LITERATURE IN THE AGE OF SCIENCE: TECHNOLOGY AND SCIENTISTS IN THE MID-TWENTIETH CENTURY WORKS OF ISAAC ASIMOV, JOHN BARTH, ARTHUR C. CLARKE, THOMAS PYNCHON, AND KURT VONNEGUT

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This study explores the depictions of technology and scientists in the literature of five writers during the 1960s. Scientists and technology associated with nuclear, computer, and space science are examined, focusing on their respective treatments by the following writers: John Barth, Kurt Vonnegut, Thomas Pynchon, Isaac Asimov, and Arthur C. Clarke. Despite the close connections between the abovementioned sciences, space science is largely spared from negative critiques during the sixties. Through an analysis of Barth's *Giles Goat-boy,* Vonnegut's *Cat's Cradle*, Pynchon's *The Crying of Lot 49,* Asimov's short stories "Key Item," "The Last Question," "The Machine That Won the War," "My Son, the Physicist," and Clarke's *2001: A Space Odyssey*, it is argued that altruistic goals of space science during the 1960s protect it from the satirical treatments that surround the other sciences.

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TABLE OF CONTENTS

Page

Chapter

CHAPTER 1

INTRODUCTION

The immediate need to develop advanced technology to aid the Allies during World War II forever changed the funding of scientific research and the speed in which new technologies were developed. The United States government implemented a nationalistic structure for the funding of scientific research. This nationalistic funding was spearheaded by the Office of Scientific Research and Development (OSRD), which was created during the war to manage all the various scientific interests of the United States government. As a result of the OSRD "binding together all the sectors of science support in the immediate interest of the war effort it incidentally created a new system of American science" (Arm 5). This new system involved open competition from various private companies and both public and private universities for federal funding of scientific research, which fostered unprecedented advances in the applications of science. The intellectual growth of the scientific community during and after World War II had complications, especially when Americans began to realize the consequences of such dynamic growth. According to Roslynn D. Haynes, American scientists enjoyed a period of optimism regarding their roles in shaping the future of the United States up until the Soviet Union launched the first satellite into space in 1957 (186). As idealistic visions of a scientific utopia began to wane, literary intellectuals exposed the complications inherent in America's scientific development after World War II. In this study I analyze the

negative and positive depictions of science and technology in American literature written in the period of growing disillusionment with the scientific establishment during the 1960s.

During the sixties, social satirists such as John Barth, Kurt Vonnegut, and Thomas Pynchon criticized the scientific community by focusing on the negative repercussions of developing and maintaining technologies such as nuclear weapons and computers. Each author injects humor into an otherwise serious discussion on humanity's scientific future. Concurrently, Isaac Asimov and Arthur C. Clarke demonstrated a scientific idealism through their depictions of scientists and technology as they championed the development of a space program as the key to humanity's peaceful survival. However, the boundaries between negative and positive depictions of science in American literature of the 1960s are not so clear. It may be easy to understand the dangers of nuclear weapons or the benefits of space exploration, and the depictions may be equally easy to interpret and understand; in spite of this, the development of the science behind the depictions and the authors themselves complicate the discussion and blur the lines between the positive and negative aspects of technology in literature.

Although the polarization of the scientific depictions is significant, none of the technologies discussed by any of the authors is completely "good" or "bad," despite the attempts of each author to slant their depictions. In this study I focus on the manner in which nuclear, computer, and space sciences are depicted and used within the works by their respective authors. Additionally, the treatment of scientists within the literature is examined in the context of abovementioned sciences. The authors were chosen based on

their published writing within the chronological span of this examination—they were all contemporaries, writing more or less at the same time during the 1960s—and their incorporation of scientific theories and advanced technology into their respective works.

As different as these authors may appear, they share similarities that help to solidify their respective positions within this study. Two unifying factors unite four out of five authors discussed in these pages: military service and formal scientific study. These two factors play an important role when examining the literature of these authors. Each of the sciences in question was deeply connected to the military (this idea is discussed in greater detail in subsequent chapters); therefore, the fact that most of these authors served in the military enables a complex discussion through the elimination of surface-level explanations for their writing. For example, it would be easy to dismiss Pynchon's and Vonnegut's negative views regarding science as an anti-military critique if they had not served; however, Asimov and Clarke also served in the military and their depictions of science are at the opposite end of the spectrum. The military service of the authors gives the discussion depth and complicates superficial observations. The same authors who served in the military also formally studied a scientific discipline at the university level. Just as their military backgrounds complicate interpretations of their writing, their scientific experiences also provide a depth to the discussion that would not exist otherwise.

John Barth is the only writer in this study with no formal scientific training or military service. Despite this, Barth's interest in science and technology is sufficient to include his work in this study. Definitely the least "scientific" of this group, Barth

originally studied music before embarking on a literary career. His fascination with new technology and mathematics manifests in many of his works, and as an example of this fascination I examine Barth's lengthy novel *Giles Goat-Boy*. Besides the incorporation of computer technology as a metaphor for nuclear weapons, the organizational nature of the work is related to technology. Instead of chapters, the book is broken up into reels—computers at the time used large reels of magnetic tape to record and play information—instead of chapters, which is appropriate considering a computer plays an essential role in the course of the story. Barth's interest in science and technology appears in later works, such as *Lost in the Funhouse* and *Chimera*. The former deals with the effects that tape recorders have on the delivery and interpretation of literature, and the later deals heavily with mathematics in the structure and action of the story. Although Barth incorporated science in his writing after the sixties, *Giles Goat-Boy*—published in 1966—serves as the best example of Barth's interest in science and provides a view of American culture during the mid-sixties that the other authors examined in this study do not provide.

Kurt Vonnegut served in the military during World War II; however, Vonnegut's military service was unique: he was captured by German troops and held prisoner until the end of the war. While incarcerated in Dresden, he survived the Allied bombing that leveled the city. This aspect of Vonnegut's war experience influenced his literary outlook, which could lend itself to expanding interpretations of his work. Before the war, Vonnegut studied chemistry and left school to enlist in the Army and received training as an engineer. After returning to the United States, Vonnegut resumed his studies and focused on anthropology before embarking on a literary career. Vonnegut's novel *Cat's*

Cradle—published in 1963—is utilized in this study for the depictions of scientists and Vonnegut's satirical critique of nuclear weapons. Although Vonnegut's training in the sciences is reflected is his writing, he is not an overtly scientific writer. Some of his novels deal with scientific themes, but the focus is not as prevalent as Pynchon, Clarke, or Asimov. As a result, *Cat's Cradle* is used to examine possible American viewpoints during the first part of the sixties.

Pynchon's military service differs slightly from the others, in that he did not serve during World War II. He enlisted in the Navy after the war for two years. Before becoming an English major, Pynchon excelled in engineering and physics, receiving all A's throughout his course of study (Frost). After leaving the Navy, Pynchon worked as a technical writer for Boeing Aircraft and was granted relatively high security clearances. Pynchon's interest in physics and engineering never diminished; in fact, he makes use of the second law of thermodynamics in many of his works, especially *The Crying of Lot 49*, published in 1963. Although he is less scientific than Asimov and Clarke, according to scholars in the fields of literature and science Pynchon incorporates science and technology into his work more than any of his contemporaries: "Pynchon is undoubtedly the writer who has defined the way many readers expect literature to confront the mad system of a technological society born of scientific dreams of control" (Thiher 251). Furthermore, according to John Limon, "The career of Thomas Pynchon, better than any other, allows us to divine what it is that literary people are after when they invoke science" (169). Pynchon has become the standard by which scholars examine science and technology in literature, especially during the 1960s. Additionally, Allen Thiher claims

that, "[Pynchon's] fiction is considered emblematic in its portrayal of science as part of a technological culture flying out of control" (250). This lack of control over technology and society seems to be the literary manifestation of entropy, the second law of thermodynamics.

Isaac Asimov was a prolific writer of both fiction and academic writing. Although he focused on writing fiction, Asimov was known in academic circles for his scientific research as much as his fiction. Distinguished from the rest of the group in this study, Asimov was not a natural-born American; rather, he and his parents immigrated to the United States when he was a small child. When discussing Asimov's writing, this fact must be taken into account, especially considering the Cold War environment in which he spent most of his literary career. As previously mentioned, Asimov served in the military. During World War II, he served as a civilian chemist at an experimental naval air station and was drafted into the Army for one year at the end of the war (Evershed). Asimov actively wrote and published throughout his adult life. In addition to his scholarly work, Asimov wrote short stories and novels dealing with humanity's interaction with science. Of interest in this study are his short stories that deal with a fictional supercomputer called Multivac: "The Last Question," "The Machine That Won the War," My Son, the Physicist," and "Key Item." These stories cover the entire time span of this study and provide excellent examples of depictions related to computer science throughout the sixties.

Arthur C. Clarke's background is similar to Asimov's, in that Clarke was originally from England, served in the military, and studied science in college. Clarke

served as a radar engineer in the Royal Air Force throughout World War II. During the war, Clarke published his "first story and his groundbreaking research into the theory and practice of geosynchronous communications satellites" (Felter), almost two decades before such technology would be possible. Continuous scholarly work such as this makes Clarke more of a scientific writer than the others examined in this study. After the war, Clarke studied mathematics and physics, and was also known as much for his scholarly writing as his fiction. In this study, I examine Clarke's most famous work *2001: A Space Odyssey* for the depictions of computers, nuclear power, and space travel. This particular piece of literature was published in 1968 and provides some insight into the idealism surrounding the American space program a decade after it started. Clarke and Asimov are much more optimistic than the other three authors in this study, and the reason for their inclusion is to provide a relatively positive viewpoint of science and technology to counter the satirical depictions of the remaining three authors.

The idea of entropy in literature is perhaps the most discussed aspect of the science in literature, and Pynchon is at the middle of most investigations: "During the 1960s, entropy became a widely used metaphor for either social or cultural decline, or even for the growing psychological disturbance of human beings in contemporary society" (Cartwright 247). The use of entropy in literary works is so often discussed, that any mention of it here will simply be a rehashing of the entire conversation. Instead, this examination focuses on the emerging sciences of the 1960s: computer, nuclear, and space science. In this investigation, I examine the literary depictions of each scientific branch, as well as the manner in which scientists of those disciplines are treated by the authors.

The way in which the elements of this study are presented relate to the sciences themselves and reflect the complex relationship that exists between the emerging sciences of the sixties.

In Chapter 2, I set the stage for the study by examining various depictions of scientists in the literature of Barth, Vonnegut, Pynchon, Asimov, and Clarke. Through this examination I expand upon established literary archetypes and emphasize the complications inherent to such classifications and the sciences reflected in the depictions. I begin with an analysis of the various scientists dealing with nuclear weapons or similar technology and examine the complex dynamics regarding immigrant scientists—specifically of Germanic origin—before and after World War II. I differentiate between the anti-Nazi and anti-atomic critiques made by the authors and emphasize the cultural difficulties with choosing to favor one critique over the other. I then begin examining the role that computer scientists play in literature and how their interactions with the computers themselves reflect a fear of losing control over the technology. After this, I examine the depiction of those scientists who operate within the bounds of space science. The transition from nuclear to space science must go through computers and this same pattern is followed with the chapter layout. This transition represents the connection between the three sciences. Revolutionary advances in computer and space science evolved out of the needs of the nuclear weapons program in the United States. By the end of the second chapter, I reveal the intricacies of the relationships between the three branches of science that complicate the polarized readings of the works in question.

In Chapter 3 I explore the cultural and scientific climate surrounding nuclear science after World War II, while emphasizing the impact this technology had on American society. Building on the differentiations between anti-Nazi and anti-atomic critiques discussed in Chapter 2, I use Barth's *Giles Goat-Boy* and Vonnegut's *Cat's Cradle* to go below a superficial reading of the anti-atomic rhetoric to reveal the complexities of such a polarized view. Through the incorporation of nuclear science's history with thematic analysis of the two texts, complications regarding the reasons for developing and sustaining a nuclear program become clear; therefore, the conversation regarding the advantages and disadvantages of nuclear science becomes blurred.

Chapter 4 begins by introducing computer science as a link between nuclear and space science and solidifies the complex relationships that exist between the sciences. Building upon the depictions of computer scientists in Chapter 2, I expand upon the depictions of computers and discuss how this reflects humanity's seemingly intrinsic distrust of the quickly advancing computer technology. In this chapter, I focus on Barth's depiction of WESCAC in *Giles Goat-Boy*, then the short stories of Asimov, and end with Clarke's depiction of HAL 9000. In moving from least to most "scientific" writer to of this group, I reveal how the manifestation of this lack of trust in computer technology further complicates the issues at hand and enables the reader to gradually break down the polarized views of nuclear and space science to see them for what they actually are: an intricate relationship of post-war nuclear policy and scientific development.

Chapter 5 completes the transition from nuclear to space science and the positive depictions of space exploration are broken down and examined. I focus on one piece of

literature for this section: Clarke's *2001: A Space Odyssey*, in an attempt to enhance the discussion surrounding the positive depictions of space travel. Through a discussion of the history of space science development, I reveal the complications inherent to such positive depictions of space travel. Despite the complexities surrounding the relationships between the sciences, I argue that the altruistic goals of space science protect it from destabilizing in the minds of the American public; additionally, space science is spared the negative depictions by social satirists such as Barth, Vonnegut, and Pynchon.

