the subsequent harms from released radiation— parallel's Isaacs own personal tragic arc. Here, Isaac figuratively becomes one with the weapon, but the weapon, of course, destroys itself in the process of exploding. This self-destruction parallels the self-inflicted mental breakdown later experienced by Isaac as a result of his guilt from creating the bomb. Of course, the figuration of the scientist as a self-destructive bomb is also ironic, because it reveals that the highly rational perspective that drives Isaac to become technological, in fact, destroys him. Thus, it is not very rational at all because it doesn't contribute to self-preservation, which we generally assume to be a logical instinct.

George hints throughout the novel that Isaac has lost touch with his humanity through the diction employed by the narrator and other characters to describe him. In fact, these descriptions even suggest that following his descent into madness, Isaac succeeds in his quest to merge with technology by becoming the very physical phenomenon that he attempts to manipulate through science: radiation. George provides us with Caleb's perspective as a child on his father when he is first institutionalized: "When he was first put away...he seemed to have no real face. His expression was like glass, easy to look through but much harder to look at." (George 43). Caleb perceives Isaac's humanity as diminished, since his face, which allows him to express human emotions, is described as "like glass", somehow transparent and inscrutable. Like radiation, Isaac has become invisible. His loss of humanity has reduced him from being a concrete person to an intangible force that is still present, but without agency. This image of him as a technological

tool is further reinforced through the narrator's description of Isaac while he is in a mental institution: "Through it all, he never lost touch with the most complex machinery of his mind as he climbed inside a latticework of mathematics and physics. All that remained, crystalline, but he'd forgotten how to say hello... When he had parachuted free of the world he'd packed his periodic table and his logarithm chart, but forgotten to save all the tiny things that made him human" (George 59). The narrator employs technical diction to describe Isaac's transformation from man into a machine. His brain, instead of being described in organic terms, is depicted as "complex machinery." The picture of a "latticework" of science evokes a sense of imprisonment: Isaac has become a cog in the machinery of the universe, unable to act of his own free will. Furthermore, the word "parachuted" recalls the falling of the bomb, further reinforcing Isaac's identification with an object of technological weaponry, instead of with other humans. George depicts Isaac's desensitization to human feeling in order to demonstrate the effects of adopting a narrow rational perspective that excludes emotion. Therefore, through a pursuit of knowledge and power that might be considered noble and quintessentially human by the standards of classical tragedy, Isaac actually loses what makes him human.

Meeker argues that tragedy can only support an anthropocentric mode of thinking, and in many ways the tragic narrative presented by George conforms to this (Meeker 157-158). Nature itself is not made a character explicitly, and the story centers on human characters and their struggles. We identify with Isaac, despite his mistakes, and George does idealize Isaac as someone who has been able to achieve great intellectual accomplishments, despite his consequent suffering. Nevertheless, I contend that George subverts our tragic expectations by depicting Isaac's fall not as a lamentation of humanity losing its potential, but as a loss of humanity itself. By showing us that this monomaniacal scientific perspective will only cause us

to become more removed from our humanity, causing us to lose empathy for other humans and nature, he shows that we must not celebrate this cycle, but instead find a means to interrupt it. The way in which he depicts tragedy unfolding over a non-linear trajectory, affecting multiple generations, further reinforces the idea that is a cyclical process than must be redirected.

Isaac experiences his tragic fall when he realizes the harsh consequences of his own actions, but the process of his discovery is portrayed as continuous, not occurring in one single event. Isaac's mental illness develops while he is on a research assignment in Antarctica. However, the description of his breakdown oscillates between Isaac's experience of the barren terrain of Antarctica and his imagined experience of the bomb falling on Nagasaki, indicating the importance of both scenes to his revelation. George calls attention several times throughout the novel to the significance of Isaac's fall as a continuous process, especially since the novel itself follows an achronological order, in which Isaac's past is only revealed piece by piece. Before readers are introduced to the scene in Antarctica, which is not revealed until almost the end of the novel, we see Caleb, Isaac's son, attempting to understand his father's past. These snippets of conversation between Isaac and Caleb at the mental hospital in the 1960's section of the text recur several times throughout the work, creating a sense that Isaac is constantly revisiting the process of his decline. When asked why he broke down in Antarctica, the first time, Isaac responds, "It was as good of a place as any I suppose... Does one get to choose where and when one breaks down?" (George 81). Isaac discounts the importance of Antarctica not because the place is insignificant, but because the seeds of his madness are planted long before his trip to Antarctica. He confirms this in another parallel scene with Caleb when he asserts that his mental breakdown "didn't begin in Antarctica" (George 243). Instead, Isaac experiences his tragic fall as a process, not a singular event, suggesting the pernicious effects of technological violence

against nature and against the human psyche are not always immediately apparent, but take time to fully materialize. The structure of the Antarctica scene in which Isaac descends into madness reflects both the development of his madness as a continuous process, but also as something that solidifies in a particular jarring event; it oscillates between Isaac's experience of the physical landscape of Antarctica and post-bomb Nagasaki, linking these two events as essential to Isaac's tragic fall.

Both Antarctica and post-bomb Nagasaki are characterized by death and destruction. George describes the ground of Antarctica as "ash-grey" and notes the "red and gold and bronze and green nacreous clouds [that] hang like burning banners in the sky", which evokes the image of a different type of burning cloud, the mushroom cloud (George 340). While Antarctica is a natural space, inhospitable to humans but not yet a victim of human ecological destruction, it is connected to Nagasaki by the intrusion of science. Isaac comes to Antarctica on a scientific mission of exploration—a mission that rings with imperialist undertones implicating humans in the conquest of nature's last pristine spaces.

Isaac's mental breaking point occurs when he sees the carcasses of seals which have been preserved by the dry, cold conditions of Antarctica:

Withered flesh over pale bones, the skull open to the wind...He walks on, then slows and stops. Another mummified seal, then another. Perhaps a dozen. He moves among them, among their death caravan. All following the one he's first come across. A decision in the wrong direction. Heading inland where there was nothing to feed them. Their desiccated bodies could be dozens or hundreds or even thousands of years old. (George 340)

Here, the third person narrator, who adopts Isaac's own scientific perspective, displays a precautionary example of extinction caused by "a decision in the wrong direction," hinting that Isaac is reconsidering his own decision to help create the bomb since it could result in humanity's complete self-annihilation. This realization is reinforced by the similarity of the seal corpses to the desolation of post-bomb Nagasaki, a connection made explicit in the following paragraph: "He sits, a terrible weight in his bones, in his eyes, his fingertips. He blinks into a Nagasaki morning. A child's toy train, a woman's sandal. He keeps walking, as he had that Nagasaki day, searching each inch for some sign of life. But now, as then, there is none" (George 340). The two scenes are connected by their depiction of the remnants of past life, human and animal. The text mingles together these two events to demonstrate Isaac's progressive fall as he begins to recognize the negative consequences of his own actions, which only become fully apparent with time. The narrator informs us that Isaac feels his guilt "in his bones." This phrasing evokes the symptoms of physical illness, such as the ones suffered by cancer patients affected by radiation. In particular, it creates a link between Isaac and the only other character in the text that could be viewed as a tragic hero: his son, Caleb, who suffers from leukemia.

