

**NUCLEAR EVENTUALITY: HOW THE NUCLEAR BOMB
CONTAMINATED THE PRESENT WITH THE FUTURE**

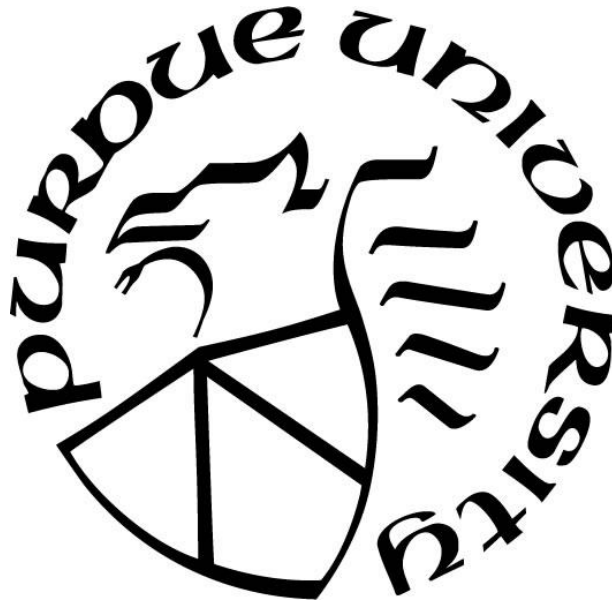
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ABSTRACT

This project argues that the nuclear bomb has made speculation an integral part of representing the material world. The bomb's capability to cause an unprecedented extent of destruction and the constant state of latent war between nuclear-armed countries (expressed through arms race and high alert readiness) created a reality where the disasters in the future must be constantly speculated to understand the contemporary world's material state. The tens of thousands of nuclear warheads sleeping in silos and submarines are not just the sum of their material components, but also incredibly compressed embodiments of future disasters that may be released at a moment's notice. Regardless of the likelihood of nuclear conflicts (with which this dissertation is not concerned), the weapon exerts its influence as one of the most catastrophic possibilities even as it remains dormant. In considering the implications of nuclear weapons, all nations and people on the planet think not of what they are, but what they can do. The weapon's possible future states define its present significance.

The inherent oxymoron of the nuclear bomb is thus that despite its staggering materiality, it is fiction as well. Any representation of the bomb that ponders its sole purpose—mass destruction—is inevitably speculative. While the degrees in which they reference empirical data vary, the narratives from which people around the world from heads of nations to common citizens learn anything at all about nuclear weaponry are forms of fiction, ranging from fantastical literary fictions to strategic fictions attempting to represent the power of the weapon that is itself fantastical. Not all representations of the weapon or nuclear war are, of course, taken seriously. Apocalyptic nuclear events are often used in popular nuclear fictions as a convenient excuse for dismantling the existing social structures and providing interesting backdrops for survivalist stories. The very fact that imaginations of hypothetical nuclear disasters have become an overused cliché all the

while proliferation remains an active threat, however, also indicates that the world has been living with the horrifying prospect of nuclear disasters for decades without an actual event of the kind—that, in other words, the weapon has existed mostly as a fiction. The introduction of the nuclear bomb to the world in this sense marks a critical point in history beyond which the speculated future outcomes of the productions in the present increasingly becomes an integral part of understanding the latter.

The central concept with which I articulate the relationship between the present and the future created by nuclear weaponry is “eventuality.” Eventuality is a narrativization process through which a historical event develops into an anticipated future event as the original event’s outcome. A story about a fictional World War III involving nuclear weapons, for example, is a form of eventuality. The conceptual usefulness of eventuality is that it articulates the historical trend in the post-1945 era as well as the more recent years of climate change, in which hypothetical future events are increasingly represented not just for the purpose of knowing the future itself, but also reassessing the history to date. Eventuality establishes a causal relation between an event and its hypothetical future outcome—or its “eventual” as I call it. By drawing a line of synthetic history extending beyond the present, eventuality as a narrativization process defines the direction in which history has been heading up to the present. Compared to the postmodernist understanding of the representation of the past, eventuality is concerned with how human productions in the present already creates the future and, consequently, how the very ways in which we conceive the present is influenced by the possible futures.

To discuss the concept of eventuality in detail, the first chapter examines time travel narratives as ideal instances of eventuality. Eventuality consists in two operations running in opposite temporal directions—speculatively writing the future (prospection) and assessing history

in light of that speculated future (retrospection). The literary genre that embodies this exact pair of movements is the time travel narrative. H. G. Wells's novel *The Time Machine* (1895), the first scientific time travel story, creates a critical legacy for the genre: the assumption that the entirety of time already exists. The conceptualization of the already-existing future is important because it emphasizes the causal relation between the present and the future—the future which the time traveler witnesses is the direct outcome of his present. In the movie adaptation produced during the Cold War, the dystopian course of history is rewritten to be a nuclear war narrative, which suggests that the time travel narrative as a base frame has been appropriated by the desire to speculate the future born with the nuclear bomb. Then decades later the *Terminator* movies develop the time travel narrative as an instance of eventuality even further by creating a scenario in which the future is no longer just an uncharted territory to be explored, but an active force that has a direct sway over the present's world.

Along with literary fictions of nuclear disasters, strategic studies on nuclear conflicts also attempt to represent the nonexistent events of future disasters. The historical significance of the advent of wargaming, a major form of nuclear strategic fiction, is that even the comparatively scientific and empirical study of nuclear war funded by the U.S. military is fundamentally speculative. The very formation and development of wargaming, in other words, is an indication that the nuclear weapon brings with it unknown possibilities for the future. The legitimacy of a wargame's findings is dependent on that of the future projection used in the scenario. But since the latter is itself speculative and thus cannot be proven, the narrative logic of a wargame is circular or self-referential. This circularity is exactly the structure of the synthetic history in the *Terminator* films, which is a form of eventuality in which the present creates the future and the future retrospectively redefines the present.

The nuclear bomb, finally, also contributed to the advent of ecological worldview with its ecocidal nature and sheer extent of destructive capability. Geosciences in the U.S. experienced a rapid growth following the second World War, as the military pursued global surveillance for nuclear activities. Some of the same scientists who developed the weapons also began to study the interactions between radiation and the human body, as the workers in the weapons production lines began to experience radiation sickness. This kind of research was soon expanded to the study of radiation's ecological effects on a broader scale involving not just the human bodies but also other environmental entities, organic and inorganic. Civilian research projects, in the meantime, found a widespread impact of weapons tests, including the "bone seeker" radioisotopes accumulated in the human body. Lastly, in terms of the more general way of understanding the world, the cases of radiation exposures discovered far away from the sources offered people around the world points of reference with which they could conceive an ecologically interconnected network on a planetary scale.

INTRODUCTION

Would it be crazy to worry about a world-ending nuclear war now? Tom O'Brien's *The Nuclear Age* (1985), published in the final decade of Cold War, suggests that it might be a trick question. By what standard, the novel asks, are we to define the adequate amount of fear for the most devastating means of destruction that has ever been created? The story's protagonist, William Cowling, is obsessed with the prospect of an impending doom, digging a hole in his backyard to eventually build a fallout shelter for his family. "Am I crazy?" (1), he asks the reader at the very beginning of the novel. Then in the last pages he answers it himself: "I'm a realist. Nothing's real" (311). Throughout the entire story he struggles with how to understand the nuclear bomb that is, as far as he can see, simultaneously material and imaginary. Many times he reiterates that the nuclear bomb is real. "You can't shrink [i.e., psychoanalyze] a warhead" (15), he says. "Uranium is no figure of speech ... it's hard and heavy and impregnable to metaphor" (65). Despite the overwhelming materiality of the nuclear bomb, he also acknowledges, the nuclear *menace*—the disaster in the future—takes imagination to see it. He believes that his "feats of imagination ... were a means of connecting the dots, locating the hidden scheme of things" (70). This is clearly a language of paranoia. But it has also been the case with nuclear strategic studies, whose very *raison d'être* is to imagine possible, but not necessarily likely, future disasters with devastating consequences. William's question has always been relevant to the question of representing the nuclear bomb: does its destructive capability somehow change depending on our perception or interpretation of it? Do the missiles in the silos somehow phase in and out of existence depending on the international political climate? There is, William suggests, no other way to represent the bomb *as the vessel of a future disaster* than with imagination.

Therein lies the fundamental material condition of the nuclear age and the challenge of representing it—reality cannot be fully understood without speculations about possible futures. So, to go back to William’s question of how to understand our relationship to the nuclear bomb, the task at hand for people living with nuclear weapons is not to ask whether it would be crazy to fear for a nuclear apocalypse, for there is no way to answer that objectively. It is rather to acknowledge that fiction—speculations of the future based on the present world’s material potentials—has become an integral part of representing the contemporary material world. Furthermore, future projections retrospectively dictate how we should understand the course of history to date. To reference the global crisis of climate change as an intimately relevant case, people around the world are either mobilizing their political power or denying the very existence of climate change depending on how much value they assign to future projections. Either way, the fact remains that climate change is, as William in *The Nuclear Age* defines the ontological nature of the nuclear menace, both critically material and dependent on our discursive construct of the disastrous future.

This study is about how the nuclear bomb has changed our way of understanding the material state of the contemporary world, and how speculation has become an integral part of representing it. The very first question I posed for this project was a much more ambiguous one—what does the nuclear bomb mean to us now? One thought that arose from that question was that it is impossible to answer it by simply thinking about the weapon’s present physical existence, such as the current global inventory of nuclear warheads and their megatonnage. The statistics by themselves, even the scientifically calculated destructive power of the weapons, do not offer any meaningful insight unless they are speculatively put into a situation and written into a narrative. The question of the nuclear weapon’s meaning to the world, in other words, requires us to consider what it can do or what it can be in the future.

The central arguments of this study are as follows. One, despite its mindboggling materiality, the nuclear bomb is also fiction. It is not just or entirely fiction, but any representation of the weapon that has any consideration for its fundamental purpose—mass destruction—is inevitably speculative. Popular nuclear disaster stories are not in fashion any more as they once were during the Cold War, but most people living in the twenty-first century still casually learn anything at all about nuclear weapons through fictional narratives. Nations pursue the weapons and regulate the flow of fissile materials and relevant technologies based on fundamentally fictional narratives of nuclear conflicts. What I want to emphasize here is not that the fear and the strategic decisions are thus baseless. Again, as William says, “Uranium is no figure of speech,” and warheads are a tangible reality. The nuclear bomb, rather, has elevated the very status of fiction to the extent that future projections have become integral part of assessing the present. Secondly, related to the first point, the nuclear bomb has expanded the present into the future because the weapon is first and foremost an embodiment of disastrous *possibilities*. Even as we are not fully aware of the consequences of our production in the present, it is already shaping the future in the most material sense. The future as we imagine it, in turn, informs our understanding of the contemporary world and history. This simultaneously prospective and retrospective operation of narratives representing the nuclear bomb is the central subject of Chapter 1, in which I discuss the relationship between the nuclear bomb’s epistemological impact and the trope of time travel.

The goal of this dissertation is to demonstrate, through readings of literary narratives of nuclear disasters along with relevant strategic fictions and historical accounts, how “the nuke” has made it necessary to take speculations into account in representing the material state of the contemporary world. The unusual term, “the nuke,” requires an explanation. By the nuke, I refer primarily to weaponized forms of nuclear power, with the infrastructure around them and

byproducts generated from their development and maintenance as a broader consideration. In its referential range, the closest term to the nuke would be “nuclear power” (the fundamental energy generated from nuclear fission or fusion, not the applied practice of power generation). The nuke, however, specifically refers to various forms in which nuclear power has been artificially materialized. I use the term instead of individual manifestations of nuclear power because, as my discussion in the following pages will demonstrate, they are often closely connected to each other. In the third chapter of this study, for instance, I discuss how nuclear fiction represents the ecological consequences of the nuke, which, depending on the specific cases, may refer to a nuclear war as a realization of the weapons’ potentials, a stage in nuclear weapons production, a weapons test, or even the radiation released into the ecosystem. It is thus either cumbersome in practice to list individual types every time or impossible to discuss them separately. I also deliberately chose the colloquial term “nuke” because of its cultural connotation that articulates the hypothetical nuclear disaster as simultaneously an incredibly horrifying devastation and an overused cultural cliché, together reflecting the human mind paralyzed in the face of a force that is too great to be mentally processed.

Eventuality: Representing Future Events

Nuclear weaponry as a sociopolitical force has mostly existed in a perpetually latent state. Although the world has produced enough nuclear warheads to destroy the planet many times over, we fortunately have never experienced the full weight of a nuclear war. While the bombing of the two Japanese cities in 1945 constitutes a use of atomic bombs in war, it was a unilateral use without the risk of nuclear escalation. After the first four years of the bomb’s existence during which the U.S. briefly held a monopoly on the weapon, the world has seen increasingly powerful warheads, more efficient delivery systems, and growing number of nuclear-armed states. As of 2016,

American multiple independently-targeted reentry vehicle (MIRV) ICBMs' yields range from 300 to 335 kt, and the Russian counterparts, 400 to 800 kt (Kristensen and Norris, "United States Nuclear Forces, 2018"; "Russian Nuclear Forces, 2018"). A single modern thermonuclear ICBM is roughly 14 to 36 times more powerful than Fat Man, the more powerful of the two atomic bombs which the U.S. used against Japan. While nuclear arms race in the conventional sense (i.e., building brand new warheads) largely came to a halt and the worldwide stockpile has significantly decreased since the dissolution of the Soviet Union, nuclear weaponry retains the status of a readily available technological means that can cause the most devastating anthropogenic disaster in a matter of hours.

Nuclear weapons exist as a tangible reality but there is, by definition, not a single document in existence recounting the hitherto nonexistent event of nuclear war. The bomb thus poses a challenge of representation. Representing it in terms of what it is now—missiles in silos—does not fully explain why it has been both pursued and feared ever since its first introduction to the world. Without historical referents, nuclear weapon tests are the closest thing to a physical rehearsal of nuclear war. Even while full-scale tests were still being conducted, however, the tests provided data only on local impacts. They do not offer knowledge about how the weapons might affect the world through, among others, long-lasting ecological contaminations and disastrous economic crises including global food shortage engendered by the nuclear winter effect. Nuclear weaponry as an embodiment of potential destruction has remained and will continue to be a hypothesis—a fiction—until a nuclear war becomes a reality.

To articulate the ways in which the nuke has made speculation an integral part of representing the material world, I propose the concept of "eventuality." Eventuality is a narrativization process through which a historical event develops into an anticipated future event

as the original event's outcome. It is a form of storytelling through which a synthetic history is composed. Most (post)apocalyptic stories involving a devastating nuclear war represent a form of eventuality, in which the discovery of nuclear power eventually develops into the realization of its full potential in the form of world-ending war. Eventuality connects dots—past events with hypothetical future events or, as I call them, the “eventuals.” Eventuals are events that have not happened yet; they are future events that only ever exist within the speculative narrative representing them. While eventuals are merely possibilities from the viewpoint of the present, the concept of eventual articulates how some of those possibilities are invested with political or scientific weight and oxymoronically treated as events only yet to occur.

Eventuality establishes a causal relation between an event and its eventual. By designating a hypothetical end point—denouement—of the progress from the event to the eventual, eventuality also defines the *direction* of the historical development leading to the present. So, in one direction, existing data on historical trends inform the model estimating the future. In the opposite direction, however, the speculative narrative retrospectively defines that the history so far has been heading toward whatever state of the world represented by the eventual. All this retrospective designation, of course, happens in the realm of fiction, within the boundary of the narrative representing the eventual in question. But it is exactly this fiction—the hypothetical future history of nuclear weapons eventually realizing their latent power—that has informed every international nonproliferation effort.

Time Travel Narratives as the Embodiments of Eventuality

Eventuality consists in two major operations—speculatively writing the future (prospection) and assessing history in light of that speculated future (retrospection). What a narrative of eventuality achieves from the reader's point of view is essentially a form of fictional

time travel, through which the writer witnesses the future and returns to the present to impart whatever wisdom they have acquired for the present world. Naturally, time travel narratives make perfect instances of eventuality. As a proper introduction to the notion of eventuality, Chapter 1 explores two iconic time travel narratives, the 1960 film adaptation of H. G. Wells's novel *The Time Machine* (1895) and the first three *Terminator* movies (1984, 1991, 2003). These stories demonstrate how the invention of nuclear weapons has inspired humanity to look at history in relation to the disastrous futures that may come as its outcome.

Time travel serves two critical purposes for the narrative of eventuality. Time travel as a plot device creates enough temporal space for an event to develop into its eventual. Time travel narratives in this regard are like anthropological experiment devices with a fast-forward button. It is also important that time travel is after all a form of travel. Unlike futuristic stories situated entirely in the future, time travel narratives that take place in multiple temporal spaces allow the time traveler to return to the present and report his findings. As my discussion of *The Time Machine* and the *Terminator* movies will demonstrate, time travel narratives internalize the interaction between the time traveler and the audience in the present—a relationship that is only assumed between the writer and the reader in exclusively futuristic stories.

I chose the film adaptation of *The Time Machine* and the *Terminator* movies not just because they are some of the most well-known works in which time travel plays a critical role, but also because the nuke is inextricably tied to the time travels they describe. To discuss this relationship between time travel and the nuke, I first revisit H. G. Wells's 1895 novel. Although Wells would become the first writer to use the term “atomic bomb” in *The World Set Free* (1914), *The Time Machine* (1895) was not yet a nuclear fiction. As a progenitor of the *scientific* time travel narrative (as opposed to other contemporary pioneers of the time travel genre like Mark Twain's

A Connecticut Yankee in King Arthur's Court, which shows no interest in the mechanism of time travel in scientific terms), *The Time Machine* conceives time travel specifically as a temporal movement without a spatial relocation. Time travel in the novel is quite literally just that, a traversing of time while the time traveler is fixed at the same position aboard the time machine. One critical implication of this form of time travel is that the entirety of history—including the future until the end of time—is assumed to have already been written, and the time traveler simply discovers uncharted temporal realms. This model of history is central to the conception of eventuality, for each narrative of eventuality assumes a future that has already been determined by the material conditions of the present. This does not necessarily mean that time travel narratives like *The Time Machine* are therefore deterministic, since the present can change.

Through the transformation from the original novel to the 1960 film adaptation, *The Time Machine* turns into a nuclear fiction. The novel is a philosophical thought experiment on humanity's long-term evolution as a species, informed by the Darwinian idea of atrophy. The future humans that have apparently regressed to their primitive forms represent what Wells imagined to be the evolutionary course for a species that no longer faces challenges to overcome. The idea of atrophy as a course of biological evolution is replaced in the film by an ecological mass suicide that humanity as a species end up committing as the eventual of their technological accident productions championed by the nuke. The most striking difference between the novel and the film demonstrating this shift is the manner in which time travel is represented. The time travel sequence in the novel describes a break in the civilization's progress in ambiguous terms. The movie, on the other hand, gives a concrete form to the historical events through which the time traveler passes—three World Wars, including the fictional World War III that leads to a violent death of the human civilization on earth. With these changes, the film adaptation of *The Time*

Machine instantiates how the trope of time travel as a means for speculation could become a much more historically specific tool for imagining a nuclear war.

One aspect of time travel that differentiates *The Time Machine* from the *Terminator* movies is the issue of time paradox—that is, the possibility of the traveler’s actions in the past influencing the future. *The Time Machine*, both the novel and the film, does not consider the possibility at all. The *Terminator* movies, on other other hand, are entirely built on it. The *Terminator* movies extensively explore the relationship between time travel as a plot device and eventuality as a narrativizing process through which the eventual of an event is conceived. As the opening scene of the first movie unequivocally states, the entire series chronicles “the final battle” between humankind and the machines that is “fought here, in our present.” The stake of the battle is the existence of either party, as each tries to travel back in time and foreclose the other’s future existence by preventing their originating event from occurring—respectively the birth of the future human resistance’s leader or the invention of Skynet, *Terminator*’s sentient A.I. antagonist.

The nature of these competing parties’ relationship makes *Terminator* unique as a time travel narrative. A simple time travel story follows its time traveler through different times. The story, in this sense, has a single focal point that is the time traveler, no matter how many temporal stages the story might depict and how complicated the causal relations might become as a result of time travels. *Terminator*, on the other hand, is driven by the bilateral interaction between the present and the future. The invasion of the future in *Terminator* thus allegorizes how our anticipations of the possible futures influence our actions in the present and our understanding of the contemporary world, even as the speculations are themselves derived from history. And it should be emphasized again that as much as the franchise combines the tropes of time travel and A.I. rebellion in its own unique ways, all of it would not have been possible without nuclear

weaponry that introduced to the world the technical means to cause a near instant destruction of the world.

Wargaming and Fiction

Literary fiction is not the only genre of writing that attempts to represent the eventuality of the nuke. On the more empirically informed side of the nuclear discourse is wargaming, strategic studies on military conflict scenarios. Chapter 2 explores the world of wargaming and nuclear war fictions in relation to it. The goal of the comparative reading is to demonstrate that wargaming is also fundamentally a form of speculation even as they more rigorously reference historical data, and consequently that the nuke as an embodiment of future disasters can only be represented through the narrativizing process of eventuality. To emphasize the shared characteristic of the two genres of writing as speculative representations of nuclear eventuals, I call them literary fiction and strategic fiction.

Modern wargaming was born out of the specific historical context of the Cold War where the prolonged passive-aggressive rivalry between the U.S. and the Soviet Union resulted in a fantastic degree of nuclear buildup. In response to the increasingly powerful weapons and more efficient delivery methods, wargaming emerged as a strategic discourse tasked to imagine cataclysmic nuclear events. Wargaming is by no means an exact science. It was nonetheless funded by the military and informed strategic decisions, for the simple reason that there was no other way to acquire any kind of definitive knowledge about nuclear warfare, even as the knowledge thus gathered was ultimately a collection of speculations. The very formation and development of wargaming with any kind of advisory influence, in fact, reflect the profound uncertainties posed by the nuke.

Wargaming informs our understanding of literary narratives about the nuke, by demonstrating that any representations of the nuke are necessarily fantastic because its destructive potentials themselves are already fantastic. Also, like nuclear literary fiction, wargaming is a particular form of simulation. It is a simulation that relies on imaginary referents—nuclear crises that have never happened. Nuclear wargaming thus simulates in the Baudrillardian sense of the word—“To simulate is to feign to have what one doesn’t have” (Baudrillard 3). Feigning to have the knowledge of the future is exactly the objective of wargaming, as it is used not only to hypothetically play out the more realistic scenarios, but also to discover possibilities that have not even been considered before.

Along with wargaming as a genre tasked specifically to develop knowledge for the military, the second chapter also explores the U.S. civil defense texts aimed at the general population as another form of strategic fiction. Civil defense plans are what Lee Clarke calls “fantasy documents.” Contingency plans as fantasy documents, such as post-nuclear-war recovery plans, are called “fantasy” documents, because the validity of the entire course of action they prescribe is based on the very event that they merely pretend to know. To simulate the unobtainable knowledge of nuclear war, civil defense plans as fantasy documents make use of “apparent affinities” between a known disaster such as a natural disaster and nuclear war. The resulting advice—*a la* “duck and cover”—turns nuclear war into a manageable risk. The nuclear eventual is, in other words, overwritten by a repetition of a historical event only more potent. The point I want to highlight here is not the inaccuracy of such plans (for an effective defense against a nuclear attack in any form has never been made possible even to this day), but that they are written as an attempt to cover the fundamental lack of knowledge.

After exploring the relevant historical contexts including most prominently the advent of wargaming, the rest of the chapter discusses specific literary representations of nuclear war in relation to major tropes of the genre. One of the concepts central to both nuclear wargaming and nuclear fiction is mutually assured destruction or MAD. *Fail-Safe*, the first novel I discuss, dramatizes a hypothetical scenario in which a mechanical error almost leads to a nuclear war. The novel represents the contemporary anxiety over accidental war as the weapons systems became increasingly complicated and automated. Through the eventual of accidental nuclear conflict, *Fail-Safe* suggests that deterrence is at its core already a form of MAD, as deterrence is fundamentally a circuitry of mutual threat that ironically facilitates, if not guarantees, escalation in the event of active conflict.

Even the most outrageous nuclear fictions are not only insightful allegories, but surprisingly accurate descriptions of the mutual vulnerability created and maintained in pursuit of security that has become a ubiquitous material condition for the nuclear age. One of the texts I analyze in this context is a 1967 episode of the original Star Trek series, “A Taste of Armageddon.” The story’s central motif is virtual war, which reflects the anxiety for the contemporary development of automated weapon systems. What surprises the crew of USS *Enterprise* in the film is not that the two belligerents in this corner of the fictional universe have been at war for the last five centuries, but that the war has been waged completely virtually. Everything is calculated by supercomputers connected between the two nations, and not a single bomb is physically detonated. The only consequence of the virtual war that is materialized in reality is the human casualty, as each side “disintegrates” (i.e., executes in a high-tech science fiction way) their own citizens based on the simulated numbers of death. The story highlights that MAD is effectively a perpetual state of war, as even in peace every nuclear-armed state endlessly strategizes and prepares for the

nuclear eventual looming in the future (according to the eventuality of nuclear war by which every nuclear missile's existence is justified, not the conscious belief of political leaders).

The Nuclear Bomb as an Ecocidal Weapon

As the history of Cold War shows, a significant part of the discourses surrounding nuclear weapons (as the first and most impactful application of the newly discovered power of the atom) was concerned with speculating their potential effects. Nuclear weapons were invented as weapons, but their power was so great that their impact range could not be limited to the intended targets. The fundamentally uncontainable nature of nuclear weaponry stems from the radioactive fallout as an entirely new type of damage inflicted by a weapon reaching far into distant lands as well as times, combined with the unprecedented extent of destruction leading to a large-scale disruption of the global climate as estimated by nuclear winter hypotheses. Regardless of the user's intentions, in other words, the bomb always targets the planetary ecosystem. Thinking about the nuclear bomb's significance to us here and now thus means identifying it not only as a threat of instant explosions, but also as an embodiment of planetwide ecological disasters in the future.

One of the earliest nuclear events to demonstrate the ecocidal potentials of the bomb was the *Lucky Dragon* incident in 1954. The crew of *Lucky Dragon*, a Japanese tuna fishing boat, was exposed to a lethal dose of radiation from the fallout generated by the Castle Bravo test on the same day, March 1. It was the highest-yielding American nuclear test to date, and Operation Castle as a whole resulted in extensive irradiation of the test area, the Marshall Islands. The U.S.-designated "exclusion zone around the Castle tests [spanned] 1.5 million square kilometers, an area approximately equal to 1 percent of Earth's terrestrial area" (Merlin and Gonzalez 193). The *Lucky Dragon* incident evidenced that nuclear weapons were not just tremendously destructive as

explosives but also ecocidal, and that any form of their use including weapons tests would have material consequences.

Nuclear fiction, in varying degrees but inevitably, displays an awareness of ecological connections between things—humans, other organisms, and inanimate environmental entities—because of the fundamental condition of the genre that its primary subject matter is an ecocidal weapon. One of the most exemplary texts in this regard is Nevil Shute's *On the Beach* (1957). It is not quite accurate to call *On the Beach* a nuclear “war” novel because while a large-scale nuclear war figures as the central impetus for the plot, it is predominantly a story of an aftermath. The survivors in Australia, the story's main stage, are living their last years, as the lethal radioactive fallout generated from the war in the northern hemisphere is expected to gradually flow across the equator. What the novel describes is not the spectacles of war, but the workings of the planetary ecosystem delivering contaminants across great distances, thus highlighting the fact that all organisms on the planet are materially bound together.

Through the nuclear bomb as a material as well as discursive catalyst for an ecological awakening, nuclear fiction's ecological worldview is tied to the intimate historical relationship between the development of nuclear technologies and the advent of modern ecology. The case in point is the evolution of “health physics,” a small part of the Manhattan Project tasked to monitor radioactive materials' detrimental effects on the project workers' health. Later health physics became a broader project named “radioecology,” as the scientists of health physics began to realize that radiation could affect the workers indirectly through their environment.¹ The scientific studies

¹ “Radioecology” is a term that Stephen Bocking uses in his work *Ecologists and Environmental Politics* (1997). It is “a field that, as described by Odum, Auerbach, and other prominent AEC [Atomic Energy Commission] ecologists, sought to bridge the gap between basic ecological research and the nuclear sciences” (79). The source he references in this passage is a conference discussion led by Eugene Odum, an American biologist and one of the pioneers of ecosystem ecology: “Panel Discussion on Education and Research Training.” *Radioecology: Proceedings of the First National Symposium on Radioecology, September 10-15, 1961*, edited by Vincent Schultz and Alfred Klement. Reinhold, 1963, pp. 643-645.

initially tasked to monitor how the human body could be locally damaged by radiation gradually expanded its scope to the ecosphere as a whole, for it did not take too long for the scientists to learn that the body was radically open to the environment at large. The famous Baby Tooth Survey (1958-1970), where about 300,000 teeth of American children were collected and examined for their strontium 90 (Sr-90) contents, for example, demonstrated that the traces of the global environmental event of nuclear weapons testing could be discovered in the human body.

Cat's Cradle (Vonnegut, 1963), the first nuclear fiction I read from an ecological perspective, is an interesting example of fiction representing the nuclear bomb as an ecocidal weapon. It is technically not a nuclear fiction, for not a single nuclear bomb goes off and radiation is never mentioned in the story. *Cat's Cradle* is, however, very much a fiction about nuclear power that galvanized the formation of the ecology of catastrophe. Ice-nine, the story's novum, is a fictional polymorph of water that freezes any body of water that comes into contact with it. The story ends with almost all environmental water on the planet frozen. As a contaminant spreading at an incredible speed through water—a ubiquitous matter responsible for ecological circulations as well as the survival of most organisms—ice-nine allegorizes the potentially devastating ecological consequences of the nuke by combining the temporal longevity of radiation with the velocity of nuclear chain reaction.

The study of the nuke's ecological impact would be incomplete without the story about how nuclear weapons have historically caused actual damage even without a nuclear war. For this reason I devote the last section of the dissertation to the discussion of historical nuclear fiction, as opposed to speculative nuclear fiction. One important products of the nuke that the two novels I read demonstrate is a form of internal war—a peacetime war—that the state wages against its own people. The primary inspiration for my notion of internal war is Rebecca Solnit's *Savage Dreams*:

A Journey into the Hidden Wars of the American West (1994). Nuclear tests are, she argues, not merely preparations for war, but themselves constitute a form of nuclear war in peacetime. The tests, she points out, have actual material consequences, which makes the very designation of “test” a misnomer. As representations of the radioactive internal war’s victims, *Downwinders* (Oberhansly and Oberhansly, 2001) and *Ceremony* (Silko, 1977) explore two of the major ways in which the internal war is manifested, nuclear testing and uranium mining, respectively.

Nuclearosis

In one of many civil defense propaganda short films of the 1950s included in *The Atomic Cafe* (1982), a cartoon professor explains “a dreaded disease called nuclearosis,” a major symptom of which is “nuclear blindness”—“all he [the “nuclearotic”] can see is a mushroom cloud, he is blinded from the fear of it” (1:06:17). William Cowling in *The Nuclear Age* undoubtedly suffers from the so-called nuclearosis. But just as Lacanian psychoanalysts would say neurosis is the “normal” state of consciousness constantly trying to protect itself from the gaping abyss of the Real, nuclearosis is, the novel suggests, a natural product of the nuclear age. William’s own conclusion about his relationship with the nuclear bomb which I mentioned at the beginning—“I’m a realist. Nothing’s real”—perfectly describes the material condition which the nuclear bomb has forcefully imposed on the world. We learned at bomb-point, as it were, that to understand reality we must also imagine its future states. Without imagination, speculation, and fiction, the nuclear bomb that has never carried out its sole purpose remains a static number, rather than an incredibly concentrated embodiment of future disasters. The concept of eventuality articulates a representational method with which the events in the future are narrativized and tentatively given the status of event within the confines of fiction. There are already many such fictions that inform our understanding of the world and political decisions around the world. The ecological and also

very much futurological worldview is now widely understood because of climate change. It was the nuclear bomb, however, that for the first time in history contaminated the present with the future to a greater extent than ever before.

CHAPTER I. THE NUKE, TIME, AND EVENTUALITY

The Terminator (James Cameron, 1984) opens with the core premise of what would become one of the most iconic and commercially successful franchises of the genre: “The machines rose from the ashes of the nuclear fire. Their war to exterminate mankind had raged for decades, but the final battle would not be fought in the future. It would be fought here, in our present” (01:30). The central tropes themselves were not entirely novel. The machines in the *Terminator* universe are led by a homicidal artificial intelligence called Skynet. We can find its predecessor in, for instance, H.A.L. 9000 in *2001: A Space Odyssey* (1968), an A.I. that operates the spacecraft in which the film unfolds. Both Skynet and H.A.L. are sentient artificial intelligences that eventually turn against humans. The nightmare of apocalyptic nuclear war—another important part of the *Terminator* movies’ setup—was imagined even before the invention of the actual weapon. H. G. Wells’ *The World Set Free* (1914) was the first literary work to use the very term “atomic bomb.” Alongside literary fictions, numerous strategic scenarios written during the Cold War also imagined catastrophic nuclear wars. As much as the first *Terminator* movie was fantastical, its central event was very much reflective of the equally fantastical degree of threats created by the technological advancements in the real world—the increasingly powerful and automated nuclear weapons systems.

The *Terminator* movies (hereafter referred to collectively as *Terminator*) successfully combined the two tropes—the self-conscious A.I. and the world-ending nuclear war. The plot device that made *Terminator* unique by the contemporary standards was, however, the temporal relation between the postapocalyptic future and the preapocalyptic present. As the first movie explains from the very beginning in the aforementioned on-screen message, the apocalypse has already happened, in the specific future that has unfolded from the present. While it is stated in the

past tense that “[t]he machines rose,” the “final battle” that “would be fought here, in our present” is a battle to erase the already-happened future. This peculiar dynamic between the two times results in the ambivalent ontological status of the most important event for the entire series—the nuclear apocalypse called “Judgment Day.” All of the following statements about Judgment Day are thus true simultaneously in the world of *Terminator*: Judgment Day has happened; it will happen; it has not happened; it will not have happened. Judgment Day is, in other words, a Schrödinger’s cat.

The film imagined the apocalyptic nuclear war as both a hypothetical possibility and the eventual culmination of nuclear power already awaiting humanity in the future. This is precisely because although nuclear war has never happened to this day, the technological means to realize the disaster have survived the dissolution of the international order in which they were born. So while “the bombs were not released [and] [t]he missiles remained in the underwing carriages, unfired,” as a character in Don DeLillo’s *Underworld* remarks in retrospect (DeLillo 76), it is equally true at any given time that the bombs simply have not been released yet and the missiles are still in the underwing carriages (or in missile silos) yet to be fired. While the same conditionality can be applied to other hypothetical disasters, nuclear war continues to be one of the most devastating artificial disasters that are very much within the range of the currently available technological possibility. After all, it is because of the hypothetical disaster—a nuclear war of some kind—that the U.S. still maintains one of the largest nuclear arsenals in the world. As the 2018 Nuclear Posture Review states, “U.S. nuclear capabilities make essential contributions to the deterrence of nuclear and non-nuclear aggression” (Department of Defense vi). Every international treaty, negotiation, and sanction regarding nuclear weapons has also been written and enforced to prevent hypothetical disasters. The battle to foreclose the apocalyptic future in

Terminator, in this sense, allegorizes the sustained effort in the real world to prevent the realization of nuclear power's disastrous potentials.

Reading *Terminator* and other Cold-War literary representations of the nuke—manifestations of nuclear power that can potentially cause or have already caused a lasting damage to the planet—including H. G. Wells' *The Time Machine* (1895) and its film adaptation released in 1960, I explore in this chapter how the nuke has radically changed not just our sense of time,² but also the actual relationship between the present and the future. The core characteristic of this relationship's change can be expressed as the *expansion of the present into the future*, whereby the present already actively determines the material state of futures, near and distant. The cause of this change is the unknown possibilities and increasingly far-reaching material impacts of new technological inventions, including various applications of nuclear power and fissile materials. By the “expansion of the present into the future,” I mean quite literally that the temporal breadth of the present increases to incorporate more and more of the time that has yet to come. The present can be as wide as, for instance, 10,000 years. Ten millennia is the length that technicians set for the minimum necessary structural integrity of the Waste Isolation Pilot Plant (WIPP), the first American permanent repository for transuranic waste (radioactive waste from weapon production). The moment the WIPP is completely sealed, the entire facility with everything present in it becomes a temporally elongated object lying across 10,000 years. Imagine, if you will, a four-dimensional space where everything has a temporal volume according to their material lifespans, and the concrete subterranean tomb for radioactive waste ripping through the conventional boundary of the present and protruding 10,000 years into the future. Because of the extraordinary

² Isaac Asimov, for example, once wrote that “the rate of [technological] change, and the extent of the effect of that change on society, becomes great enough to be detected in the space of an individual lifetime” and as a result, “[t]he future is, ... for the first time, discovered” (18).

temporal breath of the WIPP, the researchers working for the facility have explored ways to deal with future threats to it, including effective “markers to deter inadvertent human intrusion into the Waste Isolation Pilot Plant” by humans or other intelligent beings that may walk the planet in the distant future (Trauth et al. iii). They are effectively communicating across millennia, as the present expands into the distant future through the repository lying across the time. The WIPP is one of many technological manifestations of the present’s expansion because unlike, say, the Ancient Greeks who had built the Parthenon to at least partially last for more than two millennia, we built the WIPP to control the future. Every military scenario produced to prepare for the eventualities of nuclear war is motivated by the same desire to control the future. And the control we desire, because we have known for some time now that our actions in the present are increasingly shaping the future, and conversely, the speculated futures are increasingly informing our actions in the present.

The Event and the Eventual

One of the earliest critical efforts to articulate the nuke’s power to expand the present into the future is found in the works of Günther Anders, a German Jewish philosopher best known for his work *Die Antiquiertheit des Menschen (The Obsolescence of Human Beings)* (1956). The central topic of the book is what he calls in his later writing, “Theses for the Atomic Age” (1962), the discrepancy between “our capacity to produce”—most notably the technological means to destroy represented by nuclear weapons—and “our power to imagine” the consequences of our production (Anders 497). He concludes, in the same article, that we are therefore “inverted Utopians” because “while ordinary Utopians are unable to actually produce what they are able to visualize, we are unable to visualize what we are actually producing” (496). Every molecule of plutonium-239 (the primary fissile isotope of nuclear weapons) occupies a temporal span of over 24,000 years. The

timescale introduced by plutonium-239 is inconceivable to average human mind. Our production of plutonium-239 nevertheless directly affects the future of our world. “The future,” as Anders writes in *Die Antiquiertheit*, “will not any longer just ‘come’ as we do not conceptualise it any longer as something that is just ‘coming’, but rather create it. ... As the effects of those things we do today will persist, we already reach that future today: meaning that, in a pragmatic sense, this future is already present” (Eva Horn’s translation in “The Apocalyptic Fiction,” 34). The expansion of the present into the future—or to put it negatively, the intrusion of the future into the present—is not just a rhetorical notion but a decisively material phenomenon engendered by the lasting physicality of our production. Timothy Morton’s observation vis-à-vis hyperobjects—entities “that are massively distributed in time and space relative to humans (*Hyperobjects* 1)—that “we know that we have changed the future fossils of Earth” (*Hyperobjects* 60) aptly articulates how we might understand the change in the present’s relationship to the future. Our production in the present not only influences the future, but becomes “the future fossils” as they are lodged in time prescribing the material reality of the future.

The Promethean discrepancy—our power to produce dramatically outgrowing our ability to readily conceive the material impacts of our production—has resulted in a peculiar representational strategy. As in nuclear wargaming, we have come to assign names to future disasters and write narratives of the anticipated progressions leading up to those events. I must emphasize that this kind of representation of the future is qualitatively different from a mere fancy. Rather than just out of curiosity, we represent the future out of necessity. As much as representing nonexistent events is oxymoronic, we are actively engaged in the creation of said events ahead of time. We are creating, for instance, the future of the catastrophically warm planet, right here and now. Climate change projections like “The Special Report on Global Warming of 1.5 °C” (2018),

published by the Intergovernmental Panel on Climate Change (IPCC), attempt to represent how modifying the world's production in the present may change the future.