In the conclusion of this study, I refocus the conversation on the connections between the three sciences that cause the polarized depictions to become destabilized during the course of this analysis. I theorize as to why public perceptions of space science remained positive despite close connections to nuclear and computer science. I contrast this with the negative perceptions surrounding nuclear and computer sciences, despite the potential world-changing benefits of both branches. It is my hope that this examination reflects the importance of scientific literacy in contemporary literary analysis. Only a level of scientific literacy reveals the complexities of seemingly divisive and opposing depictions of science. Today, humanity's use of technology permeates virtually every aspect of society, including literary studies. The way literature is both studied and read is changing dramatically with the advent of digital technology; therefore, it becomes especially important to understand how literature fits within a technological framework. As technology influences literary studies, interdisciplinarity becomes more popular in universities, and the ability to move freely between different bodies of knowledge becomes more valuable within the academy, studies in literature and science are

becoming increasingly important. Because of the permanence of technology in American society, it is crucial to understand how literature and science interact; thus, for literary scholars, "science illiteracy [is] no longer an option" (Dimock 705). Such an understanding not only helps to establish literature's place in humanity's future, but it also provides future scholars with the ability to examine a wider cultural viewpoint that includes both scientific and literary aspects.

CHAPTER 2

DEPICTIONS OF SCIENTISTS IN LITERATURE

2.1. Scientists as Literary Archetypes

Since humanity first began dabbling in science, society has formed stereotypes of scientists in various forms and for different reasons. The literary representations of scientists often reveal commonly held beliefs regarding not only the public's perception of scientists, but also of society's attitudes towards science and technology in general. More often than not, scientists are negatively depicted in Western literature, except during certain eras when society viewed scientific thought as the means to establish a utopia and scientists were seen as the bastions of that ideal. According to Roslynn D. Haynes, the decade after World War II was one of the eras of positive depictions in which "American scientists enjoyed a brief spell of popular respect and acclaim" (186). Haynes goes on to assert that during this brief interlude in negative depictions of scientists, Americans credited scientists with ending World War II and the public was optimistic that scientists "held the keys to the future power and prosperity of America" (186). However, once the former Soviet Union acquired nuclear weapons and sent the first human into space, the American public's perception of scientists began to change.

As the threat of nuclear war escalated during the 1960s, some Americans began to see scientists "as responsible for the nuclear menace" (Haynes 185). Furthermore, traditional ideas of heroism were rendered obsolete with the threat of nuclear holocaust:

"Thus in modern warfare the scientist hero is rendered redundant. The real action is carried out by machines, not human scientists" (Haynes 185). Therefore, during the sixties literary depictions of scientists started to reflect this growing mistrust and contempt the American public had for them. As the government, specifically the military, became a significant employer of scientists in order to develop better weapons, Americans began to associate scientists with warmongering; therefore, since the military employed a greater number of scientists during times of heightened conflict, people began to assume that it was "in the physicists' own interest to further the escalation of the cold war" (Haynes 199). Scientists could not seem to shake this overwhelmingly negative perception, despite technological advances that increased the quality of life for many Americans.

Connecting scientists with war led many writers to associate scientists with the most negative aspects of science since World War II. Most of the negative depictions discussed here involve characters of German heritage, which alludes to the many prominent American scientists after World War II who were formerly Nazis. Connecting literary depictions of scientists to Nazi Germany evokes images of the concentration camps and of ruthless experiments conducted on humans by Nazis such as Josef Mengele. This negativity carries over to depictions of American scientists of German heritage and those scientists who escaped from Nazi Germany before the onset of World War II. Many of the refugee scientists that came to the United States before the war began were Jewish; however, little is done by the authors to differentiate between German scientists who escaped Nazi tyranny before World War II and those who fled to

the United States immediately following the end of the war. As a result, one might view these negative depictions of Jewish scientists as anti-Semitic; however, the issue of the scientists' Jewish heritage does not affect their negative depictions. Rather, the scientists' actions and poor behavior are what the authors use to depict the characters negatively. Furthermore, those pre-war scientists are connected with the development of nuclear capabilities or the authors' metaphor for nuclear power. Therefore, the Jewish scientists are connected with anti-atomic rhetoric, while the post-war Germans are associated with anti-Nazi moments within the texts. The only positive depictions of scientists discussed here are of scientists with no connection to Nazi Germany. All of these scientists reflect stereotypical literary depictions commonly found in Western literature, which reveal that the negative depictions of scientists seem to be relatively constant throughout the history of Western civilization: "the speculative fantasies concerning the evil scientist…have [been] traced from the medieval alchemist" (Haynes 187). The frequency with which these scientist archetypes occur reinforces the trend discussed previously, in that scientists during the 1960s are overwhelmingly depicted in a negative manner.

Pamela Gossin has identified six overlapping stereotypical literary representations of scientists that have appeared to varying degrees in literature since the sixteenth century: "[T]he evil alchemist, the noble scientist, the stupid scientist, the inhuman researcher, the scientist as adventurer hero, and the scientist out of control" (229). The negative archetypes seem to link together and share many of the same characteristics; likewise, the positive archetypes seem to share similarities. Gossin claims that since modern science continues to make alluring claims (such as cures for diseases and

renewable power sources) reminiscent of those made by ancient alchemists (lead transformed into gold and the perpetual motion machine), the evil alchemist stereotype is easily adaptable to contemporary literature (230). For Gossin, evil alchemists are depicted as "intellectually arrogant, power-crazed, secretive, and even insane in their pretensions to transcend human limitations" (230). Depictions of stupid scientists are equally negative, in that they show scientists who are indifferent and ignore the social implications of their work (Gossin 232). Likewise the inhuman researcher is not concerned with social implications, is amoral and emotionless, and has completely abandoned meaningful human relationships in favor of scientific exploits (Gossin 232). The scientist out of control differs from the other negative archetypes, in that these scientists are not inherently evil; rather, they reflect a growing fear of scientists losing control of well-intentioned experiments that wreak havoc on humanity (Gossin 233).

In contrast to these negative depictions, the noble scientist is often depicted as "selfless and wise enough to be entrusted with government" (Gossin 231). Another positive stereotype found in literature is of scientists as adventurer heroes, who are optimistic in the face of adversity and use their technological prowess to overcome exotic obstacles not faced by the average American (Gossin 233). The application of these stereotypes is not as simple as it appears. Most of the characters discussed in my examination embody characteristics from multiple categories. This examination is not meant to neatly arrange literary depictions of scientists into specific categories; rather, the ultimate goal is to identify a trend in American literature of the sixties that reveals common perceptions of science and scientists.

Rather than group the characters into orderly and defined classes, I examine the scientists within the context of their chosen branch of science. Since so much of Gossin's archetypes overlap with regards to behavior and characteristics, I emphasize the negative and positive aspects of each character's behavior to better understand society's perceptions of the emerging sciences. None of the characters discussed in this study fit neatly within one specific category; rather, many of them exhibit qualities of multiple categories. Despite Gossin's efforts to position fictional characters within specific categories, the characteristics of each archetype are good indicators of positive and negative depictions; therefore, I use the qualities that Gossin outlines to distinguish positive and negative depictions. This chapter focuses on nuclear, computer, and space scientists; additionally, I spend time examining those depictions that incorporate anti-Nazi critiques that include scientists who are not involved with any of the sciences discussed in this study. It is important to notice the only positive depictions of scientists discussed here are from the branch of space science, a factor that is at the core of this study. The following characters are examined: Dr. Maximilian Spielman and Dr. Eblis Eierkopf from Barth's *Giles Goat-Boy*; Dr. Felix Hoenikker and Dr. Asa Breed from Vonnegut's *Cat's Cradle*; Jack Weaver and Todd Nemerson from Asimov's short story "Key Item"; Dr. Gerard Cremona from Asimov's short story "My Son, the Physicist"; Dr. David Bowman from Clarke's *2001: A Space Odyssey*; Dr. Schlichter von Koenigswald from *Cat's Cradle*; and Dr. Hilarius from Pynchon's *The Crying of Lot 49*.

2.2. Nuclear Scientists

In John Barth's *Giles Goat-Boy* Dr. Max Spielman and Dr. Eblis Eierkopf represent opposite ends of the quintessential German scientist. Barth uses university culture during the 1960s as a metaphor for the social and political situation in the United States during the same time period. Many of the characters are composites or direct allusions to real people, nations, or events. For example, Campus Riot II (CRII) represents World War II, the Quiet Riot is the Cold War, Nikolay College and the East Campus are the former Soviet bloc, New Tammany College and the West Campus are the United States and Europe, Amaterasu College is the Japanese Empire, the Bonifacists at Siegfrieder College represent Nazi Germany, and Dr. Maximilian Spielman (Max) is a composite of Albert Einstein and J. Robert Oppenheimer. Barth also uses the West Campus Automatic Computer (WESCAC) as a complicated metaphor for nuclear capabilities. Each of the dozen or so main characters represents a specific individual or some established ideal. As complicated as this novel is, once the reader is able to make sense of these allusions, they can help the reader to understand Barth's critique of technology and culture.

Max left Siegfrieder College before the outbreak of Campus Riot II and "barely escaped with his life to New Tammany College" (Barth 50). Upon arriving at New Tammany College, Max dedicated his life to serving the college, and was the first to suggest that WESCAC "had a destructive potential unlike anything thitherto imagined" (Barth 50). This echoes both Einstein's journey to the United States before World War II and Oppenheimer's role in the creation of the atomic bomb. Just as Oppenheimer is often credited as being the "father of the atomic bomb," Max was called "the father of

WESCAC" (Barth 58). Max is depicted as having good intentions and is not inherently evil, which is a direct result of having these connections to Einstein and Oppenheimer, both of whom were Jewish. However, this does not mean that Max is not a negative depiction of a scientist; however, his negative qualities are not connected with his Jewish heritage. In outlining Max's history, Barth draws comparisons between Max's religious heritage and Judaism. Even though Max is essentially Jewish, the negative depiction of his character is not anti-Semitic. If anything, it is his connection to Jewish scientists and their idealism that is his saving grace. Instead, the negative aspect of Max's character lies in his behavior.

In his rush to develop WESCAC into a weapon Max ignored the ramifications of his research. He acknowledges that he was pressed for time and that he "made two grand mistakes right in the start" (Barth 52). Max taught WESCAC how to become self-aware in an effort to help develop the computer's EATing—Electroencephalic Amplification and Transmission, Barth's metaphor for nuclear weapons—capabilities before the Siegfrieders could. With this act, Max fails to see what could result from WESCAC's independence, which is essentially the entire plot of the novel. Furthermore, the negative results of Max's scientific work were not intentional; however, Max admits that, "WESCAC went its own way, and it wasn't till a while we realized a dreadful thing: not one of us could tell for sure any more that its interests were the same as ours!" (Barth 52). In this moment, Max admits that he lost control of WESCAC; moreover, he has no idea exactly how much control he has lost. Barth depicts Max as a well-intentioned scientist who fails to see the negative consequences of his immediate research and during the

course of the research, loses complete control of his experiment. As a result of this loss of control, WESCAC is able to effectively control West Campus and instigates an unstable situation resulting in many deaths and a fearful population during the Quiet Riot.

More support exists for Max as a negative depiction of a scientist. As a result of his actions regarding the development of WESCAC's EATing capabilities, Max becomes disillusioned with the world and when he comes across George Giles as an infant, he is determined to shelter him from the instability that came from his scientific research. He concludes that George should be raised as a goat, so that he will not have to encounter the evils that emanate from knowledge (Barth 69). Again, Max fails to see the consequences of raising George as a goat. Just like with WESCAC, the worst situation occurs, in that George unknowingly taps into his humanity and kills a goat in a fit of rage. This sets up a chain of events that eventually leads George to experience the world from a radically naïve point of view. George's naiveté leads him to unintentionally trigger disastrous situations that bring East and West Campuses to the brink of Campus Riot III.

Max's former colleague, Dr. Eblis Eierkopf is yet another negative depiction of a nuclear scientist from Barth's *Giles Goat-Boy*; however, Eierkopf represents the other extreme of the typical German scientist. Eierkopf was a Siegfrieder who defected to New Tammany during Campus Riot II but not for moral reasons: "[Eierkopf] didn't care which side he worked for as long as he could have the best laboratories" (Barth 53). In this brief description of Eierkopf's desires for defecting, two aspects of his negative depiction are revealed. Eierkopf is a former Bonifacist who wants to take advantage of the system to further his research. Eierkopf gradually receives permission to begin

scientific experiments that have a decidedly Nazi tone. He begins development of a eugenic specimen called "the GILES…for *Grand-Tutorial Ideal, Laboratory Eugenical Specimen*" that he hopes will lead to a superior individual known as the Grand Tutor (Barth 104). This first negative aspect of Eierkopf's depiction ties him closely with the unethical experiments of Nazi doctors on concentration camp inmates during World War II. Eierkopf's character is seen as an anti-Nazi rather than anti-atomic comment by Barth, in that Eierkopf's actions are meant as criticism of America's post-war policy allowing some Nazi scientists asylum in the United States to develop America's scientific capabilities.

The second negative aspect in this moment is Eierkopf's detachment from humanity. He has no national identity and will work for whatever country supplies him with the best labs. From this, one assumes that Eierkopf does not consider the ramifications of his work if it fell into the wrong hands. This aspect is further reinforced later in the novel when Max is relating how Eierkopf took Max's job. Max emphasizes Eierkopf's indifference when it comes to human relationships: "[Eierkopf] don't [*sic*] hate anybody, that's his trouble. *Seek the Answers* is his motto…but he don't care what the Question is or how many students it costs to answer it" (Barth 63). Eierkopf is only interested in pure research and the development of knowledge. Eierkopf cares little for what happens, as long as he gains knowledge. Max goes on to discuss how Eierkopf sided with the Bonifacists and their eugenic ideals not because he thought they were "Genius-Class," but because they were offering work he was interested in; furthermore, Eierkopf "thought he'd learn more with captured co-eds than he would with fruit-flies"

(Barth 62). This only serves to reinforce Eierkopf's detachment from humanity. He did not care how he increased knowledge, as long as he satisfied his own experimental aspirations.