George does not fully develop Caleb as a tragic hero in the same way as Isaac. Nevertheless, Caleb's tragic arc parallels his father's, revealing that George views technological tragedy not as a singular event that purges the readers through pity and fear, but as a cycle that repeats indefinitely unless it is interrupted. Caleb, like Isaac, is a nuclear scientist. Although Caleb claims to be working towards a more beneficial type of nuclear technology, cold fusion, he still reflects the same anthropocentric, violent attitude towards conquering nature for the use of humanity. Furthermore, Caleb's cancer signifies a direct inheritance of his father's tragic legacy. While there is no direct medical evidence to suggest that Caleb's leukemia comes from his

father's exposure to radiation, the text offers this as a possible explanation. Akiko explicitly states this possibility to Caleb, blaming his father for Caleb's cancer (George 327). Therefore, George depicts the effects of tragedy as parallel to those of radiation: they are long-lasting and recur for multiple generations.

George shows that this type of technological tragedy is an ongoing cycle of violence. Isaac's tragic fall through his creation of nuclear technology does not end with his life. Instead its ramifications are global and enduring. Meanwhile, the next generation, represented by Caleb, continues to employ a rational scientific perspective that justifies violence against nature and other humans by ignoring emotions and ethics. For example, in the text, Caleb, who starts out as an anti-war protester, grows more and more violent, committing arson in order to make a political point. His final threat to set himself on fire—which he carries out, taking his brother with him— epitomizes the self-destructiveness of such a “rational” scientific perspective. Through the tragic mode, George reveals how violence against nature and other human beings ultimately turns into violence against oneself, whether it is in the form of psychological trauma (Isaac's case), or literal violence (Caleb's case).

The succession of tragedy from Isaac to Caleb in the text is symbolized by the Tin Man costume, which Isaac originally wears when he is entertaining children as a clown. Caleb inherits the costume, and by putting it on and adopting the act of the Tin Man, he assumes the role of technological tragic hero, the scientists whose attitude spells doom for nature and himself. The Tin Man costume symbolizes the process of mechanization and dehumanization that results from overly rational science since it is a type of cyborg figure in which man has merged with machine. George shows that the Tin Man's role is passed from Isaac to Caleb through a scene in which Etta, Isaac's wife and Caleb's mother, refers to Caleb as “The Tin Man.” The scene holds out on

divulging the identity of the Tin Man, leaving it ambiguous for most of the scene: “The Tin Man stands at one of the blackboards nailed to the outside wall, a piece of chalk in each hand. Writing lines of numbers and symbols...The figures appearing in a blaze, like bullet holes” (George 320).

In the next paragraph, Etta greets the Tin Man, revealing him as Caleb (George 320).

Significantly, the figure of the Tin Man takes on a symbolic role divorced from the actual physical costume. It is not clear whether Caleb is wearing the Tin Man costume in this scene, nor does it matter, because instead the Tin Man represents the scientist at work. His mind is a machine for producing knowledge. The startling comparison of chalk marks to “bullet holes” implies that the scientific calculations he is making can lead to violent repercussions.

Portraying the rational, scientific perspective as the cause of technological tragedy, George employs tragedy as a call to action. His depiction of technological tragedy as developing continuously over time and across generations suggests that humans have some opportunities to interrupt this cycle and change our direction into a more restorative comic mode. References to the “twin paradox,” a scientific parable where the path of two twins diverges dramatically show us that George believes there are always alternatives. The two characters depicted as near twins in the text are Caleb and his brother Troy. In the following section of my thesis, I will turn towards the comic mode to reveal how Troy and other characters cope with their problems through comedic survival and restoration which allows them to recover from the effects of technological tragedy.

From Tragic Extinctions to Comedic Evolution

Comedy, like tragedy, is an ancient genre, one that modern readers associate with laughter and frivolity. But the basic structure of the comedic genre has less to do with hilarity and more with renewal. Comedy adopts the perspective that humanity is insignificant and even laughable, but it also shows how humanity endures and recovers in the face of obstacles. Meeker asserts that this restorative aspect of comedy, in which the status quo is restored by the end of the tale, renders comedy a more ecological genre. He writes, “Comedy and ecology are systems designed to accommodate necessity and to encourage acceptance of it, while tragedy is concerned with avoiding or transcending the necessary in order to accomplish the impossible” (Meeker 163). According to Meeker, comedy follows a similar trajectory to ecological succession; it depicts a system being disturbed and then returning back to a state of equilibrium, albeit a slightly different state from the one at the start. Meeker claims that comedy parallels ecology and that the fundamental structure of ecology is comic, and he supports this claim by evoking the idea of ecological equilibrium. This outdated theory views ecological succession as a linear progression. First come a series of pioneer species colonizing a new environment, usually one that has recently been disturbed by fire, volcanic activity, or even by interference by man. Over time, the pioneer species, such as lichen and hardy plants, transform the soil into a nutrient-rich area where more delicate species can thrive, such as larger trees and animals. Finally arrives the “climax community” which is, in theory, the most resilient and most well-adapted ecological choice for this area (Meeker 162). It will resist change, bouncing back from small disturbances. This is what Meeker claims that comedy mirrors, a “balanced” nature that man tends to throw off balance. However, the concept of climax communities has been debunked, throwing into question the validity of the analogy of a “balanced” nature.

Nevertheless, there is still some truth in Meeker's argument. If you look at comedy in terms of how it parallels the evolution of a single species, only those who can adapt and reproduce survive. This is not exactly how natural selection works, since in actual evolution, adaptation of traits often takes several generations because those who are not fit for their environment die off. Still, it provides an analogy for how an evolutionary perspective, one that prefers survival and adaptation to grandiose gestures that lead to tragic death and destruction, can be applied to literature.