I call these future events “eventuals.” An eventual is an event that has not happened yet; it is the future counterpart of a past event. To avoid confusion, I must emphasize that an eventual is a discursive construct that refers to the hypothetical event. It is not the event itself. The World War III dramatized in a fiction, for instance, is already an event within the text's fictional history, but only an eventual for the people in the real world. If WWII ever becomes a reality, then the eventual of WWII would also become an event at that point. An eventual, in other words, is always a product of interpretation. In this respect, my conceptualization of eventual has a certain degree of affinity with the Badiouian notion of Truth-Event. A Truth-Event refers to an event that has come to exist as one because of the person or people who recognized it as such. The Truth-Event is, in other words, a product of the naming of a historical occurrence from a specific point of view. “An event is thus circular in the sense that its identification is possible only from the standpoint of what Badiou calls ‘an *interpreting intervention*’—if, that is, one speaks from a subjectively engaged position, or ... if one includes in the designated situation the act of naming itself” (Žižek 155). As I will explain shortly, the event in my study is also named through a circular process, since the meaning of the past event is determined or reinterpreted based on its hypothetical future outcome, the eventual. And this connection between the two—the (past) event and the (future) eventual—is made through a speculative narrative in which the writer intervenes with their interpretation of the material state of the world leading up to the present. The most significant difference between my notion of eventual and Badiou's Event is, however, that the eventual lies in the future. Naming an eventual still involves an interpreting intervention on the past, but the recognized event is yet to come.

The term *eventual* is a nominalization of the existing adjective, as it derives its meaning from the regular usage of the word. Eventual as a regular adjective has two related but different meanings. On the one hand, it means “occurring or existing at the end of a process or period of time” (*OED*), as in “the *eventual* military conflict between the two countries after a decade of political tension.” On the other hand, eventual can also mean “that will arise or take place under certain circumstances or in a particular eventuality” or “contingent” (*OED*), as in “an *eventual* military conflict that might occur if the current tension continues to escalate.” The key difference between the two meanings is the tense, whether the event which the word “eventual” modifies has already happened as the result of a certain development heretofore or may happen in the future as the result of an anticipated development hereafter.

The nominal *eventual* conflates the two meanings and tenses of the original adjective. To understand this conflation, keep in mind that the past event (e.g., the discovery of nuclear power) and the future eventual (e.g., WWII) are interdependent to each other within the narrative that connects the two. On the one hand, the past event is considered from the future perspective, whereby the significance of the event is determined based on its contribution to the eventual. In a story that describes a devastating nuclear war on a global scale, for instance, the discovery of nuclear power is retrospectively found to be the originating event for the catastrophic event by, say, a fictional historian living in the postapocalyptic world. On the other hand, however, that very retrospective process of interpreting the significance of the past event from a hypothetical future perspective is imagined prospectively, for the simple reason that we have to imagine the future first to retrospect. As I discuss in detail later, the *Terminator* movies represent this interdependence perfectly through its circular causality. The very version of the present we see in the movies exists as it does because of the already-happened future, but at the same time the result of the events in

the present can change the future. The result of the interdependence between the present and the future—the event and the eventual—is a long line of composite history that spans over both history proper (the heretofore-history) and its imagined continuation (the hereafter-history). I call this composite history the *history of eventuality*, insofar as the dynamic between the event and the eventual is named *eventuality*.

The dual temporal operation of prospection and retrospection employed in succession is integral to the mechanism of eventuality. Moving in two opposite directions, eventuality is thus pre-posterous (*prae* “before” + *posterus* “subsequent”).³ It constitutes a narrativization process through which future events that cannot be represented (i.e., eventuals) are represented proleptically and, subsequently, the eventuals thus represented redefine the original event retrospectively. To make this impossible representational task possible, the narrative of eventuality writes its own hereafter-history—the fictional history that branched off from real history—and then referring back to the very history it has created as the basis for its plot. This pre-posterous representational process not only results in the temporal loop in *Terminator*, but is also employed in writings outside of fiction. Even studies that do not overtly employ the pre-posterous representation often have the same end goal of persuading the audience of the imperative of imagining the disaster in the future. The Intergovernmental Panel on Climate Change’s 2018 report, for instance, is filled with careful statements of probabilities and data on historical trends, rather than vivid, albeit speculative, descriptions of possible futures found in fictions. Still, the reason why the report was written at all is what it states in its title: “Global Warming of 1.5 °C,” not “Projections on Global Warming 1.5 °C.” One of the primary goals of the report, in other words,

³ When they describe eventuality, the term *preposterous* and its cognates are hyphenated to be distinguished from their regular usage.

is to present possible consequences of global warming, in light of which the readers may understand the hitherto-history of the world.

Because of the pre-posterous nature of eventuality, one of the most important tropes for the narratives of eventuality has been time travel. Time travel is a central plot device in the nuclear fictions I discuss in this chapter—most notably the 1960 film adaptation of H. G. Wells' *The Time Machine* (1895) and the first three *Terminator* movies (1984, 1991, 2003). Wells' *The Time Machine* discovers the usefulness of time travel as a trope in representing eventuality. The kind of time travel imagined in the novel assumes that the future already exists and the time traveler simply discovers it. About half a century later the movie adaptation transforms the pre-atomic novel into a distinctively Cold-War nuclear narrative. Wells's Darwinian utopia-turned-dystopia story about the eventual degeneration of humanity as a species is replaced in the movie by a nuclear holocaust as the eventual culmination of technological progress. The film's postapocalyptic future is also depicted as the result of humanity's own folly, rather than the law of evolution. Yet more decades later, the first *Terminator* movie begins the franchise that further develops the trope of time travel as a means of representing eventuality by introducing the concept of circular causality—a temporal loop in which the present and the future cause each other. The significance of circular causality's role in the *Terminator* universe is that the interdependent relationship between the present and the future perfectly represents the pre-posterity of eventuality. The speculated future outcome of an event retrospectively defines the event's historical significance. Before I get into time travel narratives, however, I want to first discuss the historical condition that inspired them—namely, the nuclear age that has become perpetually bracketed between the originating event and the catastrophic eventual.

The Nuclear Age as the Time between the Event and the Eventual

The Reykjavík summit in 1986 between President Ronald Reagan and General Secretary Mikhail Gorbachev was arguably the closest chance the world has had to completely eliminating nuclear weapons. The summit eventually fell apart because of Reagan's adamant refusal to abandon the Strategic Defense Initiative (SDI), which at the time did not even exist in any substantial sense (nor would it ever become a reality). According to the records of the meeting, Reagan explained to Gorbachev his reason for insisting on the necessity of a defensive system against nuclear threats as follows: "The genie is already out of the bottle. Offensive weapons can be built again. I propose creating protection for the world for future generations, when you and I will no longer be here" (Hoffman 264). Reagan was not unique in his perspective, for the difficulty of conclusive verification has always been, even to date, a major hindrance to arms reduction negotiations, let alone a complete elimination of nuclear weapons. What is striking about his remarks, however, is how much they echo the fatalistic view on the eventual nuclear doom adopted by many nuclear war fictions. As much as Reagan at this point genuinely believed in the possibility of antinuclear defense, he, too, took it for granted that "[t]he genie is already out of the bottle"—i.e., that the technical possibility of the entire civilization meeting an abrupt and total destruction has been introduced to the world.

To say that the atomic genie has been irrevocably released into the world is to recognize the discovery of nuclear power as an event in relation to the eventual of nuclear war. Without the apocalyptic assumption of the eventual, the nuclear bomb even as a mere possibility cannot be a "genie" as Reagan meant it—the harbinger of doom—and there would be no reason to "creat[e] protection for the world for future generations." After all, even reasonably effective missile defense systems merely stop incoming missiles, not erase their existence around the world. In narratological terms, any defense against nuclear weapons, regardless of their level of perfection,

can simply suspend the progression of the narrative of nuclear eventuality. As long as nuclear weapons exist—especially in tens of thousands—the narrative of nuclear eventuality as a whole remains intact. A complete dissolution of the narrative has only ever been imagined in fiction, as in *The Day the Earth Stood Still* (1951). In this Cold-War nuclear film, technologically superior and militantly pacifist aliens descend from the sky and enforce an absolute ban on nuclear weapons on Earth with the threat of planetary genocide. But without such a fantastic measure, the narrative of nuclear eventuality continues to be imagined because the weapons do not phase in and out of existence as the global political climate fluctuates, unlike the perceived prospect of nuclear conflicts that ebbs and flows.

Even before the French philosopher Paul Virilio put into words that every technological invention also invents an accident—“The invention of the airplane was the invention of the plane crash,” for example (*Pure War* 46)—people of Earth had come to suspect and fear that the invention of the nuclear bomb might have also invented the end of history. In *Rocketship X-M* (Kurt Neumann, 1950), another Cold-War nuclear film, humanity is granted the chance to foresee their own demise caused by nuclear war. The movie follows a team of American astronauts who are tasked to travel to the Moon but through an inexplicable accident end up arriving at Mars. On the red planet, the crew find the vestiges of an advanced civilization that appears to have long been dead. Based on the residual radiation and the history of their own world, they conclude—not surmise—that the complete extinction of the once flourished civilization was caused by nuclear weapons. The crew’s remarks on the significance of their expedition make it patently clear that the Mars in this story represents Earth’s future state imagined in the narrative of nuclear eventuality. Particularly relevant scenes in this respect are found towards the end of the movie. A crew member describes the ruins on a strange world as “the mistakes that we made,” rather than metaphorically

compare the two worlds (1:12:07). On a similar note, another member states that the information they gathered on Mars “may well mean the salvation of our own world” (1:16:55). The conflation of the Cold-War Earth and Mars as Earth’s future suggests that the story as a whole is a Cold-War, space-age adaptation of the nineteenth century colonial discourse of non-coevality that assigns different countries at different points on a linear, progressive history depending on the relevant degrees of their cultural, political, and technological progress. *Rocket X-M* follows this logic in its depiction of Earth and Mars in relation to each other, the latter being further into the future and more advanced, even as it technically exists in the same time as Earth. “Progress” in this case, however, means getting closer to the eventual End rather than a positive advancement. Our own history has given us a reason to suspect that “[e]ach new nuclear system—bomber, submarine, and missile—was both a technological achievement of the first order and an accelerating progression towards the end of modernity in the form of nuclear war” (Masco, “The End” 1116). Represented in *Rocket X-M*, as in *Terminator*, is the conflicted sense that on the one hand the disastrous future has already been written but, on the other hand, it can also be prevented. The End itself is, in other words, inevitable but also delayable as “something that we aspire to keep in the future forever, and never to permit into the present” (Schell, *Fate* 25).

The nuclear age conceived this way is temporally claustrophobic, bracketed by the discovery of nuclear power and the end of history—the Event and its Eventual. Since the nuke contributed greatly to the development of modern ecology (a point that I elaborate in Chapter 3), the perception of the contemporary era as a claustrophobic, in-between time influenced environmental writings as well. One salient example is Rachel Carson’s *Silent Spring* (1962). While the majority of the book is devoted to surveying historical and factual data, *Silent Spring* derives its powerful rhetoric from its opening chapter “A Fable for Tomorrow” (which,

incidentally, is a perfection expression of nuclear fiction as a genre). “The title says that the ‘fable’ is ‘for tomorrow’, but the prologue is written, like a foregone conclusion, in the past tense” (Killingsworth and Palmer 29). The majority of the first chapter is pre-posterous, as the narrator is situated in a postapocalyptic point in time and invites the reader to look back on their contemporary world from that future point of view. The very first line of the opening chapter reads, “There *was once* a town in the heart of America where all life seemed to live in harmony with its surroundings” (1; my emphasis). As the narrator describes hypothetical future events in the past tense—“It was a spring without voices” (2)—instead of presenting a projection using the future tense—‘Springs will be silent if we continue to use insecticides carelessly’—the story told in the opening chapter becomes a narrative of eventuality that describes the eventual of the invention of chemical pesticides. Generally speaking, *Silent Spring* instantiates that “[a]pocalypse is the single most powerful master metaphor that the contemporary environmental imagination has at its disposal” (Buell 285). The book also demonstrates, however, that the rhetoric of apocalyptic environmentalism becomes truly powerful when the apocalyptic event is treated as an eventual—an already-existing future event.

When it comes to visualizing the claustrophobic time of the nuclear age, nothing surpasses the Doomsday Clock. It is also one of the oldest and most popular of the kind, frequently referred to in non-scholarly texts. Published regularly by the *Bulletin of the Atomic Scientists* since 1947, the Doomsday Clock is a symbolic clock expressed in the form of “It is X minutes to midnight.” The “midnight” refers to the hypothetical end of history (Figure 1). Nuclear weaponry had initially been



**IT IS STILL 2 MINUTES
TO MIDNIGHT**

Figure 1. Doomsday Clock

the only criterion for adjusting the Clock's second hand, but the *Bulletin* expanded their pool of criteria according to technological changes to first include climate change and subsequently the likes of synthetic biology, information technology, and artificial intelligence (Mecklin 11). The full roster is similar to the list of “existential risks” studied by Centre for the Study of Existential Risk (CSER), which covers a wide range of technological, biological, and ecological threats. Historically, the Clock has fluctuated between 2 minutes (in 1953 after the first U.S. H-bomb and in 2018 after North Korea's series of successful nuclear weapons tests) and 17 minutes to midnight (in 1991 after the START I treaty). One of the notable trends in the assessment of the world's proximity to its hypothetical demise is that since 1991 the Clock has been steadily inching toward midnight, with the exception of a slight recess in 2010 after New START (Figure 2).

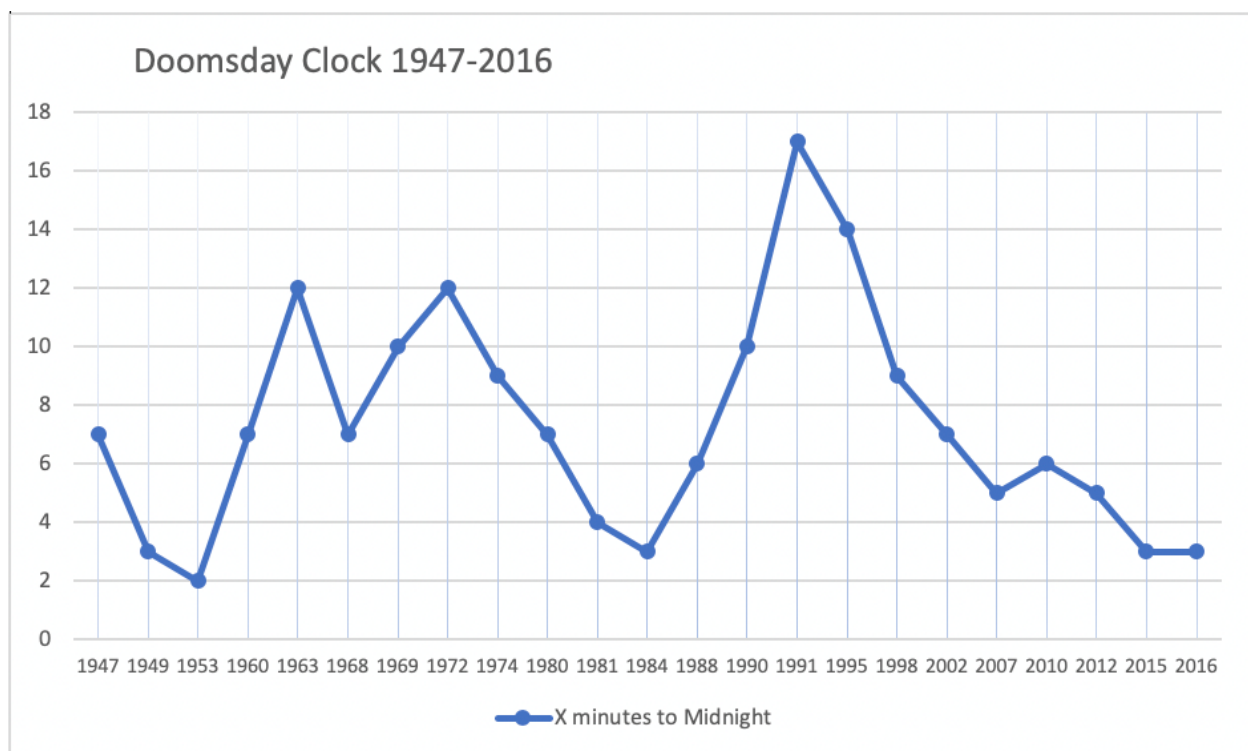


Figure 2. Doomsday Clock 1947-2016 (“0” indicates the Midnight)

Admittedly, the Doomsday Clock is not exactly a scientific index of the state of the world. It would be more accurate to say that the Clock is composed like speculative fiction based on actual history. While the Clock does not actively continue its narrative beyond the present at any given time like proper speculative fiction, it does presume the yet-to-be-written end of the story—the midnight of history. The truly unique characteristic of the Doomsday Clock, even compared to apocalyptic nuclear fiction, is that it most accurately represents the claustrophobic temporal space of the nuclear age by acknowledging the constant delay of the End. As the fluctuating second hand indicates, time in the post-Trinity history represented by the Clock moves both forward and backward. The world at any point is closer to or further away from the midnight, even as time proper is always heading toward the End. Subsequently, the temporal length of the nuclear age—the temporal space between the discovery of nuclear power and the nuclear apocalypse—is conceived to be elastic. According to the Doomsday Clock, then, humanity is literally buying time.

Among nuclear fictions, one of the best representations of the claustrophobic time of the era caught between the event and its eventual is *The Day After*, a 1983 American television movie (TVM). Based on the historical tension between the nations associated with NATO and the Warsaw Pact, the film depicts a fictional nuclear war between the U.S. and the Soviet Union and its aftermath. By the year of the film's release, the combined number of the two superpowers' nuclear warheads almost reached the highest point in history.⁴ Europe was becoming a nuclear powder keg, caught between Soviet nuclear weapons trained at Europe and the American counterparts deployed to their European allies. This volatile situation is referenced in a scene about twenty minutes into *The Day After*. In the scene, Dr. Russel Oakes, the protagonist and a professor of hematology at the Kansas University Hospital, is watching the news on the “heightening crisis

⁴ Kristensen and Norris, “Global Nuclear Weapons Inventories, 1945-2013,” p.78. The numbers of warheads were 59,350 in 1983, 64,449 in 1986 (highest), and stabilized around 10,000-11,000 after 2010.

in Berlin” with his wife. Alarmed but trying to remain calm, the wife says that “It’s not gonna happen now” since “It didn’t happen” in 1962 when the Soviet Union’s deployment of ballistic missiles in Cuba almost triggered a nuclear war. To this Dr. Oakes replies, “Nah, people are crazy, but not that crazy” (21:59-22:51). As in many other nuclear war fictions, *The Day After* is a story in which people turn out to be “that crazy.”

Many lines from the movie suggest that its creators considered the possibility of a large-scale nuclear war quite seriously at the time and recognized nuclear war as a critical eventual of their contemporary world. In one of the pre-war scenes at Kansas University, students are watching the news on the looming war. One of the students dismisses the prospect of nuclear war as “fantasy land,” but another student snaps at this, asking “You think this is *The War of Worlds* or something?” (36:28). *The War of Worlds* (H. G. Wells, 1897) is an interesting choice of reference. Although technically it was one of Wells’s later novels—*The World Set Free* (1914)—that would mention the atomic bomb for the first time in literary history, evoking Wells is a deliberate narrative strategy to convey the contemporary fear that a catastrophe of the magnitude only ever imagined in fiction might now come true. The perceived eventuality of nuclear war is also related to the qualitative shift in the nature of war brought about by intercontinental nuclear missiles—namely, the expansion of war zone to the entire planet. One particular scene from the movie referencing this change depicts a dialogue between a student and Dr. Oakes. “What do you really think,” the younger man asks, “the chances of something like that [i.e., being attacked by ICBMs] happens way the hell out here in the middle of nowhere?” The doctor responds: “Nowhere? There’s no nowhere anymore” (38:21). The sense of being entrapped within the global target range of ICBMs is also articulated in an earlier scene where Dr. Oakes’ colleague points out that even if people were to run away from Kansas City—one of the prime targets for Soviet missiles due to its missile

fields—there is nowhere safe to go. “We are not talking about Hiroshima anymore” (32:32), the doctor adds, emphasizing the difference between the bombing of the two Japanese cities in 1945 as a limited, one-sided use of atomic bombs and a full-scale nuclear war between nuclear-armed states.

The Day After represents the temporal structure of the nuclear age in the most symbolic as well as tangible way. The film is divided into two parts by the abrupt and devastating nuclear war between the U.S. and the Soviet Union. After the intercontinental missiles are launched about one third into the movie, the rest of the pre-apocalypse part of the story becomes the most agonizing kind of waiting period. Watching the American ICBMs soaring into the sky, a professor at Kansas University speaks to himself: “They are on their way to Russia. They take about thirty minutes to reach their targets.” His student standing next to him responds, “So do theirs, right?” (53:21-53:31). He articulates the very moment at which both the event and its eventual are born—the launch of the missiles and their arrival at the predetermined targets. The time between the two is a small-scale model for the much larger but equally claustrophobic temporal space of the nuclear age. The missiles’ launch and their arrival in the movie, in other words, allegorize the invention of nuclear weaponry and the full realization of its destructive potential, as two corresponding sets of an event and its eventual. The obvious advantage of the “thirty minutes before the missiles arrive” model as a rhetorical means to represent eventuality is the indisputable and easily graspable causality. The missiles *will* arrive at their targets, and as such, the destruction of the target areas has in a sense *already happened* the moment the missiles leave the silos. The sense of irrevocability is thus conceived within the narrative in which the past event—the missiles being released into the wild—begins a progress toward its catastrophic culmination. But what if the progress from the event to the eventual requires more time, decades rather than thirty minutes? One way to create the

sufficient temporal space for the development is to introduce time travel to the narrative, which is my next topic.

Now the Future Has Nuclear Bombs: From *The Time Machine* the Novel (1895) to Its Film Adaptation

The nuclear bomb has been one of the earliest topics for the narratives of technological eventualities in a truly apocalyptic sense, because of its unprecedented potential to drastically change the physical state of the world. For instance, Herman Kahn, the RAND strategist best known for his controversial work *On Thermonuclear War* (1960), once wrote that “[t]he world may be permanently (i.e., for perhaps 10,000 years) more hostile to human life” in the event of a major nuclear war, remarking on nuclear weapons as an ecologically apocalyptic force (qtd. in Ghamari-Tabrizi 221). This new, terrifying possibility introduced by nuclear power has inspired a plethora of disaster narratives. Even when it is not the main focus of the story, a nuclear catastrophe of some description offers a ready-made excuse for an abrupt and complete transformation of the world, which holds true even to this day. In such postapocalyptic movies as *Waterworld* (1995) or the *Mad Max* series (1979-2015), for instance, the cataclysmic disaster in the past is assumed to be nuclear-related, but the story’s focus is the strange new world, not the reason for the old world’s violent downfall.

A particularly interesting case can be made, however, when we look at how the trope of time travel has been influenced by that of nuclear apocalypse. My comparative reading of Wells’s *The Time Machine* written decades before the invention of the first atomic bombs and its movie adaptation made during the Cold War demonstrates that the nuclear catastrophe came to take over the more ambiguously defined apocalypse in the novel. The disastrous progress of humanity is also reconceived accordingly, as Wells’s musing on humans’ eventual degeneration inspired by

Darwinian ideas becomes overwritten by the narrative of nuclear eventuality, in which technological advancements lead humanity to its explosive demise. In the new scenario, the fate of humanity is defined much more concretely, for the simple reason that the future now has a specific, tangible culprit for the species' demise—the nuclear weapon.

H. G. Wells's *The Time Machine* (1895) is a novel commonly regarded as the progenitor of the time travel narrative. There were other pioneers before it, such as Edward Bellamy's *Looking Backward* (1888) or Mark Twain's *A Connecticut Yankee in King Arthur's Court* (1889). But *The Time Machine* was qualitatively different from them, in that it was a scientific time travel fiction. "For the first time in a work of fiction Wells provided an up-to-date, technologically and scientifically grounded rationale for doing something that had hitherto been justified as occurring either by means of magic or through some sort of dream vision" (Firchow 19). Earlier time travel narratives "do not bother to treat the actual journey in any realistic sense" (Firchow 19), whereas *The Time Machine* explores the scientific possibility of time travel with detailed explanation of how the time machine exactly works. This characteristic of the novel is important for my discussion, for eventualities are always deliberations on the realm of possibilities introduced by contemporary technologies. The importance of *The Time Machine* in the history of eventuality discourse, in other words, lies in that it is a science fiction as Isaac Asimov defines it—"the reaction of human beings to changes in science and technology" (Asimov 82)—or as Kurt Vonnegut does in a much simpler fashion—science fiction "notice[s] technology" (Vonnegut, *Wampeters* 1). After reviewing the novel briefly, I move on to its 1960 film adaptation (dir. George Pal), because it is with this Cold-War movie that time travel as a means to represent eventuality finally meets the nuclear bomb. More specifically, the differences between the two versions

exemplify how nuclear weaponry as an unprecedented form of risk transformed the pre-atomic apocalypticism into a distinctively nuclear narrative of eventuality.

The unique quality of time travel imagined in *The Time Machine* is directly dependent on the idea of time as a dimension. While the same is true for most subsequent time travel narratives, *The Time Machine* treats time travel quite literally as a movement exclusively on the temporal axis without a spatial relocation. In comparison, time travel in the *Doctor Who* franchise (a long-running television show produced by BBC since 1963), for instance, represents time travel narratives in which maintaining the exact spatial location during the time travel is never an important concern. The time machine in the series (“TARDIS”) relocates the passengers both temporally and spatially. In the *Back to the Future* movies, to take another popular time travel narrative, the time-traveling automobile (the “DeLorean time machine”) blinks from one time to another, maintaining the exact spatial point. In both *Doctor Who* and *Back to the Future*, time travel is essentially a temporal version of a wormhole travel, as you travel through a shortcut connecting two points in time instead of space. The process of the travel is, accordingly, depicted just like a wormhole travel as shown in *Doctor Who*’s famous opening sequences with the time machine flying through a temporal tunnel. Compared to the time travel process of *Dr. Who* and *Back to the Future*, *The Time Machine* depicts a time machine that travels exclusively in time at varying speeds. It thus allows the passenger—the otherwise unnamed “Time Traveller” of the novel—to experience the time travel as we do the spatial movements while driving a car. Wells even theorizes, through the Time Traveller’s words, about the risk of temporal movements while the time machine’s space is already occupied by another object: “The peculiar risk lay in the possibility of my finding some substance in the space which I, or the machine, occupied. So long as I travelled at a high velocity through time, this scarcely mattered: I was, so to speak,

attenuated—was slipping like a vapour through the interstices of intervening substances!” (18). Instead of jumping between different points in time, the Time Traveller effectively puts the world around him on fast forward and physically goes through every second of the entire travel. Because of this, his time travel becomes a cinematic experience that is an “essentially kinetoscopic ‘velocity through time’ of the accelerated objective world” (Wittenberg 87).

According to the time travel as it is conceptualized in *The Time Machine*, every second of the future history is assumed to have already been written. The novel implies, in other words, the entirety of time already exists and the Time Traveller simply explores the temporal realms that have never been charted for the people of his time. This specific choice for the mode of time travel can be associated with the fact that, historically, the British empire at the time of the novel’s publication (1895) was in “the last great age of British imperial exploration and expansion” (Firchow 19). Culturally, the novel “appeal[ed] to an audience [i.e., the late Victorians] that ... had been nourished on a rich fare of travel literature, especially travel to exotic places and often ... under conditions of extreme hardship and danger” (Firchow 19). *The Time Machine* is, in other words, a temporal version of the Victorian travel literature born out of imperialist explorations, except the exotic and foreign lands are replaced in the story by the postapocalyptic world in the future.

It is equally true, however, that *The Time Machine* is more generally a philosophizing about the future of humanity as a species, offering a dystopian vision that could be described as a Darwinian interpretation of the nineteenth century utopianism. In *Modern Utopian Fictions: From H. G. Wells to Iris Murdoch*, Peter Firchow explains the influence of Darwinian ideas on Wells’s novel as follows:

[Wells] is the first writer of utopian fiction to argue that the achievement of utopia will inevitably lead to stagnation and degeneration. ... The driving force behind

Darwin's theory is ... the struggle for the survival of the fittest. What is less well known is that a concomitant aspect of Darwin's theory posits that once this struggle ceases ... the fittest will no longer survive but must inexorably degenerate into ever more hopeless states of unfitness. ... Utopia ... is and must ever be a condition of stasis. (Firchow 28)

From this point of view, in other words, utopia means the lack of challenges, which leads to humanity's degeneration. Textual support for Firchow's reading of Wells can be found in many passages of the novel where the Time Traveller attempts to theorize the future he comes to witness. To quote some of the relevant monologues: "It seemed to me that I had happened upon humanity upon the wane. ... The work of ameliorating the conditions of life—the true civilizing process that makes life more and more secure—had gone steadily on to a climax" (26); "Under the new conditions of perfect comfort and security, that restless energy, that with us is strength, would become weakness" (28). Admittedly, "[t]he Time Traveller's understanding of the future is solely based on his deductions, which ... remain mere hypotheses to the very end" (Firchow 23). But *The Time Machine* makes an interesting case for a representation of exactly that process of deduction. The central subject of the novel, in this sense, could be the ways in which the future is interpreted (in relation to the hither-to history), as much as the nature of the imagined future itself.

When the novel is recreated into a movie in 1960, the story as a whole takes on a nuclear cast, with a number of changes and additions that reflect the film's contemporary world. The most notable addition is the nuclear war as the middle passage between the present and the future. In the novel, only about two pages of the fourth chapter titled "Time Travelling" are devoted to the description of the actual experience of time travel. The Time Traveller makes some general remarks on his travel, such as that "the peculiar sensations of time travelling ... are excessively unpleasant" (17). There is only one paragraph where he describes his visual experiences en route. Based on what little information he provides—"There was the sound of a cap of thunder in my ears. ... A pitiless hail was hissing around me" (19)—the best we can surmise is that there was (or

will be) a period of tumultuous weather symbolizing a certain kind of Dark Ages between the present times and the postapocalyptic future. In the movie adaptation, this portion is significantly expanded and elaborated. First, there is the comical scene where the time traveler's maid, Mrs. Watchett, moves about in his laboratory at an accelerated speed, just as it was described in the novel—"I supposed it took her a minute or so to traverse the place, but to me she seemed to shoot across the room like a rocket" (17). Then the travel sequence enters the movie's own take on the original, depicting George (the Time Traveller now named in the movie) chuckling at the mannequin in the show window across the street from his laboratory. The mannequin constantly changes its clothes to visualize not only the change of seasons, but also George's experience of time travel during which he is "see[ing] the changing world in a series of glimpse" (29:11).

As the story takes a dystopian turn soon after, we can clearly see that the time travel in the movie is colored with distinctively Cold-War imageries of nuclear holocaust. Instead of the ambiguous descriptions of ominous weather in the novel, there is now a more clearly articulated middle passage composed of moments during the critical military conflicts George stops by—the first, second, and third World War in 1917, 1940, and 1966, respectively. Because of the nature of the events, the history of this middle period is represented predominantly as a history of war. That war in the movie is regarded as the central substance of history is also suggested in the time traveler's musing in 1940: "The last time I have stopped in 1917, twenty three years ago. And the war with Germany was still waging—now in the air, with flying machines. Then I realized the truth of the matter—this was a new war. I decided to push on into time and see the outcome of this" (37:37-37:57). Approaching 1966—six years into the future from the movie's release—George stops the time machine upon hearing a shrieking noise, which turns out to be air raid sirens distorted by the speed of time travel. He meets the now old James Filby, the son of David Filby

who is the traveler's closest friend in his present. In the dialogue between the two, the film's identity as an atomic cautionary tale is fully expressed. Everyone is fleeing to air raid shelters, on the entrances of which are signs reading "Air Raid Precautions" (the British civil defense organization between 1937 and 1941). Unaware of the exact nature of the commotion, the time traveler marvels at the tall buildings representing humanity's material accomplishments. George excitedly tells James: "This is fantastic! Your store is magnificent! ... The achievements! The gigantic strides that man has taken!" (40:33). Then a moment later, the city is ravaged by atomic bombs. The deliberate juxtaposition of the time traveler's praise of progress and its violent destruction writes in a world-ending big bang at the end of Progress.

Because of the addition of nuclear war as a concretely defined apocalyptic event, the postapocalypse—the future—also becomes associated with the nuclear bomb as an ecocidal weapon. Once George escapes the nuclear holocaust of 1966, the original text's "clap of thunder" and "rebounding, dancing hail" (Wells 19) are replaced with descriptions suggestive of nuclear winter: "Mother Earth, aroused by man's violence, responded with volcanic violence of her own" (42:51). The language with which the time traveler describes the violent winter following the nuclear war is unmistakably reflective of the modern environmental rhetoric as well as post-nuclear-disaster stories where the hostile Nature of the turn-of-the-century naturalism returns as an artificial product. With the apocalyptic event reimagined, the descriptions of the postapocalyptic world of the future humanity—now split into two subspecies called the Eloi and the Morlocks—change as well. In the novel, the Time Traveller speculates what happened to the last civilization based on its material traces found at a place called the "Palace of Green Porcelain," a giant museum apparently built by the last intellectual humans. In the movie, the museum now houses "talking rings," audio replay apparatuses containing records of the last civilization. Two of

the rings specifically teach George how the current state of the world came to be. The first ring recounts a story about the longest war in history that eventually led to a complete destruction of the planetary ecosphere.

The war between the East and West, which is now in its 326th year, has at last come to an end. There is nothing left to fight with and few of us left to fight. The atmosphere has become so polluted with deadly germs that it can no longer be breathed. There is no place on this planet that is immune. The last surviving factory for the manufacture of oxygen has been destroyed. Stockpiles are rapidly diminishing and when they are gone, we must die. (1:11:44-1:12:17)

In the passage, the future is written as a perpetual state of war that maintains the Cold-War-like division of the world for over three centuries. Also, given that the world in the fictional history had already been destroyed once in 1966 (World War III) and the last civilization was presumably rebuilt from the ruins of said war, the movie suggests that the natural course of progress will always end up in humanity's geno-suicide, whether in the form of violent nuclear war or slow death caused by anthropogenic contamination on a planetary scale. The passage above, in this sense, anticipates J. F. Kennedy's remark in his U.N. Speech a year after the movie's release—"Today, every inhabitant of this planet must contemplate the day when this planet may no longer be habitable" (Kennedy)—and Rachel Carson's in the following year—"Today we are concerned with a different kind of hazard that lurks in our environment—a hazard we ourselves introduced into our world as our modern way of life has evolved" (Carson 187).

In the transformation of *The Time Machine* from the 1895 novel to the 1960 film, atrophy as a natural course of evolution is replaced by ecological geno-suicide as the eventual of technological accident production. The Time Traveller in the novel theorizes how the future history must have unfolded: "[Humankind] had committed suicide. It had set itself steadfastly towards comfort and ease, a balanced society with security and permanency as its watchword. ... No doubt in that perfect world there had been no unemployed problem, no social question left

unsolved. And a great quiet had followed” (Wells 61). When considered alongside the nuclearized narrative of the film, the language of this passage is particularly interesting. He uses such expressions as “suicide” or “great quiet” which can readily be applied to a nuclear holocaust scenario, but the overall outlook of this particular future is in fact utopian despite the ultimate end result of degeneration. As mentioned earlier, the future which Wells imagines in the novel draws its inspiration from a specific kind of Darwinian perspective that anticipates utopia as “a condition of stasis” (Firchow 28). The history of the future told by one of the talking rings in the movie, however, relates a story of degeneration caused not by “a law of nature we overlook, that intellectual versatility is the compensation for change, danger, trouble” as the Time Traveller explains in the novel (Wells 61), but by technological advancements eventually creating an uninhabitable ecosphere. The origin story of the two future human subspecies is also reimagined as a direct result of the ecological destruction. As the ring informs: “Some [of the last surviving humans before the second apocalypse] chose to take refuge in the great caverns and find a new way of life far below the Earth’s surface. The rest of us decided to take our chances in the sunlight, small as those chances might be” (1:12:44-1:13:01). The former became the Morlocks (the monstrous subterranean race) and the latter, the Eloi (childlike slaves of the Morlocks). While this division of *Homo sapiens* was already present in the novel, the specifically environmental and nuclear-related reasoning for the division is one of the new additions to the film.

Ultimately, the movie is a story about the inversion of Progress—the eventual progress toward a catastrophe—marked by the nuclear bomb as both the pinnacle of humanity’s technological advancement and a world-ending weapon. As the movie adds a specific historicity to the original story, it echoes observations made in the real world about the legacy of the nuke. Ray Chow notes in *The Age of the World Target* (2006), for instance, that “the dropping of the

bombs marked the pivot of the progress of science ... whereby [science] is simultaneously advanced and reduced” (29). Compared to the novel as a record of an anthropological expedition, the movie transforms into a cautionary tale informed by future events, the production and anticipation of which is afforded by scientific developments. The basic relationship between the present and the future that we find again in the *Terminator* movies is already established in *The Time Machine* the movie—the future as an already-existing reality holds sway over the present. *Terminator*, however, develops this relationship into a more dramatic and literal form, so as to create a world where the future directly invades the present, even as the state of the future is constantly dependent on the decisions made in the present.

Terminator: The Battle over the Future Waged in the Present

To recapitulate my discussion about the two versions of *The Time Machine*, the novel pioneered time travel in literature not just as a scientific possibility but also as a narrative device which allowed the future to be embedded in the present. Not only is the novel structured in such a way that the stories about the future are bracketed by the present-day frame narrative, but the Time Traveller also comes to see his contemporary world in relation to its future state that he has had the privilege to witness. About half a century after the novel’s publication, the movie adaptation rewrites Wells’s Darwinian utopia-turned-dystopia story into a narrative of eventuality. It replaces the universal philosophizing about the fate of humankind as a species—the inevitable end of evolution—with a more historically specific fear of nuclear holocaust and other anthropogenic, technology-induced disasters. More generally, the film adaptation instantiates the ways in which the technological possibility of planetary catastrophe *makes it necessary* to actively write the hereafter-history so that there is enough temporal space in the narrative to accommodate the eventual in the future. The movie also demonstrates that the most rhetorically convincing way to

recognize the invention of nuclear weapons as a catastrophic event is to imagine its terrible outcome and (as the film version of *The Time Machine* does) to present that outcome as an event awaiting us in the future. It is in this sense that the 1960 movie discovers the potential of time travel as an effective means to represent eventuality, the narrativizing process through which a possibility in the future is recognized as an eventual. *Terminator* takes a step further in representing eventuality by introducing the concept of circular causality. As my discussion of the movie in the following pages demonstrates, the causal loop plays an integral role in emphasizing the retrospective movement of the pre-posterous eventuality—that is, how the speculated eventual in effect travels back in time and defines the significance of the original event.

The *Terminator* franchise (by which I refer to the first three iterations for the purpose of this study) extensively explores the relationship between time travel as a plot device and eventuality as a narrativizing process. In terms of the exact manner in which time travel is configured in the respective texts, the crucial characteristic of *Terminator* that differentiates it from *The Time Machine* is the newly added concept of circular causality which creates time paradoxes. Both the novel and the film versions of *The Time Machine* do not delve into the possibility of the time traveler influencing the existing course of history. *Terminator*, on the other hand, is exactly a story about two opposing parties from the future competing to change the past in their favor. It turns out, however, they are all caught in a causal loop because, as I elaborate later, the act of trying to change the future by rewriting the past ends up creating the very future from which they originate.

The addition of circular causality allows *Terminator* as a time travel narrative to explore an integral aspect of eventuality that *The Time Machine* does not quite observe—that eventuality is a bilateral, pre-posterous operation. Eventuality as a concept articulates not just a fictional

hereafter event being named the eventual of a historical event, but also the eventual retrospectively defining how the historical event itself is to be understood. To use the example of the much-imagined scenarios of World War III, the eventuality of the war involves not just the war becoming the eventual of the discovery of nuclear power, but also the discovery itself being designated by its anticipated outcome as the originating moment when humanity invented WWII. The relationship between the event and the eventual in these scenarios therefore forms a kind of circular causality, as they do in *Terminator* in a more literal fashion. We write a fictional scenario—“fictional” as in speculative and extrapolative, not groundless—about the future; the fictional scenario becomes a tentative standard by which we gauge the current state of the world; people write more fictional scenarios inspired by the new understanding of the world provided by previous scenarios; and the process continues. The narratives thus produced in this process are in varying degrees factually informed. They are, however, fundamentally narratives of eventuality that demands, implicitly or explicitly, that the hither-to history be reinterpreted in light of the future they anticipate, and the reinterpreted history in turn becomes the basis of further narratives of the future. In this circular movement of the pre-posterous interaction, the event and the eventual constantly inform and rewrite each other, which results in the circularity not just repeating itself but expanding in its scope to observe more factors in reality and possibilities in the future. What differentiates real-world projections from literary fiction, however, is that in the fiction the apocalyptic future *is* a reality. Literary narratives of eventuality, in this sense, realize the hypothetical hereafter histories we can only speculate. The significance of *Terminator* as one such narrative lies in that within the story the future actively and physically intrudes into the present, which I argue is the most rhetorically powerful representation of our future projections’ sway over our perception of the present world.