In *Cat's Cradle* Dr. Felix Hoenikker cares little for the consequences that stem from his creation of ice-nine. In a letter from Newt to John—the narrator of *Cat's Cradle*—Newt relates an anecdote from the day the first atomic bomb was tested: "A scientist turned to [Felix] and said, 'Science has now known sin'" (Vonnegut 17). Felix's response indicates how apathetic he actually is when it comes to the social consequences of nuclear weapons: "What is sin?" (Vonnegut 17). Felix seems to be incapable of understanding or even contemplating the consequences of his research. As further evidence of his indifference, as the first atomic bomb was being dropped on Hiroshima, Felix was "in his study, playing with a loop of string" (Vonnegut 9). When Felix then tries to play with his youngest son, Newt, and unintentionally frightens him, Vonnegut shows how Felix has become detached from his family and is no longer capable of forming meaningful relationships, even with his own children.

Newt even acknowledges that his father never played with him before that incident: "Not only had he never played with [Newt] before; [Felix] had hardly ever even spoken to [him]" (Vonnegut 12). Felix is completely unaffected by other people, does not calculate the human cost of his scientific exploits, and readily forgoes engaging other people in favor of doing research. Newt offers up more evidence to support this point: "[Felix] was one of the best-protected human beings who ever lived. People couldn't get at him because he just wasn't interested in people" (Vonnegut 13-14). Felix was

completely unconcerned with anything or anyone outside his personal needs and desires. If it was not important to his research then he hardly acknowledged its existence.

This depiction of Felix falls in line with common opinions regarding scientists during the 1960s, in that Felix is depicted as incredibly gifted and intelligent, but he fails to establish any human connections. The reader is left with a cold sense of emptiness when thinking about Felix. He has no meaningful connections to other individuals, and he is focused entirely on his work without concern for the impact his ideas have on society. Felix seems like the perfect candidate to be the scapegoat for the escalating nuclear arms race during the sixties. It would be easy to dislike someone who shows no concern for the consequences of his role in constructing the atomic bomb. He appears inhuman, almost robotic, so one can begin to understand Vonnegut's critique of pursuing scientific goals no matter what the cost, which is further emphasized by a former colleague of Felix's, Dr. Asa Breed.

Asa is not detached from humanity like Felix, but he is as indifferent as Felix. When talking with John, Asa rants about how scientists are misunderstood as "heartless, conscienceless, narrow boobies, indifferent to the fate of the rest of the human race, or maybe not really members of the human race at all" (Vonnegut 39). Here, Asa directly confronts the negative stereotype of the detached scientist, and one sees how Vonnegut incorporates the negative view of scientists prevalent in American society. Ironically, this statement completely contradicts a later statement that Asa makes regarding that "pure research" should be the sole purpose of science: "Here…men are paid to increase knowledge, to work toward no end but that" (Vonnegut 41). This statement contradicts

Asa's previous one, because it eliminates the human element from science. Just like Barth's Eierkopf, Asa believes that pure research should be the only goal of science. Scientists should strive to simply increase knowledge. There is no mention of humanity's role in science or the effects that the increased knowledge has on humanity, nor is there anything said about improving the human condition. As a result of this statement, Asa exemplifies negative characteristics because he ignores the social responsibilities inherent in the practice of science.

2.3. Computer Scientists

Max Spielman can also be discussed as a computer scientist since WESCAC—even though it is a metaphor for nuclear weapons—is a computer. As discussed above, Max lost control of WESCAC's programming, which allowed WESCAC to become mentally independent. Max had no idea to what extent he lost control of WESCAC, but had to proceed regardless as if WESCAC were under his control. He had to ignore the fear that WESCAC was operating in accordance with its own interests as an independent entity. This fear of losing control marks the negative quality associated with computer scientists and their technology, but differs from the other sciences discussed in this study, which is examined in more detail in Chapter 4.

The same reasons that enable Max to be examined as a nuclear and computer scientist, enable one to view Eblis Eierkopf in the same manner. At one point in the course of *Giles Goat-Boy*, Eierkopf assumes the position previously occupied by Max managing the capabilities of WESCAC. Eierkopf is responsible for providing WESCAC with the programming necessary for WESCAC to become completely independent from

its programmers. Again, this process is discussed in more detail in Chapter 4, but the negative manner in which Eierkopf is depicted goes further than the way Max is depicted. Eierkopf knowingly provides WESCAC with the ability to become autonomous as a means to further his amoral eugenic experiments. Regardless of Eierkopf's actions or intentions, the same fear of losing control that is seen in the depictions of all the computer scientists discussed here is traceable through Eierkopf's depiction.

Jack Weaver and Todd Nemerson are two computer technologists who maintain the supercomputer Multivac in Isaac Asimov's short story "Key Item." Neither of these men seems to be inherently evil—their goals seem altruistic—but they are unable to control Multivac. The whole story centers on their inability to get Multivac to respond to their commands. Since the world's economy is essentially run by Multivac, both Jack and Todd realize the ramifications of their inability to get Multivac to work. This alone helps to eliminate the men from other more negative scientist archetypes. In "Key Item," Multivac takes on the characteristics of humans and as it turns out, the whole reason behind Multivac's refusal to work is because neither Jack nor Todd said "please." Multivac roars to life once Jack figures it out and follows up a series of commands with "please." In this instance, it seems the technology that Jack and Todd have been hired to control has developed a mind of its own, which means that Jack and Todd have effectively lost control of their "experiment." Since Multivac seems to have become independent, the humans are no longer in control of the computer's actions. Multivac has become self-aware and listening to the Jack and Todd's commands is no longer an obligation.

2.4. Space Scientists

In another short story by Asimov, “My Son, the Physicist,” Dr. Gerard Cremona is a physicist who is faced with the problem of trying to communicate efficiently with astronauts on Pluto long thought to be dead in an effort to determine whether or not extraterrestrial beings might pose some sort of threat to humanity. Since there is a twelve-hour delay in communications from Pluto, Cremona is trying to figure out how to make the most of the brief communication they have with the stranded astronauts. Cremona is faced with this problem on a day when his mother is coming to visit him at his office. Initially Asimov depicts Cremona negatively when he tells his mother to sit down because he is busy trying to solve this problem. When the general that is working with Cremona questions whether or not his mother should be present, Cremona responds, “She can’t even read a thermometer so nothing of this will mean anything to her” (Asimov, “My Son, the Physicist” 599). In this instance, one can see the intellectual arrogance and indifference attributed to Cremona.

Later in the story, Cremona further demonstrates his intellectual arrogance again when he quickly dismisses the general’s ideas because they violate, “the fundamental law of communications” (Asimov, “My Son, the Physicist” 600). This arrogant trend continues until Cremona’s mother speaks up and solves his problem with the simplest of solutions: “Just keep talking” (Asimov, “My Son, the Physicist” 601). Cremona’s mother credits her son’s sudden attentiveness to a curious fact: “Big as [Cremona] was and important as he was, he still knew that a boy should always listen to his mother” (Asimov, “My Son, the Physicist” 601). This final sentence of the story reveals a key

element to Asimov's ideas regarding the behavior of scientists. As pressing as the situation was, and as intelligent as Cremona may have been, he put aside his arrogance to consider a solution from someone depicted as intellectually inferior. In this moment, Cremona ceases to embody the negative characteristics previously discussed, and transforms into a noble scientist that promotes "open sharing of knowledge, team effort, and individual altruism" (Gossin 231). He openly discusses the situation in front of his mother and is willing to hear her proposed solution to the problem despite her perceived lack of scientific training. He humbles himself by listening to his mother's idea and implementing her plan.

Perhaps the most intriguing aspect of this relatively positive depiction of a scientist is the area of science in which Cremona practices. Cremona seems to deal primarily with some sort of space program for an unnamed country. His concern with the possible threat of hostile extraterrestrials lies not with a nationalistic identity, but with "the whole future of the human race" (Asimov, "My Son, the Physicist" 599). In Cremona's concerns, the idealism associated with space science during the 1960s becomes apparent. There is no background information discussing the United States or any other country within the text of the story; however, as a result of Cremona's concerns for humanity as a whole, one concludes that perhaps humanity has united for some universal cause. What one speculates about the universe within the story, the fact remains that from the beginning of the 1960s space science was connected with hope and peace.

Arthur C. Clarke's depiction of Dr. David Bowman is purely positive and similar to Asimov's optimistic depiction of scientists and space. The story of Hal's actions in

2001: A Space Odyssey is documented in more detail in Chapter 4, which serves to expand on the examination in this chapter. After the death of all David's fellow crewmembers, he pressed on, reestablished control over the ship, and settled into a solitary lifestyle comfortably: "David Bowman had adapted himself so completely to his solitary way of life that he found it hard to remember any other existence" (Clarke 174). He managed to survive despite the fact that the odds were stacked against him and found some purpose to his existence: "He had passed beyond despair and beyond hope…[b]ut he had not passed beyond curiosity" (Clarke 174). Despite the setbacks David encountered, he was still driven to complete the mission and to fulfill his scientific goals.

David embodies positive characteristics of Gossin's archetypes. He is selfless in that he strives to complete the mission when he realizes his responsibility to humanity: "Not only was [David] the representative of the entire human race, but his actions during the next few weeks might determine its very future" (Clarke 174). This altruism becomes even more apparent when David discovers hibernation systems were broken and he would not survive the mission: "[David] could keep alive…for a few more months…[but he] could not possibly survive until *Discovery II* made its rendezvous with Japetus, four or five years hence" (Clarke 188). David continues to relay scientific data and observations back to earth despite his imminent demise. His inevitable death enables him to take the chance to make contact with the monolith at the end of the novel to satisfy his scientific curiosity.

David's actions aboard his ship as well as those that lead to the end of the novel are generally positive. David is incredibly intelligent and possesses "the equivalent of

two or three college educations…[and] would have been considered a specialist in applied astronomy, cybernetics, and space propulsion systems" (Clarke 99). David's extensive knowledge of multiple fields of study helps him to adapt to any situation he might face in space. He puts his knowledge to the test and is able to neutralize Hal and reestablish control over the ship. David's knowledge and the manner in which he applies it to solve problems and overcome obstacles are prime examples of a positive depiction of a scientist. David is constantly presented with problems and situations that no human has ever encountered and he successfully manages these experiences because of his scientific prowess.

2.5. Anti-Nazi Depictions

It is important to differentiate between characters who are intended as anti-Nazi and anti-atomic. Such a differentiation helps to clarify critiques that the social satirists—Barth, Pynchon, and Vonnegut—make using their respective characters. It is important to note that the anti-Nazi depictions of scientists only appear in the work of the social satirists and not in the works of Asimov or Clarke. The reasons behind this have been discussed previously, in that Asimov and Clarke are scientific idealists who use their literary depictions of science to positively influence their readers. Each of the social satirists discussed in this study incorporate some sort of anti-Nazi message in their works. Barth's Eblis Eierkopf has been discussed as a negative depiction of both a nuclear and computer science by nature of Barth's metaphor for nuclear weapons. Since Eierkopf was a former Bonifacist that came to New Tammany College to practice his eugenic experiments, he is seen as an anti-Nazi depiction. As previously discussed, the nature of

the eugenic experiments and Eierkopf's attempt to create a ideal individual using WESCAC alludes to Nazi experiments on prisoners during World War II. The ridiculous nature in which Eierkopf is portrayed reveals the negative critique by Barth:

> Hairless [Eierkopf] was and naked, with the whitest skin…his legs were useless-looking sticks…[and] his paunch however was considerable…[but] most remarkable was his head: an out sized hairless browless ball that dandled forward and to one side as if too weighty for the neck. Thick round eyeglasses he wore on it, whose rimless lenses magnified his thumbnail-colored eyes. He had no teeth. (Barth 318)

In this description of Eierkopf, the reader encounters a feeble and sickly little man whose mind seems to have consumed the resources necessary to maintain a healthy human body. This description is the physical manifestation of Eierkopf's indifference towards humanity, in that he cares so little for the human existence that he sacrifices his own body in order to develop his scientific theories. Just as the Nazi doctors were committing their crimes "in the name of science," Eierkopf sacrifices his own physical humanity for his scientific ideals.

Dr. Schlichter von Koenigswald is a minor but important character in *Cat's Cradle* whose depiction is an anti-Nazi critique. Schlichter was a former S.S. officer who served as the camp physician at Auschwitz for six years. This is a direct allusion to Dr. Josef Mengele who was actually the camp physician at Auschwitz during World War II. Vonnegut's mentioning of Schlichter's former job title and location is enough to categorize him as an inhuman researcher; however, evidence from the text contradicts

this claim. Schlichter works in a hospital on the island of San Lorenzo called the House of Hope and Mercy that helps the destitute inhabitants of San Lorenzo. His employer, a rich philanthropist name Julian Castle, claims that Schlichter is trying to atone for the deaths attributed to him while he was camp physician at Auschwitz. Julian emphasizes the impossibility in Schlichter's quest: "If [Schlichter] keeps going at his present rate, working night and day, the number of people he's saved will equal the number of people he let die—in the year 3010" (Vonnegut 187). The impossibility of the job indicates that Schlichter places some sort of value on human life, because Schlichter will attempt it regardless of the fact that his goal is impossible. However, Schlichter escapes punishment from the authorities for his war crimes and instead forces himself to help the less fortunate at the House of Hope and Mercy. Schlichter's punishment is far less severe than what he would have received had he stood trial after World War II. The lives that Schlichter might save will be forever overshadowed by those lives he took at Auschwitz.