Take, for example, Shakespeare's comedy, *Much Ado About Nothing*. In this play, the character Hero, set to marry Claudio and falsely accused by the scheming villain Don John of being false to Claudio, seems to drop dead on the stage. But significantly, she does not really die; she merely faints, and with the help of a friar, she is able to restore her reputation and win back Claudio through the faking of her death. At the end of the play, there is a wedding of not just Claudio and Hero, but also of Benedict and Beatrice, who have finally overcome their pride and decided to marry. Weddings are a common ending to comedies, as they represent not only a continued future for the characters, but also a renewed commitment to order itself. No longer can the protagonists revel in the chaotic state of bachelorhood; instead they invest their interest into society, instead of merely themselves (Shakespeare).

Comedy as a genre comes in many more forms than just this one example, but I believe the structure of a Shakespearean comedy demonstrates why the comedic elements in the novels *Accident: A Day's News* and *Ocean Roads* shape the novels' conclusions on how to respond to the trauma and violence resulting from the legacy of the Cold War. Both must cope with the nuclear radiation that pervades the environment and the anxiety fostered by this era. Comedic interruptions of the tragic trajectories of the novels, significantly ones that depict human

creativity channeled towards healing and growth as opposed to destruction and violence, light the way towards a smarter response to nuclear technology other than just resignation to inevitable apocalypse. The comedic perspective adopted at certain points in both these novels does not call for a rejection of technology entirely, since it recognizes the futility of such a gesture. There is no way to turn back the clock; radiation in the atmosphere is here to stay. Instead, the novels reveal recovery from the emotional and radioactive fallout of the Cold War as only possible through a humanistic, but biocentric attitude that requires human creativity in all of its forms, whether art, gardening, or even science.

The Shovel, the Needle, and the Pen: Is Redemption Possible Through Technology?

Accident: A Day's News poses the implicit question: how do we move beyond ecological catastrophe? In order to reject the anthropocentric and destructive attitude of Western science that Wolf portrays as inextricable from the use of nuclear technology, must we distance ourselves from all technology and all the benefits that science and technology provide? Wolf suggests that this is not the answer. Through the novel's portrayal of the narrator's daily life and her thoughts on her brother's surgery, Wolf establishes that technology, albeit risky, is useful and even necessary in the process of recovery from the physical and psychological trauma that our Western scientific mindset has perpetrated. Wolf takes a comic approach in her depiction of certain technologies, ones that are used to heal, endure, and adapt, in order to show that redemption from our fallen state is possible through a change in perspective. We can avoid a tragic outcome of self-induced extinction by changing the way we engage with the world through technology, using it not to manipulate or destroy nature and other humans, but to innovate and work alongside nature.

Technology can be defined as the products and tools derived from the application of knowledge.¹⁴ Thus, it includes not just what we would conventionally consider technology, such as medicine, but also agriculture and even writing. While the latter's connection with technology

¹⁴ Definition from the *OED*: "4a. The branch of knowledge dealing with the mechanical arts and applied sciences; the study of this. b. The application of such knowledge for practical purposes, esp. in industry, manufacturing, etc.; the sphere of activity concerned with this; the mechanical arts and applied sciences collectively. The product of such application; technological knowledge or know-how; a technological process, method, or technique. Also: machinery, equipment, etc., developed from the practical application of scientific and technical knowledge."

is not obvious, it is, in fact, a type of tool we use to communicate. Wolf critically examines all of these technologies, revealing how civilization is entrenched in the use of technology. As the narrator considers how the accident at Chernobyl came about, she considers the origin of agriculture as a possible source of violence in society:

I read that the connection between murder and invention has been with us as long as agriculture itself. Cain, tiller of soil and inventor? The founder of civilization? It was difficult to refute the hypothesis that human beings were the most important tool in the selection which brought about a speedy further development of the brain through battles against their own kind and the extermination of inferior groups...Murder, within one's own population as a way of preventing overpopulation? Murder within limits, biologically acceptable? (Wolf 61)

We might not expect Wolf to depict agriculture, with its pastoral legacy that would conventionally seem opposed to technology, as the beginning of the Western tradition of using technology to dominate nature and others. However, she aligns the two by alluding to the story of Cain and Abel from the Bible, in which Cain, jealousy of his brother, murders him on the very fields which he tills (*English Standard Version*, Gen. 4) Significantly, Wolf's narrator draws upon the scientific concept of evolution in her examination of this Biblical allegory. Describing humanity itself as "tool" which "brought about speedy further development of the brain" through violent competition amongst groups, the narrator seems to subscribe to Social Darwinism, which views cutthroat competition and selfish behavior in human society as mechanisms of natural selection. The narrator views this as a turning point in human history, when "man become[s] his own enemy" revealing evolution as a ruthless, amoral phenomenon since it is driven by the

betrayal and murder of others (Wolf 61). However, viewing evolution in this way misrepresents it, which Meeker points out:

Evolution itself is a gigantic comic drama, not the bloody tragic spectacle...
Nature is not 'red in tooth and claw'... for evolution does not proceed through battles fought among animals to see who is fit enough to survive and who is not. Rather, the evolutionary process is one of adaptation and accommodation, with various species exploring opportunistically their environments in search of a means to maintain their existence. (Meeker 164)

Thus, we should take the narrator's pseudo-scientific explanation of murder with a grain of salt; Wolf points out elsewhere that if one carries this attitude of competition to the extreme, it results in extinction, not survival, as in the case of nuclear arms race. I do not believe Wolf argues here that agriculture, as a technology, is irredeemably yoked to this violent attitude that could result in the self-annihilation of humanity.

Instead, in her depictions of gardening, Wolf offers an alternative approach to such technology in which human partnership with nature becomes fruitful instead of a means of subjugation. For example, even after she has been warned against eating the fruits from her garden, due to the possible radioactive contamination from Chernobyl, the narrator still finds solace in her garden and what it represents to her:

Why did it mean so much to me that the zucchini had sprouted. I envisaged the plants in the sun bed having grown larger, first sprouting their seed leaves during fair weather...Saw the large blossoms, glowing yellow. Their fruits, cucumberlike, beautifully shaped, glistening dark green. Meals outdoors, the high point of which will be the breaded zucchini fritters, basted with garlic sauce. Yes.