Terminator uses time travel as a means to create an interdependent relationship between the present and the future, rather than to dramatize the process of the travel and present the journey as an exotic spectacle as in *The Time Machine*. The emphasis on the interdependent relationship between the preapocalyptic and postapocalyptic times in *Terminator* is demonstrated by the fact that neither of them takes precedence over the other. True, most of the story happens in the preapocalyptic time. The events that unfold throughout the trilogy, however, take place because of the actions taken by the agents from the future, as much as they do because of how the present-day protagonists react to the intrusion. This is completely different from the relationship between the Time Traveller's present and future, which is a one-sided relationship experienced by a lone anthropologist. Also, the present in *Terminator* is not a fixed point in time to which the time traveler always returns after each travel, like the modern-day London to which the human companions of Dr. Who return after their trips to all manner of places and times. As the series progresses, the present-day world of *Terminator* gradually approaches the nuclear apocalypse called Judgment Day. At the end of the third movie, the present even enters the postapocalyptic time, whereby the full circle of *Terminator*'s head-eating-the-tail history becomes complete. First the present-day protagonists—John and Sarah Connor—encounter the first Terminator (portrayed by Arnold Schwarzenegger); John Connor survives the nuclear apocalypse; and finally he becomes the leader of the human resistance and sends his agent back in time to protect his mother and himself from the first Terminator.

The Terminator (James Cameron, 1987), the first movie of the franchise, begins in the ruins of Los Angeles in 2029. In the opening scene, a robot army is marching over human remains and hunting down the few remaining survivors. About a minute into the movie, an on-screen message appears:

The machines rose from the ashes of the nuclear fire. Their war to exterminate mankind had raged for decades, but the final battle would not be fought in the future. It would be fought here, in our present. (01:28)

This succinct bit of context for the *Terminator* universe is interesting in a couple of ways. Immediately noticeable is the peculiar tense of the background story. The first two sentences inform the viewers entering the world of *Terminator* for the first time that a nuclear war *had happened* at some point in the past, and the machines' campaign for humankind's extinction *ensued*. At this point, the present is the postapocalyptic world. But, then, the second half of the second sentence and the third sentence suggest that the background story is actually being told from the preapocalyptic present, and the fight in this present—"our present" as the narrator designates—*will* happen after the events that have already happened in the future. Viewers familiar with the fictional tropes of time travel and time paradox would soon pick up that there are two temporal stages in the movie, and that the future initiates the series of events unfolding in the present. We have already seen this particular form of temporal relations between the present and the future in the opening chapter of Carson's *Silent Spring*. In fact, when the nuclear war and hostile robots are replaced by hazardous pesticides, the background story for *Terminator* perfectly expresses *Silent Spring*'s preamble and how it frames the rest of the book. Careless use of pesticides has already caused irrevocable damage to the planet, but "the final battle ... would be fought here, in our present" in the time of *Silent Spring*'s readers.

The content and brevity of *The Terminator*'s prologue suggest that by the time the movie was released (1984) the tropes of time travel, nuclear holocaust, and A.I. rebellion had already become familiar to the general public. *The Terminator* is, however, unique by the contemporary standards in that it not only combines the three tropes seamlessly, but also utilizes time travel in a completely different way from *The Time Machine*. Compared to Wells's novel and its film adaptation, time travel in the *Terminator* franchise is used exclusively to open up the present to

the influences from the future, rather than to allow the protagonists to travel in time. The Connors in the present never experience the world-ending event throughout most of the trilogy. All their pursuit to change the course of history is carried out based mostly on a secondhand knowledge (along with the strong encouragement from the android assassins sent back in time, of course). Time travel in *Terminator* is a channel through which an external force can affect the present-day protagonists—their actions, their understanding of the present world, and finally their existence itself—in the form of entangled causal relations between the two times. In the sense that the human protagonists are not themselves time travelers and the process of time travel is never really one of the central interests of the story, time travel in *Terminator* is much more important as a plotting device. The film franchise demonstrates, as such, that “[t]ime travel narratives have metafictional characteristics inasmuch as they encourage readers to think about the construction of narrative” (Leiby 38-39). Already in the short preamble to the series in the first minute of the first movie, understanding the composition of the plot is given as a major hermeneutics of the franchise—a quest that viewers are invited to pursue. The same task is given to the Connors as well, for their journey throughout the series is, after all, dependent on their decision to believe in and react to the incredible plot of the hereafter-history explained first by an agent sent by the future human resistance and later by T-800, the villain-turned-hero Terminator.

Because of the possibility of mutual interference introduced by time travel, the hereafter-history of the *Terminator* universe is constantly threatened ontologically even as it haunts the present-day world. The future of the robot army led by Skynet—the super A.I. responsible for the nuclear holocaust—and the few remnants of humanity exists as it does at the moment, but it is also contingent on crucial decisions made or to be made in the present. Those decisions most notably include the development of Skynet, the culminating point of which appears in the third movie

where the A.I. is fully activated. The ensuing battle between humans and the A.I. is literally ontological, for both parties vie to obliterate each other—to strike out the letters of their enemy from history. In narratological terms, what is at stake is then the *fabula* itself; the battle is waged not on how the future will be written since it has already happened once, but on how it can be rewritten.

The *fabula* of *Terminator* is mutable, for “[t]he future is not set” in this reality, as one character says in the first movie (1:08:08). The series as a whole is an embodiment of this mutability, as it dramatizes that “the *fabula* of a time travel narrative may very well be ... incomplete at the time the narrator begins his tale” (Leiby 40). The *fabula*—“the order of events referred to by the narrative”—as opposed to the *sjuzet* or *syuzhet*—“the order of events presented in the narrative discourse” (Brooks 12)—often functions as the story’s hermeneutics, especially in narratives with an entangled chronological order, deliberate lack of information, and/or an unreliable narrator. In Faulkner’s *Absalom, Absalom!* (1936), for example, figuring out the *fabula* becomes the primary task of reading as well as a major driving force of the narrative itself, as the two protagonists of the novel, Quentin Compson and Shreve McCannon, try to piece together a story about the Compson family’s past. The situation is similar in *The Zero* (2006), Jess Walter’s post-9/11 novel. Because of the schizophrenic narrator-protagonist Brian Remy, readers only get to know one strand of the story which the Dr. Jekyll side of Remy remembers, even as the Mr. Hyde side of the story is undoubtedly progressing outside the reader’s purview. The novel as a whole is also thematically driven by the desire to know the truth, represented by the fictional government department called the Remains Recovery Department which is tasked to reconstruct the “true history” from the partial documents that survived the terrorist attacks. Dramatized in both novels is the impossibility of knowing the pure, objective past, as discussed in Linda Hutcheon’s

postmodernism: “Historiographic metafiction acknowledges the paradox of the *reality* of the past but its *textualized accessibility* to use today” (*Poetics* 114). From this perspective, the past objectively exists, but we can only ever access it through the mediation of representation.

In *Terminator*, the boundary between the *sjuzet* and the *fabula*—the story and the history to which the story refers—is conflated. The franchise actively incorporates into the narrative itself the chronological and causal complications that time travel entails. If “[p]lot could be thought of as the interpretive activity elicited by the distinction between *sjuzet* and *fabula*, the way we *use* the one against the other” is a form of plotting—an imposition of temporal order and causal relations between story elements and events (Brooks 13). In time travel narratives where time paradoxes play a critical role, however, we only have the *sjuzet*, partly because the *fabula* of the henceforth is open to the possibility of being rewritten. It is also because the version of the future we know—like the ruins of human civilization portrayed in flashforward scenes of *Terminator*—is already incorporated into the hitherto-story through the logic of circular causality. In the first *Terminator* movie, for example, Kyle Reese (a member of the human resistance) is sent back in time to protect Sarah Connor (John’s mother) as Skynet’s objective in this iteration is to kill Sarah to prevent John from being born in the first place. Kyle at one point explains to Sarah that his mission is important because “You must survive or I will not exist” (1:08:13). Kyle, however, also spends a night with Sarah and she becomes pregnant with John. Kyle travels back in time not only to prevent the A.I.’s attempt to kill Sarah, but also to actively, albeit inadvertently, enable the henceforth timeline by becoming John’s father. Skynet also unintentionally contributes to creating the very foe whom it tries to erase from history, since Kyle would not have been sent on his mission if it was not for Skynet’s scheme.

The battle between humans and machines in *Terminator* is ultimately a stalemate. The two forces are oppositional and yet mutually dependent, due to the plotting that completes the causal loop and the threat of obliteration that goes on forever in that loop. The only way this circular structure of the narrative can stop is for either side to win once and for all. Neither side wins, however. Their battle ends in a perpetual stalemate exactly because the competition's result makes its beginning possible at all. To understand this point, we have to look at the grand story arc encompassing all three movies. The first movie depicts Skynet's initial attempt to obliterate the human resistance by assassinating Sarah Connor. In the second iteration, her son—John Connor—is already born, now a teenager. This time Skynet tries to kill John and a couple of others who are to be high-ranking officers of the resistance. The human protagonists go on the offensive as well, as they try to actively foreclose the birth of Skynet by persuading the inventor of the A.I. to destroy the Skynet program in near completion. It is, however, in the third movie that the story arc becomes complete.

The most striking feature of the third movie in terms of its role in the series' overall plot is that the malleable middle period between the present times of the first two movies and the post-apocalyptic future is finally rigidified. Everything in the third story contributes to the completion of the grand narrative loop of the franchise. In the time between the second and third movies, Skynet is again invented by another person, Lt. Gen. Robert Brewster, USAF. He is Skynet's primary creator and the father of Kate Brewster, the third movie's heroine and John's future wife. The seemingly inevitable creation of Skynet is reflective of the idea that dangerous technologies like nuclear power is destined to be discovered and the technological knowledge itself cannot be unlearned, or as Jonathan Schell puts it, "the world forever after [the discovery of nuclear power] would be, if not nuclear armed, then at least nuclear-capable" (*Seventh* 34). It is this fatalistic view

of history and technological progress that the third *Terminator* movie dramatizes, as it completes the story arch by finally setting in stone the apocalyptic event which connects the present and the future as they have existed so far.

Considering that the entire plot of the series revolves around the battle between humans and machines to change the course of history, the moment at which the story finally catches up to the apocalyptic event, which has been only referred to so far in the story, is surprisingly anticlimactic. Neither side wins, and John Connor merely survives the nuclear holocaust rather than preventing it. Described just as a self-learning program in the second movie but now an A.I. in control of the entire nuclear arsenal of the U.S., Skynet is finally activated and soon becomes self-aware. In an attempt to destroy Skynet's main frame, John and his future wife, Kate, hurry to a secret government bunker built in a remote mountain as they have been instructed by Robert Brewster in his dying breath. The bunker, however, turns out to be just a spacious fallout shelter for VIPs built during the Cold War. Seeing all the outdated computers under decades of dust, the protagonists belatedly realize that Skynet does not have any main server but exists on the network, and that Kate's father just wanted them to survive the imminent catastrophe. At this point, the repeatedly mentioned mission objective of T-800—keeping John live—is reiterated, reminding the viewers that despite the action hero traits of T-800, he was never tasked to prevent Judgment Day. The third movie's ending, more importantly, emphasizes that *Terminator* as a story was never about an eventual victory of humankind, but the perpetual condition of struggle itself. John's closing narration clearly suggests this point: "I should've realized our destiny was never to stop Judgment Day. It was merely to survive it, together" (1:41:04). Hiding in a Cold-War fallout shelter, the couple survive to fill in the missing link of the looping story arc, whereby the *sjuzet* and the *fabula* finally become one and the same.

To recapitulate, time travel has been utilized in fiction to represent eventuality as a narrativizing process which consists in both the event's development into its eventual and the eventual's retrospective assessment of the event's historical significance. This much had already been discovered by Wells' *The Time Machine*, and subsequently applied to the eventuality of nuclear power in the film adaptation. It is in *Terminator*, however, that the future comes to actually influence the present. The future event in the movie is thus fully conceived as an eventual—the hypothetical outcome of a heretofore event dictating our actions in the present. The introduction of circular causality also makes *Terminator* a more effective representation of eventuality, for not only our production of future disaster projections are inspired by historical trends, but also the history and the current state of the world are constantly reinterpreted based on the future projections.

Eventuality Narrative Case Study: Skynet as the Embodiment of the Global Nuclear War Machine

In the remaining pages of this chapter, I examine the historical and technological context of Skynet, the true antagonist of *Terminator*, to demonstrate how history and fantasy interact in a narrative of eventuality. As a combination of a self-learning A.I. and a computerized weapons system (both of which continue to be developed by the military today), Skynet makes a perfect symbol of modern technology that has seemingly become an independent threat with its own agency. The entire story of *Terminator*, after all, consists in humanity's own creation not only leading to their ultimate demise, like pesticides do in Carson's ominous vision of silent springs, but doing so as a conscious agent. Simultaneously a character articulated with a name and an amorphous force, Skynet is an embodiment of the networked and automated systems of unimaginably destructive weapons in the world. This personification—an A.I. representing a broad

material reality—makes a stronger case for eventuality, for now the development from the event (the birth of the atomic bomb amplified in *Terminator* by the creation of Skynet) to the eventual (the end of the world) occurs largely independent from human actions, on the level of things themselves. Like the ecological point of no return that has been discussed in recent years vis-à-vis climate change, Skynet allegorizes the moment in technological advancement when the inertia of currently existing material forces may set the course of history toward a technological cataclysm.

Skynet as an idea comes from the science fiction tropes of sentient A.I. and A.I. rebellion. Early instances of the tropes include D. F. Jones's novel *Colossus* (1966) and Harlan Ellison's short story "I Have No Mouth, and I Must Scream" (1967). They represent the typical plot of the subgenre born in the Cold War, where supercomputers control the superpowers' vast array of weapon systems, eventually attain self-awareness, and exterminate the human race. Between the two stories, there are only minor differences in the number of the supercomputers—two in *Colossus* built by the Soviet Union and the U.S., as opposed to three in "I Have No Mouth" with China added as the third party. While not a world-destroyer A.I., "Multivac" in a number of works of Issac Asimov is often depicted as a mechanical sage or even a de facto god in some stories, based on whose calculations humans make major decisions. Much like these predecessors, Skynet is a cutting-edge A.I. capable of machine learning that attains consciousness soon after its activation. Its creators try to deactivate the self-aware Skynet because the A.I. has been given complete control over all networked components of the U.S. military systems, including its nuclear weapons. As a preemptive measure for self-preservation, Skynet decides to destroy humanity in the most effective way available to it at the moment—to launch nuclear missiles at Russia to trigger a global nuclear war (similar to *The Sum of All Fears* [2002] where a terrorist group attempts to spark a nuclear war between the same countries). Skynet's choice demonstrates that it not only has

the means to carry out its plan, but also a good understanding of the political instability of the Cold-War world and the material insecurity of the nuclear-armed world.

One of the integral aspects of the Cold War's legacy that Skynet represents is the newly conceived possibility of accidental war caused by increasingly automated weapon systems, including such functions as targeting, delivery, and monitoring, all developed alongside nuclear warheads themselves. In this sense, Skynet is a variation of the fabled Doomsday Machine. A fictional fail-safe retaliatory system, the doomsday machine is designed to detect incoming nuclear missiles and automatically launch a massive counterattack, without any human input throughout the entire process. Although the idea of automated war machine capable of destroying the entire world may seem fantastic, it is largely based on the material realities that the Cold War has produced. As a concept, the doomsday machine is an extreme expression for the doctrine of mutually assured destruction or, in less dramatic terms, mutual deterrence through the threat of nuclear retaliation. There are real-world instances of doomsday machine in history, albeit not as autonomous as the fictional system. One instance is the United States' general nuclear war plan Single Integrated Operational Plan (SIOP) that remained effective until 2003 (and succeeded by Operation Plan [OPLAN] 8010 with toned-down retaliatory plans). The 1962 version of SIOP demonstrates its end goal was not much different from that of the doomsday machine, as it "envisaged a pre-emptive first strike involving 3,423 weapons totaling 7,847 megatons [which] would result in the immediate death of 285 million Russians and Chinese" (DeGroot 268). Another example, the SAGE (Semi-Automatic Ground Environment, which was in operation until the 1980s) was a nationwide monitoring system composed of supercomputers jointly producing a unified image of the U.S. airspace based on radar data, "forged out of the demand for a total national defensive carapace" (Marzec 55). On the other side of the Pacific, Russians created a

semi-automated nuclear retaliatory system called “Perimeter,” which was the closest system to an actual, fully-automated doomsday machine. Under a certain condition where the system determines the Soviet Union is under attack (such as when the system cannot establish communication with the national command center), it is programmed to launch communications rockets which consequently order nuclear missiles to launch. Perimeter will be discussed further in the next chapter.

Skynet is an effective representation of the interlocked global war machine comprising nuclear-armed states perpetually in preparation for the eventual of nuclear war. I say effective because Skynet is, just like the global nuclear war machine, a human product that ends up escaping human control to create a catastrophic accident. Skynet as a program coordinating the military hardware and networks is intended. Skynet developing consciousness and turning against humans, on the other hand, is an accident. In Virilio’s sense of the word, of course, the A.I. going rogue is a side effect that is as much a product of its invention as its intended use.

The story development from the second *Terminator* movie to the third suggests, however, that the birth of Skynet cannot be prevented. The protagonists manage to prevent the development of Skynet in the second movie, but the third movie shows that the development was simply delayed and would be accomplished by another inventor at a later date. This is the reason why Skynet is also an interesting representation of the nuclear war machine—the super A.I. is presented as an inevitable product of technological advancement, rather than an unfortunate chance event. A similarly fatalistic assumption on technological development is found in *A Canticle for Leibowitz* (Walter M. Miller, 1959). In this postapocalyptic science fiction novel’s history, humans had become almost extinct by a nuclear war, and many centuries later a new civilization of humans repeats the same process independently from the old world’s technological knowledge. In the

greater context of the technological anxiety that both *A Canticle for Leibowitz* and *Terminator* reflect, powerful and hostile A.I.s in fiction do not primarily represent the actual prospect of inventing sentient artificial intelligence (although relevant scientific advancements certainly inspired writers), so much as the material condition of the world that may lead to the same disastrous end.

In political terms, Skynet is an externalization of the insanity that is at the core of the doctrine of mutually assured destruction. True for any kind of nuclear retaliatory doctrine, even when they are not as extreme as MAD, is that “the sane half and the crazy half cannot easily be pried apart” (Schell, *Seventh* 61). Deterrence works, that is, only insofar as the country that makes the threat is genuinely committed to the act that it would define insane. The structural logic of deterrence therefore rests on the dichotomy of insane and sane, and simultaneously invalidates any claim on the position of sane possessor of nuclear weapons. Skynet embodies the two core components of this structure of deterrence—the madman initiating the attack, and the retaliatory system that guarantees for the initial attack to escalate to a series of mutual exchanges—for the A.I. initiates the attack with a full intention of triggering a war between humans. The characterization of Skynet follows the age-old tradition of othering—a process through which negative traits of the self is externalized and projected onto the monstrous other. The fact that Skynet is the culmination of humankind’s technological advancement, however, renders the clear dichotomy difficult. In the *Terminator* universe, humans create their own madman that is Skynet. Skynet, however, is not a deranged terrorist, but a systemic trigger that awaits an activation. At the very end of the third *Terminator* movie, John Connor narrates, “Judgment Day, the day the human race was nearly destroyed by the weapons they’d built to protect themselves” (1:40:54). Herein lies the fundamental misunderstanding of deterrence. There is no such thing as a weapon that

“human race” has built for “themselves.” Each and every nuclear weapon was built by an individual nation trying to protect itself. When seen on the level of species, the human race has simply stockpiled weapons that could kill themselves, which is a state of the world that Skynet represents in a much more simplified and tangible relation between the autonomous weapons and humans.

Skynet as a character reiterates the elusive truism that there is no element of security or protection guaranteed by nuclear weapons on the species scale. It is exactly what the alien ambassador in *The Day the Earth Stood Still* (Robert Wise, 1951), Klaatu, tells the people of the Earth: “I came here to warn you that by threatening danger your planet faces danger. Very grave danger.” (43:13) The “race of robots” created by the unspecified federation of alien races as a perfect police force represents a utopian vision for nuclear weapons as a means to keep peace through force. Klaatu’s parting speech to humankind elaborates this vision perfectly:

We have an organization for the mutual protection of all planets and for the complete elimination of aggression. ... For our policemen, we created a race of robots. ... In matters of aggression, we have given them absolute power over us. This power cannot be revoked. At the first sign of violence, they act automatically against the aggressor. The penalty of provoking their action is too terrible to risk. The result is we live in peace without arms or armies, secure in the knowledge that we are free from aggression and war. ... Join us and live in peace or pursue your present course and face obliteration. (1:28:38-1:30:14)

The idea suggested here is that the technological utopia is possible only when the ultimate weapon is made into a self-functioning and self-governing entity, whereby it is forever separated from its creator, just like Skynet sans its genocidal tendency. The result is the exact opposite of the constitutional right to bear arms becoming hardcoded into the structural base of society. When compared to the utopian scenario of *The Day the Earth Stood Still*, the planetary material condition represented by Skynet is far more realistic. In the former, the ideal of the Hobbesian transfer of the natural right to self-preservation to society is finally realized in a truly universal form, for there

is no longer an outside; the entire galaxy is under the control of a single policing force, an army of robots with an exclusive right to possess weapons. Or rather, the movie suggests that weapons of mass destruction create a situation where ensuring peace within the national border becomes practically meaningless when each nation's act of self-preservation would eventually lead to the self-destruction of the species. Thus, nuclear weapons as the technological means to inflict destruction on a fantastic scale "fuse[] an obliteration of the other with collective suicide" (Masco, "The End" 1122). Both the robot-controlled galactic police in *The Day the Earth Stood Still* and Skynet in *Terminator* are products of this new material condition of the nuclear age, one foreclosing and the other expediting the eventual of nuclear geno-suicide.

Skynet represents the real-world system capable of self-destruction on the planetary level, more than it does the fictional idea of super A.I.s gone haywire. This is strongly suggested by the way in which Skynet causes the nuclear holocaust. The following is a dialogue between T-800 and Sarah Connor appearing in the second movie.

T-800: "The system [Skynet] goes online on August 4th, 1997. Human decisions are removed from strategic defense. Skynet begins to learn at a geometric rate. It becomes self-aware at 2:14 a.m. Eastern time, August 29th. It a panic they try to pull the plug."

Sarah: "Skynet fights back."

T-800: "Yes. It launches its missiles against the targets in Russia."

John: "Why attack Russia? Aren't they our friends now?"

T-800: "Because Skynet knows the Russian counterattack will eliminate its enemies over here." (1:17:58-1:18:28)

Skynet launches nuclear missiles at its disposal against Russia because Russia has the most nuclear weapons aside from the U.S. Skynet understands the structure of deterrence, at the core of which is the assured retaliation. In this scenario, Skynet does not simply destroy the world on its own. The end of the world comes because the A.I. knows how to activate the hair-triggered global nuclear system, or rather, simply because the system is already in place. At the center of *Terminator's* mental experiment is, then, the question: What will be left when the human element

is subtracted from the equation of the global nuclear weapons network? The answer the movie offers is just the sheer amount of radioactive explosives and weapon systems as some of the most complicated and largest anthropogenic “organs” of the postwar world ensuring their detonation, which together create “the technological infrastructures of human extinction” (Masco, *Borderlands* 1). Skynet is quite literally the embodiment of what Virilio calls “Great Accident”—“the accident of a world now foreclosed in what is touted as ‘globalization’, this internationalization at once desired and dreaded ... as though the anthropological horizon of ideas and ideals suddenly felt blocked off, both by the foreclosure represented by a geographical lockdown and by the suddenness of worldwide interactivity of exchange” (Virilio, *Original Accident* 38). It would not be farfetched to say that before the age of international flight networks and catastrophic global epidemics fictions, or before the age of the internet and the heads of states insulting each other on Twitter, it was nuclear missiles capable of reaching anywhere on the planet that brought about globalization, in the form of eventuality that everyone on the planet came collectively to fear.

CHAPTER II. THE NUKE AND WARGAMING: NARRATIVES IN BETWEEN THE FANTASTIC AND THE REAL

In 1952, the Federal Civil Defense Administration (FCDA) commissioned the architectural firm McLeod and Ferrara to build a mock-up town called “Rescue Street” in Olney, Maryland. The town was “designed and built in permanent ‘bomb-damaged condition’ to serve as sets for realistic training of civil defense rescue workers and planners from all over the nation (Monteyne 22). It was possibly the most physical embodiment of the fantasy that the hypothetical event of nuclear war—the eventual of nuclear power awaiting in the future—could be represented. While quite literally built like a model house, however, Rescue Street was a curious case of model, because it did not have any existing referent. There was no original to imitate. Both the original and an imitation, Rescue Street was thus a self-referential fiction—a simulation of a nonexistent event.

Wargaming, too, is a form of simulation in the same sense. Despite the real-world data it references, wargaming fundamentally simulates nonexistent events. “To simulate,” in this sense, “is to feign to have what one doesn’t have,” as Baudrillard defines simulation in *Simulacra and Simulation* (3). That was exactly what wargaming was designed to do—to feign to have the knowledge of the future or the blueprint for nuclear contingencies. More generally, the nuclear strategic discourse, including wargaming and the U.S. civil defense as attempts to represent nuclear eventuality, is inherently speculative, which is why I call it strategic *fiction*. “[A]lmost all the enormous body of writing and the sophisticated conceptual structures which have been built up about the use of nuclear weapons for preventing or conducting conflicts are in a strict sense speculative” (Quinlan 13). This body of discourse that consists in simulations of hypothetical

nuclear events is thus a peculiar combination of matter and fiction—highly sophisticated technologies and classified information on the one hand, and stories of eventualities on the other.

Ever since the discovery of nuclear power, nuclear weapons have been physically manufactured, tested, and deployed, but the knowledge about their effects and the future they might bring about had to be simulated. There certainly are empirical data available with which estimations and scenarios can be and have indeed been generated, such as the records of historical weapons tests and laboratory experiments. The earliest data of this kind was the set of reports produced by the U.S. Strategic Bombing Survey (1944-45). The Survey's board of experts put together reports comprising over 300 volumes assessing the effects of the Allies' strategic bombing of Germany and Japan during WWII with a separate section devoted to the atomic bombs, which became a major source of data for the civil defense later. In the end, however, we have virtually no empirical data on major nuclear conflicts. The bombing of the two Japanese cities in 1945 is not representative of potential nuclear conflicts during and after the era of nuclear arms race. The result of a proper nuclear war (instead of a one-sided use of two atomic bombs with significantly low yields by the current standards) would be significantly different in terms of megatonnage, travel distance, and travel time. There is also the qualitative change since the days of the U.S. nuclear monopoly, in that now multiple countries own nuclear weapons. Quantitatively, "Hiroshima and Nagasaki do not serve as precedents for any probable nuclear war scenario. The weapons used on those cities approximated 15 kilotons of explosive force each. At one megaton—a small weapon by contemporary standards—we are trying to imagine 70 simultaneous Hiroshima explosions" (Geiger 17). At the peak of the arms race in the 1960s, the total output of the U.S. nuclear arsenal was "the equivalent of 1.4 million Hiroshimas" (Millet 396). Qualitatively, "Hiroshima and Nagasaki were single events, with effects decaying over time," whereas "today

we are faced with the possibility of multiple events—a thermonuclear explosion at 10 a.m. and another at 4 p.m.” (Geiger 17). Also, any data collected from controlled environments like weapon tests do not tell us how actual conflicts—the interactions between nations as well as between human and ecological agents—may exactly play out. The possibility of meaningfully effective⁵ physical defense against missiles has only ever been imagined, as in President Reagan’s fantasy of Strategic Defense Initiative (SDI). The only remaining alternative for the world to prepare for the eventuality of nuclear war is to simulate—to feign to know the future events by fabricating scenarios and exploring possible decisions based on the scenarios. For this reason, the nuclear bomb has largely been written into history as the simulated, speculated, and fantasized, despite its unprecedented materiality represented by its destructive power and the ecological cost of its entire life cycle.

One of the notable discursive counterparts to *Rescue Street* as a simulation of the hypothetical nuclear event is nuclear wargaming. This chapter explores nuclear wargaming in relation to nuclear war fiction to demonstrate the affinity between the two genres—strategic fiction (wargaming) and literary fiction about nuclear war. The goal of the comparison is to show that wargaming is not different from literary fiction in that it is also fundamentally fiction, as it simulates the knowledge of the future. The inevitably (or even purposefully) speculative nature of wargaming as a discursive field designed specifically to study the unprecedented form of risk evidences that the nuke—weaponized applications of nuclear power—can only be fully represented with narratives of eventuality. Through wargaming, in other words, the nuke is

⁵ “Meaningfully effective” defense against nuclear weapons: “When the US World War II bomber force had to fly repeated missions over the same German targets ... the Germans exacted heavy losses on our [the Allies’] bomber forces. But even then, the attrition rates obtained by a good air defense system were in the range of 4 to 8 percent. ... [I]n a nuclear war with an ICBM attack of one or two sorties, an air defense system that shoots down only 10 percent of the attackers is catastrophically inadequate. To be effective against an ICBM attack, a defensive system must exact attrition rates well in excess of 90 percent—the first time! No historical data supports contentions that such attrition rates could be achieved by any defensive system in real combat situations” (Perry 67-68).

discovered as an ontologically ambivalent mass that is simultaneously the sum of its constituent materials and its destructive potentials which may one day create countless material interactions between itself and the planetary ecosystem. What makes wargaming interesting as a topic pertaining to the study of nuclear fiction is the fact that it emerged as a response to the lack of empirical data about nuclear war (to reiterate, the atomic bombing of Hiroshima and Nagasaki was a unilateral use of nuclear weapons, and as such does not offer sufficient data for a large-scale nuclear exchange). That this response is a form of futurology highlights the nature of its central subject matter—the disaster in the future whose material basis already exists in the present.

One particular matter I want to emphasize again before moving on to the discussion of wargaming is that it covers the very lack of knowledge, not the truth. There is no truth about nuclear war as it has never happened. In this sense wargaming does not constitute what Timothy Melley calls the “covert sphere” engendered by secrecy. Wargaming represents, instead, a *fantastic* sphere, in the sense of the Lacanian fantasy that covers the lack of truth—the hole in the Symbolic, insofar as the Symbolic in this case is the body of existing literature about nuclear war. As much as it constitutes a fantasy, however, wargaming is symptomatic of the technological development that necessitated the fantasy—the simulation of unobtainable knowledge—as nuclear weapons has forced humanity to consider not just their contemporary material existence, but the accidents in the future in Virilio’s sense of the word. The invention of the nuclear bomb also invented its accidents—nuclear disasters including but not limited to nuclear war—in the sense that “to invent the sailing vessel ... is to *invent the shipwreck*” and “[t]o invent the train is to *invent the derailment*” (Virilio, *Unknown Quantity* 24; original emphases). Wargaming, then, is a discourse whose primary objective is to represent the accident, which inevitably renders the discourse speculative even as it stares intently at the material conditions of the contemporary world.

Although Melley's notion of covert sphere does not quite explain wargaming, it still offers an opportunity to consider nuclear fiction's relationship to reality. He defines the covert sphere as "a cultural imaginary shaped by both institutional secrecy and public fascination with the secret work of the state" (5). It is a discursive realm inhabited by speculative fiction and conspiracy theories, offering "channels of knowledge ... between the public and the covert state" (Melley 16). "This knowledge," he explains, "comes substantially through fiction, which the public can dismiss as an amalgam of possibility, fantasy, and dramatic hyperbole" (16). Taking the relationship between 9/11 and the uncanny prescience found in the pre-9/11 fiction as an example, Melley continues to write,

Popular film displayed an awareness that the world was poised to strike the United States, and yet this awareness was disavowed as mere fiction. As Michael Taussig notes, when public secrets concern state institutions, "only the movies tell it like it is. ... But that's fiction." The phrase "but that's fiction" is a familiar dismissal—a reminder that fiction is what the philosopher John Searle (following J. L. Austin) famously called "nonserious" discourse. But it is precisely fiction's status as nonserious that has made it the privileged discourse of the covert sphere. Unlike the "serious" discourses of the rational-critical public sphere, fiction can reveal the public secrets of the covert state without appearing to reveal any "real" secrets, for its knowledge is invented, not found. (16)

Literary fiction indeed plays a special role in questioning classified truth. Melley's implicit argument in this passage with regards to the pre-9/11 fiction anticipating the attack, however, is that the fiction should be taken "seriously," rather than "disavowed as mere fiction." The covert sphere is a delicate concept, as its primary interest lies in the very phenomenon of discourse production in the absence of concrete public knowledge, rather than whether or how much the narratives thus produced are true. As such, arguing that "fiction can reveal the public secrets" somewhat defeats the purpose of the concept. Although he does not make it explicit, the argument in essence is not much different from that of Eugene Burdick and Harvey Wheeler in their preface to *Fail-Safe* (1962). It is a Cold-War American novel describing how a fictional World War III

could almost happen due to a mechanical error on the United States' part and how they prevented the war by dropping a nuclear bomb on one of their own cities. In a somber tone the authors write in the preface, "Men, machines, and mathematics being what they are, this [the novel] is, unfortunately, a 'true' story" (8). On a similar note, William R. Forstchen, the author of the *New York Times* bestseller nuclear novel, *One Second After* (2009), complains in the acknowledgements of the novel's sequel that his attempt with the first novel to "lay before the American public the existential threat to national survival"—by which he refers to electromagnetic pulse (EMP) attacks—has failed and that he has "at times, been met with mocking disdain" (7, 8). While the concept of covert sphere does not exactly suggest that we heed the novelist's warning about EMP, it constantly attempts to link truth with fictions created around it.

Nuclear fictions like *Fail-Safe* or *One Second After* are not "mere" fiction, but they are fiction nonetheless. The question which my study of nuclear fiction suggests we ask is not whether we should call them mere fiction or change the definition of fiction, but whether we can understand the material state of the present world without fiction—speculations on the futures and narratives of eventuals. The question is also, consequently, whether we should openly acknowledge speculative narratives as an integral part of the representation of reality. This question is especially relevant in an era where various kinds of threat assessments are inevitably reliant on speculations and affect real-world decisions that have actually shaped history from the Cold-War arms race to the antiterrorism policies of today. My answer to both questions is a yes. Fiction is necessary to understand the material state of the contemporary world, especially with regards to the nuke. The second question, whether we should more generally consider speculative narratives as an integral tool to understand the present, is certainly debatable. But it cannot be debated that climate change as the latest global threat to humanity has introduced another stage of amalgamation between

empirical science and fiction. The discourse of eventuality as the confluence of empirical science and fiction emerged to represent the material reality in terms of its potentials.

The discourse of eventuality is discussed in this chapter through two genres of texts—military nuclear discourses and literary narratives of the nuke. I will refer to them heretofore as *nuclear strategic fiction* and *nuclear literary fiction*. By strategic fiction, I refer to the discourses produced to prepare for potential military conflicts involving nuclear arms, most prominently in the form of wargaming. I consider strategic and literary fictions side by side because both genres comprise the body of speculative discourses on the eventuality of the nuke, influencing and inspiring each other. When I say the nuke is fiction, strategic and literary narratives of nuclear eventuals together represent this fiction. Discussions of specific texts representing either genre in the following pages will also demonstrate that there is a significant degree of affinity between strategic and literary fictions, not just in terms of how fantastic they often sound, but also, more importantly, how imagination figures as an integral value in both genres. The majority of the discussion will focus on the Cold War era. While the fundamental nature of the bomb has never changed since its birth, it was during the Cold War when the futures that may be brought about by the terrifying new technology were most actively speculated. The most paranoid moments in this regard were also the most productive moments, in both terms of arms production and discursive production.

Alongside nuclear war fiction, wargaming is discussed in this chapter as a representative of the discourse devoted to producing the knowledge about the nuke. Despite the empirical data accumulated and processed over time, any discourse attempting to represent the fully realized state of the nuke's potentials is by definition speculative. With enough security clearance, one may

acquire at least the estimated numbers of the weapons that the potential enemies possess,⁶ but anticipating whether and how they will use them and exactly how much damage the hypothetical attacks would incur requires more than sufficient data and sophisticated calculations. The anticipation requires imagination, not only because war involves human intentions but also because those who design simulations of nuclear war or postwar states have to decide which social as well as ecological factors they should include in their estimations. The entire genre of modern wargaming was born out of this very necessity of imagination. Nuclear weapons as an unprecedented variable added to the equation of war forced the military, political, and scientific experts to acknowledge that the potential threat was far beyond what they had hitherto experienced and yet there was not enough data to make decisions without relying on speculative estimations. While every technology also invents its own accident, the need to anticipate and prepare for the accident becomes imperative when said accident is expected to involve millions of immediate casualties within a matter of hours. Declassified wargames and studies discussing war plans thus offer a peculiar perspective. We generally do not associate the military with imagination or literary sensibility. But the area of strategic studies concerned with scenarios of nuclear conflicts read almost like fiction. They read like movie scripts, not necessarily in terms of style, but very often in terms of their fundamental mode of narrativization. They are both ways of plotting or fabricating a series of causal links between things, people, and events in inventive ways.

The nuclear bomb's unprecedented potential for destruction, in other words, brought about an era in which scenario writing became an integral part of representing the material reality of the

⁶ Still, very few have access to top secret military information about the nuke. Bret Lorrie's 2001 *Bulletin of the Atomic Scientist* article explains, for example, that even the U.S. senators cannot review the SIOP, which makes it impossible for them to produce policy guidance based on hard facts. Lorrie also shows that even the research organizations dedicated to nuclear arms control, such as NRDC (Natural Resources Defense Council), have to resort to approximations, "[i]n the absence of the real, classified SIOP" (23).

contemporary world. Scenario writing—wargaming, war plans, threat assessments, and political columns on the prospect of the North Korean nuclear program, for example—is indicative of the state of the nuclear age (1945-present) where the future constantly encroaches on the present, or rather where the future is already and permanently a part of the present. While not a single bomb has been detonated in war since 1945, nations’ nuclear weapons production and political negotiations as well as conflicts between them—represented most notably by the US-SU/Russian arms race and the international regime of deterrence, respectively—have had as their fundamental motivation the *projected* threats of the bomb. And in the process of textualizing the hypothetical disasters looming in the future, military scenarios and literary nuclear fictions are both produced in the realm of nuclear discourse perpetually caught between the real and the fantastic. Strategic fictions written by military or scientific experts on nuclear warfare, of course, cannot be directly equated to literary fictions imagining the world in radioactive ruins, in terms of the extent to which they reference real-world data. What I demonstrate in the following pages, however, is that they are both products of the uncertainty and insecurity engendered by the bomb; that they have influenced and interacted with each other on some levels; and that, as a whole, they comprise a large part of what we know about the bomb.

Fantasy Documents: Self-Referential Plans

Nuclear wargaming is a product of the desire to write the future preemptively. In this sense, it belongs to the same general category of writing-of-the-future as contingency plans for natural disasters. But because nuclear wargaming can use only so much empirical data, the logical structure of plans it generates becomes inevitably circular, as they refer not only to existing knowledge but also themselves. A useful concept in understanding this circular logic is the

“fantasy document” articulated by Lee Clarke, the author of *Mission Improbable: Using Fantasy Documents to Tame Disaster* (1999).

Fantasy documents are plans that simulate knowledge about future contingencies. The plans as fantasy documents not only lay out the course of action in the given scenario, which may or may not be effective in reality, but also write the very scenario—a specific case of nuclear war, for instance—to use it as their underlying assumption (or rely on other similar preexisting fantasy documents for the assumed authority). “When uncertainty about key aspects of a task is too high,” Clarke explains, “rationalistic plans and rational-looking planning processes become rationality badges, labels proclaiming that organizations and experts can control things that are, most likely, outside the range of their expertise” (Clarke 4). One type of fantasy documents directly related to my study are post-nuclear war recovery plans. “Plans for recovery after general nuclear war are fantasy documents,” Clarke suggests,

because the knowledge and experience necessary to know what would make for a realistic plan are unavailable. Those who propose the reality of nuclear war civil defense must assert their claims without knowing key details about how nuclear war would actually play out. ... The same goes for blast yields, the number of bombs, whether the bombs explode in air or in ground, time of year and so on. All these uncertainties, and more, mean that projections of societal recovery are in large measure outright guesses.” (Clarke 14)

The legitimacy of recovery plans is, in other words, wholly dependent on the accuracy of the projected post-nuclear state. But in the absence of applicable referents—historical nuclear wars—with which they can be validated, the plans resort to produce their own referents.