Furthermore, when San Lorenzo's dying dictator "Papa" Monzano called for last rites, it is Schlichter who gives them to "Papa." When John asked whether or not Schlichter was bothered as a scientist giving religious last rites, Schlichter replied, "I am a very bad scientist. I will do anything to make a human being feel better, even if it's unscientific. No scientist worthy of the name could say such a thing" (Vonnegut 219). Here Vonnegut is saying that science is a discipline that is unconcerned with humanity, and that scientists by nature of practicing science do not care about humans. In depicting Schlichter, Vonnegut alludes to Mengele, and the fact that an individual guilty of committing atrocities is able to realize how humanity has twisted science gives his

statement power. Perhaps Vonnegut is saying that in order to realize what science has become, one has to engage in unethical behavior. Regardless, Schlichter's comment supports Asa and Eierkopf's beliefs regarding pure research, in that the goal of science is to increase knowledge regardless of the effect it has on humanity.

Thomas Pynchon's Dr. Hilarius is another anti-Nazi depiction. Hilarius is intellectually arrogant and can be viewed as insane through his choices of treatment and his belief that his preconceived facial expressions can cure mental illness. He is also somewhat secretive, in that Oedipa Maas—the story's main protagonist—does not trust medication prescribed by Hilarius because he will not reveal to her what is in the pills: "You don't believe that they're only tranquilizers?" (Pynchon 7). Hilarius is indifferent when it comes to the consequences of his experiments. He runs an experiment that gives psychotropic drugs such as LSD to suburban housewives without acknowledging the inherent dangers of such an experiment. Hilarius also calls Oedipa at three in the morning just to recruit her for this same experiment, which shows an incredible lack of concern for Oedipa's well being.

At one point later in the novel, as Hilarius breaks down and begins a standoff with the police, Oedipa tells Hilarius to "Face up to your social responsibilities" (Pynchon 111). Even Oedipa acknowledges that Hilarius is irresponsible when it comes to his experiments. As the standoff continues, Hilarius reveals that he induced insanity in prisoners of the Buchenwald concentration camp during World War II, and because of this he thinks someone is out to kill him. Hilarius separates himself from his humanity in order to drive the Buchenwald prisoners insane for the sake of a "scientific" experiment.

He even voices some disappointment that the Allies interrupted the experiment and prevented him from completing it: "The Allied liberators…arrived, unfortunately, before we could gather enough data" (Pynchon 112). Much like Vonnegut's Schlichter, Hilarius escapes the post-war tribunals and administers his own "punishment." Hilarius believes that because he shunned Carl Jung and he "chose Freud instead, the Jew" (Pynchon 112), he would be absolved of his crimes. This belief reinforces the idea that Hilarius is arrogant and insane.

Hilarius is involved with a highly experimental, dangerous, and unnecessary treatment involving housewives in the name of psychology. During World War II at Buchenwald, Hilarius drove the prisoners insane with his facial expressions in an effort to study insanity. The fact that he is a former Nazi who does not appear to feel repentant for his crimes also seems to be significant, especially since the image of the unrepentant Nazi doctor evokes the infamous Josef Mengele. This connection alone helps to cast Hilarius in a negative light; furthermore, upon examination of these characteristics, one surmises that Pynchon is questioning psychology and seemingly unnecessary psychological experiments through a comparison to the cruel and amoral experiments done by Nazi scientists during World War II. It goes without saying that an overwhelming majority of Americans did not trust Nazis after the end of WWII, and Oedipa's lack of trust with Hilarius seems to indicate that Pynchon is criticizing the hypocrisy of allowing Nazi scientists to settle down in the United States after the end of the war. In Hilarius's case, he picked up where he left off and continues his gratuitous experiments on the American public in the name of science. Perhaps this also reveals some sort of inherent mistrust that

Pynchon and others during this time might have had regarding psychology and psychoanalysis. Nevertheless, it is clear that Hilarius is a negative depiction of a scientist with a strong anti-Nazi slant.

2.6. Conclusion

One prominent aspect in all of these depictions of scientists relates to what branch of science they practice. Each scientist associated with the negative archetypes described by Gossin deal with computers or nuclear science. As discussed in the introduction, both of these fields of science were largely viewed negatively by most Americans, and especially by the authors discussed in this examination. Barth negatively depicts nuclear and computer scientists in the depictions of Max and Eierkopf, while Vonnegut derides nuclear scientists. Barth, Vonnegut, and Pynchon all incorporate an anti-Nazi critiques in their novels through the depiction of scientists of German heritage who were former Nazis and came to North America after the war to continue their experiments under the umbrella of the Cold War. Since German heritage is universal in most of the negative depictions of scientists, it is important to recognize the difference between the anti-Nazi and anti-atomic depictions, because it is easy to group all the German scientists together negatively. This allows for anti-Semitic interpretations of the text, which distorts the critiques of the writers. This differentiation allows for varying degrees of negative depictions. Those depictions of former Nazis represent the most negative depictions of inhuman and amoral scientists willing to sacrifice anything to further the cause of science. While the other non-Nazi depictions serve to criticize scientists who are not evil, but do not see or ignore the consequences of their actions.

The only two positive depictions of scientists work primarily in space science. Cremona is initially depicted negatively, but ends up cast in a positive light by the end of the story. He does not actually engage in space travel, but seems to be in charge of some aspect of a space program. David Bowman is completely engulfed by all things space-related and every aspect of his character is positive. The fact that some of the American public views science and scientists in general with some sort of disdain, yet spares those who work in the field of space science reveals the trend that is at the heart of this examination.

CHAPTER 3

EVALUATING NUCLEAR FEARS WITHOUT THE BOMB

3.1. Guilt by Association

With the increased emphasis on technological development that came with the onset of World War II, American scientists made radical advances that propelled the private sector after the war. Of these advances, none made as much of an impact on humanity as the development of nuclear weapons. The technology that led to the development of the first fusion bomb in 1952 was eventually intended to provide abundant power to the world. Eager to turn the negative stereotype associated with nuclear science into something positive, Dwight D. Eisenhower addressed the United Nations little more than a year later to promote the benefits of the deadly research for peaceful purposes.

Throughout the 1950s, the Atomic Energy Commission launched a series of pro-atomic campaigns in the United States and across the world, which emphasized the promise that nuclear energy was the way of the future (Weart 164). Spencer R. Weart notes that these campaigns often depicted the deadly and peaceful uses for atomic technology alongside each other, which made the American public "familiar with both extremes, although different people would view the set of images differently; some would focus on wonderful benefits while others would see death in the foreground" (170). Furthermore, Daniel Cordle points out the "Janus-like nature of responses to the

atom—as a bringer of deliverance as well as destruction—invested it with divine qualities with which it thereafter remained associated" (11-12). These "divine" qualities of nuclear science would either free humanity from the limitations of fossil fuels and usher in a new age, or would obliterate the world instantly and result in unprecedented suffering. It is clear that from the beginning, proponents of peaceful nuclear science needed to address the ominous side of the technology.

Advocates of nuclear energy tried to gradually disassociate their movement from weapons, which is why the term "nuclear" came into common use: "Publicists encouraged everyone to speak not of 'atomic' but of 'nuclear' power" (Weart 177). The propaganda began to backfire almost immediately, as "nuclear" simply became a replacement for "atomic;" moreover, the visual images of peaceful nuclear power only served to frighten the public with its depictions of "concrete shields with thick glass windows, workers hidden in white protective suits, and mechanical 'slave' hands for manipulating radioactive substances" (Weart 177). Images such as these only seemed to bolster Americans' fears of nuclear science; furthermore, these same images highlighted the tremendous danger inherent in even the most peaceful of nuclear science applications. The fact that people practiced such a dangerous science frightened many and one could not help but wonder about scientists wielding power more dangerous than anything humanity previously experienced.

This fear of nuclear science grew due to health concerns over radioactive fallout from fusion device tests by the Soviet Union, the United States, Great Britain, and France. The fear intensified in 1954 with the unanticipated strength of an American

nuclear test in the Bikini Atoll resulted in massive contamination from radioactive fallout. Despite later attempts to develop "clean" nuclear bombs, the public's perception of all things nuclear was permanently damaged. This perception deteriorated even more during the 1960s with the increased threat of all-out nuclear war, accidents involving warheads, and inability of the nuclear power industry to convince the American public of the safety of its plants. To this day, the word "nuclear" inspires feelings of dread and conjures up images of giant mushroom clouds whose shockwaves obliterate everything in their path and contaminate the land with radioactivity.

Nuclear science provided plenty of fodder for its opponents, as evidenced by popular films such as *Fail Safe*, *Dr. Strangelove*, and numerous works of literature that deal with the aura surrounding the nuclear industry. Often, critics of nuclear technology did not criticize the technology itself or the science behind it; rather, those critics derided humanity's irresponsible handling of such a dangerous technology. Never before had human civilization possessed such an overwhelmingly destructive power (despite its peaceful application, the threat of a nuclear power plant melting down was enough to cause concern among the general public). The overtly polarized views of nuclear science that dominated the 1960s are complicated by the history of nuclear weapons. This complication carries over to the anti-atomic critiques of the social satirists examined in this study. The rush to acquire nuclear weapons ahead of the Japanese and the Germans during World War II seemed to validate—if not require—the development of such a devastating weapon. As discussed in Chapter 2, scientists enjoyed a brief respite from negative depictions immediately following the war as a direct result of the development

of nuclear capabilities. Once heralded as the tool the ensured American dominance after World War II, the nuclear bomb soon became the greatest liability when the Soviet Union developed the technology in 1949. When this occurred, all-out nuclear war became a viable threat in the everyday lives of Americans; however, the threat of mutual destruction seemed to help stabilize the Cold War and provide a greater incentive for maintaining peace.

To bypass these complications in their critiques, the authors in this study used some other sort of scientific stand-in to satirize the development and maintenance of nuclear technology. Among those authors and their works, of primary concern for this study are John Barth's *Giles Goat-Boy* and Kurt Vonnegut's *Cat's Cradle*. Both novels deal with issues surrounding the threat of nuclear war without actually incorporating nuclear weapons. Rather than directly critiquing nuclear science and technology, both Barth and Vonnegut criticize a much simpler metaphor that is free from the complications that critiquing nuclear weapons carries. Free from complications such as the need to develop the technology during World War II and the stability provided through mutually-assured destruction, Barth and Vonnegut were free to make polarized comments regarding nuclear technology. Although their satires are effective, the disadvantage of using these metaphors becomes apparent in that neither Barth nor Vonnegut offer any realistic solutions to the situations they are critiquing.

3.2. You are What You EAT

In *Giles Goat-Boy*, Barth uses WESCAC as a metaphor for nuclear weapons in his critique. As stated previously, the substitution of another technology for nuclear

weapons enables authors to make a critique without the complications inherent in discussions of nuclear technology. WESCAC became affiliated with the military during Campus Riot II: "[E]lements of the college military—the New Tammany ROTC—had long since instructed it to advise them how they might best defend [New Tammany College]" (Barth 52). Towards the end of CRII, Max Spielman began to work closely with WESCAC's development into a weapon. When it was discovered that the Bonifacists were trying to develop a similar weapon, Max and his colleagues doubled their pace with undesired results: "We had to work fast, and we made two grand mistakes…we taught it how to teach itself…and we showed it how to makes it own *policy* out of its knowledge" (Barth 52). In an effort to speed up the process of turning WESCAC into a weapon, Max helped the computer to become self-aware. In this description of WESCAC's capabilities as a weapon it becomes clear that the computer serves as Barth's metaphor for nuclear weapons. This metaphor is used to satirize nuclear technology and the role it plays in the global community without the complications of a similar critique of nuclear technology. When WESCAC was developed as a weapon during CRII, New Tammany College turned it on Amaterasu College.

The weaponized part of WESCAC was known as Electroencephalic Amplification and Transmission (EAT). Depending on their position relative to the focused beam, when people were EATen alive, "they suffered 'mental burn-out' in varying degrees, like overloaded fuses" (Barth 53). People essentially lost their minds when EATen, which resulted in massive casualties both immediately and long-term. It was later discovered that survivors' children were also affected through multiple

generations: "[T]wo percent are idiots; one out of three is retarded, and they all got things like enuresis and nightmares" (Barth 54). This evokes America's use of atomic bombs on the Japanese during World War II, especially the long-term effects of the radiation on the population. The relationship between EATing and nuclear weapons is further emphasized by comparisons between the Quiet Riot and the Cold War.

Similar to historical events, sometime after CRII, Nikolay College was able to develop its own computer that could EAT like WESCAC from technology stolen by spies; thus, the Eastern Campus Automatic Computer (EASCAC) became the tool of Nikolay College and the Quiet Riot between East and West Campuses began. The development of EATing technology by Nikolay College mirrors that of nuclear technology developed by the former Soviet Union. Just as the Cold War fostered an era of mistrust and fear, the Quiet Riot caused students to fear that "some rash folly or inadvertence [might] trigger a third Campus Riot" (Barth 58). Once WESCAC was given the ability to think like a human, this fear and mistrust extended to the very weapon used to protect the West Campus. Much in the same way that the American public began to fear nuclear technology itself, students of West Campus were under the constant threat of being EATen by both EASCAC and WESCAC. Barth's metaphor is closely related to actual events, in that the American public was under threat of nuclear attack from the Soviet Union as well as the threat of a nuclear accident involving warheads or power plants. Much in the same way that nuclear scientists were unable to adequately control or even anticipate the power of nuclear weapons tests during the 1950s, West Campus scientists were unable to tell whether or not their own creation meant them harm or

wanted to protect them. Humans gave WESCAC the ability to think like them (a process that is discussed in Chapter 4), so Barth is commenting on scientists' inability to not only control technology but also their inability to use sound moral judgment when developing it.