Summer would come again. All of us together, many people, would sit around the huge table... (Wolf 33-34)

We see from the progression of the narrator's thoughts the significance embedded in the simple sprouting of the narrator's zucchini plants. She imagines the stages of the zucchini's growth, from flower to fruit, revealing the sprouts as representing the potential for the plant's growth. More than that, she also sees in the sprouts the power of nourishment and of community. Her mind jumps from the image of the fruit to the meal they will provide, bringing together and feeding "many people." The narrator does not specify whether she is thinking of a family meal or a meal of friends and neighbors. She simply uses the phrase "all of us together" to signify the convergence of a community of some sort. Furthermore, she links this meal to nature, since it takes place "outdoors" and the meal itself comes from the narrator's garden. Finally, the comment "summer would come again" indicates not only the passage of the seasons that brings renewal and growth, but also implicitly comments on the situation of Chernobyl. She shows that gardening allows one to commune with nature; thus, it is through gardening that recovery from the harms of inflicted by a violent approach towards technology is possible, since it brings humans and nature together in a symbiotic relationship, in which humans cultivate plants and plants provide food to humans. This is not a situation of domination, but instead one of co-evolution, promoting survival of humans and other species.¹⁵

Earlier in the novel, when the narrator refuses to don gloves while working in her garden, despite the warnings against it, it is an act of defiance, a refusal to distance herself from nature:

¹⁵ Of course, this is not an entirely benign mode of co-existence, since the only species that are promoted are the ones that humans view as beneficial, whereas other ones that just happen to be undesired (weeds) are not allowed to grow.

“I heard on my little radio that one would be well advised to wear gloves today if working in the garden was unavoidable, and I heard a sound escape my throat which resembled a manic clarion call of triumph, while fervently continuing to pull weeds with my bare hands. Well, we’ll see about that, I retorted...” (Wolf 25). At first, this narrator’s stubbornness seems to follow a certain tragic logic. Her refusal to adapt to the risk of radiation in her environment seems illogical, but, in fact, her refusal to wear gloves is a way of overcoming the harms of Chernobyl. Instead of giving in to the anxiety that society is perpetuating, she refuses to allow fear to interfere with her gardening. Wolf describes her narrator as making a “manic” sound and “fervently” pulling weeds with her “bare” hands, showing how the narrator reaches an almost primitive, animalistic state while gardening. Wearing gloves, on the other hand, would distance the narrator from this state, and from nature itself. The idea that simply wearing gloves would somehow minimize her risk to the radiation is already flawed and reflects the hubristic attitude that human and nature can be separated. The narrator, in the act of gardening without gloves, finds a certain satisfaction in accepting that she and nature share the same fate, that if nature is damaged, humans must also be harmed. Implied in this recognition, there is also the hope that by acknowledging our dependence on nature, we will begin to work with it instead of against it.

Although gardening is an example of how to better relate to nature, it doesn’t solve the problem of the leftover damage inflicted on the environment from destructive use of technology. In particular, it does nothing to solve the contamination of the atmosphere with radiation, the main source of anxiety and concern in the novel. Wolf includes a medical narrative in the text in order to affirm medical science as a route towards physical recovery from radiation, even when it paradoxically uses radiation therapy to accomplish its ends. As Rigby points out, “by linking the brother’s tumor metaphorically with the disabled reactor, Wolf implies, moreover, that we might

not be able to do without science and technology in solving the problems that earlier science and technology have bequeathed us” (Rigby 134). We are never given a reason for the brother’s cancer, never told whether it might be due to exposure to a particular chemical or to radiation. Of course, since his tumor occurs before Chernobyl, it cannot be the result of the accident. What matters more than his tumor’s actual cause is that Wolf presents the plot of the brother’s surgery alongside the fallout of Chernobyl. This juxtaposition implies that there will be more cases of cancer in the future.

While the narrator tells us that the brother’s doctor has ruled out a need for radiation treatment, this brief mention underscores the irony of the very words “radiation treatment”—the same phenomenon that can cause cancer can also be used to help cure it (Wolf 22). Extrapolating the long-term effects of Chernobyl on people’s health, there will clearly be a need for radiation treatment in the future. By placing the comment about radiation treatment next to the phrase, “The radiant sky. Now one can’t think that anymore,” Wolf reminds us again that we have entered a new age, the nuclear age (Wolf 21). There is no turning back from the ramifications of nuclear technology, but at least we can try to find some benefits from such technology.

Rigby presents Wolf’s understanding of medical technology as a necessary evil, and certainly Wolf depicts it as an ambiguous tool that could just as much harm as good. Take, for example, when her narrator considers the process of her brother’s surgery: “We’re alive. Not exactly thriving at the moment as far as you’re concerned, I’ll grant you that. Your life is not exactly hanging by a silken thread, but certainly, I would think, by a suture. To think that a metallic instrument is just now skirting your cerebral membrane, presumably pushing aside the brain matter to make room for another instrument, with a microscope at its end...” (Wolf 10). Through the detailed description of how the surgery is performed, Wolf evokes a squeamish

reaction from the readers, making us feel viscerally the risk of the operation. The word “skirting” calls attention to just how close the instrument is to the brother’s brain, how easily it could slip and harm him.

Still, unlike the risk of nuclear technology which the narrator condemns as too risky, Wolf reveals this risk as worth taking. Her narrator shows concern for her brother: “You are fifty-three years old. That which we call life is far from over at such an age. There is more, damn it, than just these dull, lived-out cells in you, which, bored to death and sentenced to eternal repetition, can only do one thing: build tumors” (Wolf 13). Here, Wolf implies that prolonging someone’s life is a valid reason to take the risk of using technology, because it is done for the right reasons. Interestingly, Wolf personifies the cells, blaming their tumor-building on boredom. They direct their creativity towards building tumors, as opposed to their own survival, and eventually their overabundance of creativity destroys the body overall. Does this sound familiar? Wolf compares cancer cells in the body as having the same death drive as human scientists whose creative destructiveness has the potential to annihilate society. In both cases, Wolf asserts that the appropriate response is to eliminate this behavior in order for society (or for the individual) to survive. In this case, medical technology, instead of reflecting the same violent and destructive attitude, becomes a way of eradicating this attitude, manifest in the form of cancer, from the human body. In the end, the success of the brother’s surgery points towards a more comic perspective on technology, one that views it as a means for survival rather than a way of achieving greatness. Rather than viewing technology as a way for us to dominate nature, a more humble, comic view recognizes technology’s limitations. During the surgery, the brother is entirely at the mercy of his surgeon’s “experience and finesse,” and what would have harmed him is not the technology itself but human error (Wolf 10). The brother’s surgery gives us an

example of how a comic use of technology can help to repair the damage to individual's health caused by Chernobyl— but what about making sure it never happens again? For that, we must turn to the technology which makes up the entire narrative— writing.