The key mechanism by which organizations put together fantasy documents is what Clarke calls “apparent affinities.” They are “claims that a catastrophic possibility is sufficiently like something we already know as to allow planning to proceed” (Clarke 14). The rhetoric that draws parallel between nuclear weapons and more familiar types of large-scale disasters (such as natural disasters) is also known as conventionalization. In the early days of the nuclear age, the most

common form of conventionalization used to describe atomic and (thermo)nuclear weapons was the analogy between the new weapons and TNT. President Truman's national address after the atomic bombing of Hiroshima on August 6, 1945, begins with one such analogy: "Sixteen hours ago an American airplane dropped one bomb on Hiroshima and destroyed its usefulness to the enemy. That bomb had more power than 20,000 tons of TNT. It had more than two thousand times the blast power of the British 'Grand Slam' which is the largest bomb ever yet used in the history of warfare" (Truman). The very name of the victimized city, Hiroshima, also began to be used as both the referent and the unit of power. This trend remains true even after half a century since the atomic bombing, as there have been no other applicable referents. An example of the conversion of megatons to TNT via "Hiroshima" is as follows: "At one megaton—a small weapon by contemporary standards—we are trying to imagine 70 simultaneous Hiroshima explosions. At 20 megatons we are trying to imagine 1,400 Hiroshima bombs detonated at the same moment in the same place" (Geiger 16). This is an example from a 1981 article, but we can find similar phrases in contemporary news articles, albeit with greater numbers. In a simpler form, the megatonnage of modern thermonuclear weapons is converted to "Hiroshimas" as a substitute unit for megaton: "By 1982, the combined strategic arsenals of the superpowers held the explosive power of approximately 1 million Hiroshimas" (Hoffman 23).

Along with the ease of conveying the unimaginable power of nuclear weapons, the rhetoric of conventionalization was more importantly used to turn the bomb into an allegedly manageable and predictable risk. The history of the U.S. civil defense has numerous instances of such an attempt. For example, *Survival Under Atomic Attack* (a civil defense booklet published in 1951 with the intention of educating the general public) "was the first of many media—government publications and films, newspaper and magazine articles, radio and television scripts, interviews

and speeches, and even novels—that employed the conventionalization argument in order to diminish the horrifying aspects of nuclear weapons” (Oakes 54). In fact, the very first sentence of the pamphlet reads, “To begin with, you must realize that atom-splitting is *just another way of causing an explosion*” (NSRB 4; my emphasis). This might sound ludicrously deceptive now, but the push for the development of tactical nuclear weapons in the twenty-first century to make nuclear weapons usable is based on exactly the same kind of mentality. To quote a couple more passages from the booklet with explicit conventionalization: “Your chances of making a complete recovery [from radiation sickness] are much the same as for everyday accidents”; “Just like fire bombs and ordinary high explosives, atomic weapons cause most of their death and damage by blast and heat” (NSRB 5, 6).

The most significant instance of a fantasy document overwriting the unknown in *Survival Under Atomic Attack* appears toward the end:

While the lingering radioactivity that *occasionally* follows *some* types of atomic bursts *may* be dangerous, still it is no more to be feared than typhoid fever or other diseases that sometimes follow major disasters. The *only* difference is that we can’t ward it off with a shot in the arm; you must simply take the *known* steps to avoid it. (NSRB 30; my emphases)

The passage is fraught with qualifications, such as “occasionally,” “some,” “may,” and “only.” The text tries to counter this uncertainty with a rhetoric of conventionalization, including the analogy between an atomic explosion and other “major disasters.” The counter-rhetoric represented by the word “still” in the first sentence is, however, already compromised by the writer’s own admission that “we can’t now ward it off with a shot in the arm.” The authority of the conventionalization is not saved by the limiter “only” at the beginning of the second sentence, intended to minimize the significance of the uncertainty. Finally, the argument of the very last part of the passage—“you must simply take the known steps to avoid it”—is that “it” (a potential atomic attack) can be avoided, because it is already known. In *The Imaginary War: Civil Defense and*

American Cold War Culture (1995), Guy Oakes notes regarding the mass civil defense practices during the Cold War, including *Operation Alert* in 1956, that their motto was “America has a master plan or ‘blueprint for survival’, and throughout the country ... Americans put this blueprint into action” (97). One of the core objectives of civil defense was, in other words, to write the “blueprint” of the future, thereby overwriting the unknown with calculations and plans.

The relationship between the fantasy document and the people in the inner circle of the nuclear project is ambivalent. The ambivalence is comparable to the notion of “doublethink” in George Orwell’s *1984*—the ability to maintain two contradictory thoughts simultaneously. On the one hand, the writers of aforementioned *Survival Under Atomic Attack*, for instance, must have known that their statement—“Radioactivity is not new or mysterious” (8)—was false. Their supporting statements are all true: “In the form of cosmic rays from the sky, all of us have been continually bombarded by radiation every hour and day of our lives. We all have also breathed and eaten very small amounts of radioactive materials without even knowing it. For over half a century, doctors and scientists have experimented and worked with X-rays and other penetrating forms of energy” (NSRB 8). What they deliberately omit is the fact that the threat of radiation sickness lies not just in the insidious nature of radiation—“we cannot see, hear, feel, smell, or taste radioactivity,” as the pamphlet acknowledges—but in the amount of radiation released, the speed at which said amount is introduced into the ecosystem, the unpredictable paths through which it might travel, and how it might be accumulated in organisms as well as nonorganic entities. More importantly, the voice of the expert in this passage says nothing about the fact that we have artificially created fissile nuclides, only a very small amount of which exists in nature. Every time a nuclear reactor produces plutonium-239, for instance, we introduce a fresh batch of it into the world with 24,110 years of half-life.

On the other hand, however, the primary objective of fantasy document is not to deceive, but to cope with uncertainty, although deception certainly is one of its major effects regardless of the intention. It is the kind of fantasy that Lacanian psychoanalysts would articulate—a fantasy that veils the lack of truth rather than the (nonexistent) truth itself. Concealing the truth would simply be secrecy. “Fantasy documents, generally, are *not* constructed to deliberately dupe various audiences (though they can have that effect),” but are aimed primarily at “transform[ing] *uncertainties* into *risks*” (Clarke 14, 11). Fantasy documents overwrite the unknown with known scenarios, and by so doing cover up that something fundamentally unknowable exists. “Once produced, [fantasy documents] are usually set in a rhetoric of technical competence, and often enough in one of national interest, providing a context that helps persuade (internal and external) audiences of their legitimacy. When audiences grant such legitimacy, fantasy documents work to set terms of political debate by shaping vocabularies within which discussion occurs” (Clarke 16). For example, Garry Brewer and Bruce Blair, the then RAND analyst and the former Minuteman control officer, explain in their 1979 article the near impossibility of accurately representing reality through wargaming. They write, more specifically, that the “focal issue in the debate about SALT II [the second agreement of the Strategic Arms Limitation Talks signed by the U.S. and the Soviet Union in 1979] has been the vulnerability of America’s force of land-based Minuteman missiles.” They then remark, “That vulnerability, once projected, became a political fact. ... But it is impossible to determine the true picture, given the many conflicting assessments” (Brewer and Blair 20). There were many such historical narratives of the U.S. vulnerability, from the “missile gap” narrative of the 1950s to the terrorism and WMD discourses of the 2000s. Regardless of how accurate or inaccurate they might be, the narratives of strategic vulnerability are a form of fantasy document—a simulation of knowledge. Even into the new century, “threat assessment is a largely

fictional enterprise, more reflective of internal politics than external realities” (Moore 60), a prime example of which is the “axis of evil” narrative of George W. Bush.

The central interest of fantasy document as a concept is not whether or how much an instance of fantasy document represents reality accurately, but whether it is a discursive product reacting to aspects of reality that cannot be empirically represented at a given time. For example, Joseph Masco, the author of *The Nuclear Borderlands: The Manhattan Project in Post-Cold War New Mexico* (2006), explains how the Corona Project—the first American satellite reconnaissance program operational between 1960 and 1972—“not only offered a new optic on Soviet technology [but] also revealed how fantastical US assessments of Soviet capabilities were in the 1950s” (“Terror” 27). In this case, the pre-Corona estimations on Soviet capabilities would be “fantastical” in the sense they lacked a factual basis. In the 1950s, however, the U.S. needed the speculations about the Soviet military capabilities to fill in the gap of empirical data. At the limit area of its conceptualization, however, fantasy documents represent a far greater level of uncertainty, such as the impact of a large-scale nuclear war as opposed to the exact number of nuclear warheads that the enemy state has in possession. The exact calculation of the impact would involve estimating interactions between human and natural agents throughout an extended geographical area and a prolonged temporal period, as well as its influence on economic infrastructures such as the global food production and distribution. To compare the effects of nuclear weapons to those of natural disasters or conventional warfare is thus not just a means to understate or cover up the risk they pose, but also an integral part of the representational process through which the unprecedented, hypothetical threat is (falsely) given a tangible and controllable form derived from known data.

By definition, then, fantasy documents’ claim on knowledge—a paradoxical kind of scientific prescience, so to speak—is always overextended. They inevitably simulate, pretending

to know what they really do not. A 1963 civil defense textbook, *Strategy for Survival*, for example, designates 303 ground zeroes across the continental U.S. It effectively makes an oxymoronic case where all possibilities are claimed to be known but the sheer number of possibilities render the projection useless. The authors of the textbook admit this fundamental conflict, inadvertently:

‘No one can predict that any one or combination of these cities would be attacked in any future war. Thus, it might appear that we are trying to know the unknowable, to predict the unpredictable, to impose a logical rationale upon war which is, itself, illogical and irrational. But such an inference is incorrect. It was shown [previously in this book] that there are good reasons to believe that a large fraction of these cities would be attacked in a future war—but what specific cities would be included in this fraction? *Because there is no precise answer to this question, civil defense planning must assume that all could be potential targets.* Any other approach is thermonuclear Russian Roulette played with 100 million American lives. (Martin and Latham 182; my emphasis)

This passage exemplifies the ambivalent mission objective of civil defense as an ideological project, perpetually torn between the need to assuage Americans’ fear of the bomb (so that they would continue supporting the U.S. nuclear program) and to highlight its destructive power (so that they would take the Soviet threat seriously). The passage, more importantly, embodies the inherent problem of fantasy documents. Note, for example, the italicized sentence—“Because there is no precise answer to this question, civil defense planning must assume that all could be potential targets.” The statement attempts to reaffirm the possibility of planning and subsequently the possibility of representing events that have not occurred yet (i.e., Soviet nuclear missiles detonating on any number of the 303 potential targets in the U.S.). The sheer range of the identified possibilities, however, transforms the supposed plan into an acknowledgement that planning for such eventualities as nuclear war is impossible. One of the indices that the nuclear-armed states acknowledged this impossibility early on is the very fact that mutually assured destruction (or more benignly put, mutual deterrence through the threat of use) had become the default doctrine to deal with the nuclear threat. Aside from the exorbitant cost, the reason why the civil defense

program of building sufficient number of fallout shelters has never become a reality while the mutual threat has been the core mechanism of the cold war is because the latter is a far more controllable option. Compared to post-attack survival in shelters that is heavily dependent on the level of preparation and the unknown aftermath of the war, increasing the arsenal and planning an effective deployment of nuclear warheads to predetermined enemy targets is much more calculable and guaranteed.

The rhetoric of conventionalization, central to fantasy documents' claim on the knowledge of the future, helped create two notable ideas about nuclear war, both of which are reflected in nuclear fiction. On the one hand, "nuclear war, like a natural disaster, was projected as *localized* and *survivable*," and on the other hand, the conventionalization of the bomb made the third World War seem inevitable because the war had now "transformed into a force of nature that could not be resisted at the level of human discourse" (Monteyne 19). The relationship between the notion of naturalized nuclear war and nuclear fiction is complicated, because nuclear fiction as a genre is not homogenous in its perception of nuclear weaponry. One interesting contribution of literary nuclear fiction to nuclear discourse in general, for example, is that it refutes the claims of conventionalization by imagining large-scale nuclear conflicts that do not leave any intact outside, from which help can come to reconstruct the affected areas. Some fictional narratives of all-out nuclear war had to expand the boundary of their world beyond the populated areas of Earth, in order to create a relatively safe place from which the war could be observed and, more importantly, recorded at all. The places of safety include a submarine (James Morrow's *This Is the Way the World Ends*, 1986), Mars (Ray Bradbury's *The Martian Chronicles*, 1950), and even the future (Mordecai Roshwald's *Level 7*, 1959). The last instance is presented as a diary discovered and translated by alien anthropologists who found Earth that had been long dead from a devastating

nuclear war. A truly world-ending event cannot, by definition, be written at all. At the same time, however, nuclear fiction also generally accepts the eventuality of major nuclear war, for the simple reason that without the possibility and fear of the technological calamity the genre would not have been even formed.

The historical context in which the nuclear war came to be regarded as “a force of nature,” to refer back to Monteyne’s phrase quoted earlier, also influenced how the stories themselves were generally written. Paul Brians, the author of *Nuclear Holocausts: Atomic War in Fiction, 1895-1984*, aptly remarks that “the genre [nuclear war fiction] has most in common with is not in fact the war story at all, but the narrative of a great catastrophe: fire, flood, plague” (3). In nuclear war fiction, he continues, “many of the qualities central to other modes of war fiction are irrelevant” and “[n]o amount of loyalty, determination, self-sacrifice or heroism will deflect an incoming intercontinental ballistic missile,” although those qualities still play an important role in the genre (2). Finally, “[t]he hope of victory ... is absent” in such stories because “[m]ere retaliation can produce at best a pyrrhic victory, at worst, the end of life on Earth” (Brians 2). Brians’ assessment is certainly not representative of every nuclear fiction. There are post-nuclear-disaster stories that not only praise the personal victories of survivalists (as opposed to survivors) but also rely heavily on violence and masculine values in describing the protagonists’ struggle in the postapocalyptic world. Militaristic survivalist nuclear narratives were written profusely during the Cold War, and the legacy continues on to date. William Forstchen’s *New York Times* bestseller *One Second After* (2009) is one of the recent examples. It remains true, however, that war in nuclear fiction is described as the cause of not only devastating but pointless destruction, and there is no longer a place for a conventional sense of national victory, although the war itself is almost always waged between nations.

To sum, the most important characteristic of the nuclear discourses as fantasy documents is that they are fictional narratives attempting to represent the future. While this task is by definition impossible in the strictly empirical sense, they are produced nonetheless when society is anticipating events with high uncertainty and catastrophic consequences. “[T]he key uncertainties that fantasy documents are trying to turn into [quantifiable and manageable] risks have to do with how future events will evolve, and how future actors will respond to those events” (Clarke 13). Wargaming emerged as a form of fantasy document, born in the fallout of the unprecedented uncertainty of the future introduced by the bomb. Because of the fundamental impossibility of representing nuclear war as its central subject, wargaming is inevitably speculative and thus belongs to the broader category of nuclear fiction along with literary fiction about nuclear disasters.

Nuclear Fiction and Wargaming: Rehearsals of the Hypothetical War

Nuclear fiction, both literary and strategic, is a product of the nuclear age. It is the era of imagination, or more precisely, an era where the physical reality of the world cannot be fully understood or represented without imagining its future that may be wrought by its technological inventions. To define the nuclear age in terms of imagination and representation is ironic, for the bomb represents one of the most potent *material* forces of the period. It is a technological marble made possible by the concerted effort of physics, engineering, and industrial production. But as John Canaday points out in *The Nuclear Muse: Literature, Physics and the First Atomic Bombs* (2000), “Despite their physical substance, since World War II nuclear weapons have exercised their power in the purely literary form of their fictional use in the future” (22). I expand this statement further, by adding to the “literary form of their fictional use” all forms of speculative nuclear discourses including strategic wargames and scientific simulations of nuclear events. The

very discovery and development of nuclear power was in fact a product of imagination, too. Leo Szilard, the Hungarian-born Manhattan Project physicist who successfully created a nuclear chain reaction for the first time in history, is said to have been inspired by H. G. Wells's pre-atomic atomic bomb novel, *The World Set Free* (1914). In the novel, Wells names the fictional weapon of mass destruction the "atomic bomb" for the first time in history.⁷ The idea of nuclear fission, in other words, preceded its technological realization. The ways in which fiction contributed to the birth of the atomic bomb, however, is beyond the purview of my study, although it would make an interesting topic for a historical study.

The main point I want to demonstrate with nuclear fiction, rather, is that the bomb required imagination to understand it, as what it *is* cannot be accurately understood without imagining what it *can do*. It is due to this necessity of and emphasis on imagination that even the more serious discourses of nuclear war (such as the strategic studies commissioned by the U.S. armed services) reside in the realm between the fantastic and the real. Ghamari-Tabrizi calls this realm "the no-man's land between positively known reality and impossibilities—the frontier of improbable but not impossible events," describing how the Cold-War world was perceived by the nuclear-generation of civilian experts at RAND (84). Regardless of our opinions on the likelihood of large-scale nuclear conflicts, whether during the Cold War or now, we can all agree that nuclear war would be catastrophic. Without suitable empirical points of reference, however, our fear of nuclear calamities is informed by fiction. This does not necessarily mean that our fear is fictive or baseless, but rather that the only concrete representations of the imageries and words from which we derive our fear of nuclear weapons are narratives of a fundamentally speculative nature. They can be movies like *The Sum of All Fears* (a 2002 Hollywood film in which a terrorist group attempts to

⁷ For detailed accounts on this see: Aris Mousoutzanis' "Apocalyptic SF," p.460; Ken Ruthven's *Nuclear Criticism*, p.8; or William Lanouette's "Ideas by Szilard, Physics by Fermi," p.17.

incite a nuclear war between the U.S. and Russia) or publicly available estimations of thermonuclear detonations like “Nukemap” (nuclearsecrecy.com/nukemap), or, for a handful of people in the U.S., even the SIOP or other top-secret plans for nuclear war.

Fiction also helped the leaderships of the U.S. and the Soviet Union visualize the perils of nuclear war. President Reagan, for instance, was deeply perturbed by the fictional World War III depicted in *The Day After*, an American television movie (TVM) that garnered “then the second-largest audience in history for a single television program” when it was aired on November 20, 1983 (Hoffman 96). According to Reagan’s official biographer, Edmund Morris, the president was “still fighting off the depression caused by *The Day After*” even days after watching it (Hoffman 91). The president’s reaction to the film suggests that the fictional war between the NATO and the Warsaw Pact states dramatized in the film was not just a possible future that he feared on an abstract level, but an integral part of the reality as he perceived it. Given that Reagan’s Strategic Defense Initiative (SDI) as a fantasy of perfect defense against nuclear weapons was initiated on March 23, 1983 (only half a year before *The Day After*’s airing), it is difficult to say whether the movie directly inspired the project. The television movie, however, does represent the contemporary fear of nuclear war that contributed to Reagan’s continuing obsession with the SDI, which would lead to the failed breakthrough at the Reykjavík Summit in 1986 when the world was closest to a complete nuclear disarmament. Considered in the historical context and the extent of destruction of which the world was already capable, *The Day After* was not merely a fiction. The first iteration of the Single Integrated Operation Plan (SIOP), for example, laid out a preemptive all-out assault on the Communist bloc that “committed the full US arsenal in a simultaneous global nuclear strike, involving 3,200 nuclear weapons delivered to 1,060 targets around the world” (Masco, “The End” 1119). *The Day After* certainly imagines a story of nuclear war, but such

realities as “one Trident submarine could kill more than 40 million” (Lorrie 28) are already as fantastic as anything a fiction can imagine.

On the other side of the Pacific, a fictional representation of World War III had also terrified the General Secretary of the Soviet Union, Leonid Brezhnev, about a decade before the SDI and *The Day After*. In 1972, the General Staff produced an estimation of the U.S. nuclear first strike on the Soviet Union. In the scenario, “the military had been reduced to one-thousandth of its strength; 80 million citizens were dead; 85 percent of Soviet industry was in ruins” (Hoffman 20). The impact this scenario had on Brezhnev could be observed during the dummy ICBM launch test that immediately followed the presentation. Adrian Danilevich, then chief of the General Staff who also participated in the exercise, recalls that when Brezhnev had to press the launch button, he “asked [Andrei] Grechko [the Defense Minister] several times for assurance that the action would not have any real world consequences” (Hoffman 20). At the bottom of the General Secretary’s anxious question—“Are you sure this is just an exercise?”—is the understanding that nuclear war plans and scenarios are rehearsals of an artificial catastrophe necessitated by the very existence of the weapon. The scene of Brezhnev and his General Staff’s war room also demonstrates that while every plan and scenario related to nuclear war is fiction, the distance between the fiction and the event with enormous material consequences can be very small when the war is not only waged but also represented by buttons on the control panels and figures on the situation monitors. On the level of command-and-control, in other words, the interface of war looks the same, whether in a real war or a fictional one. Almost half a century since Brezhnev’s time, now we can understand more readily that “the equipment a commander uses to play at war often resembles—or actually is—the equipment he will be using to direct real war” (Allen 77).

Imagination was the keyword for both literary fiction dramatizing nuclear disasters and strategic studies on nuclear warfare. In fact, nuclear strategic studies have always been, from its inception, a futurology in varying degrees because their primary subject matter is the event in the future that is the realization of the latent power of nuclear weapons. Studying such strategic studies offers an interesting approach to the study of nuclear fiction, for both genres of writing were born from the same source—namely, the perceived imminence of planet-scale catastrophes made possible by nuclear weapons technology. The strategic futurology, represented most prominently by the RAND (Research AND Development) Corporation, embodies the epistemological and ontological cataclysm introduced by the bomb. The invention of the first atomic bombs, in other words, also gave birth to the whole realm of discourses devoted to studying fantastic possibilities, produced or funded by the government agencies and the military. Strategic fictions demonstrate that there is an incredible degree of affinity between them and literary fictions, not just in terms of how much they both sound like science fiction, but also in terms of the centrality of imagination in their production. Consider, for instance, the following words of Hans Speier, the first Director of the Social Science Department of the RAND Corporation: “When I now think about RAND, I think about a group of people who were very peculiar in the sense that they lived in a world in which you could talk about future in the plural—there’d be ‘futures’ you could choose from” (qtd. in Ghamari-Tabrizi 46). His words read pretty much like guidelines for fiction writers, especially of alternate histories.

Definitions and History of Wargaming

Throughout the chapter, I use the term “wargaming” to refer to strategic studies a genre that revolves around military conflict scenarios involving nuclear weapons, and “wargames” as its individual instances. By the original definition the term is applicable to scenario- and strategy-

writing involving conventional weapons as well. The terms “wargaming” and “wargame” have been written both with and without a space between “war” and “gaming/game.” I elected to write them without a space, except in quotations following the two-word convention.

In its historical emergence and development, wargaming has been a loosely defined term closely tied to but often distinguished from such adjacent concepts as simulation and modeling. According to Peter Perla, the author of *The Art of Wargaming* (1990) which is one of the most oft-quoted works in the wargaming scholarship, “In its broadest application the term *wargame* is used to describe any type of warfare modeling, including simulation, campaign and system analysis, and military exercises” (Perla 163). He then narrows down the scope of the word to “a warfare model or simulation whose operation does not involve the activities of actual military forces, and whose sequence of events affects and is, in turn, affected by the decisions made by players representing the opposing sides” (Perla 164). In other words, while wargame may refer to a wide range of practices, its narrower definition is limited to the practices employing only words and data, not actual weapons and people. In my discussion of wargaming, I mostly follow the narrower definition of the term, as my interest lies in the narrative writing process of wargaming incorporating extrapolations and verbal games between human actors.

The full spectrum covered by the umbrella term wargaming includes, from the most abstract to the most concrete forms, “analytic gaming,” “electronic simulations,” “people-around-a-table games like the one in the Pentagon basement,” and “games played with real warriors and real weapons” (Allen 40-41). Abstract analytic games are, for instance, the kinds of games that produce charts representing major decisions and events, and the branching paths of possible scenarios resulting from them. More specific data derived from the real-world statistics are introduced in electronic simulations. The third one in the spectrum—“people-around-a-table

games”—is also called “political-military games” or “pol-mil” for short, which is the specialty of RAND. While these types of wargaming can technically be differentiated, they may also be employed together in a single instance of gaming. For example, Thomas Allen, another prominent figure in the studies of wargaming, explains:

The typical game scenario is built up from ... real-world information and intuition. The final game scenario is in two parts, a “world scene,” in recent years usually presented documentary style in a video screen, and a crisis, in written form. The world scene thrusts the players into the future and lays out the situation in which the crisis takes place. The staff strives to make the video presentation realistic. (Allen 32)

The “world scene” and “crisis” in this context are constructed through simulating the future, or by writing “synthetic histories” as scholars in the field call such narratives of hypothetical histories. The players then engage in a pol-mil game in which they perform their designated roles, such as high-ranking military officers and political leaders of the U.S. and the Soviet Union. The findings from a pol-mil game, in turn, may be incorporated later into a post-game scenario, which may become the foundation of a physical military exercise.

Among the subcategories of wargaming, political-military games most closely represent the fantastical or paranoid world picture rooted in the Cold-War world. Pol-mil games represent the part of wargaming that pays close attention to interactions between human agents and events, and the unexpected outcomes of those interactions. “Wargames revolve around the interplay of human decisions and game events; this active and central involvement of human beings is the characteristic that distinguishes wargames from other types of models and simulations” (Perla 8). As the next section will demonstrate, the motto of wargaming in this sense was to think outside the box because, from the viewpoint of the strategists and scenarists of the Cold-War America, the “box” (i.e., the rules of the conventional war) had already been becoming obsolete since the birth of the bomb.

The Question of Realism: Affinity between Fiction and Wargaming

The specific historical context in which wargaming emerged—the nuclear-armed Cold-War world—dictated its fundamental nature and objective. The prolonged and passive-aggressive rivalry between the two superpowers was expressed through the expansion of their nuclear arsenals that reached a fantastic degree while the weapon’s full potential was never materialized. Amidst the increasing megatonnage, number of warheads, and efficiency of delivery, wargaming emerged as an equally fantastic enterprise tasked to anticipate cataclysmic future disasters. The contingency plans for the future had to be written without sufficient empirical data with which they could be sufficiently validated. Due to their speculative nature, wargames have seldom been accepted at their face value and the legitimacy of wargaming in general has often been questioned. The practice nevertheless lives on even after the end of the Cold War for the simple reason that there is no alternative to speculating the future. A nuclear wargame can be truly validated only by an actual instance of nuclear war, which means even the most factually informed and carefully designed wargame remains a fiction until the eventual of nuclear war becomes an event. “Throughout history, commanders at every level have always based their plans for the future on the experience of the past. ... In the case of nuclear warfare, though, no such experience was available. Speculation and science fiction aside, this fact left wargames as almost *the only available tool* for understanding it, planning it, and testing it, vastly enhancing the role they could and should play” (van Creveld 237-238; my emphasis). In the end, the entire body of strategic scenarios and games is fiction, but this fiction is all that exists in the place of definitive empirical knowledge.

Wargaming’s inherently paradoxical objective of simulating the knowledge of the unknown is voiced in the passages of texts devoted to the genre. U.S. Naval War College’s *War Gamer’s Handbook*, for instance, explains that “War gaming is a tool for exploring decision-making possibilities in an environment with incomplete and imperfect information,” and that “a

value unique to all war games is the occurrence of previously unknown issues, insights, or decisions that arise during the conduct of a game” (Burns 3). According to the two intertwined functions of wargaming pointed out in these passages, wargaming’s objective is to discover possibilities hitherto unconsidered by having human players play out a hypothetical scenario, and introduce unexpected factors and developments into the prescribed scenario. The passages also suggest that the fundamental insight which wargaming offers is that there are certain kinds of knowledge that only wargames can attempt to approximate. Wargaming, to reiterate, *attempts to approximate* the knowledge about nuclear warfare, which is to say that the relationship between wargaming and the knowledge it seeks is highly tentative. This unique relationship is best represented by the fact that the validity of games has been a difficult question even for the people directly involved in wargaming. Perla writes, for example, that “[w]argaming designers, players, and analysts, as well as critics and decision makers who judge the validity of a game or define its results ... only in terms of ‘lessons learned’ not ‘issues raised’ have lost sight of what a wargame really is and where its main benefits are to be found” (179). The difference between “lessons learned” and “issues raised” he emphasizes here is that the former implies the insights gained in games can readily be used in real crises, while the latter simply refers to possibilities that may or may not be realized in the future. On the same note, Robert Rubel remarks in “The Epistemology of War Gaming” (2006) that “war games produce insights, not proofs” (112). “Perhaps the best way to characterize this conditionality [of wargaming],” he continues, “is to say that knowledge produced by war games is indicative—that is, at its best it can indicate the possibilities of a projected warfare situation and certain potential cause-and-effect linkages” (112). That wargames are “indicative” suggests that while wargaming does make use of empirical data—including classified information inaccessible to most people including fiction writers—its goal is not too

different from that of science fiction. They both paint detailed pictures of the unknown future to, ultimately, understand what possibilities the material conditions of the current world hold.

The language used to explain wargaming also strongly suggests that the fundamental *modus operandi* of wargaming is not much different from that of speculative fiction, as speculative fictions extrapolate future crises from what the writers perceive as historical trends. In the aforementioned passage from Rubel's article, for example, he suggests that wargames "can indicate the possibilities of a projected warfare situation and certain potential cause-and-effect linkages" (Rubel 112). The scenarios resulting from the games "describe possible, although not certain, projections or evolutions of trends, events, and conditions from today to a future time period" (Taylor ix), which may very well be a passage from a study of science fiction. At the peak moments of strategic imagination during the 1950s, wargaming even surpassed science fiction in its "will to circumscribe the totality of future war while simultaneously splintering any single conjecture into almost infinite variations," represented in the form of "manifold [historical] alternatives in branching forms and correlative graphs and columns" (Ghamari-Tabrizi 128).

Despite the debatable validity of insights gained from wargames, they were actively produced by the U.S. government agencies, armed services, and civilian think tanks during the Cold War. One of the earliest efforts by the government to understand the nuclear-armed world through synthetic histories was the Gaither Commission (named after H. Rowan Gaither, then chairman of the Commission and RAND). The Commission was initially conceived to evaluate the current capabilities of fallout shelters. The range of its research area, however, was quickly broadened to nuclear war in the very first meeting in August 1956, which resulted in the Commission's 1957 report, "Deterrence and Survival in the Nuclear Age." In the meeting Eisenhower, the then incumbent president, asked the members present: "If you make the

assumption that there is going to be a nuclear war, what should I do?” This question “disposed the committee to enlarge the scope of its study from the merits of civil defense to the current and near-future state of America’s ability to deter, fight, and survive a nuclear war” (Ghamari-Tabrizi 186). Eisenhower’s question was the most fundamental question for wargaming as a whole—if we make the assumption that there is going to be a nuclear war, what should we do? This archetypal question of wargaming also expresses its universal demand—namely, that the world must prepare for hypothetical catastrophes. Although the U.S. civil defense was more an ideological project to manage the public’s fear of the bomb than an enterprise that produced actual means of defense against nuclear attacks, the premise of civil defense as a national security project was that nuclear war required systematic preemptive plans. Herman Kahn’s 1958 report, for instance, proposes that “government attention should be redirected from a World War II-era policy of recruiting industry and civilians after a war has begun to ensuring the nation’s survival by peacetime preparations for war. In the nuclear age, the nation’s survival could be ensured only by mobilizing citizens for war during peacetime” (Ghamari-Tabrizi 194). The focus shifted, in other words, from postwar recovery to prewar preparations. According to the proposals in the report, proper peacetime preparations—i.e., a federally funded civil defense program—would cost \$20 billion at the time. Building enough fallout shelters to house the entire nation and stocking them with supplies was too expensive, when the very reason to make such commitment and the shelters’ effectiveness were ultimately a speculation.

The fact that strategic fiction emerged to fill the void of knowledge pertaining to nuclear warfare is integral in understanding that this fiction is nevertheless a discursive product not only wrought by but also designed to address the material state of the contemporary world. Plans and scenarios for nuclear exchanges and the post-nuclear world are written, in other words, simply

because nuclear weapons exist. Take, for example, the following passage from a 1981 *Bulletin of Atomic Scientists* article discussing mutual assured destruction:

The most important point is that MAD works because of the limits imposed by available technology. Maintaining a capability for assured destruction requires nuclear forces that can survive a surprise attack and penetrate enemy defenses, an ability to identify the source of an attack and adequate command and control structure to make a threat to use nuclear weapons appear credible. ... Unless either a true first-strike capability [i.e., a first-strike that would completely disable the enemy country's ability to retaliate] or a virtually leakproof defense become [*sic*] technically possible, that basic relationship is not going to change. (Buchan 13-14)

From this point of view, “MAD becomes less a strategy than an acceptance of reality,” as Buchan writes earlier in the same article (13). Or rather, MAD is an articulation of the material and technological condition of the post-1945 world insofar as nuclear weapons are concerned. The acronym sounds anachronistic now, as if it seemingly belongs only to the uncanny science-fiction-like bygone era of the Cold War, but nuclear weapons still influence real-world decisions by virtue of their sheer existence. A 2016 *Bulletin of Atomic Scientists* article asks, for example, “how many nuclear warheads does the United States need?” as its title reads. After the general overview of the current situation regarding the U.S. nuclear arsenal (such as that about 1,800 warheads are currently deployed out of approximately 4,700 operational warheads and that the US public have little idea that their government still has this many warheads) the article explains two major justifications of political leaders for maintaining the arsenal: to deter Russia’s nuclear weapons and to destroy them should a national emergency arise. The two reasons are, in other words, counter- and first-strike capabilities—the two exact key criteria by which virtually every nuclear war plan was conceived during the Cold War (von Hippel 274). What is important about the question of “how many warheads are needed” in the twenty-first century is not which method or data should be used to calculate the right number, but the very fact that the nuclear arsenals of other countries are still and simply the fundamental reason why any size and kind of nuclear

weapons are maintained and deployed. MAD as an international institution, in other words, does not require as its integral part a deranged human agent *a la* Dr. Strangelove; it just needs the weapons to exist in the world, for they already embody the insanity.

What nuclear strategic fiction demonstrates is this exact point. The possibilities suggested in the scenarios and wargames sound fantastic because the material capabilities of nuclear weapons are fantastic. They go well beyond the most extreme limit of ordinary people's experience and imagination. Wargames exemplify that nuclear weaponry as a subject matter renders any discussion of it fictional in varying degrees, because such a discussion invariably involves representing the material reality in terms of its potentials. As Ghamari-Tabrizi writes paraphrasing Kahn, "[nuclear war] could only be approached with the imagination born of a faith that leapt across the abyss between the present and the post-attack world" (84). "For Kahn," she also notes, "the proper referents for nuclear planning were the *twinned realms* of the status quo and the improbable but not impossible world of nuclear war" (96; my emphasis). While this sounds like a passage from a guide to science fiction writing, it is also true for virtually every argument for maintaining or developing a nuclear program for "defensive" purposes. In 2018, for instance, there were more arguments than ever before that South Korea and Japan should have their own nuclear weapons given the continuing progress of North Korea's nuclear program. Whether we agree or disagree with this particular option, and regardless of how seriously and consciously we regard the situation, the threat of the North Korean nuclear missiles—or nuclear arsenal of any state—is considered within "the twinned realms of the status quo and the improbable but not impossible world of nuclear war."

The inherently ambivalent relationship between strategic fiction and reality, in which the former simultaneously represents and constructs the latter, is expressed in strategic studies as the

question of realism. “Since much of the work is oriented towards the future rather than the past, validation, i.e., making sure that the game represents something ‘real’ and is not simply a figment of somebody’s imagination, presents a serious challenge” (van Creveld 255). Without existing data to validate the games as representations of the future, the question of their legitimacy is substituted by that of realism. “Typically, players finessed the problem of gaming’s validity by emphasizing the intensity of the *experience*” facilitated by the details and real-world references included in the game scenarios (Ghamari-Tabrizi 161). Such “intensity of the gaming experience” provided by the appearance of realism is important because wargaming relies heavily on human interactions, and the players can only react to the game situation as they would in reality when they are engaged not just intellectually but also emotionally. “Wargaming is an act of communication. Designing a wargame is more akin to writing a historical novel than providing an algebraic theorem. The latter requires the use of deductive reasoning within a previously defined framework of knowledge.... The former requires the construction of a framework, the creative building of an internally complete and consistent world” (Perla 183). In wargames, the players are both characters and writers, for they simultaneously act on the stage of the given scenario and extend it into the future with their own actions. In this sense, “lived experience” is an apt expression for wargaming. “[Wargaming’s] very intensity made the game a special kind of lived experience. ... A colonel in the Air Command and Staff College wrote, ‘It is ... [now] possible to glimpse the elusive and manifold shape of future conflicts and to harden, by fictional exposure, the officers who may some day come face to face with the hideous visage of the real thing’” (Ghamari-Tabrizi 164). Wargaming as a “lived experience” described in this manner suggests once again that it is a veritable fiction, and the individual games are the scenes of spontaneous narrative production.

Pursuing realism in designing wargaming is a delicate exercise because many key referents of wargames reside in the future. The very job of wargaming is to write the nonexistent referents for strategic studies and political decisions. As such, aside from the real-world data used for the starting point of extrapolation and gaming, the realism of wargaming consists fundamentally in constructing narratives with their own internal logic, as it is the case for speculative fiction. It is for this reason that wargaming has often been called a form of art and compared to literary fiction—“designing a wargame is an art, not a science” (Perla 183). Ghamari-Tabrizi discusses the internal congruity necessary for wargames as narratives in terms of “totality”:

Certainly, we can recognize a parallel between game scenarios and literary art. Scenarios could not be plucked from their cultural and historical situation. They were oriented toward the totality, and like a novel, they dramatized several streams of interaction simultaneously. ... [I]n war game design, one makes out a wish to cast a richly furnished world, but one sealed off like a terrarium or a tableau in a paperweight. This snug little world, in which the totality could be grasped all at once, encompassed the universe of miniature life. (Ghamari-Tabrizi 165-166)

Despite the attention to detail, in other words, game scenarios are narratives skewed and outlined according to their agenda. Ghamari-Tabrizi’s description of the world recreated in wargames—“a richly furnished world” that is nevertheless “sealed off like a terrarium”—also describes fiction writers’ world building. Consider, for example, the following passage from Henry James’s preface to the New York edition of *Roderick Hudson* with Ghamari-Tabrizi’s words in mind:

Really, universally, relations stop nowhere, and the exquisite problem of the artist is eternally but to draw, by a geometry of his own, the circle within which they shall happily appear to do so. He is in the perpetual predicament that the continuity of things is the whole matter, for him, of comedy and tragedy; that this continuity is never, by the space of an instant or an inch, broken, and that, to do anything at all, he has at once intensely to consult and intensely to ignore it. (James vii)

Both gaming scenarists and fiction writers have to consider not just the relations between existing (historical) factors, but also the relations between them and nonexistent (future/fictional) factors which the scenarists and writers themselves create. The question of realism in wargaming—the

question of how much and what kind of detail should make it into the scenario to offer at least some semblance of validity to the speculations—thus sheds light on the fact that wargaming asks a very much ontological question about nuclear weaponry that exists as a tangible reality as well as an embodiment of disastrous possibilities.

The task of knowing the future that strategic studies set out to carry out, in other words, invariably involves representing the present factors and conditions in very different lights depending on their future states anticipated within individual games. A wargame on the military tension in the Korean peninsula during the Trump administration, for example, may produce a scenario where North Korea almost uses their newly developed nuclear weapons. In one logical direction, this is an extrapolation producing a speculative narrative branching out of history. The peculiar power of this scenario (and of wargaming in general) is that the logical direction can be reversed as well, whereby the hypothetical scenario legitimizes the perception that the current North Korean nuclear arsenal is a real military threat rather than a political tool. Once the scenario is circulated enough and has inspired more studies in similar veins, a game becomes real in its influence on the general perception and political decisionmaking. In a sense, then, the more significant effect of wargaming as a connecting-the-dots is that it identifies and defines the existing dots in certain ways, than it actually predicts the future. Consider what Secretary of Defense Donald Rumsfeld said after 9/11 about antiterrorist programs: “It is their task to try to connect the dots before the fact” (qtd. in Ghamari-Tabrizi 127). To know how to connect the dots, one needs to simulate the knowledge of the whole narrative.