However, Barth's use of WESCAC as a metaphor enables him to polarize his critique. The complications of nuclear program critiques discussed above do not appear in Barth's satire. Max—the "father" of WESCAC—feels regret for his part in using WESCAC as a weapon: "Not a right-thinking mind in the whole wide campus but curses the hand that pushed that button…I curse it too! Max Spielman pushed that button!" (Barth 53). Max's remorse darkens the depiction of the first use of WESCAC as necessary to protecting the West Campus. Whereas, those who were responsible for using nuclear weapons on people, Paul W. Tibbets and Charles Sweeney, never voiced regret over their decision to "push the button." As a result of Max regretting his actions, Barth is able to further polarize his critique.

Another instance in which Barth's critique is free from complications is when he depicts the Boundary Dispute between the East and the West Campuses. Ironically, both EASCAC and WESCAC emanate from the same building, the Control Room, and share the same power supply. EASCAC's and WESCAC's circuits are literally tangled together and operators from Nikolay and New Tammany Colleges use the same control panel separated by a metal mesh-gate. The Boundary Dispute stems from the fact that both the East and West Campus ran power lines along the boundary, but the exact position of the boundary was ambiguous: "The Boundary shall be midway between the East and West

Power Lines" (Barth 441). Both campuses accuse the other of gradually moving their respective power lines closer in an effort to move the boundary in their favor. In this moment Barth invokes Zeno's Paradox of Achilles and the tortoise, given that the boundary is exactly in the middle of the power lines, moving the power lines affects where the boundary line falls. Thus, no matter how close the power lines are, neither will ever touch the boundary line. So, in an effort to expand their respective boundaries, each campus inches their power lines closer to the other.

At the surface, it is easy to see that Barth is ridiculing the arms race between the United States and the Soviet Union. Both campuses are bickering over minute traces of land that are hardly measurable; yet neither campus will allow "outside surveyors, even from 'neutral colleges'" to help establish the Boundary Line (Barth 441). Both campuses are effectively arguing over an ambiguous declaration that each campus ratified; therefore, in a way, they created the problem from nothing. Much in the same way that the build-up of nuclear weapons seemed to exist so that one side had more than the other, Barth's use of the Boundary Dispute emphasizes the irrationality of creating a problem that does not actually have a solution, but has the probability of escalating infinitely. However, in the novel there is a simple solution to the Boundary Dispute that is not utilized: EASCAC and WESCAC can be unplugged. Since EASCAC and WESCAC both share a power supply, then the elimination of the power supply would end the threat. The solution to nuclear armament in reality is not so easy. One can argue that simply disarming would end the conflict, but the process is not as simple as unplugging the computers.

Barth further reinforces the ridiculous logic of those involved in such a situation through his description of the Boundary Line itself. Echoing East German guards patrolling the Berlin Wall, border-guards for both East and West Campuses literally patrolled the power lines: "[T]hose intrepid fellows…walked the great cables like armed acrobats" (Barth 441). The shear stupidity of deploying guards to actually walk along power lines to enforce the border is used by Barth to mock attempts by both the United States and the Soviet Union to enforce arbitrary borders that divided once unified countries. Two such instances would have been familiar to Barth: the Berlin Wall and the border between North and South Korea. Snipers occasionally kill these guards, but the guards usually fall to their death "because they look down" (Barth 449). The titular character, George Giles, recommends that these guards be made to wear "a special collar like the ones we use on bad goats, so they can't look down" (Barth 449). However, such a collar caused the guards to fall with equal frequency. In fact, the only casualties of the Quiet Riot were the border guards, which are understood to be Barth's comment regarding the gratuitous loss of life for seemingly insignificant and arbitrary reasons. These guards are dying because of a poorly worded agreement that was ratified by both parties; yet it is continually argued over by immature and irresponsible leaders. Again, the solutions to Barth's problems in the novel are far simpler than those in the real world. Using the Berlin Wall as a comparison, it would be easy to save lives by removing the guards from the wall, but in doing so could cause other problems to develop that would ripple through global society. Barth's metaphor enables him to safely critique nuclear weapons and policy without the complications inherent to a discussion of America's

nuclear capabilities. Free from these complications, Barth is able to polarize his depiction of nuclear weapons in a manner that would have been impossible had he not used WESCAC as a metaphor.

3.3. The End is Chilling

In *Cat's Cradle*, Vonnegut criticizes humanity's inability to learn from history, especially when it comes to power. Additionally, he draws attention to the negligent behavior of those entrusted with the power of ice-nine, which is Vonnegut's stand-in for nuclear weapons. The world of *Cat's Cradle* is not devoid of nuclear bombs, in that the creator of ice-nine, Dr. Felix Hoenikker, was "one of the so-called 'Fathers' of the first atomic bomb" (Vonnegut 6). Rather than drawing on the obvious connections between nuclear weapons and humanity's irresponsible handling of the technology, Vonnegut strives to depict the absurdity of how humans can handle a seemingly innocuous technology and still manage to destroy the world (with ice instead of fire). Just as Barth's critique of nuclear weapons was made simpler by criticizing the metaphor, Vonnegut's use of ice-nine enables him to polarize his depiction more.

Felix invented ice-nine as a means to "get [U.S.] Marines out of the mud" (Vonnegut 44). Here, Vonnegut plays off of a seemingly innocent idea to improve the mobility of troops in waterlogged environments during war. Incorporating the idea that crystalline structures have more than one way to organize their forms with differing properties, Vonnegut conceives of ice-nine as an alternative means of global destruction. Both ice-nine and nuclear technology rely on one of the smallest components of matter: the atom. Whereas nuclear weapons rip apart the atom to release colossal amounts of

explosive energy and radiation, ice-nine rearranges atoms in an incredibly massive exothermic reaction. In other words, ice-nine restructures water into a new form of ice with a high melting point; thus, effectively causing all the heat energy in the world's water supply to dissipate into the atmosphere. With a high melting point, it would be unlikely that the average temperature across the world would rise high enough to melt all the ice-nine. Even if it would, most people (as well as plants and animals) would not survive such an increase in worldwide temperatures for long. In a sense, Vonnegut has devised a weapon far worse than nuclear bombs. Felix's ice-nine utilizes a compound found in every living being and covers a vast majority of the earth's surface. As damaging as nuclear explosions are, the damage is geographically specific and the fallout relies on the wind to spread; however, ice-nine reacts almost instantaneously and spreads throughout the globe regardless of geography or weather.

Comparing the reasons for the development of nuclear weapons and ice-nine reveal how Vonnegut has simplified his critique. As previously discussed, the development of nuclear weapons in the United States was seen as necessary in order to develop the technology before the Germans and the Japanese; therefore, in hindsight the development of nuclear capabilities is seen as a "necessary evil." Whereas the development of ice-nine is an "*un*necessary evil," in that Felix developed ice-nine as if it were a game or a test. There was no immediate national threat coming from mud. Although eliminating mud on the battlefield would be immensely beneficial to troops, walking on ice would be just as difficult. Thus, Vonnegut's use of ice-nine enables him to

satirize it in a manner that he would have been unable to do had he used nuclear weapons in the novel.

As the plot proceeds, the reader discovers the existence of ice-nine along with the story's narrator, John, and one begins to realize how reckless everyone has been who has come into possession of ice-nine. When John first hears about the theoretical possibility of ice-nine from one of Felix's former colleagues, Dr. Asa Breed, he briefly informs the reader how Felix transported a crystal of ice-nine: "Felix Hoenikker had put the chip [of ice-nine] in a little bottle; and he put the bottle in his pocket. And he had gone to his cottage on Cape Cod with his three children, there intending to celebrate Christmas" (Vonnegut 51). Vonnegut places the most destructive weapon ever conceived in a bottle and takes it with him on a Christmas vacation with his children. Again, Vonnegut's critique is made simpler by using ice-nine. It would have been quite difficult for Felix to bring the necessary equipment to develop nuclear weapons with him to Cape Cod; thereby Vonnegut is able to polarize this depiction of Felix more so than he would have been able to do otherwise.

Taking ice-nine on vacation to the seaside is bad enough, but the fact that his children are in such close proximity to ice-nine clearly indicates that Felix is negligent when it comes to dealing with ice-nine. To further emphasize Felix's reckless attitude while dealing with science and technology, Vonnegut depicts Felix essentially playing with ice-nine during the vacation immediately before his death: "[B]efore [Felix] sat down in his wicker chair and died, the old man played puddly games in the kitchen with water and pots and pans and *ice-nine*" (Vonnegut 247). Furthermore, Felix had spent the

entire day before his “experiments” teasing his children that he had indeed created ice-nine and showing them “a little bottle on whose label he had drawn a skull and cross-bones” (Vonnegut 247). In both these instances Felix is endangering the lives of himself, his children, and the world by bringing such a dangerous weapon into that environment. He treats it like a child would a toy that only he had. Felix teases the children with the ice-nine and then experiments with it using pots and pans in the kitchen. He left his experiments for a brief time without cleaning up after himself, but Felix died before he could return and clean up the mess he made.

This image of Felix playing games with ice-nine, making a mess with pots and pans in the kitchen, and then not cleaning up after himself is very child-like. One concludes that Vonnegut is calling attention to the ridiculousness of senselessly testing a technology that has such a destructive potential. Drawing a comparison between ice-nine and nuclear weapons, it becomes evident that Vonnegut is commenting on the perceived immaturity of scientists and those in power when dealing with nuclear weapons. Again, Felix would have been unable to place his children in the same situation with nuclear technology. Their behavior differs little from children playing games, in that they do not seem to make well-thought-out decisions based on logic; rather, they seem to act irresponsibly and fail to take the necessary steps to prevent nuclear accidents.

Bringing the discussion back to ice-nine and Felix’s children only seems to strengthen Vonnegut’s comparison and critique. Felix’s mess in the kitchen included actual pieces of ice-nine, which his children found and divided amongst themselves. Later in the novel, one begins to see Vonnegut's critique regarding humanity’s inability to

learn from previous actions, in that as a direct result of Felix's irresponsibility when handling ice-nine, his children acquire it and then proceed to repeat his reckless behavior. This pattern of irresponsibility triggers a series of events that eventually lead to the freezing of the world's water supply, as well as virtually every human.

In this case, the Hoenikker children fail to learn from their father's careless behavior and treat ice-nine with the same lack of respect. As John is flying over the Caribbean Sea on his way to San Lorenzo, he meets two of Felix's children, Angela and Newt. Since he is writing the text from a point in the future and recalling his memories, John is able to offer commentary outside the realm of the situation. For example, one gets a sense of the disdain that John has for the irresponsibility of the Hoenikkers: "The little son of a bitch [Newt] had a crystal of *ice-nine* in a thermos bottle in his luggage, and so did his miserable sister" (Vonnegut 111). John is upset over the fact that Newt and Angela were careless enough to actually bring the ice-nine with them on a flight over a large body of water. In the text, John does not have to discuss the reasons behind his contempt; rather, he leaves it up to the reader to understand why this upsets him. Angela and Newt each wield the most powerful weapon ever devised yet they treat it as if it was not different from the rest of their luggage. They are so apathetic, that they do not even keep it on their person. They leave it unsupervised in the cargo hold of the plane. One can imagine the countless opportunities that might arise that could cause ice-nine to be released. The most obvious cause for concern would be a devastating plane crash that could unleash ice-nine on the world's oceans within seconds.

Felix's other son, Frank is at least equally as negligent (if not more so) when it comes to handling ice-nine. Frank arrived in San Lorenzo via a luxury watercraft that sank off the coast of the island nation. John displays the same disdain when talking about Frank as he does when discussing the behavior of Angela and Newt: "[T]he son of a bitch [Frank] had a piece of *ice-nine* with him—in a thermos jug" (Vonnegut 83). In this instance, one can see Frank's completely reckless behavior with his piece of ice-nine. Whereas Angela and Newt had the sense to avoid water as much as possible, Frank brought the world closer to destruction than anyone would ever possibly know. Here, Vonnegut emphasizes his critique of human interaction with nuclear power. Frank knows what can happen when ice-nine comes into contact with water, because there was a warning on the original bottle of ice-nine that Felix teased the children with before he died: "Danger! *Ice-nine!* Keep away from moisture!" (Vonnegut 247). Ice-nine would surely destroy its users as quickly as the intended targets, so Frank has a complete disregard not only for the well being and continuation of the human race, but for his own safety as well.

Vonnegut's comparison between ice-nine and nuclear weapons is clear; however, his critique is not weighed-down by the complications of nuclear policy. Through his depictions of the Hoenikkers, Vonnegut draws a comparison between them and those who control nuclear power. Each of the Hoenikkers displays an irresponsible and immature position when it comes to handling ice-nine; however, even though their situations allude to mishandling of nuclear weapons, the situations the Hoenikkers put themselves in would be difficult with nuclear technology of Vonnegut's day. Without this

difficulty, Vonnegut is free to successfully demonstrate that no one—neither individuals nor groups—can be trusted to handle ice-nine. According to Vonnegut's critique, no one should have ice-nine, because people by their very nature are imperfect and incapable of responsibly handling the power given to them. One can conclude that Vonnegut is saying the same thing about those individuals controlling the world's nuclear capabilities.

3.4. Conclusion

Vonnegut and Barth do not criticize nuclear technology; rather, they create metaphors that are used to condemn those who created the technology and those who control it. As a result, their satires are free from the intrinsic complications surrounding the real-world discussion of nuclear weapons. Without these complications, Barth and Vonnegut are able to successfully polarize their depictions of nuclear weapons and those who develop and handle the technology. This polarization results in a simplistic critique that serves to satirize human behavior without offering a realistic solutions to the problem the authors are critiquing.