At first glance, Wolf's narrator suggests that writing is as implicated in the same technological destructiveness that nuclear scientists engage in; in fact, she even goes as far as claiming to give up writing near the end of the novel. During a long stream-of-consciousness section that shows the narrator reaching a crisis, the narrator asks “must destruction and the desire to write be coupled,” recalling earlier in the text when she describes the desire for destruction as the reason why scientists created the atom bomb (Wolf 99, 47). She continues:

the circle of destruction around a writer, how often have I observed it, how strongly feared it, sometimes managing to circumnavigate it, not always able to avoid it, since it appears to be in the nature of things, the essence of the vice of writing, ... [writing] always intervenes into the lives of people, persons who become affected by writing, who are bound to feel observed, pinned down, categorized, misjudged, or worse still, betrayed, always kept at a distance...(Wolf 99)

The linguistic breakdown that occurs in this passage, as the narrator seems to relinquish the use of periods entirely, reflects the narrator's anxiety coming to a head. At the same time, it also mirrors the very phenomenon described in the passage— her writing runs in circles that grow smaller and smaller until the meaning that she is trying to convey is pinned down. The image of a “circle of destruction” brings to mind the radius of devastation from a nuclear bomb. Furthermore, by asserting that writing “intervenes,” and affects people by making them feel “observed,” “pinned down,” and “kept at a distance” the narrator is describing the same

empirical and rationalistic process of Western science that Wolf has criticized throughout the novel as invasive and unempathetic. Is Wolf truly suggesting that in writing this novel, the narrator herself is just as culpable as the nuclear scientists? The narrator seems to believe so, asserting, “I know no remedy but silence, which means less consideration for oneself than others, in other words, self-betrayal again” (Wolf 99).

We should doubt the narrator’s pledge to give up writing, because it does not resonate with the overall message of the novel. First of all, why would Wolf spend a hundred pages writing, only to conclude that writing only makes the problem worse? Secondly, the novel does not stop there, but continues for another ten pages. So why does Wolf present her narrator as having this moment of crisis, questioning the value of writing itself? The narrator herself admits that giving up writing, while it would prevent her from affecting others, would be a “self-betrayal” because the narrator would be denying herself self-expression. Furthermore, the narrator condemns writing too easily, since writing itself is just another technology that is morally neutral. Affecting people might be a positive influence, as opposed to being a negative one, yet the narrator only considers the latter. I believe Wolf is showing the narrator in a moment of self-doubt in order to affirm the importance of speaking out. Because if words and language can have concrete consequences, they can be used to create positive change.

In fact, Wolf gives us a clear example of the power of words to change a story from a tragedy to a comedy. At one point, the narrator relates the tale of a nuclear scientist, Peter Hagelstein from Lawrence Livermore labs, who is coerced into developing an X-ray laser; meanwhile, his girlfriend protests his experiments and breaks up with him (Wolf 65). Significantly, the narrator compares them to Faust and Gretchen—their is a tragic narrative that can only end in self-destruction. Yet later on the narrator finds out the true ending to their story:

Nearly five months later after the day which I am still describing here, someone draws my attention to an item in the newspaper... a renowned young scientist had left the nuclear-weapons research center in Livermore upon terminating his contract... The man is called Peter Hagelstein. That can't be! I say.... Somebody made it. Nothing is final. I'll have to reconsider the destinies and decisions of modern Faust (Wolf 93).

What the narrator had "pinned down" as a tragedy changed course from its tragic trajectory. There's no mention of Josie, the girlfriend, in this reference to the scientist's tale, but from what we know about him, we can surmise that he was influenced to quit by his girlfriend, whose expression of protest led to a concrete change in the status quo. The implication that love itself was a determinant in changing his mind reinforces the turn towards comedy. This anecdote demonstrates the power of words and protest, which is possible in the United States, but would have been difficult to achieve in the German Democratic Republic where the narrator's story takes place. Also, it reveals the power in how a story is framed. Wolf, herself, is protesting, expressing her dissident opinion and objecting to how the dominant voice in policy has been pro-nuclear technology, despite its costs. Furthermore, by demonstrating an instance in which the potential tragic narrative of one nuclear scientist transforms into a comic narrative in which "somebody made it," Wolf reveals that humanity can turn from its current path leading to tragedy and extinction. Through a more comic perspective on technology, which elevates the use of technology to help us nourish ourselves, reproduce, and build community, there's hope for the survival of the human species.

Love, or the Art of Healing

Ocean Roads, in its expansive global and temporal reach, at first seems to only offer a narrative of loss, a tragic trajectory. It records the ramifications of the nuclear bomb and the Cold War, in its chronicle of Isaac's madness, Caleb's cancer, and Troy's post-traumatic stress disorder. However, there is a comic counter-narrative that runs parallel to the tragic one, emerging to present an alternative response to the violence and suffering of the Cold War other than self-immolation, which is the route the tragic hero Caleb takes. Instead, George presents recovery, primarily psychological, as possible through acts of human creativity and communion with nature, such as dance, gardening, or clowning. What distinguishes all of these acts is that they are done with love. Throughout the novel, bonding between family members and couples during these activities is essential to the damaged characters in healing their psychological wounds and accepting their physical scars.

In opposition to the acts of human creativity that Isaac and Caleb have pursued as nuclear scientists, George presents dance as a creative outlet for Akiko allowing her to protest against the use of nuclear technology through her art and to grieve and recover from the losses she has suffered due to the bomb. In the final scene, Akiko performs a dance during a protest against nuclear war, but does not present herself as a hibakusha, keeping her identity unspoken. The narrator describes her dance:

It is the knowledge alone [that she is a hibakusha], captured, contained, burned into each step of her dance. And as she dances she lets long silk ribbons fly behind her, her feathers, her tail. The paper crane's tail. Beyond the point of the mask's beak she can see her mother's face, her father's face, neither of which she has a memory of beyond photographs. They're with her now...She swoops and

rises on the wind currents, currents she wishes could flow against
history... Behind the mask, where no one can see, a tear touches against her cheek
(George 360-361)

Akiko's dance reclaims light as a positive force, directly contrasting its association with nuclear radiation in much of the novel. The words "captured, contained, burned," which describe the way Akiko channels her grief, recall the energy of a nuclear explosion. Akiko's costume takes the form of the bird, which could represent a paper crane, as the text suggests. But we are also told the costume is "crimson" (George 360). Crimson could signify either the color of blood or the color of fire, and in both cases the color and the costume evoke the image of a phoenix burning and rising from ashes. A phoenix, as a symbol for rebirth, is an apt role for Akiko to perform, since she literally rises from the ashes of Nagasaki, where her entire family was slaughtered, starting a new life in New Zealand. Interestingly, photography recurs as a motif in this moment, since photographs are the only way Akiko can access her parents' likeness. This moment epitomizes the dichotomy of technology used for destructive purposes, the nuclear bomb, versus technology that serves a more benign purpose, photography. In this case, photographs allow Akiko to maintain her connection to family members who have died. Finally, the image of her rising on the wind currents connects Akiko's dance back to the irradiated global environment. The currents have spread the burden of radiation from nuclear bombs and nuclear testing around the globe. The scene recognizes the impossibility of undoing the damage that has been done through the spread of radiation on these currents, lamenting the futility of these "currents she wishes could flow against history." Nevertheless, Akiko's dance symbolizes her own efforts to remediate the wrongs perpetuated by nuclear violence.