The analogy between Cold-War wargames and the post-9/11 terrorism discourse is especially apt in that they are both discourses of possibilities rather than probabilities. The scenarios of disasters are written and sometimes even translated into actual policies not because

they are likely to happen, but because the anticipated events are of terrifying magnitudes, regardless of the anticipation's factual legitimacy. The fearful scenarios are also written and acted upon because they are concerned with capabilities rather than intentions, which correspond to possibility and probability, respectively. People who now look back at the Cold War paranoia and simply dismiss it as anachronistic insanity should be reminded that the U.S. and the Soviet Union competitively produced more warheads and designed more powerful weapons not primarily because they were convinced of each other's nefarious intentions (i.e., the probability of nuclear war), but because they simply possessed the physical means to carry out nuclear strikes.

Nuclear Fiction

To summarize my discussion so far on wargaming as fiction, “[w]ar games are inherently simulations of reality” (Rubel 113). “Simulation” in this context has two meanings, both intertwined with and contradictory to each other. A wargame recreates a world that looks like the real world, but simultaneously constructs the reality it represents. While the postmodern question of representation is concerned with the impossibility of accessing the past without textual mediations, the question of representation raised by wargaming has to do with the impossibility of representing something that has never existed in the first place. Wargames are, of course, not just made of speculations. They do use records of the past as their building blocks. But whether we should consider, for example, the thousands of warheads in the U.S. as causes of future disasters or just remnants of a bygone era is a qualitatively different question from, say, whether speculative fiction about the Atlantic slave trade's Middle Passage can offer alternatives to the virtually nonexistent historical records of the slaves' own voices. While nuclear strategic and literary fictions differ in terms of the rigor with which they reference empirical data, they do not, by definition, compete over truth, for there is no definitive real of the bomb as an embodiment of

future events. Just like the missileers at launch control centers today still carrying out pretty much the same task they did during the Cold War, perpetually waiting and preparing for a war that never happened,⁸ nuclear strategic and literary fictions have been and will be waiting to be proved or disproved, until either a nuclear war finally breaks out or every warhead is one day miraculously removed from the planet. The complete denuclearization of the planet has only ever been imagined in fiction, as in the movie *Superman IV* where the eponymous superhero rounds up all the missiles and discard them on the moon.

The value of revisiting nuclear stories written in the last half a century lies in the reminder that we are still living in a world where decisions regarding the most powerful weapon in history are made based on what is fundamentally a fiction. They also remind us, more generally, that we are still living with the bombs that are still being developed, maintained, and funded largely without the public's assent and outside official political procedures. To conclude that we should therefore still worry about the possibility of an imminent planetary doom would be to be alarmist. That is not the intention of this study, for no one can claim to see the future. But that precisely is, at the same time, what I want to demonstrate through nuclear fiction. The history of nuclear fiction, both strategic and literary, represents the human race's desire to see the future, not just out of fanciful curiosity, but a very specific fear of their own technological creations. Unlike alien invasion stories allegorizing the earthly xenophobia, every nuclear war plan and every nuclear war story is a rehearsal of largely unknown disasters, be it the World War III or a nuclear-induced catastrophe of a similar magnitude. Nuclear fiction is a rehearsal not because it is necessarily more accurate or realistic than other kinds of speculative fiction, nor because its writer is necessarily convinced of the possibility of war, but simply by the virtue of the fact that the life of the bomb

⁸ For the current state of American missileers stationed at Missile Alert Facilities (MAFs), see Nathan Hodge and Sharon Weinberger's "The Ever-Ready Nuclear Missileer" (2008).

has never ended. The status of nuclear fiction as a fiction, in other words, is fundamentally ambivalent in its relation to reality because the bomb *as a destruction in the future tense* is so fantastic that its often ludicrous representations are too material and tangible to be disregarded as paranoid.

Thirty Minutes Extended to the Entire Era: MAD and the Doomsday Machine

Along with the fallout shelter, Mutual Assured Destruction (MAD) is one of the most widely known and culturally exploited keywords of the nuclear history. Beneath the pop culture imageries of mad scientists, deranged generals, and exaggerated animosities between the East and the West, MAD in the real world references the internationally institutionalized trigger mechanism by which nuclear-armed states are mutually threatening and threatened by each other. Whether or not it is emphatically called MAD, any politico-military relationship between states involving mutual nuclear deterrence has MAD as its fundamental mechanism. Given that most political leaders of nuclear states do not officially consider a first strike as an option (with few outliers like Kim Jong-un and Donald Trump on rare occasions), the world of MAD is curiously asymmetrical. It is fraught with retaliatory plans while there are very few tangible first-strike threats. The rise of terrorism in the twenty-first century has certainly changed the scene in some degrees, but the threats of nuclear attacks are still not quite definable aside from the very existence of operational weapons. MAD as an international relation is, however, very much symmetrical as well, for all involved parties constitute potential aggressors to each other, regardless of their stated intentions.

MAD is at the center of the numerous narratives of nuclear war hitherto written, both during and after the Cold War. They differ in such setups as the reason why the war is triggered, the manner in which it develops and concludes, or which aspect of the war the narrative mainly follows (e.g., the lives of civilians as opposed to soldiers). Most of them, however, share the same narrative

device that drives the story forward—namely, a rapid and unstoppable escalation. The fear of escalation was closely tied to that of inevitable war. At the bottom of America’s popular fantasies of World War III was not just a suspicion that the communists might be evil and/or reckless enough to launch a massive nuclear attack, but more importantly the material reality that the American and Soviet nuclear missiles were readily trained at each other for swift retaliation in the event of either side’s aggression. Escalation thus seemed inevitable not necessarily because the involved parties had the intention to carry out their threats, but because the international system of mutual nuclear deterrence—one of the core material conditions of the Cold War—was built to guarantee escalation. There were, as I have discussed at length earlier in this chapter, many variables to nuclear war, but one element of the potential war that both U.S. and the Soviet Union could control with a reasonable degree of certainty was guaranteed retaliation. While the efficacy of the threat of retaliation is dependent on how the other side interprets it—a “squishy” factor as strategic analysts call it—retaliation itself has largely to do with one’s own capability. Mutually assured destruction as a means to control the future narrative is thus a far more rational policy relying on the balance of capabilities than its horrifying objectives suggest.

One of the most well-known literary works from the Cold War era vividly representing the machinery of MAD is *Fail-Safe* (Eugene Burdick and John Harvey Wheeler, Jr., 1962), published at the height the U.S.-Soviet arms race and fantastic war scenario writing. Situated in the contemporary United States, the novel represents the anxiety over an accidental nuclear war. As Paul Briens notes in *Nuclear Holocausts: Atomic War in Fiction, 1895-1984*, “[i]n the majority of cases, [nuclear] wars are presented as beginning by accident or from unspecified causes. So overwhelming is the prospect of a nuclear holocaust that authors rarely provide reasonable justifications for what seems to most people the ultimate act of political madness” (26). In *Fail-*

Safe the exact nature of the initial mechanical error that triggers the central crisis of the story is never disclosed. The novel suggests, however, that the real cause of nuclear war could be the tightly interlocked nuclear weapons systems of the nuclear powers, rather than potential mechanical errors that by themselves would not lead to war. After setting up the scene in the first half, the novel introduces the central crisis. During its routine exercise flight, a SAC (Strategic Air Command) nuclear bomber called “Vindicator” receives an attack signal due to a mechanical error. As the bomber crew fail to make a radio contact with the SAC Headquarters in Omaha, Nebraska, they conclude that the order must be obeyed and fly toward Moscow, their predesignated target. Later the central command manages to reach them, but the bomber’s commanding officer ignores the president’s plea to turn around, as all bomber crews have been instructed to consider any radio communication received past the “fail-safe” point to be the enemy’s ploy to cause confusion. After the American president’s subsequent effort to shoot down the bomber with help of the Russians fails,⁹ Moscow is destroyed. As a desperate attempt to prevent a nuclear war by convincing the Russian premier that it was a mistake, the American president orders the protagonist, Brig. Gen. Black, to drop four nuclear bombs on New York. The novel ends with the news that Black committed suicide after carrying out the order.

The obvious irony of the title “Fail-Safe” is that the crisis resulting in the obliteration of two iconic metropolitan cities was, from the writers’ perspective, guaranteed to happen because of the very fail-safe system. The system has two components—a mechanical safety system designed to minimize malfunctions through redundancy and routine checks, and the set of protocols that human agents operating the system have to follow to ensure a smooth and controlled flow of orders cascading down the chain of commands. In the novel, the second kind of fail-safe—the human

⁹ Interestingly, the Russian president is identified as Khrushchev, the actual First Secretary of the Soviet Union between 1953 and 1964, while the American counterpart is unnamed.

fail-safe—is described as an ambivalent system. While it prevents accidental engagements by requiring bombers to attain explicit instructions to fly past the geographically designated fail-safe line, the attack order becomes irreversible past it as the bomber crews are instructed to disregard any radio communications thereafter. The interlocked mechanical-human fail-safe system leads to a catastrophe because mechanical errors cannot be completely eliminated and the human fail-safe creates a small yet guaranteed path through which mechanical errors are escalated into a major military conflict. In this sense, the question the novel asks is what constitutes the “failure” which the fail-safe system is designed to prevent—whether it is to prevent the failure to respond to a nuclear attack or the failure to prevent a war.

Two opposing attitudes toward the allegedly fail-safe system are described in the dialogues between General Black (the protagonist and a bomber pilot) and Dr. Grosteschele (a civilian strategic expert modeled in many ways after Herman Kahn) during a security conference for high-ranking political and military officials. A staunch believer in the safety of their weapons system, Grosteschele argues that “[t]he chance of war by mechanical failure is next to zero” (157). The figures which the doctor offers during the conference—“In any year the odds were 50 to 1 against accidental war” (156)—is portrayed as false confidence partly because, as Black remarks to Grosteschele, “the increasing intricacy of the electronic systems and the greater speed of missiles make[s] that figure worse each year” (157). The dramatically reduced response time in the event of attack due to the advancement of weapons delivery methods—such as the ICBMs as opposed to bombs delivered by bomber planes, or SLBMs (submarine launched ballistic missiles) that could be launched from a close distance to the enemy shore—was a real concern for the U.S. and the Soviet Union. The shorter the available time for deliberation and response became, the further into the future the plans had to be written. So the war plans were written and missiles were put on a

constant high alert, which in turn necessitated various forms of safety protocols against accidental deployment of nuclear weapons like the one we see in *Fail-Safe*.

One of the crucial lessons that nuclear states learned from the progressively decreasing missile travel time was the impossibility of effective defense against nuclear weapons. It became apparent that nuclear weapons were not only impossible to defend against by shooting them down, but also to evade by promptly relocating the population in the targeted areas. “By the 1950s, due to new technologies like the intercontinental ballistic missile, the standard window for evacuating or taking shelter had narrowed to fifteen minutes” (Monteyne 19), which was why already in its early days the U.S. civil defense’s focus shifted from evacuation to sheltering. The sheltering plan itself was also debated not only because building enough number of fallout shelters for the majority of Americans would have been exorbitantly expensive (the responsibility was thus largely relegated to the nuclear family), but more fundamentally because even with enough shelters, it could not be guaranteed that there would enough time to relocate people to shelters. Civil defense with any real capacity for protection was, in other words, doomed to fail due to the very nature of the threat which it aimed to handle. A month after the successful long flight test of the Soviet’s first ICBM (R-7 Semyorka) on August 21st, 1957, a *Nation* article sarcastically proclaimed that “Civil defense is dead, as of right now” (qtd. in Henriksen 105; originally from “Civil Defense Is Dead”, *Nation*, 28 September 1957, p.186). “And to all the people who have been worrying, because the stumbling procedures of the Federal Civil Defense Authority left them uncertain and unprepared,” the article continues, “the ICBM brings a paradoxical note of cheer: You don’t have to worry any more.”

The accelerated speed of a hypothetical war since the introduction of ICBMs and SLBMs (coupled with more advanced surveillance and data processing technologies) is also closely tied to

the perception that the nuclear tension is psychological as much as physical. As Black says in *Fail-Safe*: “Who needs more muscle now? Neither side. It gets down to a guess in a psychological game” (Burdick and Wheeler 147). The idea that “military strategy at the nuclear level became entirely ‘psychological’” was not unique during the Cold War (Schell, *Seventh* 62). In the context of *Fail-Safe* and the particular kind of scenario the novel describes, however, Black’s remark turns out to be ironic, since the whole affair has very much to do with the “muscle.” The story after all ends with a complete destruction of two metropolitan cities, for one of which Black himself becomes responsible. According to the novel, then, the real significance of the bomb being a psychological weapon is not that it is difficult to interpret the enemy’s intentions (although it was and still is very much true), but more fundamentally that nuclear weapons force such a game of guess by virtue of their sheer destructive power and the speed at which the catastrophe can be delivered across a great distance. As the consequence of having only thirty or less minutes to decide whether to retaliate while there may or may not be hostile missiles incoming, the war is waged even before it actually happens. The Cold War is none other than this perpetual preparation and anticipation of war, *the thirty minutes extended to an entire era*.

To tie this point back to the discussion of the novel, the state of constant readiness for war is the reason why Grosteschele’s claim that the odds of accidental war is only about “50 to 1” every year is not reassuring (Burdick and Wheeler 151). Black questions whether the increasingly sophisticated weapons systems would progressively increase the likelihood of mechanical error. He also articulates other causes of accidental war as it has been imagined in fiction. They are various human elements that comprise complex systems of war—political tensions, misjudgments, jingoism, or insanity—not as unintended influences on the mechanical system, but its critical components. The novel as a whole emphasizes through the ironically successful human fail-safe

(because of which the bomber crew indeed carry out their mission, albeit as a result of miscommunication) that if there was a mechanical error, the interlocked war machines of the two superpowers would likely see that the unfortunate chance event evolves into a real conflict. *Fail-Safe* is fundamentally about this systematically paved way to disaster despite all intentions of deterrence, or rather, that the very international institution designed to repress war also doubles as a fail-safe circuitry of catastrophe.

Fail-Safe, as such, questions the logic of deterrence, effectively arguing that deterrence at its core is already a form of MAD. At one point during the security conference, “Black remembered the flurry of excitement a few years before when some scholar had published a paper on the strategy of surrender. If either side strikes first, is not surrender the only possible strategy for the other side? What is to be gained by retaliation?” (161-162). This is simultaneously a valid observation and a flawed logic. It is valid because there is indeed nothing to be gained by retaliation, but also flawed because nuclear deterrence as a preventive measure works only when accompanied with the threat of use. But to call Black’s suggestion of surrender flawed is questionable as well, since it is deterrence itself that is inherently conflicted. The doctrine of mutual deterrence rests on the mechanism of threat, no matter how explicit or implicit the threat might be. But the moment the threat materializes the usefulness of deterrence evaporates. Or more precisely, it is the material preparations made for deterrence that also keep the realization of even the most unintended threats a technical possibility. The fear expressed in *Fail-Safe*, along with numerous nuclear war fictions of a similar nature, is not that deterrence might someday fail, but rather its MAD circuitry will eventually work as unintended but very much designed.

Fail-Safe dramatizes the understanding that the anxiety over accidental war, prompted by increasingly complicated and automated weapons systems and deterrence as an international

trigger mechanism, is rooted in the historical context of the nuclear-armed world. During the Cold War this anxiety was profusely narrativized (and to a lesser extent it still is). Through the process of narrativization, catastrophic uncertainties introduced by the bomb were transformed into anticipated stories, whether or not their outcomes were desirable. MAD, in this sense, was conceived not because political and military leaders during the Cold War were particularly paranoid or suicidal/genocidal, but because MAD overwrote uncertainties with a comparatively definitive plot—namely, a cataclysmic destruction of the world. As wargaming experts “plotted the outcomes of myriad scenarios in which the United States and Soviet Union employed the latest technologies of destruction” (Hamblin 155), MAD was one of the ways to plot the outcomes. Every nuclear war narrative that anticipates and follows through the explosive culmination of MAD is, in this sense, a perfect demonstration of Peter Brooks’ classic definition of plot. A plot confers meaning to otherwise chaotic collection of events, and “only the end can finally determine meaning, close the sentence as a signifying totality” (Brooks 22). In the case of nuclear fiction, the event (nuclear war) has to be artificially triggered for the story (the history of the nuclear age) to reach its closure. One of the central interests of nuclear fiction, in other words, is to somehow complete the story of the bomb by writing its end.

The vast majority of nuclear war fiction, however, does not end with an actual end of the world. Discussing the influence of religious apocalypticism from the pre-atomic era often observed in nuclear fiction, Paul Brians remarks that “most authors ... are reluctant to imagine even so modest an end as the annihilation of all human life” (54). As the narrator of John Varley’s short story “The Manhattan Phone Book, Abridged” (1984) sarcastically suggests, most “after-the-bomb stories” represent our unspoken assumption that “we’ll survive” and “[a]ll those *other* folks will die” (Varley). Most nuclear war narratives are, in other words, stories of survival, if not renewal,

and in that regard they are not different from the more traditional apocalyptic stories where the “end is never the end” and the apocalyptic event serves as “revelation, unveiling, uncovering [of] the true nature of what has been brought to an end” (Berger 5). One of the most explicit nuclear narratives of renewal in the recent years is William Forstchen’s *The Final Day* (2016), a sequel to the *New York Times* bestseller, *One Second After*. The story of *The Final Day* ends with delegates from around the post-nuclear U.S. effectively reenacting the Constitutional Convention of 1787. The world, however, does literally end in few stories. One of the most popular stories of the kind is Nevil Shute’s *On the Beach* (1957), in the ending of which the global human society is slowly approaching a certain death.

Mordecai Roshwald’s *Level 7* (1959) is another one of the few novels that end with a complete extinction of humanity. Although relatively unknown, *Level 7* is an important text in the history of nuclear fiction, as it weaves together some of the notable genre tropes. As a representative of a proper world-ending nuclear fiction, it also avoids the pitfall of using nuclear war as a convenient stage for a postapocalyptic survivalist story. To briefly summarize the overall story first, *Level 7* is presented as “The Diary of Push-Button Officer X-127,” which in fact was the novel’s working title. X-127 (the protagonist) and 499 other people are assigned to “Level 7,” a deep subterranean military bunker. The overall setup of the bunker is an extreme form of military installation for a second-strike readiness. Akin to hardened underground command centers or nuclear submarines in the real world, Level 7 is the deepest artificial space (4,400 feet deep) that is “safe from surprise attack and capable of retaliation” (Roshwald 1). To ensure its survival in the event of attack, the bunker is completely sealed off from the outside world aside from radio communication and designed to be self-sufficient for 500 years. It has food stored in a giant freezer, an air control system including a special room housing live plants to produce oxygen, and a nuclear

reactor which would theoretically outlast every other resource stockpiled within the bunker. The story is divided into three major parts. First, the settings are introduced, then the attack order arrives and missiles are launched, and finally the post-nuclear period describes the people who have survived the initial exchanges dying off one by one due to radioactive contamination slowly seeping through the soil.

While *Level 7* falls into the same category as *Fail-Safe* in that the crises occur as the result of a mechanical error, it explores further into the fantastic world of nuclear war discourse by introducing three additional popular tropes of nuclear fiction to the story: the fallout shelter, the fabled doomsday machine, and total war. As much as the fate of the world in *Level 7*—a complete obliteration of humanity in an all-out nuclear war—is on the extreme end of the spectrum of nuclear disaster imaginations, the narrative components making up the plot are far from being mere fancy. The idea of self-sufficient and ecologically hermetic fallout shelter was nothing new in popular after-the-bomb stories as well as civil defense plans. The very point of building such shelters was to completely sever the human habitat's connection to the planetary ecosystem, and replace it with artificial imitations of nature in varying scales. The fallout shelter was a direct product and expression of the nuclear age, for it was, compared to the conventional bomb shelter, designed to protect its occupants from an ecological threat that was radiation. "Radioactive fallout extended the *duration* of disaster, replacing the idea of immediate civil defense rescue work with the necessity of long-term sheltering" (Monteyne 20). Fallout also extended the range of the disaster, as evidenced in such historical instances as the Chernobyl and Fukushima nuclear reactor disasters as well as atmospheric weapons tests. The contaminants from the events spread through ecological channels, most notably wind and ocean currents. Creating a space insulated from the hostile ecosphere for an extended duration "by imitating nature on a small scale" (as *Level 7*'s

structural design is described in the novel), however, was ultimately an impossible task (Roshwald 39). Therein lies the technocultural significance of the fallout shelter as a symptom of the nuclear age. While the fallout shelter was a logical response to the new kind of threat, it also shed light on the fact that the “vulnerability of the environment is the last word in the argument against the usefulness of shelters: there is no hole big enough to hide all of nature in” (Schell, *Fate* 61).

Closely tied to the trope of fallout shelter is that of total war. Total war refers to the form of war newly conceived by nuclear weapons, with two interrelated changes from the conventional war. It is a war whose end goal is to comprehensively disarm, if not destroy, the enemy state through massive deployment of nuclear arms. It is also a war that, due to the nature of nuclear weapons and long-range missiles, largely blurs the conventional distinction between the frontline and the rear, and consequently combatants and noncombatants (terrorism would bring about a similar kind of conflation decades later). Although not a proper nuclear war between nuclear-armed belligerents, the United States’ atomic bombings of Hiroshima and Nagasaki at the opening of the nuclear age proclaimed the birth of total war. In his national television address on August 6, 1945, sixteen hours after the bombing of Hiroshima, Truman specifically said,

We are now prepared to obliterate more rapidly and completely *every productive enterprise* the Japanese have above ground in any city. We shall destroy their docks, their factories, and their communications. Let there be no mistake; we shall *completely destroy Japan’s power to make war*. (Truman; my emphases)

“Every productive enterprise” including “their docks, their factories, and their communications” represents what the Hague Convention of 1923 defines as “military objective,” such as “military forces; military works; military establishments or depots; [munitions] factories ... lines of communications or transportation” (DeGroot 4). Reflected in the designation of military objective was the qualitative change in the ways in which war was waged. “War had evolved into a contest not between armies but between peoples. Success required not just a good navy or army, but also

an efficient system of organizing the productive capacities of the civilian population” (DeGroot 4). As Niel Bohr already remarked in 1939, preparing a nuclear war “couldn’t be done without turning the whole country into a factory” (qtd. in Rhodes 500), which led to the situation where “every productive enterprise” became a potential “military objective.” Between nuclear-armed states, the objective of eliminating the enemy’s “power to make war” meant destroying the entirety of their nuclear arsenal and the industrial complex supporting it, for even a small number of bombs would result in devastating loss without reliable defensive measures.

The primary environment of *Level 7* is the prospect of total war—a massive all-out war transforming the entire national territories into one expansive frontline. The novel’s description of the war is fairly standard for a nuclear fiction dramatizing all-out wars triggered by technical accidents. The novel, however, introduces the idea of “Level 0,” a unique conceptual tool with which the writer invites us to consider the meaning of total war in a new light. As the title of the novel already intimates, there are seven levels of underground facilities in the world of *Level 7*. The first two levels have the largest capacities, but lack comprehensive protection, like the average fallout shelters built for civilians in the real world. As the novel describes them, “Unless the war is a very limited one, [Levels 1 and 2] do not stand a chance” (Roshwald 110). Beneath them are Levels 3 through 5 reserved for the “*elite* of the civilian society”; “the more important the civilian, the deeper he will descend and the safer he will be” (Roshwald 100). Then finally there are Levels 6 and 7, which are military levels carrying out defensive and offensive operations, respectively. There is one more level, however, that is not officially recognized in the hierarchy—Level O (zero).¹⁰ In the context of the bomb’s power to obliterate not only cities but the spatial demarcation between the war’s front and rear, the most chilling moment in the story from a 21st-century

¹⁰ It is Level “zero,” but Roshwald writes it with an alphabet O, perhaps to emphasize the nonexistence/emptiness of protection on the ground level.

reader's perspective is not when thousands of nuclear missiles are launched, for such a war no longer seems very likely. It is rather when the entire surface world is designated as Level O. The level is first introduced in the story through a public radio lecture series broadcast within Level 7 titled "Know Other Levels." X-127 writes in his journal one day, "the 'Know Other Levels' series ended today with a talk about the preparations on the surface—Level O, the speaker called it, and I suppose the term was convenient for his purpose, though of course the surface is not a real level at all" (Roshwald 110). The designation emphasizes that the entire surface world is a vulnerable, exposed space. Whether people at any given time since 1945 come to consciously fear that the "simple physics of nuclear devices render everyone, everywhere, susceptible to instant destruction" is tied to international political stability as well as cultural discourses of nuclear weapons/war at the time (Lifton and Falk 23). That nuclear weapons (along with satellites) had turned the entire world into Level O, however, remains true regardless of our perceptions of the nuclear threat or the relationships between countries. "[I]n the age of bombing, the world has ... transformed into—is essentially conceived and grasped as—a target" (Chow 31), for the entire world constitutes a zero-protection level.

The topic of MAD appears in *Level 7*, lastly, in the form of doomsday machine. A fictional creation, the doomsday machine is an automated and integrated surveillance-weapons system designed to detect nuclear attacks and rapidly launch massive retaliation without human input. The RAND Corporation's *Glossary of Terms on National Security* (1961) defines it as "a reliable and securely protected device that is capable of destroying almost all human life and that would be automatically triggered if an enemy committed any one of a designated class of violations" (Smith 413). In *Level 7*, the war is triggered by the enemy state's twelve thermonuclear ICBMs detonating

over some cities of the protagonist's country¹¹ allegedly by a technical accident. The defending country responds with two thousand rockets, which eventually leads to a series of massive exchanges. In the post-catastrophe radio communications between Level 7 and the enemy state's counterpart, it is revealed that the retaliations were carried out by doomsday-machine-like computers, rather than the political leaders of the two countries.

The idea of doomsday machine originates from Herman Kahn's *On Thermonuclear War* published in 1960. By then, both the U.S. and the Soviet Union had already developed thermonuclear weapons. It was before any major international treaties for nuclear weapons, as it would take three more years for the first treaty of the kind—the Limited Test Ban Treaty (atmospheric test ban) in 1963—to be signed. At one point in *On Thermonuclear War* where he discusses “peacetime objectives of a strategic force” (i.e. nuclear deterrence), Kahn comes up with the idea of “doomsday machine” to demonstrate the necessary qualities of good deterrence measures, using the doomsday machine as an example of the kind of measure to avoid. He writes, more specifically,

A Doomsday weapons system might be imaginatively (and entirely hypothetically) described as follows: Assume that for, say, \$10 billion we could build a device whose only function is to destroy all human life. The device is protected from enemy action (perhaps by being put thousands of feet underground) and then connected to a computer which is in turn connected, by a reliable communication system, to hundreds of sensory devices all over the United States. The computer would then be programmed so that if, say, five nuclear bombs exploded over the United States, the device would be triggered and the earth destroyed. (Kahn, *Thermonuclear* 144)

It is immediately noticeable in the passage that the automated weapons system in *Level 7* is a faithful representation of Kahn's imaginary doomsday machine. Also worth noting is that the

¹¹ *Level 7* is deliberately vague about the exact identities of the two nuclear states depicted in the story. It does not provide any specific real-world references such as the names of well-known politicians or cities, although they are doubtlessly modeled after the U.S. and the Soviet Union.

reason why Kahn regards the doomsday machine “unacceptable” despite the fact that “it maximizes the probability that deterrence will work” is because it is “not sufficiently *controllable*,” being an automated system operating independently from human decisions (*Thermonuclear* 146-147). He writes that “the consequence of a failure” in the event the doomsday machine is activated “kills too many people and kills them too automatically” (*Thermonuclear* 147). This concern is vividly demonstrated in *Level 7*.

The doomsday machine as a fantasy of an equally fantastic era, however, does have a material basis and reminds us, through an exaggeration, of what mutual deterrence and maintaining nuclear arsenal in the name of self-defense fundamentally mean. One instance of doomsday machine that actually existed (and possibly still exists)¹² is a Russian nuclear command rocket system called “Perimeter.” In the early 1980s, Russians actually considered building a fully automated retaliatory system, known as the “Dead Hand.” They, however, decided against it for the same reason why Kahn argued against the doomsday machine—too many deaths by a too automatic measure. They instead built a semi-automatic system called Perimeter (Hoffman 23-24). The existence of this retaliatory system became known to Americans for the first time with Bruce Blair’s *New York Times* op-ed published on October 8, 1993. Blair, the former Minuteman ICBM control officer and senior fellow at the Brookings Institution, had a series of conversations with Valery Yarynich, the former Russian colonel who had served as a specialist in the command and

¹² There have been indications that the Perimeter system might be still operational. Daniel Ellsberg writes in *The Doomsday Machine* (2017): “In a February 2, 2017, article, *Pravda* revealed that the commander of Strategic Missile Forces Lieutenant-General Sergey Karakayev said five years ago in an interview in a Russian publication, ‘Yes, the “Perimeter” system exists. The system is on alert’” (306). The article he references is: Sudakov, Dmitry. “Russia’s Secret Shield: Perimeter, aka Dead Hand.” *Pravda*, english.pravda.ru/russia/136776-perimeter. A *National Interest* article covering a 2019 Russian newspaper article explains, quoting Viktor Yesin, a former Russian Strategic Rocket Forces commander in the 1990s, that the Perimeter or “Dead Hand” (“Mertvaya Ruka”) is likely to be still functioning. “There have been cryptic clues over the years that Perimeter still exists. Which illustrates one of the curiosities of this system, which is that the Soviet Union kept its existence secret from the American enemy whom it was supposed to deter” (Peck).

control of the Soviet Strategic Rocket Forces from 1959 to 1986.¹³ Perimeter is a nuclear weapons system designed specifically for retaliation. Its centerpieces are special rockets that, instead of a nuclear warhead, “carry a special nose cone of electronics,” designed to “broadcast a message to all the remaining nuclear-armed intercontinental ballistic missiles in their silos below: ‘launch!’” (Hoffman 150). Being a semi-automatic system, Perimeter becomes active only if the “permission sanction” has been given in advance of actual attacks. With the permission sanction in effect, “if there were seismic evidence of nuclear strikes hitting the ground, and if all communications were lost, then the duty officers in the bunker could launch the command rockets,” which in turn would trigger the launch sequence for a horde of missiles with actual warheads (Hoffman 422). The U.S. also had a similar system, called the Emergency Rocket Communications System (ERCS), with a command rocket carrying a UHF transmitter instead of a warhead. The ERCS was deactivated in 1991 by President George H. W. Bush.

Perimeter and the ERCS demonstrate again that the primary goal of MAD is to replace uncertainty with a more controllable narrative—to, in other words, plot the future. “In the event of nuclear explosions, communications links would vulnerable to disruption, especially between the headquarters and the missile silo. The Soviet military designers wanted to eliminate that uncertainty” (Hoffman 149). Even without Perimeter as a drastic kind of historical evidence, however, the nuclear-armed states themselves are in a sense doomsday machines.¹⁴ Consider

¹³ Also see: Hoffman, David. “Valery Yarynich, the Man Who Told of the Soviets’ Doomsday Machine.” *Washington Post*, 20 Dec. 2012, www.washingtonpost.com/opinions/valery-yarynich-the-man-who-told-of-the-soviets-doomsday-machine/2012/12/20/147f3644-4613-11e2-8061-253bccfc7532_story.html?utm_term=.88dad2929d06

¹⁴ Daniel Ellsberg writes in *The Doomsday Machine*: “Here is what we know now: the United States and Russia each have an actual Doomsday Machine. It is not the same relatively cheap system that Herman Kahn envisioned (or Stanley Kubrick portrayed) But a counterpart nevertheless exists for each country: a very expensive system of men, machines, electronics, communications, institutions, plans, training, discipline, practices, and doctrine—which, under conditions of electronic warning, external conflict, or expectations of attack, would with unknowable but possibly high probability bring about the global destruction of civilization and of nearly all human life on earth” (339).

Kahn's description of the fictional world-ending weapons system: "The device is protected from enemy action ... and then connected to a computer which is in turn connected, by a reliable communication system, to hundreds of sensory devices all over the United States" (*Thermonuclear* 144). The United States as a whole, for example, is one such "device," without a fully automated system, but with very carefully written plans for mass destruction. The anticipated casualty and damage of SIOP were so great that it in fact "became known as the 'doomsday machine'—within twenty-eight hours of a threat being confirmed, the US would deliver over 3,000 weapons to around 1,000 targets in the Soviet Union, China and Eastern Europe. According to reliable estimates, such an attack would kill 285 million people" (DeGroot 210).

Even beyond their contemporary time when nuclear war was perceived to be a much more likely and imminent prospect, nuclear war narratives like *Fail-Safe* and *Level 7* still remain relevant. They remind us of the irrefutable fact that at the bottom—the foundation as well as the less visible level—of nuclear deterrence is the threat of use. Every nuclear war story, in this sense, is a reminder that the system of mutual threat still exists, along with the means to carry out the threat, regardless of the international climate at any given time. The nuclear wars depicted in the *Terminator* movies and *Level 7* are triggered and carried out by the international nuclear war machine itself, not as a result of any previous escalation between human agents. By fictionally materializing the underlying (or even undergirding) threats, nuclear fiction also demonstrates that in the nuclear age the relationship between nuclear-armed states is defined by their mutual vulnerability, stemming from the reality where the power of offensive measures vastly exceeds those of defensive measures. The irony of the mutual vulnerability is that while it is a direct result of arms race (which continues on in the form of weapon modernizations even as the overall number of weapons and warheads decrease), it has also been artificially created to serve as a deterring

force to arms race. For instance, the primary goal of the Anti-Ballistic Missile (ABM) Treaty of 1972 between the United States and the Soviet Union (which limits each party's arsenal of anti-ballistic missiles to 100) was "institutionalized vulnerability" (Polanyi 6). The ABM Treaty's termination following the United States' withdrawal in 2002 and the subsequent tension surrounding the Korean Peninsula (caused by the successful nuclear weapons tests by North Korea starting in 2017, the U.S. deployment of THAAD in South Korea, and China and Russia's expressed opposition to the deployment) demonstrate a potential scenario of escalation in the absence of institutionalized vulnerability.

As much as the ideas of mutually assured destruction and institutionalized vulnerability are gruesome, they are, ironically, designed to offer a more predictable future. MAD is premised on the rationality, not insanity, of the involved parties, because it is a plotting tool to alleviate the uncertainties introduced by nuclear weapons. "The uncertainties inherent in the ultimate effects of a nuclear war are ... a central reality of MAD" (Buchan 14). Also, while the realization of MAD is literally madness, "it continues to depend as it always has on the rational behavior of national policy-makers. A national leader who is insane, drunk, just plain mean, or not sufficiently in control of events may not be deterred by the logic of mutual assured destruction" (Buchan 14). The threat of mutual destruction is, in other words, a catastrophic trigger system that is nevertheless expressive of the belief in the logic of relational decision making articulated by game theory.

The inherently paradoxical nature of MAD, intended to maintain peace through a promise of the most extreme form of destruction, is reflected in the paradoxical kind of optimism in nuclear fiction. Aside from the few narratives where humanity is completely obliterated, there are always survivors and, as a corollary, the post-disaster world can be recorded at all. But at the same time, the war or the great catastrophe in some other form is perceived to be inevitable. This paradoxical

optimism in fact sums up Herman Kahn's futurological strategic fiction. For him, there was little doubt that the world would eventually come to a violent nuclear eruption. His studies, as a result, explore ways of post-disaster mitigation, as much as or even more than the means of prevention. "Kahn's notorious table of 'tragic but distinguishable states' [i.e., various projections of the outcome of a large-scale nuclear war] dramatized his conviction that prewar preparations limited deaths, limited damage, and fostered postwar recuperation" (Ghamari-Tabrizi 220). His argument was, in other words, that if war was bound to happen, we should do our best to minimize the damage. For him, the realistic optimism in the age of nuclear weapons was to believe in humanity's survival while admitting the inevitability of disaster and abandoning the expectation of restoring the post-war world back to its "normal" state. This is the world picture of the nuclear age reflected in every nuclear war narrative that ends with any number of survivors and at least a little bit of hope for the future.

It is in the context of the simultaneously fatalistic and optimistic vision of the future that some nuclear narratives push the limit even further, beyond the conventional dramatization of a nuclear war. The two instances I want to discuss here are an episode from the original Star Trek series, "A Taste of Armageddon" (1967), and a short story written by Leo Szilard, "The Mined Cities" (1961). To shed light on the absurdity of mutually assured destruction, the stories sarcastically explore the idea that if MAD is already firmly rooted in our reality we might as well should institutionalize it even further to make it even more effective as a means of deterrence.

The main novum¹⁵ of "A Taste of Armageddon" is virtual war, in which every detail of the on-going war is simulated with computers rather than carried out physically. The episode takes place on a planet called Eminiar VII, the home world of the Eminian people. Soon after their arrival

¹⁵ "Novum": A Latin word meaning "new thing" coined by science fiction scholar Darko Suvin to identify the central innovation of any given science fiction narrative.

the crew of the *USS Enterprise* learn that the Eminians have been at war with their neighbor, the Vendikans, for the last 500 years and, even more surprisingly, that the war has been entirely virtual. As a dialogue between Spock and Anan 7 (an Eminian officer) reveals, the war is not “theoretical” but “quite real” and “mathematical.” While every detail of the war is simulated, the data is derived from the material reality, such as each party’s arsenal and targeted areas’ populations. What really makes this war real in spite of being completely simulated is that the calculated casualty from each attack is physically resolved. The Eminians and the Vendikans who happen to be in the affected areas are required, by a treaty for their virtual war, to submit to disintegration (a science fiction version of incineration).

Aside from the fear that a war might eventually break, the immediately relevant historical context for the imagination of virtual war is wargaming coupled with the evolving computer technology. Alluded early in the story is the new form of threat introduced by nuclear weapons. Upon landing, Kirk inquires why he and his crew were advised to stay away when he “see[s] no danger here.” The Eminian official admitting the crew, Mea 3, says, “The danger exists” (06:32). Kirk later asks her, “Don’t you take shelter?” to which Mea 3 replies, “There is no shelter, Captain” (08:58). Mea 3’s remarks complete the analogy between the fictional virtual war and the real Cold War, both with ever-present and ubiquitous threat. Once the party arrive at the Eminian control center that houses the super computer simulating the war and connected to the Vendikan counterpart, Kirk wonders if “this is some sort of *game* you’re playing” (my emphasis). The head of the Eminian High Council, Anan 7, angrily responds—“This is no game, Captain. Half a million people have just been killed” (11:04). At this point it becomes evident that the virtual war is a stand-in for numerous war scenarios that wargame scenarists and fiction writers have imagined throughout the Cold War.

In terms of technologies behind the fantasy of fully computerized virtual war, computers in our history had indeed become an integral part of defense and the wargaming community since the mid-1950s, about a decade before the initial airing of “A Taste of Armageddon.” The construction of the Navy Electronic Warfare Simulator (NEWS, the first large-scale wargaming computer in the U.S.) was commissioned in 1958. The Semi-Automatic Ground Environment (SAGE, the first American weapons system that was closest to a completely automated one) became fully operational in 1961. Due to the advancement in computer technology,

Fantasy that strategic and tactical inputs could be programmed into the black box and the desired plan or even the war itself would thereby be rendered was not merely a quixotic desire afloat in the void. ... For example, the mathematician John Kemeny ... wished, wars would be conducted at ‘great simulations laboratories at the United Nations’. The war would take place ‘on the largest and most expensive computing machine ever constructed by Man. After twenty-four hours of computation, both sides are informed of the outcome. The victor can then rejoice, and the defeated country—after paying due reparations—can start arming for the next simulated war’. (Ghamari-Tabrizi 175)

The fantasy of war waged completely on computers, of course, stemmed not just from the new technical possibilities afforded by increasingly powerful computers, but also from the military need for fast data processing and prompt counterstrike. “[T]he speed with which these weapons could react, each to the other, seemed to indicate that only a machine with vast memory and instant response could be expected to indicate a successful counter strategy in sufficient time to be useful” (Koopman qtd. in Ghamari-Tabrizi 176).