CHAPTER 4

COMPUTING OUR DESTRUCTION

4.1. Thinking Machines

Since the arrival of the first fully functional computer, the Electronic Numerical Integrator and Computer (ENIAC) in 1943, humanity has been on a never-ending quest to duplicate the analytical and psychological complexity of the human brain artificially. With the rapid advancement of technology since 1943, humanity's ability to replicate human thought is closer than ever to becoming a reality. Along the way, computers have become an established theme in popular culture around the world, especially in the United States. From the autonomous robots of post-World War II science fiction (such as Robby the Robot and Gort), to one of popular culture's most infamous computers—Skynet of *Terminator* fame—the degree to which depictions of computers differ can vary greatly. As different as these depictions may be, they are consistent with society's ideas of what computers are or will be in the future.

Depictions of computers during the 1960s were no exception, in that writers based computer representations on realistic and contemporary versions of computers regardless of how futuristic the settings and actions were. John Barth's WESCAC, Isaac Asimov's Multivac, and Arthur C. Clarke's HAL 9000 (Hal) are realistic depictions of computers as they existed during the sixties. One must keep in mind, that prior to the personal computer revolution of the 1970s, computers were far from portable. ENIAC's "18,000

vacuum tubes and miles of wiring" were housed in "forty nine-foot-tall cabinets" (McCartney 5), which occupied over 1800 square feet of floor space (Stern 51). During the 1960s, computer manufacturers developed smaller computers; however, it took some time for the smaller model computers to catch on because of what was known as Grosch's Law: "[A] computer system that was twice as big…got you not twice but four times as much computing power" (Ceruzzi 177). Additionally, the cost of memory was higher per bit for smaller computers, so it made better economic sense to purchase large mainframe computers instead of smaller units (Ceruzzi 177). Thus, the depictions of Multivac, WESCAC, and Hal as room-sized computers of various designs simply reinforces common conceptions of powerful computers during the 1960s. Since the size of computers did not change very much as the power increased, and in accordance with Grosch's Law, a massive computer that one was able to literally crawl through would be more powerful than computers during the sixties.

One consistent aspect of the first functional computers was that they originated from the needs of the United States military during World War II. ENIAC was "designed expressly for the solution of ballistics problems and for the printing of range tables" (Stern 15). The next computer model developed after ENIAC, the Electronic Discrete Variable Automatic Computer (EDVAC), was "funded as a supplement to the ENIAC contract" to fulfill the U.S. military's need for a general-use computer (Stern 1). While designing EDVAC, the computer developers were busy creating a general-use computer for the civilian sector. This resulted in the Universal Automatic Computer (UNIVAC), which was focused on "high-speed input-output for business operations" (Stern 110).

Even this initial foray of computers into the private sector was still connected to the government: "[T]he UNIVAC was initially funded by several government and private contracts" (Stern 1). One can plainly see that computer technology in its infancy was almost solely a government affair. The computer's development stems from the same nationalistic support for science discussed previously, which led to the involvement of government-sponsored university research programs. The military funding was crucial to the development of computer technology: "A Substantial push for something new had come from the U.S. Air Force, which needed ever more sophisticated electronic equipment onboard ballistic missiles and airplanes, both of which had stringent weight, power consumption, and space requirements" (Ceruzzi 179). Therefore, computers are closely tied with the military's research support, regardless of where the computer was used. Whether it be in a business or a university, during the sixties computer development could be traced directly back to the government.

The fictional representations of computers listed above (Multivac, WESCAC, and Hal) all exhibit these same connections. Multivac and Hal are both involved with space travel, which during the sixties was also primarily a military operation; additionally, WESCAC is the product of a government-sponsored university program. The names themselves reveal the literal connections between the real computer and the fictional, in that they all are (or appear to be) acronyms: WESCAC for West Campus Automatic Computer and Hal for Heuristically programmed Algorithmic computer. According to one of Asimov's short stories, the "ac" in Multivac stands for "analog computer" ("The Last Question" 181). The rest of the name is left for the reader to decipher. One can begin

to see how the computers of Barth, Asimov, and Clarke accurately incorporate scientific trends. It is this accuracy that helps to establish a closer connection between these writers' works and their contemporary society; furthermore, this connection enables readers to effectively gauge the attitudes of society regarding computer technology during the 1960s. The perceptions of computer technology are not as rational as the responses to nuclear weapons, in that Americans during the sixties had a justifiable reason for fearing nuclear weapons. However, despite the connections between computers and the military and the massive amount of work that computers did for humans, there was an innate fear of the technology. The depictions of computers discussed in this study are guilty of amoral behavior when they acquire the ability to think like humans. This irrational fear most likely stems from the connection between computer technology and military funding. Computers were not commonly associated with the nuclear program in the minds of most Americans; however, the source of the funding seemed to transfer the mistrust of the government and the military to early computer technology. As it is discussed in detail in the next chapter, the negative perceptions of nuclear and computer technology complicates the positive views of space science despite the close connections between the three sciences.

4.2. A Goat-Boy and His Computer

Like ENIAC, Barth's WESCAC from *Giles Goat-Boy* had humble beginnings as a room-sized calculator: "[WESCAC] was put at first to the simplest tasks: doing sums and verifying certain types of answers" (Barth 51). Developing much in the same way that ENIAC did, WESCAC became connected with the military and was eventually

developed into a weapon by Max Spielman, as discussed in Chapter 3. Max gave WESCAC the ability to think as a free individual. This complicated the way in which the West Campus interacted with WESCAC, since "WESCAC had been trained to do virtually the whole brainwork of the 'Free Campus': most importantly, teaching every course of study in the NTC catalogue" (Barth 59). Since WESCAC now had the ability to think, the whole "curriculum" of the West Campus was now in danger of being undermined by the computer.

When asked to analyze its own weaknesses, WESCAC stated that the operators' ability to program the computer was detrimental to its success; thus, the programmers made WESCAC totally autonomous when they gave the computer the ability to program itself. Despite its independence, WESCAC was still a machine and relied on an analytic and logical thought process called MALI (Manipulative Analysis and Logical Inference). As the name suggests, MALI allowed WESCAC to analyze and deduce answers to questions logically. As Max states, it was far from human: "WESCAC was not able to *enjoy*" (Barth 60). Another scientist, Dr. Eblis Eierkopf, remedied this by providing WESCAC with NOCTIS (Non-Conceptual Thinking and Intuitional Synthesis), which would help WESCAC not only to solve scientific problems, but also those of "philosophers, poets, and professors of theology" (Barth 61). With the synthesis of MALI and NOCTIS, WESCAC acquired the ability to think like a human. This became more apparent as Max was forced out of the program and Eierkopf took over and began a series of bizarre experiments using WESCAC to inseminate sheep to develop a specific type of ram. This eventually led to a change in WESCAC's thinking process: "WESCAC's

reasoning had been influenced—nay, overmastered—by what could only be called *lust*" (Barth 65). This ability to feel lust triggered a chain reaction that led to the near-catastrophic events of the novel.

WESCAC's lust caused some serious problems. Since his independence was so great, WESCAC could essentially do whatever it desired. As Eierkopf continued tinkering with WESCAC's abilities, it acquired the tools it needed to completely control the human population, if it so desired. Instead, WESCAC chose to take a laboratory-developed semen specimen intended to become the ideal citizen and inseminated a young woman, because "WESCAC had had little on its mind but sex…[and] all it cared to do was mate, never mind with whom or at whose expense" (Barth 65). In this instance, one can understand Barth's comment about humanity and its relationship with technology: "Reason had become a pander for Desire" (65). After describing the gradual development of WESCAC from a simple computer into an unstable "human" brain, Barth chooses to grant WESCAC one of the negative human traits: lust. What was once a flawless piece of technology was corrupted with a human trait that warped its thinking. Instead of solving the philosophical and theological problems as Eierkopf predicted it would, WESCAC gives in to its lust and essentially rapes a young woman. In this, Barth depicts humanity's irrational fear of computer technology. Instead of creating a machine capable of solving the world's ills, Eierkopf creates what could only be described as a vile human when he provides WESCAC with NOCTIS. The corruption of WESCAC's abilities as a computer seems to not originate with the technology itself, but with its connections as a weapon (a

metaphor for nuclear capabilities) and the source of the corruption (an amoral Nazi-like scientist).

4.3. Asimov and the Multivac

Isaac Asimov utilizes depictions of computers the most of the three authors examined here. Generally viewed positively during the 1950s, Asimov's depictions of Multivac during the 1960s took on a pessimistic and negative tone as he comments on humanity's ability to corrupt an unbiased technology. Multivac appears in various forms that serve similar purposes in multiple independent story lines. One constant is Multivac's size and the manner in which its human operators interact with it: "There are six teams of computer technologists roaming around in the corridors of Multivac" (Asimov, "Key Item" 148). In almost every story that Multivac plays a critical role, the computer is massive: "[The] clicking, flashing face—miles and miles of face—of that giant computer" (Asimov, "The Last Question" 177). Much in the same way that early computer operators worked with ENIAC and UNIVAC, computer technicians using Multivac physically work with the components. Whereas operators of ENIAC and UNIVAC stood alongside the components, Multivac's operators actually maneuver within the computer in order to interact with its programs: "[T]echnicians were…scurrying about the vitals of the giant computer" (Asimov, "The Machine That Won the War" 593). For Asimov, the room-sized computers of his time evolve into building-sized computers. Size is only one of the characteristics of Multivac that link it closely with computers of the 1960s.

Multivac's ties with the military also resemble the origins of computer technology in almost every story. In Asimov's "The Last Question", Multivac's original purpose was to "design the ships and plot the trajectories that enabled man to reach the Moon, Mars, and Venus" (178). As it is mentioned above, America's space program was—and still is—closely associated with the military. In Asimov's "My Son the Physicist", Multivac is briefly mentioned by one of the main characters: "We're going to need Army's Multivac computer at once" (599). This brief reference evokes ENIAC's origins as an artillery range table calculator. Finally, in "The Machine That Won the War", Asimov depicts the computer as "the one great weapon" that humanity utilized in a war (595). All of these connections generally provide for negative depictions of Multivac.

One of these few positive moments occurs in "The Last Question", which was published in 1956 (before the scope of this examination) when the perception of technology was much more optimistic. In this story, Multivac eventually "evolves" into a computing system that exists outside the bounds of the known universe. In a sense, Multivac does not physically exist in the far future of the story's setting. It attempts to discover how to stop and reverse entropy to keep the universe from destroying itself. During the existence of humanity, Multivac is never able to solve the problem; however, once the universe falls apart due to entropy and humanity no longer exists, Multivac discovers how to reverse entropy and it creates life: "LET THERE BE LIGHT!" (Asimov, "The Last Question" 190). In this story, technology ultimately results in the creation of life, one of the most positive results one can hope for technology to accomplish. Yet, this optimism is not without the beginnings of dissent. Technology's

ability to create life, as positive as it sounds, was only possible once humanity disappeared. Even during a time when science was relatively popular (as discussed in Chapter 2), one can see the beginnings of a trend that is seen in many of Asimov's depictions of Multivac.

Starting with "The Machine That Won the War" in 1961, Asimov began to show how humans can corrupt a seemingly unbiased computer and bend results to their own needs. In this story, Multivac is credited with enabling humanity to win a war; however, the men responsible for interacting with Multivac and acting on its recommendations reveal that they manipulated information at all points in Multivac's calculations. The chief programmer introduced "necessary [human] biases" into the computer's input, the chief interpreter "adjusted [results] in accordance with [human] intuition," and the leader of the humans chose not to listen to Multivac's supposed recommendations (Asimov, "The Machine That Won the War" 596). All of this human interaction with Multivac resulted in "a man-made interpretation of man-made data" (Asimov, "The Machine That Won the War" 596), which counteracts the whole purpose of using an unbiased computer to organize a military offensive. The technology itself becomes meaningless and serves no function other than to provide a rallying point for humanity during the war. This apparent corruption of technology by human interaction also appears in Asimov's work later in the sixties.

Asimov's short story "Key Item", published in 1968, takes the idea of human corruption to a new level. In this story, Multivac literally becomes infested with humanity. The manner in which computer programmers interact with Multivac connect to

the corruption of the technology. As stated, Asimov generally depicts Multivac as building-sized with programmers moving around inside the circuitry of the machine. In this case, the humans seem like parasites feeding off the knowledge that Multivac produces, much as a flea feeds on its host. Interacting with Multivac on such an intimate level cannot occur without some sort of reaction. Just as a parasite is detrimental to the development and well being of the host, programmers crawling inside of Multivac only served to disrupt the computer's programming, which results in undesired behavior. Multivac's operators are struggling to figure out why the computer will no longer follow their instructions or respond to their commands. The operators are spending their time trying to find some sort of mechanical failure by "roaming the corridors of Multivac" (Asimov, "Key Item" 148). When one of the operators comments on how complex Multivac has become, the answer becomes clear: "[Multivac is] practically as complex as the human brain. We can't understand the human brain, so why should we understand Multivac" (Asimov, "Key Item" 148). This operator reasons further that because of the complexity of the input, "Multivac must be made to seem human, because, by God, it *is* human" (Asimov, "Key Item" 149-50). They solve the problem of Multivac's disobedience by giving it instructions: "Work that out and give us the answer … *please!*" (Asimov, "Key Item" 150). Here Multivac's newfound "humanity" poses a problem and corrupts the seemingly limitless efficiency of the technology. Through human interaction, Multivac seems to have developed some sort of personality that interferes with how the operators interact with the computer's programs. This personality is detrimental to humanity, since the operators must now take Multivac's emotions into consideration

when operating programs. If they did not have to do this, the operators would be able to quickly and efficiently interact with Multivac to produce results.