In protesting for peace, she seeks to prevent a nuclear war from breaking out. Her creative pursuit of dance is, thus, both a political act and a personal therapy. Earlier in the scene the narrator remarks that Akiko “has never sought anyone’s help to move out of her sadness” (360). Although this makes her seem like she dwells too much on her grief, she, in fact, uses her sadness to make her dance more powerful, to create a positive impact on the world and to heal herself. This contrasts, of course, Caleb’s desperate act of setting himself on fire that occurs later in the same scene. Caleb’s tragic response to his suffering, as discussed in the tragedy section, does not take into account the biological and evolutionary need to endure, to survive, and to reproduce. Akiko’s efforts to effect healing of herself, her family, and the world, on the other hand, are depicted as productive and useful, not futile. The final scene of the novel makes this especially clear: “Akiko stands from her work table, watching the vinyl disk circle. She waits a few bars then begins to dance....She stops and takes off her clothes until she is naked. Lets her scars feel air, the scars she has carried since the day she was born. Scars that she has hidden from almost everyone. Baring them to music” (George 383). Akiko’s scars have been a source of shame for her, since she hides them from public view. In the scene above, we can see how dance frees Akiko from any guilt or shame she might feel from being a survivor and from being disfigured. Akiko’s scars are not healed or erased by her actions; instead she gives them visibility, showing that Akiko is accepting them as part of her identity. The last line “baring them to music” suggests that putting her physical body in contact with music through dance is a therapy in itself. Dance allows her to cope with her grief, without denying its validity, and helps her continue to survive.

Of course, dance is more of a symbol for healing than an actual method, since Akiko cannot literally heal her scars through dance, nor can dance prevent nuclear war between

countries. George is not suggesting that if everyone took up dance, there would no longer be sickness or conflict in the world. Instead, dance is a representation of the creativity of the human spirit, an example of how we can use our creativity to produce art and technology that encourages renewal and coexistence instead of violence and destruction.

Akiko extends the power of psychological healing that she gains through dance to Troy. Troy, who suffers from PTSD due to his stint in the Vietnam War, parallels his younger half-brother, Caleb, and the two seem to play out a real-life version of the theoretical “twin paradox” mentioned several times in the book. The “twin paradox” is a special relativity thought experiment involving one twin who flies into space and returns having aged less than the twin who remained on Earth (“The twin paradox”). In this case, the paradox is that Troy and Caleb have both suffered from the Cold War, although only one of them was in a war. Caleb develops leukemia whose origin is implied to be radiation in the atmosphere from nuclear testing. While both court Akiko, Caleb removes himself from her and becomes more involved with developing nuclear fission and helping arsonists who are protesting the war through violent acts. Troy, on the other hand, grows closer to Akiko, and her creativity seems to have a positive influence on him. Initially Troy attempts to “save” Akiko, when he observes her seeming to lose herself while she dances, but it is actually Akiko who saves Troy. Early on her relationship, she teaches him how to make an origami paper crane, which she says is “considered luck. A symbol of long life” (George 227). This references the story of another hibakusha, Sadako Sasaki, whose story is documented in the book “Children of the Paper Crane” by Masamoto Nasu, mentioned by George in the acknowledgements at the end of the book. Sadako, diagnosed with cancer, folded paper cranes, following a Japanese legend that if you fold a thousand paper cranes, you will be cured (Nasu). Thus Akiko’s adoption of the figure of the paper crane, both as her costume during

the protest and as a form of art that she teaches Troy, signifies how she attempts to heal the psychological wounds inflicted by the Cold War on the people she loves. The origami is another form of human creativity that can be therapeutic, but more important than its literal potential to help Troy's PTSD (which admittedly, is probably limited), it represents the healing role that Akiko takes on in Troy's life. In her relationship with him, she gives him hope, something to live for, and a future: she has his child.

During Akiko's pregnancy, the motif of the paper crane recurs, and now its meaning solidifies even more as a representation of hope for Troy and his growing family: "Troy sits up, draws the sheets away from Akiko's naked body, looking down at her belly. He reaches over her to where a paper crane sits on the windowsill, lifts it down and sets it atop her, over her belly. She chuckles and the paper crane begins to slip away. Troy lifts it up and kisses it, then sets it back atop her." (George 283). The paper crane, placed on top of Akiko's pregnant belly, almost becomes conflated with the child itself, since Troy shows such tenderness to it, kissing it. Thus, it symbolizes hope for Troy's unborn child. Akiko, therefore, in her ability to produce art and to give birth to the next generation, offers the means to move past violence and trauma in Troy's past induced by the Cold War. Just as in the traditional genre of comedy, it is the union of a couple which marks the transition to the next generation and offers hope for the continuance of the hero's line and for society at large.

This motif of recovery through building familial relationships recurs throughout the novel, and women are consistently portrayed as the mediators of artistic creativity, healing, and reproduction. DeLoughrey characterizes this gendered depiction as problematic:

The author leaves it to his women characters to heal the scorched earth... *Ocean Roads* upholds maternal love and reproduction as the antithesis to the excess

illumination of modern science and technology [*sic*], a gendered universal humanism Yoneyama has noted in the post-atomic nationalism of Japan (196). Moreover, this suggests that the duration of the maternal functions as a constitutive contrast to the violent cataclysmic time of wartime masculinity. (DeLoughrey 489-490)

This “gendered universal humanism” that DeLoughrey observes in the novel also associates the women characters with nature, positioning them in opposition to technology, especially in the scene in which Rai and Akiko sow seeds in their garden: “Akiko puts her bag down on the grass, takes a couple handfuls of seeds from the trays. The women walk down the rows, sifting seeds through their fingers” (George 373). Placing Rai and Akiko in the position of the gardener who is sowing seeds, George suggests that in their roles as mothers and healers, they are responsible for the cultivation of the next generation. Furthermore, this scene aligns them with nature, since it depicts them as nature’s partners. Thus, George does, to a certain extent, portray women as closer to nature than men, falling into an essentialist trap that associates women exclusively with care and nurture and views these supposedly feminine traits as parallel to the natural world. They are the saviors of men, especially the scientist Isaac, who is trapped by the ideology of violence and domination.¹⁶

¹⁶ Interestingly, Rigby accuses Wolf of also using the love of a woman to redeem a scientist, in Wolf’s depiction of Josie and Peter Hagelstein: “Clearly, Wolf...is tempted to model her recovery narrative along these lines, casting women in the redemptive role of weaning men of their machinate desires, their secret addiction to death, their striving for transcendence, [*sic*] and restoring them to their senses, to a love of earthly existence, to the pleasures of immanence” (Rigby 133).