Another important technical development to which the computer war in the Star Trek episode refers is the virtualization of war, waged and presented on computer screens. Seminal to the virtualization technology in the U.S., SAGE was a major U.S. Air Force project operational in the late 1950s and 1960s. It was designed primarily as an airspace surveillance system capable of producing a unified map of the continental United States, by integrating and processing a vast amount of data gathered from radar sites around the country. Also, as the acronym implies, it was

a “wise” system that could calculate enemy missiles’ trajectories and likely target areas. SAGE in this sense not only virtualized war by visualizing space, but also mapped the future by visualizing eventualities. “The map display, constantly updated with the latest information on the projected trajectories of incoming enemy forces Protection of the ground environment was to be achieved in and through the *doubling* of that environment by the virtual display. This doubling aimed to make possible the preemptive realtime control of eventuality within the parameters of the real space mapped on screen” (Crogan 10-11; my emphasis). The technocultural significance of this “doubling” is that war is now not only controlled via digital interface, but conceived as such—in the forms of maps, moving dots, numbers, and buttons. The computer war in “A Taste of Armageddon,” then, represents a hypothetical future where war reaches the level of the hyperreal. When the virtualization of war is perfected, the virtual is the war, and the physical world is adjusted according to the result of the simulation. In the Star Trek episode, the perfect virtualization amounts to each state killing their own citizens according to the calculated casualties.

The perfect virtual war is a perversion created by the technological capabilities of nuclear weapons in both the story and the real history of our world. Toward the end of the episode Captain Kirk remarks, “Death, destruction, disease, horror ... that’s what war is all about That’s what makes it a thing to be avoided. You made it neat and painless, so neat and painless you’ve had no reason to stop it. And you’ve had it for 500 years” (43:20). But the history of nuclear weapons shows that such a perversion has also been the product of perfecting defense in the nuclear age. While it is true that war is all about “death, destruction, disease, horror,” the nuclear bomb raised the stake of war too greatly that nations could not afford to be deterred by actual losses and horrors of war after the fact. Or as Rey Chow writes, “The atomic bomb did not simply stop the war; it also stopped the war by escalating and intensifying violence to a hitherto unheard of scale” (31).

Instead of going through costly trials and errors, the nuclear-armed states speculate possible outcomes and are deterred by those speculations. Each nuclear power is, in other words, deterred not just by the existence of nuclear weapons in other countries' possession, but also by the nightmares of their own imaginations. The measures of assured retaliation are in this sense the measures ensuring that the scenarios of an actual war would end with an unprecedented catastrophe, which is precisely the definition of MAD. The completely virtual use of weapons in the fictional war is also a perfect analogy for the usage of nuclear weapons in the real history. Herman Kahn once wrote, "Terrible as nuclear weapons are, they exist and therefore maybe used. Even if they are used only as a threat, such threats, if credible, in themselves represent a kind of use. ... Even pure deterrence-only politics 'use' nuclear weapons in the attempt to institutionalize a mutual paralysis through fear" (*Essential* 45). The point that "A Taste of Armageddon" dramatizes in this regard is that even this type of use has a material implication—that, in other words, if threats are made based on real weapons, the nuclear relationships in the real world are not too far off from the virtual war of the *Star Trek* episode.

The absurd level of virtualization as the perversion/perfection of nuclear warfare imagined in the 1967 *Star Trek* episode is, finally, a commentary on the historical reality where nuclear states try to prevent war without eliminating the weapons themselves. The war entirely waged on computers is, the film suggests, a logical conclusion of such a conflicted effort. The writer sarcastically proposes that since there is no way we would abandon our weapons, we should come up with a way to minimize their destructive effects. In the world of the Eminians and the Vendikans, war is completely institutionalized. While this level of institutionalization, where the belligerents have agreed to terminate their own citizens according to the simulation results, seems

unlikely to become reality, at nuclear-armed states always already gamble with the lives of their own citizens.

Leo Szilard's short story "The Mined Cities" imagines a more physical form of the institutionalization of MAD. Published in a 1961 issue of the *Bulletin of Atomic Scientists*, the entire story is a long dialogue between two characters. One is the unnamed protagonist (indicated simply as "A") who is a medical doctor that had recently been awakened from an eighteen-year-long cryogenic sleep. At the other end of the conversation is another unnamed character (indicated as "B") who is presumably a technician or a medical attendant working at the cryogenic facility. The doctor learns from the attendant that at some point between his time (1961) and the current time (1980), the United States and the Soviet Union agreed to each convert fifteen of their major cities into "mined cities." Underneath each mined city is a "fortress" housing a hydrogen bomb, manned by each other's citizens who are drawn by a lot "much like citizens are drawn for jury duty" to serve for 14 days (Szilard 408). In the fictional 1980s world, these fortresses—a crystalized form of tit-for-tat or in this case literally city-for-city—comprise the only remaining nuclear weapons. All others have been dismantled. Fallout shelter programs have also been abandoned, allowing both countries to save billions of dollars.

Better than any fictional concepts found in nuclear fiction, the idea of mined city articulates mutual vulnerability in its purest form. It also reflects a reality where managing uncertainty is considered a more serious and immediate issue of national security than the prevention of an actual war that may or may not happen. The incredulous ways to institutionalize war in nuclear fiction are expressive of the perceived extent of the nuclear uncertainty, so great that the writers imagine situations in which political leaders prefer a perpetuated but anticipated war (as in "A Taste of

Armageddon”) or a life literally built atop bombs (as in “The Mined Cities”) to missiles falling from the sky unannounced.

The same desire that drives the plot of these stories also motivates wargames, civil defense pamphlets, and nuclear war plans: the desire to simulate—to feign to have—the knowledge about the future by preemptively writing it. Like literary fiction, strategic fiction is also an instance of eventuality tasked to anticipate the materialization of the nuke’s destructive potentials.

CHAPTER III. CATASTROPHIC ECOLOGY: ECOLOGICAL THINKING LEARNED AT BOMB-POINT

I began my project with the overarching thesis that the nuke is fiction and proposed eventuality as a conceptual tool to articulate it. In Chapter 1, I discussed how time travel as a plot device is used to represent eventuality. The time travel narrative is a perfect embodiment of eventuality, the narrativization process through which a historical event develops into an anticipated future event. The story dramatizes how the future not only is determined by but also affects the present, reflecting the increasing trend in the real world where catastrophic future projections that are fundamentally fiction nevertheless influence the present, from policy decisions to the more general understanding of the material world. The second chapter explored the world of wargaming, demonstrating the affinity between strategic and literary fictions about the nuke as two different but also similar genres of simulation that represent nonexistent events. This comparative reading was to serve as another kind of proof that the nuke is fiction, as its representations can but be speculative in varying degrees.

As a continuation of my discussion so far but with a different focal point, the final chapter examines the ways in which nuclear fiction represents the inherently ecological nature of the nuke's impact on the world. Nuclear fiction tends to display an awareness of ecological connections between things because its primary subject matter, the nuclear bomb, is an ecocidal weapon. A story that dramatizes a fictional nuclear war cannot do so without touching upon the fundamentally ecological nature of the weapon's impact. Not only radiation affects the human body as well as the ecosphere as a whole, but also the sheer extent of destruction caused by a major

nuclear disaster is expected to critically disrupt the global climate.¹⁶ As nuclear fiction's historical context, I also discuss in this chapter the development of ecology following World War II, to demonstrate that the advent of modern ecology as a field of study was motivated by the catastrophic prospects of nuclear war.

The second half of this chapter explores literary representations of the nuke's ecological influence that is historical rather than hypothetical, focusing on the slow and insidious violence of radiation. Compared to the stories imagining hypothetical nuclear disasters in the future, the ones that represent the inherently ecological nature of the nuke have more direct historical references. While we have fortunately not had a nuclear war, there have been multiple major nuclear disasters, from Chernobyl in 1986 to Fukushima in 2011, both of which remain to be ecological threats requiring continuous containment.

Given the overarching thesis of my project that the nuke is fiction, the inclusion of the historical nuclear fiction—a body of fictional narratives that focus primarily on historical nuclear incidents, as opposed to the more speculative nuclear fiction imagining future outcomes of nuclear power—requires some explanation. The knowledge of the nuke is fundamentally dependent on various kinds of speculations and the full realization of its destructive potentials can only be represented in fiction. Still, a study of nuclear history vis-à-vis its literary representations would be incomplete without a discussion of the empirical basis for the speculative—namely, the weapons tests and production with real victims in history. Also, while the historical nuclear fiction does focus on the nuke's past rather than its possible futures, it is still a fiction, compared to

¹⁶ Daniel Ellsberg explains the prospect of global famine caused by nuclear winter as follows: "It is the smoke, after all (not the fallout ...), that would do it worldwide: smoke and soot *lofted* by fierce firestorms in hundreds of burning cities into the stratosphere, where it would not rain out and would remain for a decade or more, enveloping the globe and blocking most sunlight, lowering annual global temperatures to the level of the last Ice Age, and killing all harvests worldwide, causing near-universal starvations within a year or two" (17).

documentaries or testimonials. Although not as spectacular as its more speculative counterpart, the historical nuclear fiction still represents the nuclear eventuality, as it weaves together pieces of the past into a narrative in which the time-delayed effects of the nuke manifests in the protagonists' present. In the two primary novels which I discuss as examples of the historical nuclear fiction—Curtis Oberhansly and Dianne Nelson Oberhansly's *Downwinders* (2001) and Leslie Marmon Silko's *Ceremony* (1977)—the protagonists discover the nuke in their personal lives. Christine, *Downwinder's* protagonist, finds it in her own body and traces it back to her family's irradiated backyard where she played as a child in the days of aboveground tests. Tayo, *Ceremony's* protagonist, discovers the U.S. nuclear complex in an abandoned uranium mine near his town, where he experiences a trans-like moment of realization about the intimate link between the U.S. nuclear landscape and that of his people, the Laguna Pueblo, and other Native Americans.

Because of the nature of radiation as a lethal contaminant spreading through ecological channels, ecology plays an integral role in this chapter. To broach the subject of nuclear fiction as a representation of the weapon's ecocidal capabilities, I first examine the intimate historical relationship between the development in nuclear technologies (for military and civilian purposes) and the advent of modern ecology as both a discipline and a general way of understanding the material world. The strand of modern ecology that emerged as a reaction to the advent of nuclear power began as a study of radiation's detrimental effects on the individual human body. The focus, however, quickly expanded to the interactions between the body and the environment, and eventually to the ecosphere as a whole. Ecology considered in the context of the nuke is thus critically informed by the prospects of catastrophes.

After the historical overview, I turn my attention to the nuclear winter hypothesis as a synthesis of nuclear scenario writing and ecological studies. In the context of the nuke as an

ecocidal weapon, the significance of the hypothesis is that it emphasizes not its capability for direct and immediate destruction, but the extent to which a nuclear war can disrupt the ecosystem. The nuclear winter hypothesis anticipates, in other words, a form of violent nuclear climate change. An excellent representation of such a prospect is Kurt Vonnegut's *Cat's Cradle* (1963). The novel is technically not a nuclear narrative, for the central disaster of the story is not caused by a nuclear device. I argue, however, it is also very much a nuclear disaster narrative, as the fictional substance that turns the entire planet into one frozen mass—ice-nine, a fictional polymorph of water—is a perfect representation of the nuclear weapon's ecocidal potential. Ice-nine is an effective representational tool for the slow violence of radiation. Compared to such spectacular and fast events as World War III or unprecedented global epidemics imagined in popular fictions, the gradual spread of radiation is not as easy to narrate. The solution which ice-nine offers to this problem of representation is acceleration. Both radiation and ice-nine contaminate the planet in the same way—they spread through the ecosystem. The difference is quantitative, as ice-nine's spread occurs almost instantly, freezing any body of water connected to the ground zero and bringing the planetary circulations to a complete halt. Released into the wild, ice-nine rapidly causes an ecological death of the world. The novel's focus on the fictional substance's ecological impact, rather than direct influence on organisms, strongly suggests that it stands in for the nuclear bomb as an ecocidal weapon.

The next topic I discuss is how the nuke influenced the ways in which humans perceive the ecosystem. A nuclear disaster on a planetary scale is simultaneously an immediate physical experience and an expansive reality that can only be understood in its totality through mechanical mediations. In fiction as well as in our own reality, there are two major ways in which humans can experience a global nuclear event—either with their own body exposed to the irradiated or

otherwise compromised environment, or through the data collected and processed by machines. For the fictional representation of humans experiencing a nuclear war through such mechanical mediations, I read Philip Wylie's *Triumph* (1963). It is a novel about a small group of people confined to an underground fallout shelter and receive the news of the dying world outside through mechanical sensors and broadcasts. *Triumph* is a typical Cold-War fallout shelter story, but also one that invites us to consider how we learn to perceive the ecosphere. Fallout shelter stories like *Triumph*, I propose, can be read as amplified representations of our mediated relationship to the ecosphere, as the irradiated environment in the fictional world leaves no choice to the protagonists but to rely on mechanical sensors.

The last section of the chapter is devoted to the discussion of radioactive internal war and its literary representations. Compared to the earlier sections of the chapter, the last part is concerned with the nuke's influence in peacetime. I read two novels, *Downwinders* (2001) by Curtis Oberhansly and Dianne Oberhansly and *Ceremony* (1977) by Leslie Marmon Silko. As I mentioned earlier, the central thesis of this chapter is that the bomb is constantly harmful even without an actual war. In peacetime, the nuke exerts its material influence through its production cycle from mining operations to weapons tests and waste disposal. One important aspect of the nuke represented by the two novels is that it constitutes a form of internal war—a war waged by the state against its own people. *Downwinders* is a story about the American victims of the fallout generated from the test shots at the Nevada Test Site in the 1950s. *Ceremony*, on the other hand, is a Laguna Pueblo protagonist's journey through the endo colonization of the Native Americans by the U.S. government for the bomb production. Despite their differences, the two novels share the same approach to the ecological history of the nuke, as they lead their protagonists to climatic

moments of realization about the intimate connections between their private lives and the national nuclear project.

The Nuclear Bomb and the Age of Ecology

“The Age of Ecology began on the desert outside Alamogordo, New Mexico on July 16, 1945, with a dazzling fireball of light and a swelling mushroom cloud of radioactive gases” (Worster 339). This is the opening line of Donald Worster’s *Nature’s Economy* (1977). One of the pioneers of environmental history, Worster proposes that the originating event of the “Age of Ecology” was the detonation of Trinity, the first atomic bomb. His designation of the first atomic bomb as the beginning of the Age of Ecology is more than a rhetorical emphasis on the historical importance of the discovery of nuclear power. In the preface, he writes that ecology as a scientific field of study “has been suddenly called on” in “recent years” (the 1960s and 1970s) and that this new discourse has become so influential that his contemporary time “might well be called the ‘Age of Ecology’” (vii). *Nature’s Economy* chronicles the history of ecology’s precursors starting from the eighteenth century. Although the label “ecology” was, as he points out, introduced in 1866 by Ernst Haeckel and “it took almost another hundred years for it to enter the vernacular,” Worster still treats the precursors as forms of ecology just without the name (viii). Why, then, does he argue, after exploring the history of ecology for over three hundred pages, that the Age of Ecology actually began with Trinity? The answer is found in the following passage in the epilogue:

One kind of fallout from the atomic bomb was the beginnings of widespread, popular ecological concern around the globe. ... The devastation of Bikini atoll, the poisoning of the atmosphere with strontium-90, and the threat of irreversible genetic damage struck the public consciousness with an impact that dust storms and predator deaths could never had. Here was no local problem or easily ignored issue; it was a question of the elemental survival of living things, man included, everywhere in the world. (340)

The Age of Ecology as an era in which ecology plays an integral role in representing the material world, in other words, began in earnest when there appeared a material threat whose destructive power and reach incited an ecological understanding of the world—a global threat that was the atomic bomb. Modern ecological thinking was instigated not only by historical disasters—the bombs that had already been detonated and the radiation that had already been released into the ecosphere—but also by the imageries of catastrophic futures. Ecology, in this sense, has been informed by disasters in the future. I call it *catastrophic ecology*, not to refer to a specific strand of ecology, but to emphasize the integral role played by catastrophic events, historical or speculative, in the formation and development of the field.

Nuclear fiction demonstrates this power of the nuke as a catalyst for the advent of ecology. The genre reflects, in other words, how ecology was learned at bomb-point. As soon as nuclear weapons are introduced to a story, it becomes ecologically informed, for the simple reason that the nuclear bomb is a vessel of ecological disasters. It is designed to destroy just like any other weapon, but the victims of the destruction include the environment, rather than just the intended local targets, whether due to radiation or a large amount of smoke disrupting the planetary climate.¹⁷ It is because of this particular nature of the weapon that nuclear war narratives are akin to “not in fact the war story at all, but the narrative of a great catastrophe: fire, flood, plague” (Brians 3). In *On the Beach* (Nevil Shute, 1957), to take one of the better known works of the genre, the survivors

¹⁷ “a large amount of **smoke** disrupting the planetary climate”: The nuclear winter hypothesis posits that one of the disastrous effects of a nuclear exchange would be caused by the large quantity of smoke generated not necessarily by the explosions themselves but rather buildings and environmental entities ignited by the explosions. Pearce and Denkenberger’s “A National Pragmatic Safety Limit for Nuclear Weapon Quantities,” especially p.2, provides a good summary of various studies on the nuclear winter hypothesis. See Robock, Oman, and Stenchikov’s “Nuclear Winter Revisited with a Modern Climate Model and Current Nuclear Arsenals” (2007) for an updated estimation for nuclear winter. It should be emphasized that even a relatively small nuclear war is estimated to cause nuclear winter: “first-strike nuclear attacks by either side very much smaller than were planned in the sixties and seventies ... would still kill by loss of sunlight and resulting starvation” (Ellsberg 17). As a related work, Lynn Eden’s *Whole World on Fire* (2004) is a historical investigation into the “systematic failure to assess nuclear fire damage” since the invention of the atomic bomb (2).

in Australia are facing a slow but certain death, as the lethal level of radiation in the northern hemisphere after World War III will eventually be carried over the equator. As much as they are dying because of the most toxic war in history, they are dying also because the wind blows, the water flows, and the world turns. While the ecological circulation by itself is not the culprit, it is also the only force moving the world to its end (at least for humanity) after the war. The entire story consists primarily in descriptions of the waiting for the eventual death, not the nuclear war itself (which is already a preexisting condition). What *On the Beach* fictionally demonstrates, in other words, is not just the disastrous extent of a nuclear war, but also the ecosphere vis-à-vis its extensive disruption. The story shows how a powerful and lasting contaminant illuminates ecological channels that bind all organisms on the planet. The world does not end with a bang in *On the Beach*. The end slowly but surely creeps into the surviving part of the world. The tragic tone of the story is set not by this fact alone, but rather the survivors' ecological knowledge about their eventual death—their ability to imagine the eventuality of the bomb as an ecocidal weapon.

Before proceeding to the main part of the chapter, I want to first introduce a concept that is particularly relevant to the discussion of the nuke in ecological terms: *hyperobject*. Coined by Timothy Morton, hyperobjects are entities “that are massively distributed in time and space relative to humans” (Morton, *Hyperobjects* 1). Examples of hyperobjects include Styrofoam, plutonium, global warming, and Earth. Styrofoam is a hyperobject because it takes over a million years to break down naturally and is, as such, massively distributed in time. To really see it as a hyperobject, you have to visualize a chunk of Styrofoam occupying a wide breadth of time, lying across, as it were, the temporal span of more than a million years. Imagine, for example, that you were an alien living in the far future who just discovered a piece of Styrofoam on Earth as one of the few material traces of the human civilization that has long been dead. The piece of Styrofoam

would connect you, the alien, to the time when it was created many millennia ago, as the Parthenon connects us to the times of Ancient Greeks. Global warming is a hyperobject because it “covers the entire surface of Earth, and 75 percent of it extends five hundred years into the future,” and because humans cannot see it in its entirety due to its massive temporal and spatial span (*Hyperobjects* 103).

The hyperobject is relevant to the discussion of nuclear fiction in ecological terms for a couple of reasons. First, the hyperobject bridges the historical to the speculative, which is important for the overall structure of my project as I will explain shortly. One of the characteristics of the hyperobject which Morton emphasizes is that it “is not a function of our knowledge; it’s *hyper* relative to ... humans” (*Hyperobjects* 2). It is, in other words, not just an abstract concept, but a name for a physical thing that has existed before its naming, just like climate change. But because hyperobjects are too expansive for humans to perceive with their natural sensory organs and to a certain extent even with their mental capabilities, they are experienced intimately and “withdrawn” at the same time, as Morton puts it. “Contemplate global warming, a hyperobject that you can’t directly see or touch.” (“Here Comes” 167). “Yet there it is, staring me in the face” (*Hyperobjects* 60) in the form of, say, a hurricane as a local expression of the planetary change that is tearing apart my house. To a human observer, hyperobjects appear both tangible and discursive—something that can be physically experienced but also has to be explained through concepts and numbers. When applied to the nuke, this duality of the hyperobject is discovered in the history of radioecology. The field of study has found radiation first in the human body, then its immediate environment, and finally the broader ecosystem. The duality also plays an integral role in the nuclear fictions discussed in this chapter, as the characters in the stories not only experience the nuke firsthand, but also come to see its greater extent as a hyperobject and the ways in which

it permeates their personal lives. For Christine in *Downwinders*, the nuke is both her cancer and the fallout that was created from the aboveground tests at the Nevada Test Site. Tayo, *Ceremony*'s protagonist, finds the U.S. nuclear project at an abandoned uranium mine, where he experiences a moment of sudden realization about its historical connections to his Laguna Pueblo community and the world. In these stories, the hyperobject of the nuke connects the historical and the speculative, as the nuclear history of actual incidents of contamination prompts the protagonists, and by extension the readers, to the consequences of the nuke which have not been represented within the stories as well.

The second reason why hyperobject is relevant to the discussion of nuclear fiction in ecological terms is because the genre represents the movements of radioactive matters traversing the spatial and temporal boundaries of the original event. The explosion of a test bomb or a leakage at a radioactive waste disposal site, for instance, spills over the boundary of its local space. When the impact of the aboveground war slowly seeps into the ground in *Level 7*, when the radioactive contamination spreads across the equator in *On the Beach*, or when the haphazardly buried radioactive waste from the Cold War era is found on the site of a former nuclear munitions factory in *An Atomic Romance* (Bobbie Ann Mason, 2005), these texts represent the nuke as a hyperobject that is “massively distributed in time and space relative to humans,” even though it is a human product. Nuclear fiction represents the nuke as a hyperobject, thanks to the privilege of fiction to fore-cast—to cast history into the future. As it is the case for science fiction, the “what-if” questions of nuclear fiction—“what if there was a major nuclear exchange or a nuclear power plant accident bigger than we have ever experienced so far,” for instance—involve a reassessment of the world as it has been. More specifically, it is a reassessment of what all the tremendously destructive and toxic nuclear matters that have hitherto been produced and tucked away really

mean to the contemporary world, regardless of human intentions and despite the efforts to prevent mishaps. Stories of nuclear disasters, in other words, encourage us to ponder the ecological circuitry of the world through which contaminants flow, imaginary or real.

The Conception of the Ecocidal Nuke: From the Body to the Planet

The first half of this chapter explores the historical advent of nuclear power and its products as ecocidal material forces, and how the catastrophic potentials of the new technology have been expressed in literary forms. The history of the nuke begins with the ailing human body and eventually develops into the study on the capabilities of the nuke to change the planetary ecosystem even without a large-scale war, in the forms of fallout, radioactive waste, and nuclear winter.

The Body and the Permissible Dose

The U.S. Clean Air Act of 1956 represents an important historical moment where the threat posed by toxic smog to the human body was addressed. More generally, it was one of the historical events demonstrating that people would wake up to the unintended environmental consequences of their production once they start noticing its detrimental impact on their health. Health was also what initially galvanized the attention to the potential ecological impact of the nuke. From the studies of the interaction between the human body and radiation came the insight that, as Rachel Carson puts it in *Silent Spring*, “there is also an ecology of the world within our bodies” (189). The ailments caused by ionizing radiation could only be understood by considering the human body as an organism constantly interacting with the ecosystem, and other organic or nonorganic entities in the same network carrying radiation from the source to the human body. The question that followed the recognition of the body as an open organism was how much exposure was safe.

The story about the permissible dose of radiation begins with the two atomic bombs detonated over the two Japanese cities in 1945.

Published only about a year after the atomic bombing of Hiroshima and Nagasaki, John Hersey's *Hiroshima* (1946) was one of the earliest literary responses to the catastrophic event. Telling the stories of six survivors of the bombing, five Japanese and one German priest, it provided the English-speaking readership with a then rare opportunity to appreciate the event from the victims' point of view. *Hiroshima*'s claim on authentic history was, of course, criticized. Alan Nadel notes, for instance, that "[*Hiroshima*] can never create a totalizing narrative, one that will tell us what happened to the people of Hiroshima" with mediated stories of just six people (54). Still, *Hiroshima* did capture successfully the temporality of radiation. The last chapter of the book plays an important role in representing the temporal breadth of radiation as a hyperobject. The last chapter, titled "Aftermath," was added forty years after the initial publication to revisit the six survivors. The forty years between the original chapters and the later addition provided a waiting period necessary for the slow violence of radiation to take a more tangible form in the real world. In the section on Hatsuyo Nakamura, a Japanese widow who was 1,350 yards from the epicenter, Hersey discusses *hibakusha* (the bomb victims).

Non-*hibakusha* employers developed a prejudice against the survivors as word got around that they were prone to all sorts of ailments, and that even those, like Nakamura-san, who were not cruelly maimed and had not developed any serious overt symptoms were unreliable workers, since most of them seemed to suffer, as she did, from the mysterious but real malaise that came to be known as one kind of *lasting A-bomb sickness* ... [I]t was said that unspeakable diseases might at any time plant nasty flowers in the bodies of their victims, and even in those of their descendants. (Hersey 92-93; emphasis added)

The passage describes the victim's alienation from her own body, as indicated by the phrase "the mysterious but real malaise." One of the reasons why the "A-bomb sickness" is "mysterious but real," as Nakamura puts it, is because it is caused by radiation—a hyperobject that is

simultaneously right there “staring me in the face” and yet “time-stretched to such a vast extent that they become almost impossible to hold in mind” (Morton, *Hyperobjects* 60, 58). As a living vessel of radiation, the ailing body in a sense becomes time-stretched as well, just like Indra Sinha’s description of the Bhopal gas tragedy’s victims who “don’t know what horrors might yet emerge in their bodies” (Sinha 283). Like the gas victims’ horrors, the *hibakusha*’s mysterious malaise develops *in time*. The forty years between the original text of *Hiroshima* and its last chapter added later creates the temporal space necessary not only for the latent illness to surface, but also the prospect of delayed disasters in the future—the radiation sickness that “might ... plant nasty flowers ... even in those of their descendants”—to be represented within the story.

The “lasting A-bomb sickness” was one of the critical points at which the histories of the nuke and ecology intersected. With the introduction of nuclear power to the world, it came to light, not for the first time but on a greater scale than ever before, that the bodies of humans, other organisms, and inorganic entities were constantly open to their environment. For the Japanese atomic bomb victims, the bomb is literally in their bodies—in their genes. The two atomic bombs detonated over Hiroshima and Nagasaki thus triggered not just the Cold-War arms race that could lead to a violent and rapid destruction of the world, but also the popularization of the view that the human body could be exposed to a much more gradual and imperceptible kind of threat. This duality of the risk posed by the nuke would lead Joseph Masco to write decades later that “Indeed, the legacies of a half century of radioactive nation-building are not only in our technological infrastructure and our social institution—they are in *our* bodies” (Masco, *Nuclear Borderlands* 26).

The study of the ailing body as an isolated subject was expanded to the study of the body in the ecosystem. At the root of ecology’s advent from the first nuclear disasters, including the deployment of Little Boy and Fat Man and the repercussions from the Bikini tests, is this expansion

of the scope from specific instances of the radiation sickness to the planetary ecosphere. One of the most poignant expressions of this perceptive expansion in the early days of the nuclear bomb's life is found in David Bradley's *No Place to Hide* (1948). In his firsthand record of the Bravo tests, Bradley, a surgeon, describes his participation in the radiation monitoring operation during the tests with medical officers:

The really great lessons of [the Bikini tests] ... belong to no special group but to all mankind. *The atomic era, fortunately or otherwise, is now man's environment* We don't know to what distances from Bikini the radiation disease may be carried. We can't predict to what degree the balance of nature will be thrown off by atomic bombs. We certainly have little idea what the long-range effects on our lives would be from an all-out atomic war, devastating our shores, our fish, and our agricultural industries. But at least at this time we do know that Bikini is not some faraway little atoll pinpointed on an out-of-the-way chart. Bikini is San Francisco Bay, Puget Sound, East River. It is the Thames, the Adriatic, Hellsfont, and misty Baikal. (xiii, 149; my emphasis)

The passage expresses an unease stemming from the uncertainties engendered by the new weapon which, as Bradley suggests, should now be a concern for everyone on the planet. The same questions—how far radiation would spread, how extensive the ecological impact of the bomb would be, and what the long-term effects of nuclear enterprises would turn out to be—would soon be asked and studied by scientists and strategic experts, as well as people who were a peculiar synthesis of these two—nuclear futurologists like Herman Kahn and other RAND analysts. The only certainty, as Bradley writes in the last two sentences, was that any place on the planet could now become another Bikini. It was a realization that the world had entered an era of a catastrophic kind of globalization.

The concern over the bomb's spatial and temporal reach, combined with the progress of the Soviet Union's own nuclear program and the ensuing arms race, gave birth to the so-called Hiroshima-at-home genre of fiction. Also known as the nuclear homefront stories, these texts imagined the U.S. becoming the target of the very weapon it invented, used, and monopolized for

a short period of time. Almost always concomitant with the anxiety of war reflected in this subgenre was the fear of ecological devastation following the war. A good example to demonstrate the inherently ecological nature of nuclear war as imagined in fiction is *The Day After*, the 1983 American television movie I discussed briefly in the previous chapter with regards to the nuclear age as a claustrophobic time caught between the invention of the nuclear weapon and its eventual. Situated mainly in a couple of major cities in Missouri, the film dramatizes a fictional nuclear war between the nations of the NATO and the Warsaw Pact, which, as of the film's production, was still within the realm of the possible. The first half of the movie is a waiting period between the launch of nuclear ICBMs (from both sides, although the film only shows the American missiles leaving their silos) and their arrival at the targets. The rest is the aftermath, with the film's ending strongly suggesting that it might be the end for Americans, if not for humanity as a whole. There are, as expected of nuclear war fiction, depictions of ruins and radioactive poisoning, including the slow death of one of the protagonists, Dr. Russel Oakes. He is a professor of hematology at the University of Kansas Hospital, who desperately tends to bomb victims in the crumbling city.

One particular post-nuclear-exchange scene vividly demonstrates how a nuclear war might create ecological devastation. In the scene we see a gathering of farmers discussing the plans for "decontaminating the soil." An unnamed farmer asks, "How do you know what 'safe' is?" (1:44:14). Another man in the gathering, John, suggests that they scrape off the top soil, to which Jim Dahlberg, another farmer, angrily responds, "Where'd you get all this information ... all this good advice, out of some government pamphlet?" (1:45:04). Represented in this dialogue are not just the concerns over the extensiveness of reconstruction. Scraping off the soil on the national scale would be almost impossible when the cleanup of a single contaminated site like Hanford is

estimated to cost at least \$150 billion (Niles 46-7). The farmers' arguments, more importantly, represent the historical disputes surrounding the safety standards for radiation.

During the era of aboveground tests, when the mushroom cloud was still very much occupying people's mind, the United States government tried to control the definition of the "permissible" level of radiation exposure. The objective behind the operation was to contain the dissenting voices about the tests. One of the earliest events that considerably called into question not just the official standards but the very idea of safe level of radiation exposure was Bikini. In "Atmospheric Nuclear Weapons Testing and the Debate on Risk Knowledge in Cold War America, 1945-1963" (2010), Toshihiro Higuchi explains how the extensive radioactive contamination caused by the second test of Operation Crossroads conducted at Bikini Atolls in 1947 called into question the U.S. Atomic Energy Commission's attempts to define the safe dose level as follows:

After the Bikini incident had highlighted the danger of fallout, geneticists publicly disputed the idea that a 'maximum permissible dose' (MPD) of radiation existed and that exposure to radiation below that limit would not pose a threat to human health. ... By 1956, the U.S. National Academy of Sciences had accepted the no-threshold theory for the genetic effects of exposure to radiation. ... As uncertainty about the threshold hypothesis grew, the International Commission on Radiological Protection (ICRP) repeatedly revised MPD levels downward. (Higuchi 307-8)

In the context of the historical debates on the permissible dose, the question of the safe level of radiation dramatized in *The Day After* echoes Bradley's ominous musing in *No Place to Hide* that anywhere on the planet can be another Bikini. The worries of the farmers in the film are not without material basis, either. "On Bikini, even though the amount of residual radiation had substantially decreased in the atoll since the end of the tests, sufficient quantities remain at present to make human consumption of crops grown there still unsafe" (Merlin and Gonzalez 199). The disputes surrounding the permissible dose of radiation sparked in the era of aboveground tests have been some of the early indications of the nuclear age's general material condition—the increasing

difficulty of drawing a clear line between the safe and the hazardous without looking into the ways in which the present might develop in the years to come.

The Broadening Horizon: From the Body to the Planet

Health (or more specifically the impact of potentially harmful environmental changes to the human body) has always been an important motivator for ecological studies as well as one of the most popular barometers of environmental degradation. Health has also been central to the historical debates surrounding the ecological risks posed by the fallout. As Toshihiro Higuchi, a U.S. foreign relations historian, notes regarding the radiation monitoring projects organized outside the U.S. national security circle during the Cold War, “once [Americans] learned that they were exposed to nuclear fallout in the food on their tables, the environmental costs of national security ceased to be a remote, abstract issue” (316). For instance, strontium 90 (Sr-90), one of the radioactive isotopes produced by nuclear fission, was studied extensively in the decade following the atomic bombing of Hiroshima and Nagasaki because of its proclivity to become accumulated in the bones. Like other “bone seekers” such as radium or plutonium, “[s]trontium-90 happens to resemble calcium in its chemical composition, and therefore finds its way into the human diet through dairy products and is eventually deposited by the body in the bones, where it is thought to cause bone cancer” (Schell, *Fate* 62). One of the better-known civilian monitoring projects for Sr-90 was the Baby Tooth Survey. Between 1958 and 1970, almost 300,000 teeth of American children were donated to be analyzed by the Greater St. Louis Citizen’s Committee for Nuclear Information (“St. Louis Baby Tooth Survey”). Barry Commoner, the American biologist and ecologist who also played an integral role in the Baby Tooth Survey, writes in *The Closing Circle* (1971), “Before long, strontium 90 data from all parts of the world began to appear in scientific journals, and it became clear that tests of nuclear weapons had unwittingly set off the first global

environmental experiment in human history” (Commoner 52). This was a momentous discovery in the ecological history of the nuke. In human teeth they discovered the traces of “the first global environmental experiment.” In the human body, in other words, they discovered the hyperobject of radiation.

The fundamental lesson of the Sr-90 studies was, as Commoner notes, that nuclear tests had ecological implications on the global scale. The study of the bomb’s traces in the human body led to the study of the ecological travel of radioactive isotopes, which in turn contributed to the conceptualization of the planetary ecosphere. To take a specific example of such a historical development, the incipient form of what would later become “radioecology” was at first called “health physics,” founded by scientists at Oak Ridge Laboratory (later renamed to Oak Ridge National Laboratory). Initially a small part of the Manhattan Project, the facilities that would eventually become Oak Ridge Laboratory came into being because of the radiation risks faced by workers at the X-10 Graphite Reactor. Built in 1943, it was the world’s second nuclear reactor after Enrico Fermi’s Chicago Pile-1, and the first to continuously produce plutonium. “Karl Morgan, the senior health physicist at Oak Ridge ... defined health physics broadly to include not only study of the immediate dangers of radioactive materials but of *the risks posed by contamination of the environment*. Because, he wrote, radiation damage could occur ‘either directly to man or *indirectly through the ecology of his environment*’, both field surveys and studies of the ‘ecological effects of radiation’ were necessary” (Bocking 66; my emphases). The importance of the health physics at Oak Ridge in the ecological history of the nuke is explained in Stephen Bocking’s *Ecologists and Environmental Politics: A History of Contemporary Ecology* (1997). Bocking identifies three institutions as “central to the formation of contemporary ecology”: the Nature Conservancy of Great Britain, Oak Ridge Laboratory of the United States, and the

partnership between the Ontario government and the University of Toronto to study the fisheries on the Great Lakes in Ontario, Canada (5). Among the three, Oak Ridge was the only institution whose formation and research interest were directly linked to nuclear weapons, which suggests the centrality of the nuke in the development of ecology as a modern scientific field in the United States.

The intertwined history between ecology and sciences of nuclear power in the U.S., however, involved more than radioecology. While radioecology was initially motivated by health concerns, it soon became generalized into the study of radioactive substances' interactions with the environment. The health physics scientists at Oak Ridge, for instance, discovered that "radio tracers were ... far superior to the uncertain quantities and variety of radionuclides contaminating the lake bed and waste pits," the two local ecosystems which the scientists studied (Bocking 78). Radioactive substances, in other words, illuminated the ecological channels through which matters circulated. Meanwhile, ecological sciences were developed also because of military interests. As Jacob Hamblin notes in his study on military applications for environmental sciences researched during the Cold War, "[m]uch of the scientific knowledge about the physical environment—the earth, the atmosphere, the oceans—came about due to a pressing military need to expand American and allied knowledge of the forces of nature on a global scale" (86). The "knowledge of the forces of nature" was acquired from the surveillance data of weapon activities in the forms of radiological, seismic, and sonic readings from tests and actual deployments of nuclear weapons. In such a historical context, geosciences in the U.S. started to grow rapidly after World War II. This growth stemmed from investments from the military, interested in developing techniques of planetary surveillance. The Air Force was one of the biggest contributors. The necessity for a global monitoring network had already been raised in the late 1940s, and "establishing this radiological

network became the perfect job for the brand new US Air Force” (Hamblin 87). “Unlike the other armed services,” Hamblin continues to note, “the Air Force adopted a scientific worldview from its very start,” and “[t]he radiological monitoring network was one of the Air Force’s first genuine contributions to national security” (87). The “scientific worldview” that the Air Force adopted was, of course, the worldview of catastrophic ecology.

I call the contemporary ecology developed in the U.S. following World War II “catastrophic ecology.” Catastrophic ecology as a label articulates the fact that ecology was formed in terms of disasters—that it began as a reaction to the threat of nuclear weapons trained at the ecosphere as a whole. Whether for its manipulation or protection, the planetary ecosphere was recognized more clearly than ever because it could now be destroyed on a greater scale and with a greater efficacy ever. Understanding the planet in terms of disasters was closely tied to studying ways to artificially create the disasters, as the catastrophic ecology spearheaded by the military also sought to weaponize nature. Destroying the enemy population’s environment by means of dirty bombs or “salted bombs,” such as the cobalt bomb designed specifically to produce more radioactive fallout upon explosion, were in fact the most basic applications of environmental warfare, however repugnant or devastating their impact might be. The more outrageous ideas included using nuclear explosions to artificially induce earthquake or tsunami, or even “blackening large expanses of ice” to raise the planet’s temperature (Hamblin 161). Many such proposals, especially the ones developed by Cold-War think tanks like the RAND Corporation, were never considered viable because of the exorbitant costs, let alone the political consequences. The very fact that these ideas were actively explored at all even on a theoretical level, however, reflects the inseparable historical tie between the studies of the ecosphere and that of environmental warfare in the nuclear age.

Nuclear Winter, or Nuclear Climate Change

Even without the consideration of radiation, nuclear weapons introduced with their sheer destructive capability the possibility of abrupt climate change on the planetary scale. One popular discourse on the potentially global implication of nuclear warfare is the nuclear winter hypothesis. As of early 2018, the nuclear arsenals of the United States and Russia account for roughly 90 percent of the world's total inventory of nuclear warheads (Kristensen and Norris "Worldwide Deployments of Nuclear Weapons," 2017; "United States Nuclear Forces," 2018; "Russian Nuclear Forces," 2018). The current numbers—a total of 15,000 warheads worldwide—are significantly lower compared to the peak of the Cold War when there were over 70,000 warheads in the world. But even the relatively small size of the two nuclear giants' current arsenal—6,500 American and 6,850 Russian nuclear warheads as of early 2018—is still far beyond the amount necessary for any practical purposes served by the weapons. As a 2018 *Bulletin of the Atomic Scientists* column notes, "the scenarios under which a US president would consider authorizing the use of these weapons are so limited as to be almost inconceivable," and "[t]he only rationale for such large US and Russian arsenal is to target each other's nuclear forces" (Reif). Their tremendously overkill stockpiles are, in other words, justified only by their own existence, embodying the logic of status quo in its purest form.