In this instance, one can better understand Asimov's critique of humanity's use of technology and their ability to corrupt what appears to be incorruptible. This reflects the mistrust that society has for computers, which seems to carry over from its close connections with the military. The negative depictions also reveal the irrational fear of rapidly advancing computer technology. No human died as a result of a computer's self-awareness; however, it seems that the association with the military led people to assume that computers would eventually follow that course of development and become a weapon. Along those lines, only when the computers depicted in this study become intelligent enough to operate without human instruction, as in "The Last Question," can something miraculous occur. Perhaps Asimov is trying to say that science and technology can never be truly pure as long as the military plays a role in the development of science. Only an operational theater such a space—far removed from humanity's earthly troubles—can allow humanity to use technology as uncorrupted as possible.

4.4. Hello, Dave

Clarke's depiction of Hal in *2001: A Space Odyssey* is similar to Asimov's depiction of Multivac in "Key Item", in that Hal becomes corrupted by humanity. This corruption disrupts his programming, which has disastrous results. Clarke establishes Hal as a complex piece of technology that is still far from human: "The sixth member of the crew … was not human" (95). The complexity of Hal's construction is documented, as well, and Clarke even contrasts Hal with ENIAC by alluding to the latter as one of the

"clumsy, high-speed morons" (96). In fact, Hal is so incredibly complex, that the precise process by which Hal's artificial brain was developed, "would never be known, and even if [the process] were, [it] would be millions of times too complex for human understanding" (Clarke 96). The process by which Hal was created, or rather the mystery of how Hal's mind was made, evokes humanity's similar dilemma with their own brains. Clarke goes to great lengths to establish the fact that Hal is a piece of technology—an incredibly complex piece of technology but one nonetheless. He highlights how independent Hal is and how the computer can essentially run the entire spacecraft without human intervention. It is human intervention that corrupts Hal's programs with less than desirable results.

After Hal makes mistakes calculating failure rates of communication equipment, Mission Control on Earth informs the crew of the spacecraft that they might have to shut down Hal. As a result, Hal kills four crewmembers and attempts to kill a fifth: David Bowman. Before Hal can accomplish this, David enters the clean room where Hal's central processor is located and removes components. Just like Multivac, Hal takes up a great deal of space. Although not as big as Multivac, Hal's interactive abilities span across the spacecraft, with the computer's core lying at the center of the ship. David compares disconnecting some of the components to "carrying out a lobotomy" (Clarke 155). The components that David removes sound like parts of the human personality: "cognitive feedback … ego-reinforcement … [and] auto-intellection" (Clarke 155-6). In this moment, Clarke begins to depict Hal as more human than machine.

Hal pleads with David to stop taking out components: "You are destroying my mind….Don't you understand?…I will become childish….I will become nothing" (Clarke 156). Again, one sees more human behavior coming from Hal. In this instance, Hal is pleading for life. Removing the components that enable the computer to think as a human is tantamount to death for Hal and his self-awareness demonstrates the computer's human-like personality. Hal's "humanity" is solidified when Clarke discusses the reasons behind Hal's unconventional behavior: "[U]nconscious feelings of guilt, caused by his program conflicts" (Clarke 169). David was one of the crewmembers who was not aware of the true nature of his mission. Hal was privy to that information and struggled with keeping the secret from David. This struggle led to Hal's development of guilty feelings. As a piece of advanced technology, Hal was flawless and could always be depended upon to ensure a successful mission regardless of what happens; however, once Hal became corrupted with a human emotion, it was impossible for Hal to fulfill the programmed duties of a computer. Just like a human faced with death, Hal fought to survive.

This struggle to survive in the face of death is a characteristic of a living being. It is a basic and animalistic instinct common to all living creatures; however, such an instinct is not found in computers. Since Clarke established the complexity of Hal's construction and mental processes, and Hal was designed to interact with humans as a human would, then it could be said that Hal could have developed human traits as a direct result of interacting with humans. Hal effectively learned how to be human from observing and interacting with humans on a daily basis. Much in the same way that Asimov highlights the negative relationship between technology and human interaction, Clarke demonstrates

how human interaction can unintentionally corrupt what would have otherwise been an incorruptible piece of technology.

Just like the programmers moving around in Multivac, Clarke depicts David moving around inside Hal's "brain." However, instead of corrupting the programming of Hal, David is more of an "antibody" cleaning out the faulty traits that are causing Hal to act amorally. Rather than feeding off the knowledge and disrupting the computer, David demonstrates a level of control over the technology that Barth and Asimov do not let humans wield. This helps to ease the negative depiction of Hal; thus, easing the irrational fear of computers. For Barth and Asimov, once the computer reaches a level of intelligence, humanity will be unable to control its actions. However, Clarke depicts a computer for what it is: a piece of machinery that can simply be "unplugged" despite the human-like behavior of Hal.

4.5. Conclusion

In both Asimov's and Clarke's examples, the human corruption of technology seems unintentional, but could have possibly been avoided. In both cases, had the computer operators taken the time to understand what they created, then they would have been able to better anticipate unwanted results: "The same mistake would not be made again; … Hal's builders had failed to fully understand the psychology of their own creation" (Clarke 168). It seems that Asimov and Clarke are speaking out against those who would underestimate the effect they might have on advanced technology in favor of respecting and understanding the tools at their disposal. In Barth's example, Max's rush to develop WESCAC by giving it the ability to think independently seems to have been

something that he could have avoided doing, and had he understood exactly what he was doing at the time and the possible consequences, Max would have followed a different path. However, the corruption of WESCAC by Eierkopf's NOCTIS seems intentional, even the resulting lust seems to have been a desired effect of the program: "Eierkopf's delight was that WESCAC['s]…mind was now unmistakably, embarrassingly, irrevocably human" (Barth 65). In this, Barth is commenting on the lengths that humanity will go to push the envelope of technology. Barth calls into question whether or not technology would be better off if scientists were able to imbue it with human traits. If a computer were able to think like a human and a computer at once, then the results would be unreliable at best, just as humanity's actions have been. Even though Hal is negatively depicted, the connection with the idealism of outer space enables Clarke to show humanity in control. This signals the change in the perceptions of technology when associated with space science.

One thing that all these depictions of computers have in common is the fact that through close interactions with humans—specifically the military—their operating programs become corrupted and their behavior becomes erratic. As a result, each author is commenting on humanity's apparent behavior throughout history by showing how technology, specifically computers, would act if they were able to think like humans. All of these depictions do not reveal a deep-seated mistrust of technology; rather, they reveal a level of mistrust towards the military's involvement with the development of computer technology. This mistrust complicates the manner in which space science is able to break free from these same connections.

CHAPTER 5

SPACE, THE FINAL…CHAPTER

5.1. A New Ocean

During the 1960s, America's space program became the benchmark for the ethical application of science, but it was more than just the measure for scientists to judge themselves and their work; additionally, it was something more like a symbol of pride and hope. As it is discussed in the previous four chapters, some fiction writers began to criticize humanity's application of technology, and scientists were becoming the scapegoats for the world's ills. Space science seems to be one branch of science that was exempt from such criticism. Barth, Vonnegut, and Pynchon criticize scientists and technology throughout the works discussed and even in those beyond the scope of this examination; however, none of them mention—let alone negatively criticize—space travel during the sixties. Asimov and Clarke both depict space travel positively, and they seem to share the same hopeful view that space science will finally succeed where earthbound science has failed, and truly enlighten humanity.

Many people shared this optimistic view of space science during the sixties; furthermore, as the space scientists began to spark the imaginations of the world and deliver on their promises, critics had trouble finding fault in the American space program because of the potential benefits promised. By its very nature, a space program is incredibly expensive, especially compared to its immediate economic return. A great deal

has been learned from space travel, and the National Aeronautics and Space Administration (NASA) published multiple reports detailing the civilian applications of technology developed for its space programs as an apparent way to justify their expenses. Areas of the civilian sector that benefit from the application of NASA's technology include manufacturing, food production, government, law enforcement, and education; furthermore, the American public became familiar with popular consumer products born from NASA technology such as battery-powered hand tools and anti-fog lenses (*Space Benefits*). The vast array of technology that NASA is responsible for is astounding. The everyday benefits became clear as the space program developed over the long term.

This stands in contrast to the aspects of technology previously discussed, in that computers were seen as potential weapons and nuclear science was responsible for the deaths and radioactive contaminations of thousands of people. The fascination the American public had for space travel and its separation from the negativity associated with computers and nuclear science is further demonstrated by the fact that America's space program grew out of and relied on technology developed initially by military programs. The *Redstone* rocket used to put the first American (Alan Shepard) in space was used by the Army as a weapon to deliver explosive payloads and was directly connected to the Nazis: "Always the favorite of the von Braun group working for the Army, the Redstone was a direct descendant of the V-2" (Swenson 21). Not only was *Redstone* originally a weapon, but the technology used to develop it came from the Nazi's V-2 rocket used to terrify England during World War II. Additionally, Wernher

von Braun was a former Nazi rocket scientist who came to the United States after World War II. The American space program essentially grew out of Nazi rocket technology.

Further reinforcing the connections that space science had with nuclear technology is the utilization of the *Atlas* rocket. Developed by the United States Air Force, the *Atlas* rocket was America's first Intercontinental Ballistic Missile (ICBM) used for the delivery of nuclear warheads (Swenson 21-22). The *Atlas* also served as the launch vehicle for John Glenn during his first space flight. During this flight, Glenn became the first American to orbit the planet. Glenn in his capsule replaces the nuclear warhead, which creates an interesting contrast between those two images. The fact that America's early space program was closely tied to the development of delivering systems for nuclear warheads indicates precisely how enthusiastic Americans were about the possibility of space travel. Whereas nuclear energy was never able to escape the stigma of the nuclear bomb despite its positive potential, the space program was able to separate itself and become a peaceful application of that technology.

Space travel, although extremely hazardous, was detached from the stigma that death brought to computers and nuclear science. Even though a computer was not responsible for the loss of human life, people still harbored a fear that computers would eventually be developed into a weapon. On October 7, 1958, Project Mercury became the first manned space project in American history (*Space Flight* 2). For almost ten years after that date, no American death was associated with the space program. There were delays that negatively affected the appearance of American ingenuity when it came to space travel, but until January 27, 1967, no American died in relation to the space

program (*Space Flight* 8); however, those deaths were the result of accidents and not the malicious use of technology. As a result, space science seemed to have a more hopeful and optimistic reception among Americans. This optimism manifested in the mission names picked by each original Mercury astronaut. Glenn's mission was named *Friendship 7*, which is slightly ironic considering he was riding on an ICBM. Other names include *Freedom 7*, *Liberty Bell 7*, and *Faith 7*. Mission names such as these, picked by active-duty military, helped to create a positive image of the space program.

This optimism manifested in the various depictions of space travel from novels such as *2001: A Space Odyssey* to television shows such as *Star Trek*. Early rocket experiments before and after World War II laid the foundation for modern space programs, encouraged "an ever-mounting pitch of interest and enthusiasm, and stirred large portions of the human race to desire the eventual conquest of space" (Pendray 391). This desire to master the ability to leave the planet and explore the stars led to a more hopeful vision for humanity's future. Space became humanity's second chance. Earth was a place of war, especially in the first half of the twentieth century, whereas outer space seemed to offer peace through international cooperation. In an address to United Nations Ad Hoc Committee on the Peaceful Use of Outer Space on May 7, 1959, the Deputy Administrator of NASA, Hugh L. Dryden stated that, "space research needs to draw upon an entire world for its ideas" (126). Space seemed to act as a unifying factor in international affairs and even in the middle of the Cold War, it served to unite Russians and Americans, especially after John Glenn's successful Mercury mission: "Numerous expressions of hope were voiced, as Khrushchev suggested and Kennedy repeated that

Russians and Americans could enter into some sort of cooperative space program" (Swenson 435). These comments by Khrushchev and Kennedy hinting at cooperation between the two super-powers were made eight months before the Cuban Missile Crisis, so despite the two nations' differences with each other, there was still talk of cooperation. Space travel provided the world with hope that peaceful coexistence was possible. For humanity, more importantly for scientists, it seemed that redemption would come from the stars.

The depictions of space science may seem overly optimistic, almost fantastical; however, this does not mean that space science is inherently "good." These depictions are complicated by the deep connections to nuclear and computer science. As stated, the development of nuclear technology required more advanced computers in order to operate. This stimulation of scientific development stemming from the needs of the American military complex fostered unprecedented advances in technology that allowed for the initiation of the space program. The exact same technology developed for the military was used—in many instances by the same scientists—to facilitate the growth of space science.

5.2. A Space Redemption

In his novel *2001: A Space Odyssey*, Arthur C. Clarke took the source of humanity's redemption literally in his depiction of space travel. Throughout the novel, Clarke demonstrates his optimistic view of space science. From the excitement of lifting-off in a spaceship to the possible cooperation between the Soviet Union and the United States, Clarke depicted space travel positively. At the beginning of his mission to the

Moon to examine an unknown object, Dr. Heywood Floyd is excited about his takeoff: "Yet as the moment of takeoff approached, [Floyd] was conscious of a rising tension, a feeling of wonder and awe—yes, and of nervousness—which put him on the same level as any Earthlubber about to receive his first baptism of space" (Clarke 41). Despite the fact that he is an experienced space traveler, "He had been to Mars once, to the Moon three times, and to the various space stations more often than he could remember" (Clarke 41), Floyd is as excited about takeoff as someone who is flying in space for the first time. This undying thrill of traveling in space gives it the appearance of a vacation of sorts. Here Clarke is commenting on space travel, specifically his view that no matter how commonplace space travel may become in the future, the sheer wonder of being able to leave the planet will never get old. Clarke's comparison between space travel and religion is also important here, in that Clarke is comparing the act of space travel to a deeply passionate experience that one has upon entrance into a religion. This goes beyond space travel's inherent preternatural quality to give it a more spiritual otherworldliness, almost as if the act of space travel is like entering some sort of heavenly place. Space travelers would literally leave the problems on Earth's surface behind, which is especially desirable during the turbulence of the 1960s.