However, there are nuances in George's depiction of women. For example, Etta, the photographer, defies expected gender roles in pursuit of her career as a photographer. Her neglect of her adult children due to her frequent absences to cover the war is criticized in the text, but George also depicts Isaac as defending Etta when he discusses her with his son, Caleb: "Your mother is the one you shouldn't blame. She among us was the only one who struck a blow. I like to think that every photo she has had published has scrubbed one day off the war. Off all wars" (George 342). Etta protests the war through her photography, but unlike Akiko, she fights fire with fire, using jarring images of violence to expose it and discourage it. Even the language that Isaac uses to describe her actions recalls violence, such as the phrase, "struck a blow." Yet her methods are effective. Etta is the only character depicted as creating positive change while at the same time damaging her familial relationships. In the case of Rai and Akiko, relationships are paramount to their ability to spread their influence.

Rai, Akiko's daughter, also exhibits a redemptive quality in all of her actions, which include not only gardening, but medicine, since she is studying to be a doctor, and clowning, which she takes up with Isaac. Particularly important is the role Rai assumes in studying Western medicine; her name itself recalls a ray of light, or even, an X-Ray, suggesting that she has the capability to channel the scientific potential from Caleb, her uncle, and Isaac, her step-grandfather, towards healing, instead of war and destruction.

Rai's pursuit of medicine seems puzzling in the context of her uncle's cancer, especially considering how George portrays Caleb's experience with radiation therapy. When Caleb goes in for treatment, George continuously refers to how Caleb only hears "the whirring of the machine" (George 261). The narrator describes his visits: "He asks no questions, strikes up no conversations, his eyes finding a particular point among the rectangular panels of the ceiling

where four of the pockmarked tiles meet in a cross pattern” (George 274). Caleb’s experience in the hospital is incredibly isolating and painful, and ultimately the treatment fails to cure his cancer. Certainly George seeks to depict the difficulty of cancer and cancer treatment without sugarcoating it, but he also shows that Caleb isolates himself. Caleb delays telling Akiko he has cancer until after he has decided to discontinue the radiation treatment, only letting her know when he is certain of his approaching death. Of course, he feels betrayed by Akiko’s new relationship, although it is unclear whether he is aware she is with his brother. Still, his chosen isolation catapults him down a darker path, towards arson and ultimately suicide and fratricide.¹⁷ But the technology is not to blame, and radiation therapy, as horrible as it is, is not condemned.

We are never given much detail about Rai’s budding career as a doctor, but her studying medicine does imply that she intends to take on the role of a healer. And she acts as a healer in the novel, helping her own step-grandfather Isaac heal from the psychological wounds he still suffers from his role in the Cold War. Here, obviously neither romantic love nor a maternal instinct is responsible for her actions towards Isaac. Rather, their actions of familial love bridge the gap between her generation and his. She accompanies Isaac to his performances as a clown, which allows her insight into his past. While Rai helps him entertain children at a performance, he holds a rubber chicken and breaks out into a song in Hebrew, one he learned from his Jewish parents. In the scene, Rai begins to dance:

¹⁷ Caleb murders his brother at the end of the novel by setting them both on fire as Troy tries to stop him from igniting himself. This fratricide is perhaps an allusion to the story of Cain and Abel from Genesis, which is also referred to in *Accident: A Day’s News*. See my discussion of Wolf’s allusion to Cain and Abel on p.58.

Isaac looks up as Rai moves away from him, her eyes closed. His eyes are not looking at children now, just watching this young woman who might or might not be his granddaughter. The trees beyond her are a flickering chorus of leaves. He cannot move or the chicken will fall, so he stays still...A shimmer passes through her, like tender electricity...On and on she moves, losing all hint of deliberation, of thought, of clear-cut horizons. The borders of her movements against the leaves as transitory as skin on a raindrop. (George 65)

Again, George conflates women with nature in his associations of Rai with the trees who are her “chorus” and movements that are “as transitory as skin on a raindrop.” Furthermore, her name and the description of her dancing as “a shimmer” like “tender electricity” even suggests that she is a force of nature, radiation and light in human form. Unlike earlier associations of Isaac with radiation that depicted him as merging with the technology he creates, this conflation is a positive one. Rai is being compared not to harmful radiation, but to parts of the electromagnetic spectrum that are helpful to us as humans, especially visible light.

George inserts a sentence that casts doubt on Rai’s parentage— is she Caleb’s son or Troy’s— partly because it seems like Akiko has never revealed to Isaac that Troy is the father, but also because Rai is Isaac’s symbolic descendant, although she is not related to him by blood. Isaac’s only other progeny, the nuclear bomb and his son Caleb, both brought destruction, one on a global level and the other, on a familial level. Rai breaks that trend, following in her mother’s tradition as a dancer and a survivor to heal and create.

The scene above precedes Akiko’s dance scenes in the novel and much of Isaac’s character development; at this point in the text, we as readers are only aware of Isaac’s involvement with the nuclear bomb, but not the extent of his psychological trauma as a result of

it. We are given clues of his breakdown in Antarctica; the next scene sandwiched between scenes of Rai and Isaac's clowning transports us into Isaac's memory to a scene from his trip to Antarctica. Thus, George implies that Rai's presence causes Isaac to reflect on the events of his life and perhaps move beyond the pain these memories cause him. Furthermore, this is one of the few instances in which we see Isaac engage in art, making music alongside Rai's dance. Clowning as a whole for him, becoming the Tin Man to make children laugh, is a creative act in itself, and one that represents reaching out to the next generation. Therefore it is a comic act of survival and hope. It is strange that the novel's closest thing to a tragic hero purposefully attempts comedy, but perhaps it is fitting, showing that even Isaac, so late in his life, can change the course of his narrative, from tragic to comic. Rai aids him in this, connecting to him through art.