The nuclear winter hypothesis adds an interesting twist to the question of how many nuclear weapons are really necessary. Granted, the arguments for maintaining any amount of nuclear weapons for strategic necessity—i.e., effective deterrence—are themselves debatable. On that note, the nuclear winter hypothesis does not necessarily offer a better answer to the question of necessity. What it does introduce to the debate, however, is the factor of ecological sustainability—namely, the question of how much nuclear abuse the planet can withstand. For

instance, Pearce and Denkenberger, professors in engineering science, suggest in one of the most recent takes on the hypothesis as follows:

Despite the arguments for limiting nuclear weapons inventories because of the risks of accidents, full-scale nuclear war or threats of retaliation for first strikes, there is also a *fundamental upper limit* for the number of nuclear weapons needed by any country. This fundamental limit ... is based on the direct physical negative consequences of a large number of nuclear weapons being used *anywhere on the globe*. Stated simply: no country should have more nuclear weapons than the number necessary for unacceptable level of *environmental blow-back* on the nuclear power's own country if they were used. (2; my emphases)

The “fundamental upper limit” for the nuclear arsenal of any given country is fundamental because beyond that point the offensive becomes suicidal. Any nuclear war would be suicidal in the general sense, of course, but the argument which the two engineers attempt to refute here is the already questionable idea that a nuclear war can be won, or that nuclear weapons can be used at all without also considerably harming the aggressor. The authors’ intention to demystify the idea of winnable nuclear war is demonstrated by their conservative assumptions for the estimations. They assume, for example, that the casualties from “direct blow back” (i.e., the immediate radioactive fallout from the bombs) would be minimal. Instead, they consider primarily the global temperature drop that can be triggered by even a small-scale regional nuclear exchange. The study’s standard setup for most scenarios is 100 Hiroshima-sized bombs with the yield of 15 kilotons of TNT each, which is very moderate compared to most modern nuclear weapons with 100 to 500 kt yields. Even with these conservative parameters, the study estimates that most countries will suffer from severe starvation. To take a specific example from their estimations, the authors point out that the United States would be able to fair better than any other countries thanks to its sizable domestic food production capability. They also expect, however, that even the U.S. will not be able to weather more than 100 15-kt nuclear weapons without significant loss of lives, which will reach 140,000 deaths from starvation at the 1,000 bombs mark (Pearce and Denkenberger 9).

The conceptual significance of the nuclear winter hypothesis is that it emphasizes the eco-suicidal nature of nuclear war more effectively than the doctrine of MAD (mutually assured destruction) that tends to focus on immediate mass destruction. The nuclear winter hypothesis suggests that even without the defender's retaliation and direct radioactive blowback, the climate changes triggered by the sheer amount of smoke (not fallout) from explosions beyond a relatively small magnitude can by itself inflict a significant damage to the planet. This shift in the discursive focus is aptly termed the shift from mutually-assured destruction (MAD) to self-assured destruction (SAD) (Robock and Toon 67).

The most straightforward and tangible representation of self-assured destruction would be a scenario in which a single human action inflicts a dramatic physical change upon the entire planet. That is exactly what Kurt Vonnegut's 1963 novel *Cat's Cradle* depicts. The relationship between *Cat's Cradle* and the nuke is seemingly an unusual one, because it is technically not a story about a nuclear disaster. There are, of course, some references to the nuclear arms race during the Cold War. One of the story's major figures, Dr. Felix Hoenikker, for instance, is introduced as "one of the so-called 'Fathers' of the first atomic bomb," which references the key Manhattan Project scientists such as J. Robert Oppenheimer. The central event of the novel is, however, triggered by a substance called "ice-nine." It is a fictional polymorph of water that melts at 114.4 °F (45.8 °C) (Vonnegut 6). Ice-nine effectively freezes any body of water it touches, as it transforms water into ice-nine and consequently raises the freezing point of water above the natural atmospheric temperatures. The apocalyptic event occurs towards the end of the novel when, through a series of incidents, a dead body frozen by ice-nine falls into the sea and rapidly transforms every molecule of water on the planet into ice-nine.

Although not a single nuclear bomb goes off and radiation is never mentioned in the story, *Cat's Cradle* is very much a fiction about nuclear power, especially about nuclear power as a catalyst for catastrophic ecology. Consider, first of all, the very reason why ice-nine was invented. In Chapter 19 titled "No More Mud," we learn from Dr. Breed, son of the boss of the laboratory where Dr. Hoenikker worked, that one day a Marine general visited Hoenikker to inquire if it would be possible to create something light and small that would save the Marines from constantly being bogged down in mud (which the general calls their mortal enemy). "Felix suggested that there might be a single grain of something—even a microscopic grain—that could make infinite expanses of muck, marsh, swamp, creeks, pools, quicksand, and mire as solid as this desk"—namely, ice-nine (Vonnegut 43). We have a familiar historical example of a similar manipulation of the environment for military expediency—Agent Orange. The difference between ice-nine and the Rainbow Herbicides (a group of chemicals including Agent Orange which the United States military used during the Vietnam War), however, is that ice-nine is much more akin to nuclear weapons as the entire planet lies in its impact radius.

Ice-nine represents the nuclear bomb as an ecocidal weapon through acceleration. The spread of radiation through space and time is a gradual process involving multitudes of material links, which makes representing a large-scale radioactive contamination much more difficult than the more spectacular and fast disasters. Radioactive fallout, in this sense, inflicts precisely what Rob Nixon calls "slow violence," "a violence that occurs gradually and out of sight, a violence of delayed destruction that is dispersed across time and space" (2). "A major challenge" of tackling slow violence, as Nixon points out, "is representational: how to devise arresting stories, images, and symbols adequate to the pervasive but elusive violence of delayed effects" (3). *Cat's Cradle* resolves the problem of representation by dramatically accelerating the slow violence of radiation,

as ice-nine combines the temporal longevity of radiation with the velocity of the nuclear fission. As radiation is replaced with ice-nine, the slow violence becomes an instant violence. The incredible speed of ice-nine's spread is described in a scene toward the end of the novel, in which a body frozen by ice-nine falls into the sea and rapidly transforms every molecule of water on the entire planet. The end of the world befalls literally in a blink of an eye, as the novel's protagonist records: "I closed my eyes. // There was a sound like that of the gentle closing of a portal as big as the sky, the great door of heaven being closed softly. It was a grand AH-WHOOM. // I opened my eyes—and all the sea was *ice-nine*" (Vonnegut 261). Ice-nine eliminates the difficulty of finding and visualizing the causal links in the case of radiation, as the fictional substance targets water. Water is one of the most ubiquitous natural compounds on the planet as well as integral to ecological circulations and sustenance of living organisms. To refer back to Morton's discussion of hyperobjects, ice-nine exemplifies a highly effective way to represent the hyperobject of radiation, as the fictional substance rapidly transforms the entire planet into a single frozen mass, in which a vast majority of both organic and inorganic entities are affected.

The apocalyptic event triggered by ice-nine is, admittedly, a fiction. It is also an unlikely possibility in technical terms, as there is no such substance invented yet. Through the unlikely disaster caused by the nonexistent substance, however, *Cat's Cradle* represents the two intertwined developments in the nuclear age: the growing recognition of the globe as one big interconnected ecological network and the technological means by which humans can create a lasting impact on that web-like system.

The postwar history of the nuke has shown that speculative fictions of nuclear disasters are not merely fictional, for nuclear tests have irreversibly changed the ecosphere even without an active war. At the bottom of the "fallout controversy [that] was a major turning point in global

environmental awareness” was the question about the very definition of “test” (Hamblin 95). “For how does one define or limit the scope of the nuclear laboratory,” Joseph Masco asks on the same note, “when its trace elements can be found literally everywhere on the planet?” (“Mutant Ecologies” 521-22). The point I wish to emphasize here is not whether the radionuclides distributed throughout the ecosphere indeed pose significant health risks, but the fact of the planet-wide distribution itself and that a nuclear test is, just like any form of reactor or waste leakage incidents, never a local event. Rebecca Solnit even calls the very designation of nuclear *test* a misnomer. According to her, a test of any kind is supposed to be “controlled and contained, a preliminary to the thing itself,” whereas nuclear tests involve “full-scale explosions in the real world, with all the attendant effects” (Solnit 5).

Identified as an agent of ecological changes on a global scale, the nuke has also been discussed in relation to the two relatively recent topics, climate change and Anthropocene. In *The Discovery of Global Warming* (2003), Spencer Weart, a former director of the Center for History of Physics of the American Institute of Physics (AIP), argues that the advent of nuclear power was one of the major motivators for the development of ecological worldview and the understanding of global warming. “Exquisitely sensitive instruments,” he writes, “could detect radioactive fallout from nuclear test explosions half a world away—the first recognized form of global atmospheric pollution. ... Once people began to grasp that human technology actually could affect the entire planetary system, for better or worse, journalists found it easier to suggest that burning fossil fuels could change the climate” (40-41). The passage suggests, in other words, that the nuke’s contribution to the rise of ecological awareness and the discovery of climate change was twofold. It instigated, on the one hand, the development of the technical tools to observe the global environment. Nuclear power and potential disasters it can cause also provided relatively familiar

points of reference with which people could grasp the idea of anthropogenic changes on vast temporal and spatial scales.

The nuke's relation to the periodization of Anthropocene has been discussed in more technical terms. The term "Anthropocene" was first proposed in 2000 by Paul Crutzen and Eugene Stoermer in a Global Change newsletter of the International Geosphere-Biosphere Programme (IGBP) "to emphasize the central role of mankind in geology and ecology," or more specifically, of the "human activities" that have become "a major geological force" (Crutzen and Stoermer). While they concede that setting the exact starting date for Anthropocene would be "arbitrary," Crutzen and Stoermer propose "the latter part of the 18th century" (i.e., the First Industrial Revolution) to be the beginning of the era. They note that "[t]his is the period when data retrieved from glacial ice cores show the beginning of a growth in the atmospheric concentrations of several 'greenhouse gases', in particular CO₂ and CH₄." The increased use of fossil fuels and the resultant global warming have been frequently associated with Anthropocene. A 2015 *Bulletin of the Atomic Scientists* article, however, suggests that "nuclear weapons fallout" could "mark the beginning of the Anthropocene epoch," as its title reads. While the authors of the article do not directly refute the previous suggestions for the originating events or periodization of Anthropocene, they point out that those approaches are not based on sufficient stratigraphic geochemical signatures. "The standard accepted practice for defining geological time units," they explain, "is to identify a single reference point ... at a specific location, that marks the lower boundary of a succession of rock layers as the beginning of the time unit" (Waters et al 48). The industrial revolution, according to them, lacks this clearly distinguishable geological mark. "In contrast," they argue, "the fallout from the numerous thermonuclear weapons tests that began in 1952 deposited large amounts of radionuclides in the environment and left a well-defined radiogenic signature" (49). The authors

also explore other artificial sources of radiation, such as the medical use of radiation, nuclear power plants, and nuclear-related accidents, although they conclude that atmospheric weapons tests have been the most prominent contributor. While global warming is doubtlessly one of the pressing issues of this era on the species level, the idea that nuclear power might be the defining geochemical factor of the post-WWII era offers a point of view that the harnessing of the power of the atom might in fact be the most drastic form of humanity's capability to transform the ecosphere in the Anthropocene.

The World Seen through the Eyes of the Machine

Whether the distribution and accumulation of radionuclides in the environment or the progress of global warming, environmental changes in great spatial and temporal scopes can be perceived only through mechanical mediations. The necessity of machines is partly responsible for Morton's statement that hyperobjects—in this case, global distribution of radiation and global warming—are both intimate and withdrawn. Global warming is "intimate" because, for example, an episode of rain as a manifestation of the hyperobject is right there "staring me in the face." At the same time, global warming, like any other hyperobjects, is "withdrawn" because "you can't directly see or touch [it] It affects all weather on Earth yet it's not reducible to particular manifestations such as sunshine or rain" (*Hyperobjects* 60; "Everything" 167). Nuclear fiction represents this duality because of the scale and inherent nature of major nuclear disasters. The affected parties—usually a large portion of a country or the world—are prevented from seeing the entirety of the event. To take the two most typical scenarios dramatized in fiction, the limitations in observation are caused because the incoming missiles and their destinations are too numerous, or the fallout hinders immediate post-disaster damage assessment requiring humans to be physically present on site. A world ravaged by a nuclear war is, in this sense, a dramatic

representation of our own material world which cannot be fully understood without mechanical tools.

In nuclear war fictions as well as in the real world, nuclear war is to any given observer an event that is either happening extremely up close (e.g., missiles falling over my city) or represented on the situation maps with blinking dots and impact radii, whether shown on the television or the monitors in the war room. So, on the one hand, even the firsthand testimonies—like the ones that make up John Hersey’s *Hiroshima*—cannot represent the bomb in action, not just because of the impossibility of directly accessing the past (as observed by the postmodernist view of history) , but also because it is physically impossible to experience the full extent of the bombing in progress on the receiving end. “There is,” as Morton puts it poetically regarding *Hiroshima*, “a core of human silence around which the witnesses give their testimony,” quite simply because “[n]o witness was too close to the bomb: otherwise they would have been evaporated, or quickly incinerated, or blown to pieces” (Morton, *Hyperobjects* 49). To take a similar example, the citizens of Moscow in *Fail-Safe* who do end up being evaporated by a nuclear bomb would have had no idea what was going on in situation rooms. The victims would have very little information about the bombing as a whole even if they somehow survived it. So, for these people, nuclear war is both intimate and withdrawn.

On the most abstract end of the spectrum, nuclear war happens in figures on the maps and numbers on the charts. In *Level 7*, the entirety of the nuclear war between the U.S. and the Soviet Union is waged and recorded with help of machines. The section titled “June 10” that records the short but world-ending war lists the times of exchanges, the numbers of missiles, the targets, and even the specific buttons that were pressed—all nothing short of the presentational manner of a simulation or a video game. For the survivors in *On the Beach* living a slow death, the war is very

much real and personal, but at the same time they learn about it only through remote sensors and machine-processed data. One particularly relevant dialogue reads: “Well ... how many bombs were dropped? Nuclear bombs, I mean. // The seismic records show about four thousand seven hundred” (81). Again, nothing can be more intimate and withdrawn at the same time than the world-ending nuclear war.

The manner in which nuclear fiction represents the nuclear bomb as its destructive potentials are materialized in the form of imaginary disasters prefigures how the more recent ecological hyperobjects come to be known. Knowing global warming involves, as Al Gore’s *An Inconvenient Truth* (2006) vividly demonstrates, reading charts and graphs that adumbrate the hyperobject lying across a vast span of space and time. Visual materials, such as time-lapse photographs of snow-covered mountains gradually losing their wintery visage, are often included to create the most straightforward visual impact. The texts representing climate change like Al Gore’s documentary film allow the audience to see the hyperobject through the lens of machines, or rather, see it as the machines do. Amidst a global nuclear disaster, the necessity for mechanical sensors becomes even more accentuated.

Faced with deadly radiation in the atmosphere and rapidly disappearing food sources, humans are not only unable to see the hyperobject of global nuclear climate change, but also forced to ensconce themselves in shelters of various descriptions, entirely severing their physical ties to the planetary biosphere. Severely limited information about the outside world is one of the most common features of nuclear disaster fiction. The protagonists of the stories are often taking shelter and as a result largely cut off from the outside world, whether in a house (*Shadow on the Hearth*, Judith Merrill, 1950), a fallout shelter (*Triumph*, Philip Wylie, 1963; *Fallout*, Todd Strasser, 2013), a submarine (*This Is the Way the World Ends*, James Morrow, 1986), or a military bunker (*Level*

7, Mordecai Roshwald, 1959). As ice-nine in *Cat's Cradle* is an accelerated representation of slow violence, nuclear fiction describing a life in a fallout shelter serves, through amplification, as a stand-in for humans' relationship with the ecosphere in the Anthropocene. In this relationship, humans as both the agents and victims of the detrimental ecological changes are unable to perceive the ecosphere, not due to their political views but the innate limitation of human sensory and mental capabilities.

Philip Wylie's 1963 novel, *Triumph*, is one of the best literary representations of the world as a physical reality known almost exclusively through mechanical sensors. At the beginning of the story, about a dozen people are gathered at the mansion of Vance Farr, a millionaire import-export businessman, to celebrate his birthday. Vance had conveniently built a spacious, completely self-sufficient, and almost luxurious fallout shelter deep within the mountain near his abode. After a short preamble, a large-scale nuclear war breaks as the Soviet Union launches a massive nuclear attack targeting the entire U.S. continent. The fourteen main characters, including Vance's family, employees, and friends, descend into the shelter and soon find themselves to be some of the few survivors of World War III. The outside world is known to the shelter dwellers (and presumably to other survivors in this fictional world) through two main channels—the above-ground monitoring sensors feeding information to the shelter and TV broadcasts transmitted from the few surviving stations around the world. One TV program to which the novel pays special attention is a feature film produced by a Costa Rican TV station that managed to “gather together ... photographic and taped records of the American holocaust” (Wylie 118). A large section of the film consists of aerial photographs taken by a U.S. Air Force reconnaissance plane on their tour of the country after the devastating war. This story element gestures, perhaps unintentionally, to the close historical ties between the military intelligence operations and environmental studies. The

ecocidal nature of the bomb is clearly noted when the film shows not only that major cities are engulfed in the sea of flame as expected of any large-scale war scenarios, but also that “many towns, village, and small cities that escaped blast and fire” are “unruined but without life” due to radioactive fallout (Wylie 123). Another section of the film presents a map of North America indicating areas of severe fallout and ground zeros, the data for which was gathered and given to the Costa Rican station by a U.S. aircraft carrier. With these settings, *Triumph* describes a world in which it is solely through “the mediation of technical recording equipment” (Seed 242) that the inside—represented by Vance’s bunker as the central narrative space—is linked to the outside.

The mediation of information represented in *Triumph* is nothing unique in and of itself. It is after all through the long line of secondhand information that we come to learn about our world through mass media and the internet on a daily basis. What makes the mediation special in *Triumph* is, however, that there is no alternative; there is no chance of firsthand experience. As the immediate environment of humans—in this case the interior of the fallout shelter—is completely separated from the planetary ecosphere, there is, ironically, no longer a room left for the fantasy of “the world I see is the world as it is” in the manner of climate change denial. In many cases, the death of the world in nuclear fiction is a very tangible reality for individual characters. Like the final survivors of humanity in *Level 7* or *On the Beach*, they do suffer from radiation that eventually seeps into their initially sheltered spaces. Regardless of their personal physical experiences, however, the reason for their suffering has to be explained in a macroscopic picture composed of data and records of the disaster, the scope and scale of which far exceed any given individual’s everyday experience of the world. The relationship between the sheltered humans and the outside world depicted in *Triumph*, in this sense, represents through amplification our relationship with the material world, defined by machine-mediated knowledge.

Stories of the Radioactive Internal War

Just like any other kind of speculative fiction, nuclear fiction still requires a certain amount of empirical data to extrapolate—that is, to continue the history of earth into the worst possible futures. Despite and because of the fact that there has never been a nuclear war (not counting World War II which involved a one-sided use of two atomic bombs whose destructive power is radically dwarfed by the megatonnage of the current generation of nuclear weapons) the empirical basis for speculation is sought in the closest alternative that is the weapons tests. Every form of nuclear discourse that I have discussed in the previous sections, fictional or otherwise, would not have existed without the historical tests of nuclear weapons.

Weapons tests occupy a central place in nuclear fiction as the primary source of data and inspiration. This is especially true for historical nuclear fiction, as opposed to the more predominantly speculative nuclear fiction. Historical nuclear fiction ponders the catastrophic potentials of nuclear power just like speculative nuclear fiction, but it does so by examining history without imagining the futures. What it does invite the reader to imagine, however, is how similar events might have happened throughout history in different times and places. The two novels that I discuss in the following pages—*Downwinders* (2001) and *Ceremony* (1977)—fall into this category of historical nuclear fiction.

One important aspect of weapons tests which the two novels demonstrate is that the tests constitute a form of internal war. An internal war is a war which the state wages against its own people and a war that is often not recognized as a war at all. In both *Downwinders*—a story about Americans who lived downwind to the Nevada Test Site during the period of aboveground tests—and *Ceremony*—an exploration of the historical overlap between the Native American landscape and the American nuclear landscape—the nuke is found by the protagonists to be a tremendous force shaping their immediate environments and, consequently, their lives. I say specifically that

the nuke is “found” by the protagonists, because the climactic points in both stories are reached when the characters finally come to see the connections between their private lives and the history of the American nuclear project. Just like the radioecologists in history found the hyperobject of radiation in the human body, the protagonists of the stories discover the hyperobject of the nuke in the local environment around them.

Downwinders focuses more heavily on the aspect of the U.S. nuclear project as an internal war, including how the U.S. government has knowingly exposed their citizens to radioactive fallout. Comparatively, *Ceremony* considers the nuke on the more abstract level. There are very few direct references to anything nuclear in the novel, but the climax of the story—the scene at an abandoned uranium mine—completely rewrites the entire narrative into a story about the intertwined histories of the Native American communities and the United States in the pursuit of nuclear power.

Downwinders: Internal War and the Bomb in the Wind

Joseph Attencio, the lead attorney representing the fallout victims in their legal fight against the federal government in *Downwinders* (2001), describes the U.S. nuclear project as follows: “What began as a shield against outward foreign aggression clearly has been turned inward against ourselves” (Oberhansly and Oberhansly 311). The novel revolves around the lives of the fallout victims who have been exposed to radioactive fallout produced by the atmospheric nuclear weapons tests during the 1950s. The majority of these people lived in the states of Nevada, Utah, and Arizona. What is striking about Attencio’s appraisal of the Cold War nuclear weapons project is that it captures one of the project’s core characteristics that is often overshadowed by the fierce international rivalry—that the nuclear weapons project, with its accompanying operations of mining, enrichment, field tests, and waste disposal, constitutes a form of internal war. Just as

the destructive power of nuclear weapons accelerated the process through which the distinction between the front and the rear of the warzone was dramatically blurred, the extent of the ecological impact of nuclear weapons development resulted in peacetime casualties. By designating these sacrifices of citizens made in the name of national security as manifestations of an internal war, I want to emphasize that in ecological terms the Cold War had always been a hot (radioactive) war, rather than a cold war on the verge of turning into a hot (active) war. While the missiles aimed at the enemy were never fired, the test weapons constantly bombarded the land.

The inspiration for my notion of internal war mainly comes from Rebecca Solnit's *Savage Dreams: A Journey into the Hidden Wars of the American West* (1994) and a couple of interrelated works of Joseph Masco. The central framework that binds together Solnit's "journey into the hidden wars of the American West" (by which she refers to the areas surrounding the Nevada Test Site and Yosemite National Park) is the redefining of "war" in relation to nuclear weapons. Nuclear tests as preparations for war, she argues, not only have become an integral part of war, but even constitute the war itself in the absence of an active nuclear war. In the preface to the twentieth anniversary edition of *Savage Dreams* Solnit asks, "Why did people then and now imagine nuclear war as a terrible possibility when a bomb a month was exploded in the Nevada desert for forty years?" (xvii). She also suggests that nuclear war is "something that has been going on all along" rather than "a terrible thing that might happen someday" (5). At the core of this expansion of the notion of war is her definition of "test." The word "test" is, she writes,

something of a misnomer when it comes to nuclear bombs. A test is controlled and contained, a preliminary to the thing itself, and though these nuclear bombs weren't being dropped on cities or strategic centers, they were full-scale explosions in the real world, with all the attendant effects. I think that rather than tests, the explosions at the Nevada Test Site were rehearsals, for a rehearsal may lack an audience but contains all the actions and actors. The physicists and bureaucrats managing the U.S. side of the Arms Race had been rehearsing the end of the world out here, over and over again. (5)

The American fallout victims are living examples of Solnit's view that nuclear weapons tests are actually rehearsals in the sense that they produce "full-scale explosions in the real world, with all the attendant effects." Living downwind of the Nevada Test Site, they were exposed to heavy doses of radioactive fallout during the active aboveground tests in the 1950s. While Nevada, Utah, and Arizona had most cases of downwinders, the areas affected by fallout include a dozen or more states in total according to the Radiation Exposure Compensation Act signed in 1990 and amended in 2000 and 2002, as well as the studies on nationwide iodine-131 exposure.¹⁸

The problem was, more specifically, not so much that the tests were "full-scale explosions in the real world," as opposed to subcritical tests representing the majority of nuclear tests since the moratorium declared by George H. W. Bush in 1992. It was rather that they came "with all the attendant effects" because radiation could not be contained within the physical boundaries of the test site. On this note Joseph Masco aptly remarks, "Recognizing the subtle but totalizing scope of the nuclear transformation of nature—the dispersion of plutonium, strontium, cesium, and other elements into the biosphere—challenges the traditional concept of a 'nuclear test'. For how does one define or limit the scope of the nuclear laboratory when its trace elements can be found literally everywhere on the planet?" ("Mutant Ecologies" 521-522). It is because of this ecologically uncontainable nature of the test shots that Solnit says, "most U.S. bombs since [Trinity] have *attacked* Nevada" (66; my emphasis). The notion of internal war or radioactive endo-colonization is clearly articulated in Masco's words that "in the name of protecting territorial borders from attack, nuclear powers have practiced an internal cannibalism in the form of multiplying 'national

¹⁸ "The National Cancer Institute (NCI) now estimates that if you were alive in the United States between 1945 and 1963 you received at least two rads of iodine-131 (a radioactive isotope that can produce thyroid cancer) from U.S. nuclear testing. ... The NCI estimates that between ten thousand and seventy thousand people (most of whom were children at the time of above-ground testing) will develop thyroid cancer over the course of their lifetime as a result of nuclear testing" (Masco, *Nuclear Borderlands* 26).

sacrifice zones’—areas that are too contaminated for human habitation” (“States of Insecurity” 209). This brings us back to Joseph Attencio’s words in the novel that I have quoted at the beginning of this section: “What began as a shield against outward foreign aggression clearly has been turned inward against ourselves” (Oberhansly and Oberhansly 311).

The internal war which the United States government waged against its own citizens since the 1950s provides the historical background that binds together the two novels I read in this section, *Downwinders* (2001) and *Ceremony* (1977). (The 1950s was the period during which the Nevada Test Site was established and eventually most tests were relocated from the Pacific Proving Grounds to the U.S. mainland.) Despite the difference in their publication years, they are stories about the same legacy from the same period. They also share a similar narrativization strategy in that they both weave together stories of very specific and personal lives with the history of Cold War America. They differ, however, in their primary focal points. *Downwinders* deals with the eponymous victims of the fallout and the “atomic soldiers” who were deployed to the ground zero of test shots and evaluated for the radiological and psychological effects of the bomb. *Ceremony*, on the other hand, focuses heavily on the Laguna Pueblo people and other Native Americans whose communities have become the embodiment of “national sacrifice.” Despite the difference, the nuke as a radioactive material reality and a toxic national project functions in both texts as the organizing force of the plots.

Downwinders tells the stories of American fallout victims from the 1950s on two different timelines. The primary narrative set in the early 1990s follows the story of three protagonists: Dallas Parker, a Utah-based rancher in his late fifties; Christine Parker, his niece who has recently gone through a surgery for her breast cancer apparently caused by the nuclear weapons tests in her youth; and Layne Harting who is their lawyer, Dallas’s friend, and Christine’s lover. The novel

jump starts with Dallas's murder of Dr. Franklin Rudd, one of the key Manhattan Project scientists and the Chief Operations Manager of the Nevada Test Site in the novel's fictional history. The murder initially seems just an isolated accident. As the story progresses, however, it turns out to be intimately connected to the downwinders' case against the federal government for reparations. The three protagonists at some point in the story learn that Rudd's manuscript, which Dallas has found in the scientist's house, contains top secret information about how the government and the Atomic Energy Commission have knowingly downplayed the impact of radioactive fallout and carried on with the tests in spite of their awareness of the risks. Because the manuscript contains a number of highly classified documents related to the tests, a lot of which are the only existent copies, everyone involved in the two cases come to realize that it can completely change the course of the on-going court case. As it has been the case in the real history before the Radiation Exposure Compensation Act (RECA) program that came effective in 1990, the government in the novel has also been refuting the plaintiff's allegations on the basis that the causal relationship between the tests and the downwinders' illnesses cannot be sufficiently proven.

As the present story follows a linear progression over the span of a year or so, it is interlaced with episodic chapters recounting past events, which I will henceforth call the interchapters or the "history storyline." The interchapters mostly follow their own chronological order, with the earliest chapters set in the early 1950s. Together they paint the larger picture of the U.S. nuclear history from which the present events originate. Each featuring different locales and people, these interchapters are not as tightly tied to each other as the main storyline chapters are. They do, however, loosely form a narrative that connects aboveground nuclear weapons tests at the Nevada Test Site in the 1950s to the fallout-induced events happening to the protagonists in their earlier

years, including the Parkers and the Docksteaders (the family of the downwinder case's lead plaintiff, Uwanda Docksteader).

The history storyline emphasizes the temporal delay characteristic of the toxic impacts of nuclear disasters, as the novel begins with historical background stories about the military and introduces the civilian victims' side of story later. These earlier interchapters focus on the "atomic soldiers," the American enlisted soldiers who were deployed to the test site during active tests as a part of the experiments on the impact of the weapons on organisms as well as inorganic entities such as military equipment.¹⁹ The novel's descriptions of the military "guinea pigs" are accompanied by insider stories known only to personnel working within the fences, offering the reader a set of knowledge which the protagonists attain only later in their lives (at the story's present). It is only about at the middle point of the novel that Christine Parker and other civilian victims start showing up in the interchapters. This delay between the early historical chapters and the present storyline is the time between the tests as originating events and the visible manifestations of their impact on the victims, whether due to information containment or the time it has taken for radiation-induced illnesses to advance.

One interchapter that most vividly represents the delay between the event and its toxic fruition, and consequently the nuclear bomb's characteristic as a time bomb, is the one that titled "Vic Tic." Vic Tic was a commercial portable Geiger counter developed by one of its earliest manufacturers, Victoreen Instrument Company. Along with Vic Tic or Victoreen Model 631, portable Geiger counters in the 1950s were initially targeted at uranium prospectors rather than ordinary people who suspected the safety of the fallout. In the novel, the counter appears in the chapter called "Cloud Country." This section describes how Shot Huey was "extremely dirty" and

¹⁹ "It is estimated that between 250,000 and 300,000 servicemen were exposed to radiation" (Lifton and Mitchell 327).

covered Utah with radioactive dust just like its real-world counterpart, Shot Harry (also known as Dirty Harry). It was one of the test shots of Operation Upshot-Knothole detonated in 1953. In the following interchapter, “Vic Tic,” we see the Parker family at their ranch in Utah in 1955—Dallas in his mid-twenties, his younger brother and his wife, and their one-year-old daughter Christine. She is playing in the back yard, but at this point the grown-ups are oblivious of the large amount of radiation to which they were being exposed. Later in the chapter “Vic Tic,” the AEC radiation monitoring technicians show up at the Parkers’ place with Vic Tic counters and inadvertently lead Dallas to develop a suspicion that they are being lied to about the safety of the fallout from the tests. The AEC technicians claim that the “readings [they] get out here don’t mean much” and awkwardly leave the scene. Dallas retorts, “Then why are they paying you fellas ... our good tax dollars to crew off and chase it around out here?” (Oberhansly and Oberhansly 186). This background story provides the main question for the story—what happened to Christine and other downwinders in the past? The answer is found in Dr. Rudd’s manuscript three decades later.

The novel finds the origin of the time bomb in the test shots through the firsthand experience of the atomic soldiers. Along with animal subjects, the soldiers were an integral part of an auxiliary experiments to the weapons tests conducted in the 1950s. There were in fact two kinds of such experiments. One was the “Doomtown” experiments designed by the Federal Civil Defense Administration (FCDA) to demonstrate potential damage of nuclear weapons on the civilian lives. The other kind led by the military was to observe how soldiers and military equipment would fare in nuclear war. *Downwinders*’ first interchapter, “Dressing the Pigs,” describes the latter kind of test. A couple of AEC employees are introduced, as they move animal test subjects—pigs and dogs—to their designated spots around the would-be ground zero and dress them in custom-made army uniforms in preparation for Shot Huey scheduled for the following

day. Then in the next interchapter, “Mill Drill,” soldiers are also stationed around the ground zero in the same manner later on the same day, except more protected than the animals. The inclusion of human subjects in weapons tests was the result of “the government’s quest for verisimilitude” (DeGroot 240). To approximate the conditions of war, the government even went as far as to recreate the battlefield in which “[i]nstant forests were planted with hundreds of recently-cut pine trees so that the arid desert [of Nevada] would resemble more closely the Western European terrain over which the atomic soldiers might advance” (DeGroot 239). Initially, the AEC had no intention to include human subjects in the weapons tests. Even after they agreed to do it under the pressure of the Department of Defense, they were more cautious about the degree to which soldiers were to be exposed to the explosions. The DoD, however, “requested that the troops be allowed to move in as close as 7,000 yards (3.9 miles) from ground zero, and, after detonation, to move onto ground zero” (Ball 31).

The early interchapters of the novel are fictional representations of Exercise Desert Rock run by the Department of Defense between 1951 and 1957. In the novel, we see a platoon of marines who are deployed in a trench two miles from the ground zero and waiting to secure it after the detonation. The purposes of the exercise in the real world were “indoctrination in essential physical protective measures under simulated combat conditions and observations of the psychological effects of an atomic explosion” (from the letter which the Military Liaison Committee wrote in 1951 to the Chairman of the AEC; qtd. in Ball 29). The mission objective, in other words, was not only to observe the combat readiness of soldiers in nuclear warfare, but also to normalize nuclear weapons as viable—i.e., controllable and survivable—means of war in the minds of soldiers. The DoD-produced indoctrination film, *Exercise Desert Rock* (1951), clearly demonstrates this intention, as the narrator states at one point: “It is believed that they [soldiers]

will experience less fear during the blast because they have learned that radioactive elements from air bursts are carried into the stratosphere in a cloud where they mix rapidly with upper air currents. The bomb will be detonated only if all predetermined requirements are met including weather conditions” (15:32-15:54).

The claims on the harmlessness of radiation, its quick natural dissipation, and the predictability of weather were all false. In *Downwinders*, the assurance of safety is immediately suspected as the platoon of atomic soldiers arrive at ground zero and are greeted with AEC technicians in “space suits” carrying Geiger counters. At the sight of them, the platoon leader, Porkchop, questions the meaning of the protective gears.

Anywhere else, Porkchop the hardcore Marine would have snickered—those guys walking around awkwardly like overgrown boys in stifling snowsuits—but out here, the differences between “them” and “us” became dark and threatening. What was it that those men had to be protected from, while his own boys were in everyday field dress? (Oberhansly and Oberhansly 121)

The interviews of the real-world atomic veterans recorded in *American Ground Zero: The Secret Nuclear War* (1993) three decades after the weapons tests continue the story that Porkchop could not in *Downwinders*. In a sharp contrast to the confidence and trust in their government shown in the staged interviews in *Exercise Desert Rock*, the veterans speak of the toll of radiation exposure. Robert Carter, a then 17-year-old foot soldier of a platoon just like Porkchop’s, for example, states that he started to lose his hair a couple of years following a test in which he participated. Ted Prazygucki, a former army truck master of the “Doom Town” operation, was diagnosed with larynx cancer two decades after his participation in the tests. He recounts,

you didn’t question them about safety because twenty years down the road, not even your scientists who developed the A-bomb really knew what damage radiation might do. The main object was to see how our troops would react in case, in a war, our enemies dropped the A-bomb on us. See how they would react, what type of visible injuries we would receive, or burns, but never internal radiation from the fallout. Some got sick from headaches. They didn’t pay attention that headaches were caused by the radiation. My teeth fell out about 1956. (Gallagher 62)

Prazygucki's words reaffirm that Operation Desert Rock's objective was twofold: to observe the effects of radiation and to "dispel much of the fear and uncertainty surrounding atomic radiation and the effects of these rays" by concealing the findings (*Exercise Desert Rock* 17:58-18:19).

As its history storyline expands beyond the test site and into the ranches and residential areas of Utah, the novel recreates the history where the fallout from the tests blew over the boundaries of the test site. With the narrative progression going back and forth in time, the novel refutes the other two parts of the aforementioned deception maintained by the government—that radiation will conveniently dissipate, and that the tests are conducted with a perfect knowledge of weather. It is true that some of the fallout passed through the tropopause into the stratosphere, but scientists also observed that "fallout from high-altitude shots circle[d] the earth for months before dissipating" (Miller 296). More importantly, some radioactive particles from atmospheric shots stayed in the troposphere, where weather mostly occurs. They then got mixed with rain or snow clouds, resulting in highly radioactive precipitation, or simply fell down on the lands downwind of the test site in fine radioactive dust.

The radioactive dust produced in this exact manner is referenced in the story. It is said to cover the lands around the Nevada Test Site after the unexpectedly dirty explosion of Shot Huey. One passage on this event reads:

Later that morning, the [radioactive] cloud passed over the broad Lincoln Country Range of southeastern Nevada—sheep country A fine, dusty mist fell from the cloud and covered, then penetrated, the dense, layered wool of the seep, the grass and heavy sage. ... Not far away in Modena, Utah, three children came out of a ramshackle trailer house and played in what they imagined to be snow, though it had never snowed in the desert in August. (Oberhansly and Oberhansly 155)

The family of Uwanda Dockstader, the leader of the Downwinders Coalition, was also victims of the fallout. They were "a third-generation family of sheep ranchers who were bankrupted, completely wiped out in the winter of 1953 by fallout from the test site" and lost one of their

members—Uwanda’s father—to the same fallout (Oberhansly and Oberhansly 139). Along with many other parts, this bit of the story is based on the real history. When the three shots from Operation Upshot-Knothole were detonated in 1953, they covered the area around St George with unexpectedly high levels of fallout. “The most obvious effect was evident among sheep being taken to lambing sheds in Cedar City. Out of a flock of 11,710 animals, 1,420 ewes and 2,970 new lambs died within weeks” (DeGroot 247). These sheep reportedly “absorb[ed] up to 1,000 times the maximum amount of radioactive iodine allowed for human beings, according to Government documents” disclosed two decades after the tests (“4,300 Sheep”).

The novel also touches upon one of the most well-known historical cases of radioactive rain—the rain of 1953 over Albany, New York. The late Dr. Rudd in the novel remarks in his manuscript that

the cloud of Shot Simon [a real test shot, also part of Upshot-Knothole], a behemoth atomic blast, was released into the atmosphere above Nevada and then traveled for two days, crossing the entire continent at 40,000 feet before encountering a high-altitude storm over Albany, New York. Concentrated radioactive debris, deadly fission by-products that are absorbed and stored in the human body, came down in that rain on upper New York State and for a short time left the streets of Troy hotter than many areas of the test site itself” (167).

The incident demonstrates how the fallout from a nuclear test can remain in the troposphere and eventually return to the surface. The radioactive debris from Shot Simon in history was also carried by rain clouds, travelling at 40,000 feet (which is about 7.5 miles; the troposphere reaches up to around 11 miles above sea level in the mid latitudes). The problem, more specifically, was that “rain will bring fallout to earth if the nuclear cloud is blow the rain cloud,” because of which “radioactive precipitation was a somewhat common phenomenon in the 1950s” (Miller 296). Rudd’s remark that the radioactive rain from Shot Simon “left the streets of Troy hotter than many areas of the test site itself” is not an exaggerated or fictitious remark, given the historical instance of similar contamination by Shot Harry in 1953. In studies published in a couple of years following

the test, “some scientists estimated that if St. George, Utah, had been visited by a thunderstorm while the HARRY cloud passed over, the area would have become a hot spot so intense that half the population of the town would have been killed” (Miller 296).

Another important part of the weapons tests referenced in *Downwinders* is the “Doom Town,” the mock neighborhood designed by the FCDA to demonstrate how civilian buildings and population would be affected by nuclear explosions. There were two such towns, one constructed for Operation Doorstep in 1953 (during Shot Annie of Operation Upshot-Knothole) and the other for Operation Cue in 1955 (during Shot Apple 2 of Operation Teapot). As the most graphic demonstrations that the FCDA had conducted to that point, the Doom Town operations were designed to promote a “healthy” degree of fear among the general population. The novel’s interchapter “Doomtown” references this propagandistic intention with a remark on the fictional test Shot Huey. Shot Huey, the chapter reads, “was referred to like all the others, as a *shot* ... the word recalling not just the act of exploding or discharging, but vaguely suggesting an injection as well, something that would make this country stronger, healthier” (78). Wide exposure of the operations through electronic mass media (television and radio) also differentiated them from the agency’s earlier propaganda projects promoted with pamphlets and other print media. “The FCDA supplied the *Operation Doorstep* documentary to television stations across the nation, even making a small profit (\$15,000) on the print. Over sixty radio programs covered the 1953 Annie test” (Wills 62). Another key difference was the very space in which the hypothetical disasters were rehearsed—namely, the American homeland. “For the first time, an American landscape had been destroyed by the bomb and witnessed by the whole nation” (Wills 62). The historical context to this new venture of the FCDA was the relocation of major test sites during the 1950s from the Pacific islands to the U.S. mainland. Among the sites, the Nevada Test Site has been the first and

most-bombed site. The relocation was instigated by “the need to reduce the lead times between tests and to cut costs” as well as the Soviet’s progress on their nuclear program (DeGroot 237). Truman approved the establishment of the Nevada Test Site in December 1950, roughly a year after the Soviet’s first nuclear bomb—Joe-1—was tested in August 1949.