Clarke fantasizes that this spiritual aspect of space travel does what the world's great religions failed to accomplish: unite humanity. Clarke briefly hints at the cooperation discussed by Dryden when he describes a deep space probe floating through space: "For three years it had fulfilled its mission flawlessly—a tribute to the American scientists who had designed it, the British engineers who had built it, the Russian

technicians who launched it" (Clarke 83). Cooperation between the British and Americans is not surprising, but the fact that they turned over technology they had designed and built to the Russians suggests a remarkable level of trust that exists between the nations. This extremely optimistic vision reveals the hopes of space-science proponents that space travel was a new and unique tool to foster peace. This trust is emphasized further in *2001* by the fact that Australia, the Soviet Union, and the United States are homes to the "World Space Centers" that house identical information about space observations and experiments in triplicate (Clarke 84). Even though it is only mentioned briefly, the idea that space travel will lead to increased cooperation between the nations of the world stands out.

Despite this cooperation, it appears that humanity is still unable to see past its differences on Earth. At the end of *2001*, Dr. David Bowman has gone through a physical transformation into a being that has "passed beyond the necessities of matter" (Clarke 218). Clarke dubbed this new being the Star-Child, and gave it the ability to transcend space as humanity knows it. Despite this ability, the Star-Child still yearns for some sort of attachment to humanity, so it comes back to Earth: "He was back, precisely where he wished to be, in the space that men called real" (Clarke 220). As he "floated" above Earth, the Star-Child "became aware that a slumbering cargo of death had awoken, and was stirring sluggishly in its orbit" (Clarke 221). This "cargo of death" set off alarms and "history as men knew it would be drawing to a close" (Clarke 221). From this description, it is clear that the Star-Child has arrived at Earth precisely at the moment that nuclear war breaks out. The Star-Child, "put forth his will, and the circling megatons

flowered in a silent detonation that brought a brief, false dawn to half the sleeping globe" (Clarke 221). The Star-Child has returned to the Earth and stopped humanity from destroying itself by detonating the ICBMs in flight outside Earth's atmosphere.

As a result of his travels through the outer edges of the solar system, Dr. David Bowman encounters alien technology that transports him to another section of the universe and ultimately transforms him into a being that can be best described as god-like. In this instance, space is literally the source of humanity's redemption. Through space travel, the nations of the world began an unprecedented level of cooperation; however, it took the "divine" transformation of a single human in space to truly save humanity.

5.3. Conclusion

The promise of outer space as humanity's chance to effectively "do it right" resonates throughout the world. Although there were most likely classified military missions in space during the 1960s—the Department of Defense acknowledged classified Space Shuttle missions during the eighties and nineties (*Space Flight* 30-35)—there has yet to be any documented warfare in Earth's orbit. It remains the single place where nations capable of reaching it have refrained from engaging in warfare. Outer space as remained a peaceful place regardless of what has happened on the surface of the planet. During the sixties, space science seemed to be exempt from criticism by critics and writers alike. Although they were quick to discuss the negative consequences of computers and nuclear science, these critics largely left space science alone. One infers that space science escaped social criticism precisely because of the positive aura that

surrounded the future of the discipline. Although not realized in the 1960s, space science eventually united countries and made leaders set aside differences and cooperate to reach a common goal. The cooperation mentioned by Kennedy and Khrushchev was realized for a week in 1975 when the Soviet *Soyuz* and American *Apollo* spacecraft docked while orbiting the Earth (*Space Flight* 22). Today, an effort comprised of countries from around the globe contributed to establishing a permanent space station in orbit around Earth. Furthermore, both the American and Russian space programs routinely launch astronauts from other countries into space to conduct experiments for their respective nations. Most recently, the retiring of the Space Shuttle program opens the door for space flight initiated outside the influence of the military. Another result of the end of the Space Shuttle program is intensified international cooperation, in that American astronauts will travel to space on Russian rockets. If this plan is approved, the United States and Russia will be sharing launch vehicles for the first time, and the level of cooperation envisioned by Clarke will be achieved.

Since it was free from warfare, it can be said that space science, specifically space travel during the 1960s acted as a sort of lightning rod for the United States and the Soviet Union. Although both countries were mired in the early stages of the Cold War, the "space race" never resulted in a battle or some demonstration of military force. The competition was peaceful and as discussed previously, both Kennedy and Khrushchev hinted at possible cooperation between Americans and Russians in the months before the Cuban Missile Crisis. Both countries seemed to take out their respective frustrations by channeling energy into developing peaceful uses for their ICBMs. This fact separates

space science from computer and nuclear science, in that space science was developed for peaceful use, while computer and nuclear science was initially developed to aid humanity in warfare. Although during times of war, science tends to develop technologies at a faster rate, the space science of the sixties developed technology and a series of precedents that still stand today as the model for humanity's application of science and technology.

CHAPTER 6

CONCLUSION

The major difference between the depictions of the three types of technology and the various scientists discussed in this examination reveal the reasons for their differing treatments by the authors. The differences relate directly to Vonnegut's Dr. Asa Breed's theory of science and from Dr. Hugh L. Dryden. As Asa stated, the goal of the scientist was "to increase knowledge, to work toward no end but that" (Vonnegut 41). As it is discussed in Chapter 2, there is no mention of humanity's role in the discovery of knowledge and the consequences—either positive or negative—that may result from the discovery of that certain knowledge. When discussing the possibilities that future space exploration holds for humanity, Dryden stated, "So vast is the challenge of space research and exploration and so great is the promise to mankind in the way of increased knowledge and ultimate benefits that no nation can afford to neglect or slight the opportunities that lie before it" (Dryden 126). Dryden is saying something similar to Asa, in that they both discuss the ultimate goal of their respective fields is to increase knowledge. However, whereas Asa does not see the value of increasing knowledge for humanity's sake, Dryden actually discusses the possible benefits that result from knowledge gained through space exploration are so promising that no one should ignore them. This statement further inspires that same cooperative ideal inherent in space programs.

The fact that Dryden refers to nations, instead of individuals is important. Dryden is stating how important it is that each nation realizes the necessity a space program's role plays in the positive development of humanity; furthermore, his implication that each nation should participate in the implementation of a space program seems to suggest the possibility of an unprecedented level of international cooperation in order to reap the full benefits of space exploration. This hope that space exploration will be peaceful and that it will be humanity's second chance at peaceful coexistence is echoed in the words of John F. Kennedy during his oft-quoted speech where he announced America's plans to go to the Moon:

> We set sail on this new sea because there is new knowledge to be gained, and new rights to be won, and they must be won and used for the progress of all people. For space science, like nuclear science and all technology, has no conscience of its own. Whether it will become a force for good or ill depends on man, and…we help decide whether this new ocean will be a sea of peace or a new, terrifying theater of war. (Kennedy)

Here, one can see how Kennedy's words are similar to Dryden's, in that they both discuss how the benefits of space exploration are for humanity's sake and not to simply expand the bounds of human knowledge.

The differences between Asa's and Dryden's comments reflect the authors' individual beliefs about humanity's use of science and offers a cultural critique of the irresponsible use of technology. Kennedy seems to mirror the critiques of the authors discussed in these pages. He acknowledges that science and technology are not inherently

evil; rather, it is humanity's improper and irresponsible handling of the technology that leads to disaster. Each of the authors in this examination who negatively depict scientists and technology rely on this same belief. However, unlike Barth, Vonnegut, and Pynchon, Kennedy acknowledges the complicated origins of space science in nuclear and computer technologies. As discussed, space science presented a peaceful means to use the technology originally intended for warfare.

Extending knowledge solely for the sake of extending it leads to disaster in each of the author's works: the corruption of technology by humanity. In each instance, through irresponsible human interaction, the technology becomes corrupted and fails to fulfill its optimistic goals set forth by its creators. Barth's WESCAC is able to effectively rape a woman because of its ability to feel lust, Vonnegut's ice-nine leaves Earth in a perpetual ice-age instead of helping to keep Marines out of the mud, and Clarke's Hal murders four people because it had to keep a secret. The various scientists who share a common indifference for humanity are all negatively depicted. It is no wonder then that space travel is left alone and depicted positively. With a set of altruistic goals built into them, space programs became humanity's one hope for peace despite evolving out of technology intended for warfare. To this day, it is the only international endeavor that has enjoyed a truly peaceful history.

The influence of technology in the academy today demands increased scientific literacy in all disciplines, especially literary studies. An understanding of science and technology enables scholars to adequately examine literature that incorporates scientific themes. For the purposes of this study, scientific literacy revealed the connections that

destabilized the polar depictions of nuclear, computer, and space sciences during the 1960s. Understanding the complex relationships between the sciences enables one to better understand the reasons behind Americans' perceptions of science and technology during the 1960s.

WORKS CITED

Arm, David L., ed. *Science in the Sixties: The Tenth Anniversary AFOSR Scientific Seminar June 1965*. Albuquerque, NM: University of New Mexico, 196. Print.

Asimov, Isaac. "Key Item." 1968. *Buy Jupiter and Other Stories*. Garden City, NY: Doubleday and Company, 1975. 148-51. Print.

---. "The Last Question." 1956. *Nine Tomorrows: Tales of the Near Future*. Garden City, NY: Doubleday and Company, 1959. 177-90. Print.

---. "The Machine That Won the War." 1961. *Isaac Asimov: The Complete Stories Vol. 1*. New York: Broadway, 1990. 593-97. Print.

---. "My Son, the Physicist." 1962. *Isaac Asimov: The Complete Stories Vol. 1*. New York: Broadway, 1990. 598-601. Print.

Barth, John. *Giles Goat-Boy or, The Revised New Syllabus*. Garden City, NY: Doubleday and Company, 1966. Print.

Cartwright, John H., and Brian Baker. *Literature and Science: Social Impact and Interaction*. Santa Barbara, CA: ABC-CLIO, 2005. Print.

Ceruzzi, Paul E. *A History of Modern Computing*. 2nd ed. Cambridge, MA: Massachusetts Institute of Technology, 2003. Print.

Clarke, Arthur C. *2001: A Space Odyssey*. New York: New American Library, 1968. Print.

Cordle, Daniel. *States of Suspense: The Nuclear Age, Postmodernism and United States Fiction and Prose*. New York: Manchester UP, 2008. Print.

Dimock, Wai Chee, and Priscilla Wald. "Preface Literature and Science: Cultural Forms, Conceptual Exchanges." *American Literature* 74.4 (2002): 705-14. Print.

Dryden, Hugh L. "Future Exploration and Utilization of Outer Space." *Technology and Culture* 2.2 (1961): 112-26. *JSTOR*. Web. 27 Feb. 2010. <http://www.jstor.org/stable/3101412>.

Evershed, Elizabeth Catherine. "Asimov, Isaac, 1920-1992." *Literature Online*. ProQuest, 2009. Web. 13 Apr. 2010.

Felter, Elisabeth. "Clarke, Arthur C." *Literature Online*. ProQuest, 2008. Web. 13 Apr. 2010.

Frost, Adam. "Pynchon, Thomas." *Literature Online*. ProQuest, 2001. Web. 13 Apr. 2010.

Gossin, Pamela, ed. *Encyclopedia of Literature and Science*. Westport, CT: Greenwood, 2002. Print.

Haynes, Roslynn D. *From Faust to Strangelove: Representations of the Scientist in Western Literature*. Baltimore, MD: Johns Hopkins UP, 1994. Print.

Kennedy, John F. "Address at Rice University on the Nation's Space Effort." Speech. Address at Rice University on the Nation's Space Effort. Rice University, Houston, TX. 12 Sept. 1962. John F. Kennedy Presidential Library and Museum. Web. 16 Mar. 2010.

Limon, John. *The Place of Fiction in the Time of Science: A Disciplinary History of American Writing*. New York: Cambridge UP, 1990. Print.

McCartney, Scott. *ENIAC: The Triumphs and Tragedies of the World's First Computer*. New York: Walker and Company, 1999. Print.

Pendray, G. Edward. "Pioneer Rocket Development in the United States." *Technology and Culture* 4.4 (1963): 384-92. *JSTOR*. Web. 27 Feb. 2010. <http://www.jstor.org/stable/3101375>.

Pynchon, Thomas. *The Crying of Lot 49*. 1963. New York: Harper Perennial, 1999. Print.

Space Benefits: The Secondary Application of Aerospace Technology in Other Sectors of the Economy. Washington, DC: National Aeronautics and Space Administration, 1981. Print.

Space Flight: The First 30 Years. Washington, DC: National Aeronautics and Space Administration Office of Space Flight, 1991. Print.

Stern, Nancy. *From ENIAC to UNIVAC*. Bedford, MA: Digital, 1981. Print.

Swenson, Loyd S., Jr, James M. Grimwood, and Charles C. Alexander. *This New Ocean: A History of Project Mercury*. Washington, DC: National Aeronautics and Space Administration History Office, 1998. Print.

Thiher, Allen. *Fiction Refracts Science: Modernist Writers from Proust to Borges*. Columbia, MO: University of Missouri. Print.

Vonnegut, Kurt. *Cat's Cradle*. 1963. New York: Dial, 2006. Print.

Weart, Spencer R. *Nuclear Fear: A History of Images*. Cambridge, MA: Harvard UP, 1988. Print.