Ultimately Isaac, at the end of the novel, seeks out his estranged wife, Etta, to make amends with her. This reunion of the couple at the end of the novel results in an almost traditional "comic" ending: the couple in conflict from the start finally resolves its differences. But the resolution comes far too late. Their children are dead, and they themselves are starting to lose relevance, since Rai is carrying on the next generation and the mission of healing and redeeming the world from Isaac's violent nuclear legacy. Thus, in the puzzling finale of the novel, they ride off a cliff into the eponymous "Ocean Roads." Their apparent suicide might seem like an admission to defeat, a tragic ending. Yet according DeLoughrey, it is not an ending, but a symbol of rebirth because in Maori culture, the concept of *ara moana*, "ocean roads," means the afterlife (DeLoughrey 490). Love makes it possible for them to begin anew, just as it is Rai and Akiko's love that gives them the power to translate their human creativity— whether it is medical science, dancing, or gardening— into a method of healing. George shows us that

this is only way forward from the Cold War: instead of employing the unempathetic, overly rational and dominating attitude common to conventional science, we must infuse love and care into our creative production, our art and technology.

Conclusion

Neither *Ocean Roads* nor *Accident: A Day's News* can be definitively called a tragedy or comedy, as they are both innovative contemporary novels that defy genre categorization.

Nevertheless, their engagement with aspects of tragedy and comedy in their depiction of a world tainted by the fallout of the Cold War is significant because it allows us to examine how these two opposing approaches to framing a story impact the overall conclusions drawn by the texts.

Unlike Meeker, I do not believe that the genre of tragedy is inherently better or more sustainable than that of comedy. It all depends on how these genres come into play in depictions of humanity's relationship with its environment. Whether tragedies are helpful for improving that relationship depends on numerous factors, including whether they depict humanity's fate as sealed, or whether they instead reveal the possibility that tragic outcomes can be averted through systemic changes. Comedies, on the other hand, can depict humanity as working with nature to evolve and adapt to new circumstances or they can simply reinforce the status quo while ignoring problems with social institutions that may one day lead to catastrophe. Tragedy can promote revolution just as equally as comedy can validate complacency; however, in the novels that I have discussed, tragedy and comedy have followed the opposite pattern—the tragic arcs tend to idealize the role of the scientist who exploits nature while the comedic aspects reveal ways to recover from the damage inflicted by rationalistic and imperialistic science, through the use of human creativity that aligns itself with nature.

I have explored how these novels depict radiation as a trope representing the nuclear age. *Ocean Roads* and *Accident: A Day's News* both draw on the backdrop of the Cold War to show how nuclear technology has transformed the modern world. The atom bomb not only set off a chain of events that led to the Cold War, nuclear testing in the Pacific, and indirectly, the nuclear

accident of Chernobyl, but also this technology changed the way cultures around the globe perceive our environment and ourselves through the release of radiation. Anthropogenic radiation highlights how we and our ecosystems are connected globally, but at the same time it harms the very ecosystems whose function it foregrounds. It also reminds us of the fragility of our bodies as they are exposed to technological risks. Finally, both novels depict radiation as disturbing the very structures of language and narrative from which they are made and thereby point to the cultural consequences of radiation.

The depiction of radiation as a marker of the modern age lends itself to the use of tragedy in these novels. Tragedy, whether it comes in the form of systemic suffering due to the unempathetic decisions of scientists or personal suffering from the guilt of having participated in the creation of the atom bomb, assumes that an irreversible fall has occurred; the world can never return to its original state. However, both novels depict tragedy as a process that occurs gradually instead of happening in a single event, pointing towards the possibility of redirecting tragedy into a more positive direction.

Meanwhile, both novels employ comedic aspects, depicting technologies and artistic pursuits such as dance, medicine, writing, and gardening as redemptive. In these texts, human creativity that works with nature and fosters community and care for the next generation is key to founding a better society that can heal the wounds of the past and endure into the future, whether this mission is accomplished medically through technologies such as radiation therapy or psychologically by allowing people to cope with the trauma of war. Thus, these texts depict our survival as contingent not only on our ability to change our approach to science and technology from rationalistic, violent, patriarchal, and anthropocentric to empathetic, peaceful, egalitarian and biocentric, but also on our ability to reframe our histories as comedies that are open to

renewal and adaptation as opposed to tragedies that aestheticize our conflict with nature while limiting our options to move forward.

The framework employed by George and Wolf could be applied to many other environmental problems facing our globalized society, including ocean pollution, deforestation, or the degradation of wildlife habitats. The most similar problem to widespread nuclear radiation and the violent legacy of the Cold War is also arguably the most challenging of all the environmental problems humanity has ever faced: climate change.

There are many parallels between the problems. While carbon emissions do not derive from military violence, they result from the production of energy as an unintentional by-product; they are a different type of fallout, an unintended consequence of fossil fuel energy. Unlike nuclear accidents, their release is not a rare event; it happens routinely. Moreover, the use of fossil fuel energy is not without violence; wars and conflicts around the world all too often revolve around the rights to drill for oil, coal, or natural gas. Climate change could be humanity's next tragic fall, since rising temperatures and rising sea levels due to carbon emissions cannot be easily reversed. Geoengineering proposals to reduce the greenhouse effect such as dumping aerosols into the stratosphere to reflect back sunlight would not only be extremely difficult to implement and potentially dangerous, but would also reinforce the attitude that humanity can continue to dominate and manipulate nature with impunity (Biello). The field of research on depictions of climate change is open and developing. Investigating how representations of climate change employ tragic or comic narratives would help to further the discussion on how these genres influence our cultural and literary conception of humanity's relationship to its environment.

Of course, literary representations of nuclear technology and radiation also continue to be highly relevant to our modern world. Unfortunately, the March 2011 nuclear accident in Fukushima, Japan, triggered by a tsunami, is still an ongoing situation in which the risk of further contamination of the environment is high (Fackler). For cultural critics and literary scholars going forward, there will surely be significant and relevant artistic and journalistic portrayals of this accident to examine.

I have investigated *Ocean Roads* and *Accident: A Day's News* for the purpose of learning how we can better understand the way cultural and literary production frames environmental narratives. These novels reveal our environmental problems as complex issues that are not easily solved. Yet both novels emphasize in their depiction of science, technology, and environmental crisis that our cultural attitudes are crucial in the struggle to improve both the state of the environment and the lives of human beings, which they depict as inextricably intertwined. Their ultimate message is clear: while science and technology will continue to be necessary to humanity's survival, we also need revise our cultural attitudes so that we perceive our relationship to the environment not as a source of constant conflict, but as a partnership. Only through such a transformation can we hope to surmount the environmental obstacles that we face and create a better world.

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