The biggest irony of the Doom Town operations was that they were not just vivid representations of hypothetical disasters, but also produced disasters on their own right. The tests involved actual explosions affecting the surrounding lands and their inhabitants. The very designation of operation, experiment, or test, in other words, covered the material impact of the hypothetical events. While the test shots as “injections,” to refer back to the aforementioned analogy, were designed to “make this country stronger, healthier” psychologically, they were materially toxic and nothing like antigens in vaccination shots. The Doomtowntown interchapter in *Downwinders* also suggests that even on the psychological level, the “vaccination” was received with ambivalence. Clem Wheeler, “the volunteer head of the Civil Defense Network” observing the Doom Town experimentation in the novel, expresses this ambivalence toward the FCDA propaganda, as he carries on with his assignments “feeling some degree of shared inevitability with the Darling family” (79, 82). The Darling family was a mannequin nuclear family set up in the Doom Town house, named after L. A. Darling Co. that donated the mannequins and dressed in clothes donated by J. C. Penney. They were “proxies for our citizens,” in the words of Rear Admiral Robert W. Berry, the then assistant to the secretary of defense (Wills 74). *Downwinders* suggests, however, that the mannequins representing the ideal middle class nuclear family of the contemporary United States were more than mere proxies for citizens as the potential targets for incoming missiles. On the one hand, they indeed were substitutes, for they were killed by the enemy in a hypothetical war. On the other hand, they were literally destroyed by American nuclear

weapons, and thus became the perfect, albeit unintended, symbols for the citizens victimized by their own government. This was the part of the reality which the Doom Town experiments (Operations Doorstep and Cue) attempted to overwrite, by emphasizing the bomb only as a link between the danger posed by the enemy and the citizens of the United States as potential victims.

The Doom Town demonstrations were ultimately intended to manage anxiety by emphasizing both the destructive power of the bomb and the possibility of survival post-attack. The intention was reflected in the two names for the same mock towns—the official name of “Survival City” and the more popularly known label, “Doom Town.” *Operation Cue* (1955), a FCDA film about the eponymous operation, for example, “promised viewers that nuclear war could be incorporated into typical emergencies and treated alongside natural disasters such as hurricanes, earthquakes, and floods,” and that “emotional self-discipline and preparation are the key to surviving a crisis—whether that crisis is a Soviet nuclear attack, fire, or bad weather” (Masco, “Target Audience” 29). The nuclear menace could be domesticated as a natural disaster because “the portrait of nuclear danger presented in *Operation Cue* is partial, a carefully edited version of nuclear science that the day’s prevailing experts had already disproved via the test programs in Nevada and the South Pacific” (Masco 29). One critical element that was deliberately omitted in the operation’s propaganda was radiation. Even as the film makes an analogy between Hiroshima/Nagasaki and the Doom Town and depicts the post-attack reconstruction process for both cases, it does not mention anything about the damage from radioactive fallout. It is a glaring omission not just because radiation is one of the three main types of damage caused by nuclear weapons along with explosion and heat, but also because radiation is the source of contamination that renders impossible any designation of a purely local event of nuclear explosion, whether in war or tests.

The spillage of the fallout beyond the test sites acts in the novel as a plot device that connects the stories of the tests to those of downwinders. In terms of plot, the present storyline rests upon the existence of the radiation released from the weapons tests. Without them, Christine would not have developed breast cancer; Dallas would not have murdered Dr. Rudd; and Uwanda Dockstader would not have been assassinated by a hitman because of her plan to release the manuscript containing damning evidence against the government. Structurally, the novel's *sjuzet*—the order of the events as they are presented to the reader—embodies the radioactive spillage spreading in time. The experiments in the past are introduced first as the preamble to the main story, which designates them as the originating points of the present story. At the heart of this connection as well as the novel's plot as a whole is Dr. Rudd's manuscript that Dallas discovers at the physicist's house after the murder. From a letter found at the scene, Dallas gathers that Rudd was almost ready to publish the manuscript which, in Rudd's words, would "blow the lid off the U.S. atomic testing program" (4). A closer examination of the manuscript by Christine and Layne Harting, her lawyer, reveals that it contains much sensitive information pertaining to the nuclear tests. The main plot of the story revolves around this highly explosive manuscript, as the Parkers try to hand it over to the representatives of the Downwinders Coalition, while the Congressman of the Southern district of Nevada and his henchmen try to prevent the leak by murdering Uwanda Dockstader and attempting to kill the Parkers and Layne as well.

The unpublished autobiography, fraught with evidence of the government's purposeful concealment of the tests' pernicious repercussions, is the most important gate through which the real history of the American nuclear program and *Downwinders* as a fictional story seep into each other. One especially critical facet of the environmental damage caused by the weapons tests was

that it was exacerbated by the government's cover-up. In one of the passages from his manuscript, Rudd writes,

For the first time in the entire history of the United States, a large-scale covert operation was undertaken by our government, the military and segments of the scientific community not only to deny our own people access to critical information, not only to fail to warn then, but to actually engage in a public relations campaign [166] assuring everyone that the tests were safe. This, when in fact, we suspected early on and knew for certain by 1954 that they were not safe. In pursuit of this goal, we had to alter or destroy data and documents that would have contracted our story. (165-66)

The containment of information, in other words, directly prevented the containment of radiation. Such was also the case in the history of the U.S. nuclear program. "In order to sell the test programme, [AEC officials] had to argue that it was safe. Such a claim, however, meant they could not urge citizens to protect themselves, because to do so would contradict the message that they were safe. Thus, the AEC in effect encouraged people to become victims" (DeGroot 247). As the chief manager of the test site, Rudd was not only fully aware of, in his own words, the "large-scale covert operation," but also deemed it necessary. It is this belief in the necessity of sacrifice and his unapologetic justification of it, rather than the concealment itself, that prompts Dallas's murder of Rudd. The night of the murder, Christine and Dallas happen upon Rudd at a local bar. The television is showing an interview with Rudd, in which he responds to the reporter's question about the anti-nuclear protestors by saying, spitefully, that they are "idiots" for not understanding that "[l]ike any war, there are casualties" (102). The word "casualty" triggers the series of events leading to the murder thereafter. Indignant at Rudd's characterization of the protestors, Christine follows him to his house and confronts him. During their tussle, she unintentionally injures him. She then leaves the scene as Dallas arrives and handles the rest for her. What shocks Christine, and the aspect of the nuclear program that the novel tries to shed light on, is the designation of the testing as an integral part of the Cold War and the attendant damages as the casualties of war. The

central argument of *Downwinders* is, in other words, that Christine and other downwinders are the victims of the U.S. nuclear project as an internal war.

Identifying *Downwinders* as a story of internal war changes the ways in which the novel's overall plot is understood. The climax of the present storyline, in which the manuscript is discovered by the Parkers and eventually admitted to the court as evidence for the Downwinders Coalition's lawsuit against the federal government, is reached toward the end of the novel. The Parkers and their lawyer have finally escaped all attempts to stop them from releasing the manuscript to the world. *Downwinders* as a story of the internal war, on the other hand, begins much earlier in the past. The starting point of this story is at least Christine's exposure to radioactive fallout in her childhood decades ago, or even with the establishment of the Nevada Test Site when the Parkers have not even entered the narrative. The climax of the internal war narrative is reached at the moment when Christine realizes, more clearly than ever before, that the bomb has been at the heart of her reality and that it has been one of the most powerful organizing forces of the story of her life. Radiation has been, she realizes, her environment. "She had been conceived, carried, born, nursed, and raised for the first two years of her life on Dallas's ranch. Eaten the food, drunk the milk, and grubbed around the dirt" (169). She is at this moment standing on a plateau near her uncle's ranch with Layne. They have driven out to the place to recover Rudd's manuscript that Dallas had hidden in the hole-in-the-rock which him and Christine has known for a long time. Standing there, Layne looks to the west, in the direction of the Nevada Test Site. Christine nods in acknowledgement, remarking that the test site is "a hundred miles [from here] as the wind blows" (171). Then, the exact words she just uttered—"as the wind blows"—suddenly opens her eyes.

It had been a totally unconscious choice of phrasing on her part—as *the wind blows*—but now, with her body standing high above the desert plateau, with this

clear, indisputable view, she understood the past in a new way. The proximity, the wind, the fallout, the negligence and lies. The picture stunned her, repulsed her, but strangely, like that ethereal vista from Grand Canyon, it also strengthened her, sorting things at long last into a clear and shining order. (171)

At this moment of sudden realization—a moment in which she has come to see for the first time the greater picture of things in her life connected to each other—the nuke is found to have been at the heart of the novel. The novel as a whole is also redefined as a story of the Parkers, the downwinders within and outside the text, and finally of the internal war which the US government has waged against its own people, all at the same time. Through this epiphany, the bomb becomes as much a protagonist of the novel as Christine.

Ceremony: *The Local and Global Nuke*

It is with this moment of epiphany, the sudden shift in the ways in which the protagonist understands her relationship to her environment, that I compare *Downwinders* to *Ceremony*. In the scene which has been frequently identified as the climax of *Ceremony*—the abandoned uranium mine scene—is an eye-opening moment for Tayo, *Ceremony*'s protagonist. The scene is almost identical in nature and tone to that of Christine's epiphany. To introduce the general setting of the novel first, *Ceremony* is set in New Mexico in the late 1940s, and follows Tayo, a Laguna Pueblo World War II veteran suffering from PTSD, as he goes through the eponymous ceremony to cure his trauma. The healing process consists mainly in Tayo's reestablishment of his Laguna Pueblo identity, which involves understanding the historical relationship between his people and the outside world—most notably that of the Euro-American colonizers, past and present. The novel's world picture, however, reaches beyond the conflict between the Native and Non-Native Americans. Through the process of the healing ceremony, the novel suggests that the relationship which Tayo has to understand is a much broader one. It is, namely, the relationship between

humans everywhere in the world and the “destroyers,” an abstract term Silko uses to refer to the human drive for and historical forces of destruction.

The title of the novel, its central plot, and the ending of the story describing a ceremonial incantation that announces that the “witchery” is “dead for now” all suggest that understanding the nature of the ceremony is crucial in interpreting the novel. The point at which *Ceremony* is tied to my study of nuclear fiction is also the ceremony, as the nuke figures in the novel as one of the central components of the relationship between the American indigenous community and the rest of the world. The nuke appears in the novel mainly in two forms: the nuclear bomb as the most potent manifestation of the destroyers, and the abandoned uranium mine as a local manifestation of the U.S. nuclear project as well as the site for the story’s climax. Both the bomb and the mine are also some of the more visible traces of the Cold-War nuclear legacy in the U.S., which constantly looms in the background of the novel. The nuke, furthermore, is directly connected to the reason why understanding the ceremony/*Ceremony* requires more than the knowledge of the Laguna or Native-American culture and epistemology. The version of the ceremony Tayo is tasked to complete—the ceremony of the new generation practiced by the unorthodox medicine man, Betonie—reaches a critical turning point at the uranium mine, when the history imbued in the place grants Tayo a vision of interconnectedness between all living beings and events past and present. It is important to note at this point that the bomb as a manifestation of the destroyers is the single-most influential catalyst for Tayo’s epiphany. Although both the ceremony and the novel as a whole have distinctively spiritual characteristics, they are also very much materialistic. The historical context that informs them—i.e., nuclear power—represents one of the highest scientific achievements and a global enterprise driven by the sole purpose of harnessing the most elementary power of nature.

The nuke is irrefutably one of the central historical and material forces at play in the novel. I will come back to this point toward the end of this section, where I read the uranium mine scene in detail. At the moment I want to breach the topic by quoting a passage from David Rice's "Witchery, Indigenous Resistance, and Urban Space in Leslie Marmon Silko's *Ceremony*" (2005):

The immensity of the violence and destruction Tayo must fight is represented by the very spot where he experiences the most important moment of the ceremony. Remembering stories his grandmother told him about seeing the blast from the nuclear testing at Trinity site and the nuclear and uranium mines that mark the area around Laguna Pueblo, the symbolic depth of the place hits him. He is at the geographic crux of the ultimate result of the witchery, the symbolic birthplace of the atomic destruction that followed him all the way to the Pacific and back. (134)

The phrase that is particularly well-articulated is "the *geographic crux* of the ultimate result of the witchery" (my emphasis). As Rice suggests, the significance of the abandoned uranium mine—the physical backdrop of the novel's climax and the place of the ceremony's completion—is literally "geographic." The abandoned uranium mine is not just symbolic, and its significance is not confined within the story told in *Ceremony*. It is rather tied to real history and many places in the world sacrificed for national nuclear projects. The designation of the uranium mine as "the geographic crux of the ultimate result of the witchery" also explains the central place which the nuke occupies in what Jeff Karem refers to as the "globalizing aspects" of *Ceremony* or Silko's "globalism" (21). The globalism in question is manifested, for instance, in the novel's characterization of Tayo that "[h]is sickness was only part of something larger, and his cure would be found in something great and inclusive of everything" (*Ceremony* 116). What I would add to Karem's assessment is that the "globalizing aspects" of the novel can be attributed partly to the nuke as the product of a global military competition with a global ecological impact. The very fact that the quest to conceive Tayo's story on the global stage—a quest for both Tayo himself and the readers—is initiated by his "sickness" furthermore suggests that the globalization carried out by

the nuke is forceful and insidious at the same time, for he had been implicated in the complex web of the nuclear history (or the witchery as it is called in the novel) without ever realizing it himself.

Insofar as understanding the nature of the ceremony and how the nuke figures in the ceremony is crucial in interpreting the novel, the challenge of reading the story is that the U.S. nuclear history (especially its involvement with the Native American people and lands) is largely outside the story itself. The only direct references to the nuke in the novel are the uranium mine and the nuclear bomb that is said to be the ultimate product of the witchery. The story as a whole very rarely mentions anything directly related to nuclear weapons or the infrastructure for manufacturing and maintaining them. Although Native American communities, lands, and economy (especially in the Southwest) have been intimately intertwined with the U.S. nuclear industry, none of the characters are said to be employed at the uranium mines or processing plants. The novel focuses instead mostly on Tayo's struggle with his traumatic memories of World War II, similar struggle of his fellow veterans, the racism toward Native Americans to which all of them are victims, and the on-going ceremony infused with the Laguna folklore. The most notable element of the folklore which the story borrows is Ts'eh, the Laguna mountain spirit, who figures in the story as Tayo's spiritual guide and lover. As far as the contents evidently present in the text are concerned, in other words, reading *Ceremony* requires studying World War II as it was experienced by American (especially Native-American) veterans, the history of the U.S. internal colonization of the indigenous population, and the Laguna culture. The climax of *Ceremony* shows, however, that the first two—the history of World War II and the internal colonization in the U.S.—are connected to each other via the nuke, or rather, that the nuke allows Tayo to see the connections between them. And it is through Silko's appropriation of the Laguna folklore and epistemology that everything nuclear in the story is explained—the origin of the bomb, its meaning in history,

and the ways in which it is connected to the world as experienced by Tayo. According to Silko's version of the folklore, the Native American witches created white people, and they are, consequently, responsible for the eventual invention of the nuclear bomb as the world-ending product of the witchery. As such, it is the part of the Laguna culture relevant to the story that we should understand first.

One of the central concepts in the Native American epistemology that informs the novel is "story." In "The Semiotics of Dwelling in Leslie Marmon Silko's *Ceremony*," Catherine Rainwater notes,

A reader of Leslie Marmon Silko's *Ceremony* must recognize two concepts that are fundamental to Native American epistemology as Silko (and various other contemporary American Indian writers) represents it. First, what we call 'reality' is partly a product of semiosis, for many aspects of "reality" yield to human thought and imagination expressed through art and language. ... [Secondly,] there are profound, inextricable linkages among self, community, and the physical and metaphysical dimensions of the land. (219-220)

These points are also explained by Silko herself in her article, "Landscape, History, and the Pueblo Imagination" (1986). The central characteristic of the Pueblo epistemology around which the article revolves is the predominant orality of collective knowledge and memory. Instead of writing, she explains, "[w]hatever the event or the subject, the ancient people perceived the world and themselves within that world as part of an ancient continuous story composed of innumerable bundles of other *stories*," from the stories about the world's creation to the most mundane, everyday events happening in the community (268; my emphasis). This tradition is, she adds, still being practiced by contemporary Laguna Puebloans. Silko's overview of the centrality of storytelling in Pueblo culture also touches upon Rainwater's second point—the "profound, inextricable linkages among self, community, and the physical and metaphysical dimensions of the land." The individual is intimately tied to the community, Silko explains, as the very definition of the collective identity and the reality of the greater world are given their forms by stories.

Continuous yet dynamically morphing, the body of stories are maintained by what each individual Puebloan hears, remembers, and retells. “Location, or ‘place’,” Silko continues, “nearly always plays a central role in the Pueblo oral narratives.

The precise date of the incident often is less important than the place or location of the happening. ... But the places where the stories occur are precisely located, and prominent geographical details recalled, even if the landscape is well-known to listeners. Often because the turning point in the narrative involved a peculiarity or special quality of a rock or tree or plant found only at that place. (269)

The centrality of place in the traditional Puebloan stories is particularly relevant to the reading of the novel’s climactic scene at the uranium mine, for it is the physical place itself that triggers Tayo’s epiphany.

The idea of the reality as storied is first introduced in the opening of *Ceremony* in the form of folkloric lyrics. The first poem is a Puebloan creation story about “Ts’its’tsi’nako, Thought-Woman” who, at the beginning of time, “is sitting in her room / and whatever she thinks about / appears.” The second last stanza repeats the same motif, but this time explicitly uses the word “story”—“She is sitting in her room / thinking of a story now.” The poem then ends with the sentence “I’m telling you the story / she is thinking,” which not only repeats “story” once more, but also establishes, on a metafictional note, Silko’s role as the storyteller who, like other Puebloans, retells the old stories handed down through generations (1). The second poem carries on with a story about stories, but this time more specifically about the eponymous “ceremony.” The first lines—“I will tell you something about stories, / [he said]”—shows that the storyteller’s position (the narrator “I”) is simultaneously maintained and deliberately muted, indicated by the bracketed signal phrase “[he said].” The rest of the poem explains the nature of story as it is understood by many Native-American tribes, especially in the Southwestern United States. Stories, the narrator says, “aren’t just entertainment.” This statement suggests, for Silko as the writer/storyteller, that the story that follows—*Ceremony* the novel—is not a mere fiction. Stories

are, instead, “all we have to fight off / illness and death. // You don’t have anything / if you don’t have stories” (2). The first half of this passage—that stories are “all we have to fight off illness and death”—evokes the age-old literary motif of storytelling and remembering as ways for humans to render bearable the absurdity of mortality by creating artificial continuity beyond any given individual’s life. However, the following sentence—“You don’t have anything if you don’t have stories”—refers more specifically to the Puebloan epistemology, according to which “material reality originates, to some extent, in the imaginal realm of consciousness” (Rainwater 219). The sentence is also related to Tayo’s psychological struggle stemming quite literally from not having proper stories. Or rather, he lacks a mental web of connections between himself, his community, and the world, until he finally finds at the abandoned uranium mine a way to connect everything through the history which the place embodies.

Story as one of the novel’s central tropes is repeatedly evoked throughout the story. The survivor’s guilt of Tayo over the death of Rocky, his cousin, during World War II, for example, is expressed in terms of a story that now exists as a substitute for a living human being. Tayo’s extended family “all mourned Rocky that way, by slipping, lapsing into the plans he had for college and for his football career. It didn’t take Tayo long to see the accident of time and space: Rocky was the one who was alive.... It was him, Tayo, who died, but somehow there had been a mistake with the corpses, and somehow his was still unburied” (25). In a way, there is nothing special about this manner of mourning. Because Rocky’s future will never be, it is now told as a story instead. Note, however, the specific language of the passage, such as “the accident of time and space” and the “mistake with the corpses.” When read together, they suggest that Rocky living on as a story, at least in Tayo’s guilt-ridden and traumatized mind, takes precedence over Tayo who is physically living. When he thinks that “Rocky was the one who was alive,” it is more than just a figurative

speech that Rocky should have been the one who survived. Rocky is the one alive because he has a story about him even in death, while Tayo feels that his story-less existence is being overwritten by the stories about Rocky. Tayo's guilt is not just his own doing. His aunt—Rocky's mother and the older sister of Tayo's mother, Laura—constantly reminds him of her resentment. She corrects anyone who refers to Tayo and Rocky as brothers by emphasizing that Tayo is Laura's son. "'They're not brothers', she'd say, 'that's Laura's boy. You know the one'. She had a way of saying it, a tone of voice which bitterly told the story, and the disgrace she and the family had suffered" (60). The "disgraceful" family history of which Auntie reminds people is that Laura got pregnant by a white man and, as a result, Tayo is of a "mixed" blood. Here, again, Auntie's resentment is expressed in terms of the story she tells.

It is worth noting at this point that the other major characteristic of the Puebloan storytelling that Silko discusses in her article alongside the centrality of place is the assumed subjectivity of stories and the resultant polyvocality of history. There are, she explains, often multiple versions of the same event.

Implicit in the Pueblo oral tradition was the awareness that loyalties, grudges, and kinship must always influence the narrator's choices as she emphasizes to listeners this is the way *she* has always heard the story told. The ancient Pueblo people sought a communal truth, not an absolute. For them this truth lived somewhere within the web of differing versions, disputes over minor points, outright contradictions tangling with old feuds and village rivalries." ("Pueblo Imagination" 269).

Finding the "truth somewhere within the web of differing versions" is an apt way to describe Tayo's ceremony as a process through which he must come to an understanding of the web of stories in which he is entangled. One part of the web is represented by Auntie's story about the "disgraceful" entanglement of blood, which Tayo's very existence embodies. The entanglement is more broadly that of the Euro-American and Indian cultures and histories. Auntie's disapproval of miscegenation is a parochial framing of this larger kind of entanglement. As Night Swan—the

Mexican former cantina dancer and girlfriend to Tayo's uncle—tells Tayo, people who frown upon his multiracial heritage are “afraid.”

They feel something happening, they can see something happening around them, and it scares them. Indians or Mexicans or whites—most people are afraid of change. They think that if their children have the same color of skin, the same color of eyes, that nothing is changing. ... They are fools. They blame us, the ones who look different. That way they don't have to think about what has happened inside themselves. (92)

The cultural entanglement, which racism strives to deny by positing a culture as exclusively tied to a race or ethnicity (hence to prevent miscegenation is to prevent the mingling of culture), is again explained in terms of stories. Ku'oosh, the more traditional of the two medicine men whom Tayo meets, says that their world “had become entangled with European names: the names of the rivers, the hills, the names of the animals and plants—all of creation suddenly had two names: an Indian name and a white name” (62). This is directly tied to his earlier remark that the world is made of words. The medicine man says that “no word exists alone” and “the reason for choosing each word ha[s] to be explained with a story about why it must be said this certain way” (32). To call the same rivers, hills, animals, and plants by two names, in other words, is to tell two different yet intertwined stories about them. And they together tell a story about the history of the cultural entanglement. The success of Tayo's ceremony, in this sense, hinges on his ability to see this interrelationship between the stories of things, rather than the things themselves.

The story as the Puebloan epistemological mode is connected to the nuke as a material force represented in the poem about the witches' contest, which is introduced during a conversation between Tayo and Betonie. It is also in this poem that the nuke is introduced for the first time in the novel. The poem tells a story about a contest among Native American witches from different

tribes.²⁰ Instead of the more conventional shamanic rituals that others have already demonstrated, one witch tells a story. She claims, “as I tell the story / it will begin to happen” *a la* Thought-Woman, and then actually creates white people as a result (127). The witch also says that a witchery has been “set in motion / To destroy / To kill,” and that it will incite people to create “Objects to work for us / objects to act for us / Performing the witchery / for suffering / for torment.” One such “object,” a machine, mentioned in particular is the nuclear bomb. The witch foretells that “they” (white people) will discover uranium—“Up here / in these hills / they will find the rocks, / rocks with veins of green and yellow and black”—and that with it they will make the bombs and unleash them to the world—“They will lay the final pattern with these rocks / they will lay it across the world / and explode everything” (127). Considering that this poem not only reiterates the power of storytelling as a trope, but also relates it directly to the discovery of nuclear power, the verb “lay” in the poem is endowed with a particular overtone. The meaning of “lay” becomes clearer as it is repeated in the climactic scene of the novel: “But they had taken these beautiful rocks from deep within earth and they had *laid* them in a *monstrous design*, realizing destruction on a scale only *they* could have dreamed” (229; the first two emphases are mine). In these instances, the act of “laying” has both senses of technological designing and narratological plotting. In a single term, laying evokes the sense of *machination*. In the earlier passage—“They will lay the final pattern with these rocks / they will lay it across the world / and explode everything”—the first “lay” means to put things together in a certain pattern from which an emergent property appears, which, in this particular case, is nuclear fission. The second “lay” describes an act of placement as well, but this time it also means to “inject.” The atomic bomb as a newly conceived pattern of natural forces is “laid across the world.” The bomb, that is, becomes

²⁰ Although inspired by the Puebloan folklore and culture, the witchery as it is described in the novel is Silko’s invention. See Karem p.28.

interweaved with the existing pattern of the world, thereby creating a new (global) plot in which the bomb would destroy the world. If we read the instance of “lay” in the later scene again—“they had laid [the rocks] in a monstrous design, realizing destruction”—it now becomes evident that the act of laying the rocks in a certain pattern to realize a dream is described as both a material invention and a kind of storytelling endowed with a power to affect the physical world, just like the witchery that created white people or the Thought-Woman’s storytelling that created the world.

The history of the world since the introduction of witchery/the nuclear bomb first mentioned in the form of folkloric lyric (henceforth referred to as the “witchery story”) retreats to the background of the main plot, until it resurfaces at the abandoned uranium mine scene. Given the centrality of place in the Puebloan storytelling, the choice of a uranium mine as the physical site for the climax of the novel indicates the historical significance of that specific locale within the witchery story that is ushered into Tayo’s consciousness. The most critical passage of the scene warrants a lengthy quote:

He had been so close to it, caught up in it for so long that its simplicity struck him deep inside his chest: Trinity Site, where they exploded the first atomic bomb, was only three hundred miles to the southwest, at White Sands. And the top-secret laboratories where the bomb had been created were deep in the Jemez Mountains, on land the Government took from Cochiti Pueblo: Los Alamos, only a hundred miles northwest of him now There was no end to it; it knew no boundaries; and he had arrived at the point of convergence where the fate of all living things, and even the earth, had been laid. From the jungles of his dreaming he recognized why the Japanese voices had merged with Laguna voices, with Josiah’s voice and Rocky’s voice; the lines of cultures and worlds were drawn in flat dark lines on fine light sand, converging in the middle of witchery’s final ceremonial sand painting. From that time on, human beings were one clan again, united by the fate the destroyers planned for all of them, for all living beings; united by a circle of death that devoured people in cities twelve thousand miles away, victims who had never known these mesas, who had never seen the delicate colors of the rocks which boiled up their slaughter. (228)

It is immediately evident from the language of the passage that the nuke occupies the center of Tayo’s vision of the world as a web of “all living things.” The repeated use of semicolons expresses

the velocity at which the story of the world is being rearranged in Tayo's mind, as well as the sense of endless connectedness—the sense that “There was no end to it,” as Tayo puts it. When he speaks of “the point of convergence,” those which are converged represent specifically the history and institution of nuclear weaponry. Los Alamos Laboratory is where the first atomic bombs—the Gadget (of Trinity Test), Fat Man, and Little Boy—were born, and at Trinity Site the bomb was delivered into the world for the first time. The mine itself was also an integral part of the U.S. nuclear institution. Unnamed in the novel, the mine is the Jackpile-Paguate mine in the Laguna Indian reservation, once the world's largest open-pit uranium mine until it was closed in 1982. The driving force of the convergence is also the nuke, as represented in the last long sentence—“a circle of death that devoured people in cities twelve thousand miles away.”

The climax of *Ceremony* insists that the cultural and ethnic relations explored in the novel be read in the context and terms of the nuke. The more conventional readings are of course still valid in their own ways. It is true that “much of *Ceremony* is concerned with questions of entanglement” and “Tayo's quest in *Ceremony* demands a sorting out of all these cultural entanglements, a negotiation of binary oppositions in order to recapture a faithful connection to the world” (Karem 24). Or, as Lawrence Buell notes, “[o]ne of the most remarkable features of [*Ceremony*] is its fusion of regionalism and globalism, its assertion that ‘the fate of all living things’ hinges on a minor transaction taking place in a remote cultural niche, a smallish Pueblo tribe of marginal influence within an already marginalized race” (Buell 286). But the “cultural entanglements,” which Karem regards as the central topic of *Ceremony*, have happened due in no small part to the nuclear enterprises—the development, production, and disposal of nuclear products. The “fusion of regionalism and globalism,” identified by Buell as the most notable achievement of the novel, is also partly facilitated by and realized in the form of the forcefully

globalizing power of the nuke—the policide or radioactive epidemic that can be initiated from thousands of miles away. The nuke also colors Tayo’s newly attained vision of the world. In the above-quoted passage, he thinks that “There was no end to it; it knew no boundaries.” Given the textual context, the reference of the pronoun “it” is ambiguous. On one level, it refers to the web of interconnections between “all living beings.” This ecological worldview is, however, heavily informed by a very specific history of the nuke. Note, for instance, that the remark that “There was no end to it” is preceded by an overview of the birth places of the bomb, whereby the ambiguous “it” refers circumstantially to the land littered with nuclear machineries and the history of their growth, from the land of the Laguna Pueblo to New Mexico to the world’s regions of nuclear colonization. The “it,” then, refers more specifically to a certain calamity spreading through the ecological web—the calamity that ironically allows Tayo to conceive the web, precisely in the manner of catastrophic ecology.

Following the epiphany, Tayo feels a relief, “finally seeing the pattern, the way all the stories fit together—the old stories, the war stories, their stories—to become the story that was still being told” (229). Given that “the pattern of the ceremony was completed here,” it becomes clear that the completion of the ceremony—Tayo’s healing—has consisted in successfully synthesizing the seemingly disparate stories of postwar history as Tayo has experienced them. He is relieved because he now knows that “[h]e was not crazy; he had never been crazy,” and that “[h]e had only seen and heard the world as it always was: no boundaries, only transitions through all distances and time” (*Ceremony* 229). Regarding this exact moment Lawrence Buell notes, “What he had experienced as insanity, as the uncontrollable montaging of impressions (seeing the face of his Japanese ‘enemy’ as the face of his Uncle Josiah, for instance), is sanity” (286). Tayo’s “uncontrollable montaging” of stories from different time-spaces turns out to be not a sign of

insanity, but a symptom that he has not had the right frame to organize the stories in his mind. This narrativizing frame, which would explain the relation between World War II and the post-WWII Native American community, is conceived as Tayo comes to understand at the abandoned uranium mine that the Native American landscape has been an integral part of the American nuclear landscape ever since the first atomic bombs.

The nuclear bomb always targets the broader ecosystem. In a war, “even a fraction of the existing smaller arsenals [compared to the Cold War era] would be more than enough to cause nuclear winter today” (Ellsberg 17). Weapons tests have also introduced to the world a large amount of artificially created radiation, accumulated in fallout victims’ bodies and entombed in the massive concrete domes in Chernobyl and on the Runit Island in Enewetak Atoll. Finally, determining the “safe level” is not only debatable for the human body, but also the planet as a whole: “Earth scientists around the world in the 1950s found themselves unable to define contamination because they had no idea what the normal levels of radioactivity were. By the time they thought to measure them, bomb tests had already changed them. That left an open question: what were the normal levels for the oceans, for the soils, for atmosphere?” (Hamblin 95).

CONCLUSION

The substance of a bomb—what makes it a bomb—consists in the energy it contains, not its mechanical components that can be examined while it lies dormant. A bomb, in other words, is a bomb insofar as it contains within itself a capability to detonate at some point in the future. Even the etymological root of the word “bomb” finds that it has always been an onomatopoeia—an articulation of the effect of its activation—“ultimately identical with *boom*” (OED). A bomb always “will have been” one, as its very designation refers to what will come (*venīre*) out of (*ex-*) it. A bomb thus always already assumes an event (*ex-venīre*) as its outcome, which is why the invention of the nuclear bomb with a power to destroy the world has also necessitated eventuality, a narrativizing process through which an event is speculatively developed to its future outcome.

The sheer existence of nuclear weapons and possibilities, not probabilities, of disasters gave rise to eventuality as a representational mode. While it is impossible to objectively answer the question of how much we should be concerned with the prospect of nuclear conflicts, the Cold War’s material legacy of nuclear weapons continues. According to the International Campaign to Abolish Nuclear Weapons (ICAN), “the nine nuclear-armed countries spent \$72.9 billion on their 13,000+ nuclear weapons in 2019,” which represents “a \$7.1 billion increase from 2018” (ICAN 3). The United States was responsible for about a half of the global expenditure at \$35.4 billion. The toxic byproducts of weapons tests also remain. Much like the 30,000-ton steel-and-concrete sarcophagus covering the reactor number 4 building of the Chernobyl nuclear plant, for instance, there is a giant concrete dome—officially named the Runit Dome but locally known as “the Tomb”—built over the radioactive debris left from the years of Pacific Proving Grounds at the Enewetak Atoll. Recent reports warn that the dome might become a tragic point of confluence between the radioactive legacy of nuclear tests and climate change, as rising sea levels are

compromising the structural integrity of the dome (Jose et al). New nuclear weapons developed and existing ones maintained with the billions of dollars and the degrading concrete dome on the Pacific atoll are instances of the nuke that continues to exist as a container of disasters—an artifact of eventuality that is both real and fictitious.

As a vessel of future disasters, the nuclear bomb thrusts fiction into reality. The bomb is not entirely or merely fictitious, but representing it *as a bomb*—a device defined by its effect, “boom”—necessarily involves speculating its activation in the future. It is in this sense an apt synecdoche for the Cold War. “The Cold War was not an imaginary war in the sense that the nuclear threat was immaterial. It was imaginary in the sense that formats that are usually described as fictitious—from dreams and nightmares, films and novels to forecasts and scenarios—had an important bearing on the reality of the Cold War as a nuclear confrontation” (Grant and Ziemann 6).

Nuclear eventuality incited by the imperative to imagine the future creates time necessary to realize the eventual—the hypothetical event as an outcome of the original event—without the world physically experiencing it. In this sense, every narrative of nuclear eventuality is effectively a record of time travel. An actual narrative of time travel demonstrates the operations of eventuality more clearly. A temporal round-trip as depicted in H. G. Wells’s *The Time Machine* (1895) consists not only in the time traveler’s discovery of the future, but also their return to the present. To translate this back to writings of eventuality in the real world: the writer not only speculatively writes the future (prospection), but also assesses history in light of the speculated future (retrospection). The history of the future is not just added to history, but redefines the direction of history to form a synthetic history that chronicles the progress from the event to the eventual. In Wells’s novel, the degenerated humanity in the future anticipates that civilization will eventually

begin to decline once it reaches the point of humans' complete conquest over nature. As the film adaptation modifies the future to a nuclear postapocalypse, however, history is also reconceived as a technological progress that leads to its explosive culmination of nuclear omnicide.

The retrospective movement of eventuality is developed even further in the *Terminator* movies. The most critical contribution of the franchise to the time travel narrative as an instance of eventuality in this regard is that it endows the future with agency. Skynet, the sentient A.I. archvillain of the series, is the apocalyptic future incarnate and a single character that embodies the disastrous progress of technology imagined in the film version of Wells's work. Skynet allegorizes the global war machine of nuclear weapons that is simultaneously a human product and a hyperobject whose sway over the world—as the sum of top-secret national projects as well as a trigger mechanism for a radical transformation of the material reality—overwhelms its creators. Just as Skynet's android assassins invade the present, the future encroaches on the present as the nuclear weapon introduces to the world an unprecedented power to destroy and consequently the necessity to look at the present vis-à-vis its disastrous future.

At bombpoint, nuclear wargaming emerged in response to the new material condition of the nuclear age, tasked to chart disastrous futures made possible by the nuke. While it is far more bound to empirical data and scientific estimations than literary fiction, wargaming is also a form of fiction—strategic fiction—as it attempts to represent how the nuclear weapon's potentials may materialize. Wargaming is, in other words, another form of eventuality. Because strategic fiction *attempts* to be more empirical (compared to literary fiction which has no such obligation), it ironically demonstrates even more clearly that any representation of the nuke as a vessel of future disasters is necessarily fictive. Post-nuclear recovery plans, for instance, are fantasy documents whose validity can only be measured by the very future they themselves have imagined. Cold-War

civil defense pamphlets designed to indoctrinate common citizens often bypassed the issue of self-reference by containing the new and unknown threat within conventional frames, such as treating a nuclear detonation simply as a more powerful version of a conventional explosive. Even as wargames are in part based on real-world data, their narrative structure—“in the event of X, we should do Y”—also necessarily involves assuming the validity of future projections. All these forms of strategic fiction are simulations that pretend to have more knowledge about the nuke than they actually have, not necessarily to mislead but to cope with the impossibility of representing eventuality. But represented they must be, for as much as the anticipated outcome of a nuclear war is fantastic, the nuclear deterrence through a mutual threat of use—MAD—has been a constant material condition of the nuclear age.

Along with the catastrophic kind of globalization brought about by nuclear missiles that can reach anywhere on the planet, the nuke also contributed to the advent of ecological worldview with its ecocidal nature and sheer extent of power. In the history of science, the birth and proliferation of the nuclear bomb drove the military to pursue planetary surveillance, which led to a rapid growth of geosciences in the U.S. after the World War II. The interaction between radioactive materials and the human body also began to be studied by the very same scientists who developed the warheads. Health physics, as they were called, later evolved into a broader study on radiation’s ecological effects. Civilian research projects like the Baby Tooth Survey (1958-1970) and the historical cases of fallout exposure from weapons tests found in more than a dozen states in the U.S. have also demonstrated that the nuclear weapon always targets the broader ecosystem regardless of the intended target radius. In terms of the more general way of understanding the world ecologically, “[t]he biggest stimulus to changes in thinking was the astonishing advent of nuclear energy” (Weart 40). Not only “radioactive fallout from nuclear tests explosions half a

world away” became “the first recognized form of global atmospheric pollution” detected by monitoring devices developed initially for military purposes, but also “[o]nce people began to grasp that human technology could affect the entire planetary system, for better or worse, journalists found it easier to suggest that burning fossil fuels could change the climate” (Weart 40-41).

The point of arguing that the nuke is fiction is ultimately not to explain the nature of the nuke itself, but to emphasize how its very existence has made eventuality as a speculative process an integral part of representing the material world. The point of noting the integral role of fiction in turn is to emphasize how the future we speculate pre-posterously (prospective-retrospectively) defines history. And finally, the speculative process (i.e., eventuality) matters at all because we are not just speculating the future, but in fact creating it at this very moment—because we are “directly responsible for beings that far into the future” (Morton, *Hyperobject* 60).

The logic of eventuality is that the significance of a historical event is evaluated based on its speculated outcome. The need for eventuality as a mode of representing the material world grows as new technological inventions introduce to the world greater capabilities to produce accidents in the future. With the invention of the nuclear bomb, prolific narrative production of nuclear eventuality also began in literature and strategic studies, as humanity now had in their own hands a very literal and tangible—scientific rather than religious—embodiment of the world’s end. But eventuality is and will be found in many other technological productions, including climate change. Imagine all instances of “nuclear war” were “climate change” in this passage from *The Nuclear Age*:

If you can imagine it, I remind myself, it can happen.
But imagine this: Nuclear war.
A dark movie theater and you’re eating buttered popcorn and someone shouts,
“Nuclear war!”

You laugh.
But this: "Fire!"
Drop the popcorn and run. It's a stampede.
And then again this: "Nuclear war!"
Shrug? Shake your head? A joke, you think?
Imagine the surprise. (O'Brien 301)

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